APRIL 11, 2025

UNIVERSITY UNDERGRADUATE RESEARCH & ARTS FORUM

ACKNOWLEDGEMENTS

The 27th University Undergraduate Research and Arts Forum (UURAF) at Michigan State University was held at the Jack Breslin Student Events Center and online at [Symposium by ForagerOne] on April 11, 2025. This program book recognizes the outstanding research and creative endeavors by over 1,100 undergraduate students. These students represent 14 different colleges and were mentored by more than 750 faculty, staff, post-doctoral fellows, graduate students, and government / industry partners.
UURAF is sponsored by the Office of Undergraduate Education and the Honors College.

Behind the Scenes

UURAF would not be possible without a team of dedicated individuals in the Undergraduate Research Office who coordinate logistics, respond to inquiries, and support students and mentors. Many thanks to:

- Our student and support staff: Navanidhiy Achuthan Kumaraguru, Marena Haidar, Amandeep Jangra, Anisha Maheshwari, Grace Stys, Keely Thorpe, and Martina Yen
- Casie Chunko, Administrative Assistant for Academic Initiatives
- Heather Dover, Coordinator for Undergraduate Research and lead UURAF organizer
- Brittany Guercio Finch, Assistant Director for Undergraduate Research
- Brian Keas, Director for Undergraduate Research
- Korine Wawrzynski, Assistant Dean, Academic Initiatives

We appreciate the work of numerous associate and assistant deans for identifying faculty, staff, post-doctoral fellows, and graduate students to evaluate student presentations.

Finally, we thank the hundreds of dedicated mentors who guided the research projects and creative activities presented in this program book. We encourage you to learn about the impressive work of our next generation of scholars and researchers.

About the Cover

The cover was designed by Miriam Deeb, Graphic Design, 2024
Artist Statement: In order to push past stereotypical representations of research (i.e test tubes and lab goggles), I created a design through an imperfect, risograph/studio art style. Within the handmade technique of risograph printing, brightly colored ink layers are overlapped on top of each other in order to create a multi-colored image. This art style allows for multiple visuals to be seen at once through the varying transparency, which aided in translating my focus for the illustration. My concept revolved around the sharing of ideas and information, with UURAF being the outlet for presenting these discoveries and fueling further conversations. The art style along with the varying objects around the head was utilized to highlight the diversity and creativity of presentation topics as well.

Undergraduate Research Ambassador Program

Our student ambassadors facilitate workshops about undergraduate research, provide guidance on programming and initiatives, and represent the office at campus events. They frequently are invited to present to classes and at student academic organization meetings. The 2024-25 Undergraduate Research Ambassadors include

Murtaza Barkarar	Jaini Gandhi	Lowell Monis
Grant Bruninga	Neha Gopalakrishnan	Shubhan Nagarkar
Caroline Crago	James Hager	Rebekah Schoen
Arkesh Das	Anne Lemek	Jenus Shrestha
Joey Esparza	Sydney Logsdon	Grace Stys

Undergraduate Research
MICHIGAN STATE UNIVERSITY

Table of Contents

Undergraduate Research
MICHIGAN STATE UNIVERSITY

ABSTRACTS

Abstracts are organized by category. Please note that each abstract was limited to 1,500 characters; any submissions exceeding this limit were truncated.

AGRICULTURE & ANIMAL SCIENCE

THE CONTRIBUTIONS OF FLIES TO AGRICULTURAL LANDSCAPES
Presenter(s): Amelia McGinnis
Agriculture & Animal Science
Mentor(s): Deshae Dillard (College of Agriculture & Natural Resources), Hannah Burrack (College of Agriculture & Natural Resources)

Flies (Diptera) are a highly diverse, abundant, and responsive insect group. Additionally, they contribute to ecological roles such as pollination, decomposition, biological control, and herbivory in nearly every ecosystem. Because of this, Diptera have the potential to serve as bioindicators of ecosystem health through an analysis of their community composition. To effectively utilize Diptera in this capacity, it is necessary to first understand the extent of the functional roles they perform. One of the primary challenges in studying Diptera is species identification, which is time-consuming and expensive, often requiring genetic sequencing. However, many Diptera can be identified to the family level through morphological characteristics. This study compiled functional trait data for 122 Nearctic Diptera families, categorizing them by the ecological roles they perform in the larval and adult life stages. Field sampling was conducted from May to September 2023 at the Long-Term Agroecosystem Research Aspirational Cropping Systems Experiment at the Kellogg Biological Station in Hickory Corners, MI. Diptera were captured using malaise and soil emergence traps across eight cropping system treatments. A trap was placed at the center of each plot and remained in the field for 48 hours before being rotated among replicates. By linking family-level identification with functional traits, this research provides a frame

CONSERVATION AND IDENTIFICATION OF CARCHARIAS TAURUS INDIVIDUALS THROUGH REMOTE UNDERWATER PHOTOGRAPHY AND I3S
Presenter(s): Esther Woolcock, Phoebe Bosch, Sam Brown, Vivian Gunn
Agriculture & Animal Science
Mentor(s): Amber Peters (College of Agriculture & Natural Resources)

Carcharias taurus, the spotted ragged tooth shark or sand tiger shark, is a shark that can be commonly found during their gestation period off the coast of iSimangaliso Wetland Park, South Africa. This specific population's birthing location is unknown, and through Remote Underwater Photography and I3S (an interactive individual identification system), individuals are being identified in order to better collect data on their whereabouts throughout the gestation and pupping periods.

METHOD COMPARISON OF NEONATAL SWINE DIMENSIONS: STRESS RESPONSE INDICATED BY SKIN HUE CHANGE
Presenter(s): Amanda Jendretzke, Jessica Rowe
Agriculture & Animal Science
Mentor(s): Char Panek (College of Veterinary Medicine), Madonna Benjamin (College of Veterinary Medicine)

This study aims to evaluate the stress response in neonatal piglets associated with two different methods of recording their dimensions, specifically by examining changes in skin color. The "standard method", commonly used for measuring piglets, involves restraining the piglet while one person uses a flexible measuring tape for length and a piglet-o-meter for height. The second method, known as the "fish method," involves placing the piglet laterally on a fixed surface with a tape measure to measure both height and length simultaneously. A single litter of 15 piglets was assessed during their day 5 measurements, with each piglet subjected to both measurement methods. For each measurement, a control photo was taken before any dimensions were recorded, followed by a post-measurement photo after the initial method used. Skin hue changes were analyzed by taking the hue at multiple points on the piglet, including behind the ear, from photos before and after each measurement method. Using Procreate, the hue degree was taken from the specified points, with hue degree changes serving as physiological indicators of stress levels. The ongoing analysis will provide insights into which method results in less stress, as indicated by color changes, contributing to more humane measurement techniques for neonatal swine.

OPTIMIZING XENOPUS LAEVIS MODEL WELFARE: INSIGHTS FROM OUR ENVIRONMENTAL PARAMETER EXPERIMENTS
Presenter(s): Lucas Badiner, Olivia Cole
Agriculture & Animal Science
Mentor(s): John Zubek (College of Natural Science)

Xenopus laevis is a crucial model organism in biomedical research, yet species-specific husbandry guidelines remain lacking and inconsistent . Existing recommendations, such as the Xenopus Resource Guidelines (2018), emphasize general care standards but may lack specificity for diverse research settings such as those utilizing static tank environments and differing water quality. This project sought to define critical thresholds for water pH, stocking density, and other water quality parameters to enhance welfare and standardize care practices. By addressing these gaps, the project aims to evaluate growth, activity, and behavior levels as a proxy for health outcomes of Xenopus laevis in institutional environments. Preliminary results indicate that while consistent water quality was of benefit to the overall health outcomes of the frogs, there were enhanced activity, growth and feeding responses at higher stocking densities (5x greater than recommended) and lower pH levels than existing guidelines suggest (6.0-6.2 vs. 6.8-7.5). These results were statistically significant when normalized for individual activity ($p<0.001$) and serve to challenge existing assumptions regarding animal welfare throughout the research process. This project provides insight into further specifying model environmental conditions for Xenopus laevis while in institutional environments.

MAPPING ROOT GROWTH OF FRASER FIR (ABIES FRASERI) USING ELECTRICAL IMPEDANCE AND RESISTANCE TOMOGRAPHY TECHNOLOGY.
Presenter(s): Janus Grivins
Agriculture & Animal Science
Mentor(s): Younsuk Dong (College of Agriculture & Natural Resources)

Root mapping has been used in agricultural research for the phenotyping of plants, disease control and tracking, and to monitor plant reactions to changes in their environment and climate. In irrigation, root mapping is essential to understand the water availability for a plant. In precision agriculture, understanding the root system of a plant allows us to place sensors at the correct depth to accurately predict the irrigation needs of a plant. Christmas trees have required irrigation to mitigate the effects of climate change, especially for newly planted trees. Growers are interested in installing soil moisture sensors for irrigation scheduling, however the root growth of Christmas trees is unknown. The goal of this project is to utilize innovative root mapping tools to understand the root growth of Christmas trees (Abies Fraseri), and help growers make decisions on sensor depth. Three root mapping methods were evaluated; trenching, electrical impedance tomography (EIT), and electrical resistance tomography (ERT). The trench method for the excavation and mapping of roots is time consuming and difficult. A trench must be dug alongside the tree of interest. During this process, the location of found roots is noted. Each root must be carefully managed so as not be broken dur

ILLUMINATING UNDERGROUND ALLIANCES: TIMELAPSE FLUORESCENCE ZYMOGRAPHY REVEALS SWITCHGRASS-MICROBE NUTRIENT EXCHANGE
Presenter(s): Sophia Burke
Agriculture & Animal Science
Mentor(s): James Moran (College of Natural Science)

Switchgrass (Panicum virgatum), a promising bioenergy crop, forms intricate relationships with soil microbial communities that influence nutrient cycling. A critical aspect of this interaction is the exchange of carbon and nitrogen, where switchgrass releases root exudates that fuel microbial activity, leading to nitrogen mineralization. Chitin-degrading microbes play a key role in this process by breaking down chitin and releasing nitrogen, which switchgrass subsequently absorbs to support growth. However, the spatial dynamics of microbial enzyme activity in response to nitrogen availability remain underexplored. To address this, we employed timelapse fluorescence zymography, a cutting-edge technique that visualizes enzyme activity with spatial resolution, to investigate chitinase activity across soil layers. Our analysis revealed that chitinase activity is concentrated along the chitin band, particularly near switchgrass roots, suggesting a localized microbial response to plant carbon exudation. Further, by integrating zymography data with nitrogen assessments, we examined whether nitrogen availability is a limiting factor in this system, particularly under varying fertilizer treatments. Our findings enhance the understanding of plant-microbe interactions in bioenergy cropping systems and offer insights into optimizing nitrogen management strategies. By leveraging fluorescence zymography, we provide a novel perspective on microbial nutrient cycling, with implications for

EARLY DETECTION OF AIRBORNE CUCURBIT DOWNY MILDEW SPORANGIA TO GUIDE FUNGICIDE APPLICATION FOR MICHIGAN GROWERS
Presenter(s): Avery Zimmerman
Agriculture & Animal Science
Mentor(s): Mary Hausbeck (College of Agriculture & Natural Resources)

Michigan is the number one producer of pickling cucumbers nationwide, and the appropriate application of fungicides is vital to cultivating these valuable crops. The fungal pathogen Pseudoperonospora cubensis migrates north to Michigan annually via spore production, infecting cucurbit plants with the disease cucurbit downy mildew (CDM). This disease causes leaf blight, the formation of necrotic lesions, and death. Early detection of airborne P. cubensis sporangia allows for timely application of fungicides, protecting the crops without wasting product. To facilitate this, Burkard spore traps are placed yearly from May to September, at seven locations across Michigan, including five private grower fields and two Michigan State University research fields. Reels with adhesive tape are made, deployed, and collected weekly. The tape is cut into seven segments each containing 24 hours' worth of data, which are then split in half for light microscopy examination and DNA extraction for qPCR analysis. The developed qPCR method can detect sporangia at Cq values <35.5, and it distinguishes between two clades of P. cubensis , affecting different cucurbits,

RNA EXTRACTION IN DAIRY COWS
Presenter(s): Malaika Khan
Agriculture & Animal Science
Mentor(s): Mounica Sura (College of Agriculture & Natural Resources), Zheng Zhou (College of Agriculture & Natural Resources)

The development of fatty liver disease in dairy cows costs the dairy industry millions of dollars each year. In the United States, over 50% of dairy cows experience fatty liver disease during early lactation. This disease impairs liver function and reduces the productivity of our cows. One way to decrease the prevalence of fatty liver disease is by implementing preventive nutritional strategies. The Zhou Lab's previous findings demonstrated that branched-chain amino acids (BCAA) or branched-chain keto acids (BCKA) improved liver function and lactation performance. However, the underlying mechanisms remain unclear. To better understand and contribute to the overall data of the project, we extracted RNA from liver, muscle, and adipose tissue. The RNA extraction was an important step in investigating the effects of BCAA and BCKA on gene expression in bovine cells. The extracted total RNA facilitated the performance of quantitative polymerase chain reaction (qPCR). Quantifying gene expression levels provided insight into several key cellular processes to understand how to mitigate fatty liver and improve the health of dairy cows.

COMPARATIVE ANALYSIS OF FOUR TEMPERATURE PROBES IN A FAN-ASPIRATED RADIATION SHIELD
Presenter(s): Kylie Jamrog
Agriculture & Animal Science
Mentor(s): Younsuk Dong (College of Agriculture & Natural Resources)

Temperature plays a crucial role in agriculture. Accurate field-temperature data is important for understanding plant growth and predicting plant disease risk. While there are many commercially available temperature probes, their accuracy and precision under field conditions is not fully understood. Research regarding the effects of solar radiation shields on temperature sensors is also lacking. Solar radiation shields are a common solution for combating temperature probe inaccuracies by blocking direct sunlight. However, the effects of these shields on sensor performance remains uncertain. This project focuses on evaluating the accuracy and precision of three temperature sensors, while examining how solar radiation shields affect sensor performance.

STALL UTILIZATION AND STRESS MEASURES IN GESTATING SOWS
Presenter(s): Delani Stull, Kassie Wilson
Agriculture & Animal Science
Mentor(s): Andrea Luttman (College of Natural Science), Catherine Ernst (College of Agriculture & Natural Resources)

Pigs have complex social structures and experience stress when mixed into new groups as they re-establish social hierarchy. This is a concern in gestating pigs, but free access stalls (FAS) could reduce social stress by allowing pigs to choose between individual stalls or a group pen area. This study investigated if associations exist between how pigs utilize FAS and their stress levels. Continuous overhead video was recorded on 24 pigs (n=8/pen, 3 pens) for 3 days after mixing. Stress levels were assessed using salivary cortisol and tear staining score before mixing (D0) as well as post-mixing (D1, D3). Video was decoded for time spent in stalls and the number of visits to stalls by each pig for each day. Data was analyzed using linear mixed models with fixed effect of day, and random effects of pen and individual animals. At D3, pigs spent significantly more time in stalls (246.17 ± 111.88 min, $P = 0.033$) and visited stalls significantly fewer times (-15.38 ± 2.66, $P < 0.001$) than on D0. There were no significant associations between time spent in the stall with either cortisol or tear staining. However, pigs with higher tear staining at D0 tended to spend more time in the stalls ($P = 0.081$). Pigs who visited the stalls fewer times exhibited significantly lower D3 cortisol a

REGOLITH SIMULANT MGS-1S CHEMICAL CHARACTERIZATION FOR FUTURE REGOLITH-BASED AGRICULTURE ON MARS
Presenter(s): Grace Minton
Agriculture & Animal Science
Mentor(s): Michael Velbel (College of Natural Science)

Regolith is inorganic, unconsolidated rock and soil that covers bedrock. Planetary scientists research Mars regolith for ancient life and future human exploration. Regolith analogs are needed because Earth currently has no Mars samples. Simulants are used to plan and practice for the natural sample. For a simulant to be an experimental substitute, it must mimic relevant characteristics of mission-observed regolith. To study this, a simulant sample is analyzed for its chemical composition. My research focuses on determining if there are elements or compounds typically in fertilizer beneficial to growing crops, through identifying the minerals present. My methods were observing SEM images of grains in the sample, analyzing EDS chemical data for classification, and comparing properties between natural regolith and simulants. The regolith simulant MGS-1S has some required attributes for plant growth and nutrient supply, such as containing magnesium, calcium, iron, and aluminum. Regarding the three elements in fertilizer, it has trace levels of phosphorus and potassium but lacks nitrogen. The general chemical composition of the simulant is well matched to natural regolith. They share a similar mineralogical mix, including iron oxides, silicates, plagioclase, pyroxene, and olivine. A poorly matched attribute is the mission-observed regolith's basaltic composition versus the simulant being mainly gypsum. Dete

SUPPLEMENTATION OF BACILLUS SUBTILIS COMBINED WITH PLANT EXTRACTS EFFECT ON GROWTH PERFORMANCE AND POST-WEANING DIARRHEA IN PIGS
Presenter(s): Charlotte Ludorf
Agriculture & Animal Science
Mentor(s): Kwangwook Kim (College of Agriculture & Natural Resources)

The objective of this experiment was to investigate the effects of dietary supplementation with Bacillus subtilis and plant extracts on growth performance and diarrhea of weanling pigs. Two hundred forty pigs were weaned and allotted to 4 dietary treatments with 6 pigs/pen, using a randomized complete block design. The four dietary treatments were: (1) Control (CON): Basal nursery diet; (2) Bacillus subtilis and plant extracts single dose (3) Bacillus subtilis and plant extracts double dose; and (4) Antibiotic (ATB). Pigs were fed for 28 days, divided into 2 phases. BW and feed disappearance were measured every seven days after weaning to calculate average daily gain (ADG), average daily feed intake (ADFI), and feed efficiency (G:F). Diarrhea scores were recorded twice daily, with scores ranging from 1 = normal to 5 = watery diarrhea. Supplementation of BPS had the lowest ADFI during day 0 to 7 and 7 to 14 among other groups, while other growth performance indicators were not changed. G:F tended to increase in the BPS and CBX groups compared to CON group. Th

MEASURING PHYSICAL AND CHEMICAL SOIL HEALTH PARAMETERS OVER WINTER
Presenter(s): Chante Hardaway, Paige Sirak
Agriculture & Animal Science
Mentor(s): Lisa Tiemann (College of Agriculture & Natural Resources)

Soil health benefits agricultural production in many ways, from improving drought resilience by increasing water-holding capacity, to providing more accessible nutrients for plants and microorganisms. While common soil health parameters are well-documented during the growing season, how management affects these attributes over the winter remains largely unknown. As a part of a larger project, we measured wet aggregate stability as a physical property of the soil, and pH, nitrate concentration, and ammonium concentration as chemical properties. In this study, we sampled 26 soils from Kellogg Biological Station Long-Term Ecological Research site across five management practices: conventional corn/soy/wheat rotation (T1), no-till corn/soy/wheat rotation (T2), biologically-based corn/soy/wheat/cover crop rotation (T4), early successional grassland (T7), and deciduous forest (DF). Sampling occurred in mid-November and mid-January. Our results suggest that aggregates are more stable in January in no-till, biologically-based, and early successional grasslands than in November. There was no significant difference across sampling periods in conventional and forest systems. pH change from November to January was only significant for no-till and biologically-based treatments. Nitrate concentration was higher in November for conventional, no-till, and biologically-based treatments, but had no difference for

A CASE STUDY: FARMER AGENCY AND SPECIALTY CROP DIVERSITY AMONG TWO SMALL-SCALE FARMS
Presenter(s): Ann Joseph
Agriculture & Animal Science
Mentor(s): Julie Cotton (College of Agriculture & Natural Resources), Melissa Fore (James Madison College), Samyuktha Iyer (College of Social Science)

It has previously been established that as the food system becomes high centralized that corporate companies are gaining almost complete control over the food everyday people consume. Taking this into regard, the mentioned research seeks to understand this pressure considering the production of specialty crops through the eyes of local farmers. Through individual interviews with local Michigan farmers, the research hope to better understand the extent to which farmer's have the freedom to choose the crops they produce. Ultimately, the research hopes to add to existing literature to strengthen the need for policy change in the U.S. food system.

WINTER SOIL HEALTH IN MICHIGAN: ASSESSING MICROBIAL ACTIVITY ACROSS LAND MANAGEMENT PRACTICES
Presenter(s): Alex Claus
Agriculture & Animal Science
Mentor(s): Lisa Tiemann (College of Agriculture & Natural Resources)

Understanding how different agricultural management practices affect soil health during winter is essential for feeding a growing world by improving how we understand agricultural sustainability, productivity, and resilience to climate change. As part of a larger project, I measured the effects of different land management practices on the microbial community by assessing common biological indicators of soil health. This includes: soil total dissolved organic carbon and total dissolved nitrogen (DOC and TDN), microbial biomass C and N, and extracellular enzyme activities (EEA) related to microbial activity levels and rates of nutrient cycling. November 2024 and January 2025, I collected soil samples from experimental plots at the Kellogg Biological Survey Long-term Ecological Research site that are in corn-soybean-wheat rotation and managed using regionally conventional (T1), no-till (T2), biologically based (organic) management (T4) practices as well as plots that are, maintained as an early successional grassland (T7), and a deciduous forest (DF). I will use DOC and TDN measurements to provide insights into the availability of energy (C) and nutrients essential for microbial growth. Microbial biomass quantifies the abundance of microbes, while extracellular enzyme assays serve as indicators of microbial functionality and resilience of the microbial communities within the soil under winter conditions. The interaction between nutrient availability, microbial dynamics

DAY AND NIGHT IRRIGATION OF SOYBEANS IN RELATION TO DISEASE PRESSURE AND YIELD FACTORS
Presenter(s): Caden Wade
Agriculture & Animal Science
Mentor(s): Younsuk Dong (College of Agriculture & Natural Resources)

As crop diseases in soybeans, such as Cercopsora sojina (frogeye leaf spot) and Peronospora manshurica (downy mildew), continue to proliferate and increase their global range or resistance to pesticides, the question of irrigation inducing and increasing the amount of time that stagnant moisture can facilitate microbial growth arises. Altering the timing of watering to a point where morning dew is already present on a leaf surface would hypothetically reduce the length a leaf experiences additional moisture. A season long field study with irrigation set to either 12 or 10 P.M. starting at different physiological stages and while maintaining a constantly irrigated and unwatered portion was ran, and yield factors including test weight, moisture percentage, and bushels per acre were calculated and tested for significance. By using Internet of Things in-field leaf wetness and relative humidity sensors in the soybean crop, humidity thresholds and sensor-perceived wetness periods were quantified among the treatment types. Two disease ratings conducted during the soybean's late reproductive stages showed significantly lower disease in night-irrigated crops compared to those watered in the day.

IDENTIFICATION OF NEMATODES FROM GREAT LAKE MIGRATORY SALMONIDS
Presenter(s): Madison Kortman
Agriculture & Animal Science
Mentor(s): Bartolomeo Gorgoglione (College of Veterinary Medicine)

Sustaining the life cycle of Great Lakes salmonids requires substantial effort by the MI-DNR. Eggs and milt are collected from migratory broodstock, hatched, and juveniles are raised in hatcheries before being released in selected rivers. Occasional nematode-like larval stage parasites were retrieved during opportunistic samplings at DNR fish weirs during seasonal spawning migrations of salmonids, in Michigan (Coho Salmon) and Indiana (Rainbow Trout). Ethanol-preserved samples were used for morphological identification and DNA extraction for molecular biology analysis. This investigation aims to identify nematode-like parasites occasionally found in Great Lakes migratory salmonids. Specimens were morphologically examined using light microscopy to observe typical nematode larval features. Specimens from Coho Salmon were morphologically identified as Cystidicola farionis, based on the presence of a typical prominent tail protrusion and dumbbell shaped oral opening. DNA extracted from preserved specimens was quantified using spectrophotometry and used for PCR assays targeting the generic Nematode 28s rDNA. Selected amplicons were sequenced, and the retrieved sequence was used for NCBI BLAST analysis, revealing the identity. Molecular biology investigation also confirmed the identity of

EFFECTS OF MARS REGOLITH GRAINS ON IN-SITU AGRICULTURE: INSIGHTS FROM ANALOGS
Presenter(s): Sean Pierucci
Agriculture & Animal Science
Mentor(s): Michael Velbel (College of Natural Science)

Regolith is a loose, rocky, heterogeneous material that covers the solid rock layer on a planet's surface. Planetary scientists need to know about regolith on Mars because future agricultural endeavors rely on its properties. It needs to be analyzed for components that are beneficial or detrimental to crops. Two of these are grain form and elemental composition. A regolith simulant, or analog, is a mixture of materials that mimics the characteristics of natural regolith. It can be used as a practice run for experimenting on the real thing. Some true insight can also be gained by using regolith simulants that are based on what has been observed on Mars. All regoliths contain various grain forms. These characteristics are measured as roundness and angularity, and they are important because they determine the regolith's cohesion and whether or not plant roots can grow in it. Additionally, the elemental composition of a regolith sample shows if it has the necessary nutrients for plant life (nitrogen, potassium, etc.). The purpose of this research is to study the possibility of agriculture on Mars by examining the elemental composition and grain form of a Mars regolith simulant, MGS-1, in comparison to natural Earth samples. The simulant can give a general idea of what to expect from a real sample as well as being good preparation for when Mars regolith is available to test with. Data is provided by a sample of MGS-1 simulant observed under a Scanning Electron Microscope (SEM).

ACTIVE SOIL CARBON COMPARISON AMONG PERENNIAL FORAGE SPECIES
Presenter(s): Grace Beem
Agriculture & Animal Science
Mentor(s): Brandon Scott (College of Agriculture & Natural Resources), Kimberly Cassida (College of Agriculture & Natural Resources)

Active soil carbon measured by the permanganate-oxidizable carbon (POXC) test is a widely used soil health indicator reflecting the fraction of soil carbon readily available to microbes. Active carbon is influenced by climate and crop species but response to specific perennial forage species is largely unknown. Our objective was to determine how two varieties of five perennial forage species influenced POXC at northern and southern locations in Michigan. Forage species were red clover (varieties 'Evolve' and 'Renegade'), and grasses meadow fescue ('Driftless' and 'Pradel'), tall fescue ('Armory' and 'Bariane'), orchardgrass ('Ammo' and 'Intensive'), and smooth bromegrass ('Lincoln' and 'Artillery'). Plot designs were randomized complete blocks (n=4) in East Lansing (EL) and Chatham (CH) in Michigan's Upper Peninsula. Soil samples were collected to 15-cm depth in 2024 from plots established in 2020 (grasses, both locations) and 2021 (red clover, EL only). Across varieties, POXC was greater in CH than EL for meadow fescue (617 vs 433 mg/kg, $P<0.01$), tall fescue (643 vs 495 mg/kg, $P<0.01$), and smooth bromegrass (656 vs 463 mg/kg, $P<0.01$). There were no differences in POXC between varieties of meadow or tall fescue, bromegrass, or clover at either location ($P>0.05$). There was a trend towards an interaction between location and variety in orchardgrass ($P=0.051$), whereby POXC was greater in CH than in EL for Ammo (592 vs. 400 mg/kg) but not for Intensiv. Greater POXC

TREATMENT OF MM-401 METHYLTRANSFERASE INHIBITOR ON THE ZEBRAFISH METHYLATION MARK H3K4ME3 IN EMBRYOS
Presenter(s): Caroline Mrsan
Agriculture & Animal Science
Mentor(s): Joe Cibelli (College of Agriculture & Natural Resources)

Somatic Cell Nuclear Transfer (SCNT) is a technique used to create genetically identical animals from a single donor, providing a valuable model for studying human and animal diseases due to reduced genetic variability. However, SCNT success rates remain extremely low (less than 5%) and vary across species. The low success rate is likely due to epigenetic modifications formed during development, such as histone methylation. One such modification, H3K4me3, is a tri-methyl group attached to the fourth lysine on histone 3, which promotes gene expression and pushes cells toward a differentiated state. H3K4me3 is added to the histone by the enzyme H3K4 methyltransferase MLL1. MM-401 is a histone methyltransferase inhibitor that works by disrupting the function of MLL1 by preventing the formation of the MLL1-WDR5 complex that is required for proper protein functioning. Previous research shows that through the use of MM-401, mouse epiblast stem cells were able to be pushed back to a naïve pluripotent state. In this experiment, Zebrafish embryos were incubated with MM-401 until the 50% epiboly stage of development. The embryos were then fixed and stained with H3K4me3-specific antibodies to assess histone methylation levels. A decrease in H3K4me3 fluorescence would indicate reduced histone methylation, potentially resulting in a more undifferentiated cell state. This outcome could offer insights into improving SCNT efficiency by minimizing epigenetic barriers to successful cloning

DO SIGNS OF CLINICAL ILLNESS PREDICT THE GROWTH RATE OF DAIRY CALVES?
Presenter(s): Becca Townsend
Agriculture & Animal Science
Mentor(s): Barry Bradford (College of Agriculture & Natural Resources), Paiton McDonald (College of Agriculture & Natural Resources)

Heifer growth is associated with future productivity; however, poor health can slow calf growth. In this work, we assessed relationships between clinical signs of illness and average daily gain in dairy calves. We followed 43 Holstein heifer calves from birth to 56 days of age. Daily rectal temperature and observations associated with clinical illnesses were recorded. Scores were assigned 0 if normal up to 4 with increasing symptom severity. Birth and weekly weight measurements were collected until weaning. Preweaning average daily gain (ADG) was determined using a least-squares regression approach for each calf. Univariate associations between individual health scores and ADG were assessed by least-squares regression, and backward stepwise regression was used to test multivariate models. Calves had a mean ADG of 0.842 ± 0.076 (SD) kg/day with a mean rectal temperature of 38.87 ± 0.18?. Mean health scores were 0.10 ± 0.12 for ocular discharge, 0.056 ± 0.067 for nasal discharge, 0.058 ± 0.041 for ear position, 1.14 ± 0.07 for feces consistency, 0.066 ± 0.046 for attitude, and 0.053 ± 0.075 for cough. Calves had a fever (rectal temperature ≥ 39.4?) on 6.3 ± 5.5% of observed days. No multivariate model and health measures were independently associated with ADG (all $P > 0.10$). Therefore, in this cohort of relatively healthy calves, we found no relationships between ADG and observable clinical health scores. In an environment with higher disease pressure, there may be more impact

ANTHROPOLOGY & ARCHEOLOGY

ESTIMATION OF SEX BY DISCRIMINANT FUNCTION ANALYSIS FOR MAYA SKELETAL REMAINS
Presenter(s): Melissa Teja
Anthropology & Archeology
Mentor(s): Gabriel Wrobel (College of Social Science), Kevin Cabrera (College of Social Science)

The poor preservation of skeletal remains in the Maya region creates a pressing need for alternative approaches to determine skeletal sex, especially when the pelvic and cranial features traditionally used to determine skeletal sex are fragmentary or absent. Discriminant function analysis is a statistical classification method incorporating measurement data capturing skeletal robusticity to estimate sex and can be useful when working with fragmentary remains. This study builds upon the corpus of previous discriminant function analyses generated from long bone measurements, adding equations based on measurements of patellae, tali, and calcanei from Maya sites in Central and Northern Belize and Copan, Honduras. Together, these functions represent a reliable resource for researchers to quickly and accurately estimate sex from fragmentary Maya skeletal remains.

UTILIZING GIS TO VISUALIZE BIOARCHAEOLOGICAL DATA: A CASE STUDY FROM CHAU HIIX, BELIZE
Presenter(s): Allison Thomson
Anthropology & Archeology
Mentor(s): Gabriel Wrobel (College of Social Science)

Based on a previous Microsoft Access database created to organize data from the Michigan State University Bioarchaeology Laboratory, this project expands on the foundational elements of data management to enhance the accessibility, identifiability, and searchability of burial records, while incorporating visual data comparison. Utilizing an ArcGIS system to include the use of geospatial technology allows researchers to input excavation data to facilitate comparative analyses and tailor data to individual project needs. This poster reports the results of the pilot project, based on a singular site - Chau Hiix, Belize - and sets a foundation for a long-term multisite digital system supporting collaborative archaeological initiatives and future opportunities for cross-cultural comparisons.

UPDATES ON THE 2023 DISCOVERY OF THE MSU OBSERVATORY
Presenter(s): Erin Willcock, Reece Walker
Anthropology & Archeology
Mentor(s): Stacey Camp (College of Social Science)

Our poster will present on recent findings from ongoing research into MSU's first Observatory site, discovered in May 2023. Our research will combine archeological evidence with archival investigation. Our methodology will include archival research in attempts to identify any additional individuals from the one and only historical photograph of the observatory that features people, and an update on artifact analysis and site excavation. Our project aims to reconstruct the history of the observatory through archival evidence and material culture which will provide insight to MSU's early scientific education. We will present preliminary findings from our archival research and discuss upcoming excavation plans.

OS ZYGOMATICUM BIPARTITIUM: A NOVEL CLASSIFICATION SYSTEM
Presenter(s): Josephine Cowles
Anthropology & Archeology
Mentor(s): Joseph Hefner (College of Social Science)

Os japonicum , or Os zygomaticum bipartitum , is a cranial nonmetric trait characterized by the division of the zygomatic bone into two or more segments. This study presents a comprehensive review of Os zygomaticum bipartitum , drawing upon previous literature to clarify morphological variability and population prevalence. To advance understanding and standardization, we developed vector-based line drawings to illustrate the distinct character states of Os zygomaticum bipartitum , providing anatomically based, visual references for each morphological character state. Using a sample drawn from Ossenberg's (1970) cranial nonmetric dataset, we further quantified the relationship between Os zygomaticum bipartitum , biological sex, and population affinity. The resulting visualizations highlight key patterns and provide new insights into the distribution of this trait across multiple groups. Based on these findings and the literature, we propose a novel classification system to delineate the distinct manifestations of Os zygomaticum bipartitum . This system aims to enhance interobserver reliability in the identification and reporting of

SKELETAL REMAINS OF 98-3 AT ACTUN UAYAZBA KAB
Presenter(s): McKenna Kosciolek
Anthropology & Archeology
Mentor(s): Gabriel Wrobel (College of Social Science)

This project involves my analysis of human remains 98-3, discovered at Actun Uayazba Kab in Belize. The analysis included determining the individual's age, sex, and cultural background.

EFFECTS OF RADIOGRAPHIC DENTAL IDENTIFICATION TRAINING ON PERFORMANCE OF FORENSIC ANTHROPOLOGY STUDENTS
Presenter(s): Anna Stolz
Anthropology & Archeology
Mentor(s): Carolyn Isaac (College of Social Science)

Identification is a fundamental aspect of forensic investigations, with forensic anthropologists frequently conducting comparative radiographic analyses to identify a decedent. However, the dentition, although part of the skeletal system, is often relegated to the work of forensic odontologists. While forensic anthropologists do not have the same training in dental anatomy and restorations, many have training in comparative radiography and should be able to apply this skill set to dental radiographs. This study evaluates the ability of forensic anthropology students to accurately match ante- and postmortem dental radiographs before and after specialized training in dental identification. A total of five graduate and undergraduate students from the MSU Forensic Anthropology Laboratory were presented with five postmortem dental radiograph series, each accompanied by five sets of antemortem dental radiographs. Evaluators were tasked with determining whether an identifiable match existed. the matching antemortem radiograph set, and to describe and annotate the features that were used to come to that conclusion. The overall correct classification rate was calculated, along with the sensitivity, specificity, positive predictive value, and negative predictive value. The features used for identifications were also evaluated to identify trends across scenarios, practitioners, and level of training. Results showed students' correct response rate increasing from 68% to 80%, sensitivi

CRANIAL MODIFICATION IN POSTCLASSIC BELIZE: TABULAR ERECT WITH SUPERIOR FLATTENING
Presenter(s): Emily Eickholt
Anthropology & Archeology
Mentor(s): Gabriel Wrobel (College of Social Science)

The process of cranial modification in ancient and current cultures has been a considerable topic of interest for many scientific fields. There is evidence suggesting cranial modification has occurred in hominin species preceding Homo sapiens , and a plethora of skeletal evidence has been uncovered in Mesoamerica. While many specimens present with tabular erect or oblique forms, it appears superior flattening was concentrated on the shores of Yucatán from the Terminal Classic through the Postclassic period. Analysis of an individual from the Caye Coco site revealed one of these unique cases of superior flattening. After careful collection of skeletal inventory, sex and age were estimated using a multitude of techniques. Additionally, research was conducted to assess the classification of this individual's cranial modification and to consider the cultural context. Cranial modification was generally performed by women and appears to have no difference in style based on gender. The tabular erect modifications were produced using rigid compression devices, usually boards. Despite these practices, there is no evidence of harm to brain function. Superior flattening has also been linked to maritime trader communities, so this culture could be reasonably attributed to the individual. While the estimation of sex and the literature conflicted, it is reasonable to conclude this indivi

COMPARING THE UTILITY OF CASTS AND 3-D PHOTOGRAMMETRY MODELS FOR AGE AND SEX ESTIMATION IN FORENSIC ANTHROPOLOGY
Presenter(s): Lauren Keith
Anthropology & Archeology
Mentor(s): Carolyn Isaac (College of Social Science), Hailee Desrosier (College of Social Science)

The creation of casts and 3-D models of bones has been utilized in forensic anthropology to allow for ethical education on forensic anthropological methods and topics. Casting involves creating a mold of the original bone using silicon and then pouring a casting medium into the mold to create a replica of the bone. Photogrammetry is a method of creating digital 3-D models of bones from a series of photographs. While both types of models have been used for education, it is unknown which model type can be considered most useful for educational purposes, specifically in terms of age and sex estimation. The purpose of this study is to compare accuracy and precision of age and sex assessment between casts, 3-D photogrammetry models, and real bone. Seven individuals with complete ossa coxae from the MSU Forensic Anthropology Laboratory Donated Skeletal Collection were selected to create casts and 3-D photogrammetry models of the pubis for comparison. Observers estimated age using Hartnett (2010a) and sex using Klales et al. (2012) from the casts, 3-D photogrammetry models, and the real bone. Results of the assessments were compared to the documented age and sex of the individuals to determine accuracy and precision for age and sex estimation from the casts, 3-D models, and real bones. Additionally, the casts and bones were scanned using an Artec 3D spider scanner to quantitatively compare the three mediums.

HUMAN MILK MARKET
Presenter(s): Abby Anderson
Anthropology & Archeology
Mentor(s): Masako Fujita (College of Social Science), Md Moniruzzaman (College of Social Science)

Breastfeeding is often seen as a key part of both the mother-infant relationship and infant nutrition. The growing popularity of milk banks providing human milk to mothers who cannot produce milk has caused a rise in demand. The demand has been matched with a shortage of human milk domestically leading to the rise of transnational milk markets which have grown through supply chains and informal sharing networks. Laboratories based in the United States have sourced milk from donors in low income nations, often involving marginalized women who can be coerced into donating milk for cash compensation. This research reviews the ethical, cultural, and economic dimensions of the commodification of mother's milk and considers injustices donor women and their infants face.

PFAS EXPOSURE EFFECTS ON MATERNAL BIOMARKERS OF INFLAMMATION
Presenter(s): Thomas Yan
Anthropology & Archeology
Mentor(s): Masako Fujita (College of Social Science)

Per- and Polyfluoroalkyl substances, more readily known as PFAS, are persistent environmental contaminants associated with adverse health effects, such as immune dysfunction and thyroid disease. Pregnant and lactating individuals are more vulnerable, as PFAS exposure may influence their inflammatory pathways leading to potential impacts on maternal and infant health. This bioanthropological study investigates the relationship between PFAS exposure levels in certain areas of Michigan, biomarkers of inflammation in maternal blood and breast milk using a qualitative procedure to decide PFAS exposure and risk and assessing maternal blood and milk samples for inflammatory molecules such as IL-6, Anti-TPO, and C-reactive protein using EIA techniques.

CRANIAL MODIFICATION: A CASE STUDY AND MODERN INTERPRETATIONS
Presenter(s): Lilly Macinnis
Anthropology & Archeology
Mentor(s): Gabriel Wrobel (College of Social Science)

Cranial modification is a practice exhibited by a variety of different cultures across time. This practice is not limited to a singular culture, and is still relevant in modern medical practices. In this project each documented type of cranial modification is discussed, along with the methods used to achieve different head shapes. This project also explains some of the many reasons cranial modification would be practiced, some cultural, and in more modern cases, for medical reasons. The main focus of this project however, is a case study of the cranial modification of an individual found in Belize, including the method of modification and how it was determined.

CREATING A LIFE: THE USE OF BIOARCHAEOLOGICAL METHODS TO UNDERSTAND THE LIVES OF THREE MAYAN INDIVIDUALS FROM THE POOKS HILL SITE
Presenter(s): Don Henrikson
Anthropology & Archeology
Mentor(s): Gabriel Wrobel (College of Social Science)

This project uses evidence gathered both in the lab through osteological methods and evidence reported from the archaeological digs in the field to create a bioarchaeological report of the lives for three Mayan individuals from the Pooks Hill site in Central Belize. Through various osteological methods I was able to determine the sex, age, and various pathological afflictions of each individual. I then combined this information with notes taken from the field of the individuals' burials and grave goods to produce a short osteobiography of each individual, allowing us to gain a better understanding of who these people were.

OLDUVAI'S BONE TOOLS: A NEW CHAPTER IN HUMAN TECHNOLOGICAL EVOLUTION
Presenter(s): Adrianna Semioli
Anthropology & Archeology
Mentor(s): Lynnette King (College of Social Science)

I was interested in newly found bond tools at the dig site Olduavi Gorge in East Africa. I wanted to know how these bone tools had a role in technological advancement of early hominins. Upon news articles, academic journals, and articles I learned more about early hominins and their abilities.

ARCHAEOLOGY EDUCATION IN THE DIGITAL AGE: SHARING HISTORY THROUGH ARCGIS STORYMAPS
Presenter(s): Sasha Franklin
Anthropology & Archeology
Mentor(s): Gabriel Wrobel (College of Social Science)

Although archaeology will always be a hands-on field, the future is digital. This poster reports the results of an applied research project that utilized photogrammetry and GIS software to create an archaeology education tool on ArcGIS StoryMaps. Sample lessons within the StoryMap, created in consultation with the Belize Ministry of Education and Belize Institute of Archaeology, can be implemented to teach ancient Maya history, archaeological methods, and digital techniques. This project aims to broaden the population involved in archaeology, namely reaching students and descendant communities. Further, the use of digital resources allows artifacts to transcend the confines of museum and repository walls.

ECONOMIC JUSTICE AND DEMOCRACY
Presenter(s): Laila Komis
Anthropology & Archeology
Mentor(s): Elizabeth Drexler (College of Social Science), Eric Montgomery (College of Social Science)

This project focuses on deep-rooted economic injustices built within the system's foundation as well as examining how those inequalities and abuses of power have infiltrated into the possible downfall of democracy. Economic injustices endure and compound by expanding into political and social areas.

RECLAIMING ANCESTRY: ETHICAL AND PRACTICAL CHALLENGES OF REPATRIATION IN PAPUA NEW GUINEA
Presenter(s): Lily Moura-Ricks
Anthropology & Archeology
Mentor(s): Gabriel Wrobel (College of Social Science)

During colonial times, in the guise of scientific observation, curiosity, and racial typology, human remains and cultural objects of Papua New Guinea were collected and researched. Despite growing international support for the rights of Indigenous peoples and the return of ancestral remains, Papua New Guinea lacks a policy for repatriation, has few government initiatives, and has institutional records that are often incomplete. Using historical studies on skull collection, the agency of private and colonial collectors, and the role of museum collecting in the removal of ancestral remains, this session explores the ethics of repatriation using Papua New Guinea as a case study. For the Papua New Guinea collection, there were many individual communities with their own head-collecting practices, such as ritual preservation and skull trade. This excavation, and desecration of graves, resulted in the widespread dispersal of remains, and it is problematic today to determine rightful ownership. There is very little history regarding where some of these remains or artifacts came from. By concentrating on Papua New Guinea, this presentation aims to give perspective on repatriation challenges and emphasize the importance of returning ancestral remains. Cultural exchange, prior trade, and

FIELD SCHOOL AT THE MARCO GONZALEZ ARCHAEOLOGICAL SITE IN BELIZE
Presenter(s): Danielle Middleton
Anthropology & Archeology
Mentor(s): Gabriel Wrobel (College of Social Science)

The Marco Gonzalez Archaeological Site is located on the Ambergris Caye in Belize and is one of the oldest Maya sites on the Caye. Archaeological excavations, led by Elizabeth Graham and David Pendergast, began at the Marco Gonzalez site in 1984 and continued for a decade. The site was named an Archaeological Reserve in 2011 to preserve the site and draw attention to the rich Mayan history of the area. In 2023, Gabriel Wrobel, a bio archaeologist at Michigan State University, joined the excavations at the site and started a Field School for interested students. Throughout the 2023 and 2024 field seasons students and staff worked on excavating structures throughout the site, which was once a coastal Maya trading village. Excavations have unearthed the stone structures of buildings, human burials, an abundance of pottery sherds, chert, animal bones, and special finds, like beads or decorative sherds. These finds have contributed to reconstructing the history of this site, which dates back to around 2000 years ago. However, some of the most important work being done at this site is the collaboration with Maya students and educators as an effort to include modern indigenous groups in the archaeological process. Bringing Maya descendants into the excavation process provides invaluable insight

ISSUES BEYOND WORDS: INDONESIAN YOUTH SEE INJUSTICE
Presenter(s): Isabelle Ricard
Anthropology & Archeology
Mentor(s): Elizabeth Drexler (College of Social Science)

This project explores social perceptions of justice and injustice in Indonesia through a methodology of visual dialogues. In 2023-2024, Dr. Elizabeth Drexler traveled to Indonesia to conduct visual anthropology research to explore how youth in Indonesia perceive injustice in their everyday lives and translate it into images. The project was participatory and allowed youth to document images and forms of injustice of concern. Subsequently, groups of youth gathered to discuss and collectively curate the images to discern the different and related concerns and perceptions of their group. The images documented perceptions of injustice and social issues that are important to and experienced by particular youth communities. Beginning in late 2024, Michigan State University anthropology senior Isabelle Ricard began archiving and analyzing the images. She used the program Omeka, which she accessed through the LEADR lab. For her role in the project, Ricard focused on adding metadata to the images. Realizing the importance of metadata in facilitating access across institutions and cultures, Ricard adhered to DCMI best practices to organize the images in a way to be comprehensible by the artists and visitors to the site. The end product will be a bilingual virtual museum, which will showcase images centered on Indonesia's youth concerns. Ultimately, to grasp lived injustice one has to appreciate the power of experiences.

NAVIGATING CLIMATE CHANGE: COLLEGE STUDENTS' PERSPECTIVES ON RESPONSIBILITY, POWERLESSNESS, AND HOPE
Presenter(s): Owen Kozdron
Anthropology & Archeology
Mentor(s): Laurie Medina (International Studies & Programs)

The climate crisis and its impacts are steadily charging ahead despite current efforts. The way the younger generations relate to climate change, especially college students, is important since they will inherit the responsibility of addressing its challenges. This study explores how college students perceive the crisis and the emotional dimensions of their relationships. The focus will primarily be on feelings of concern, powerlessness, hope and hopelessness, and responsibility. Using the results from 11 semi-structured interviews I conducted with other college students the study examines themes such as collective versus individual responsibility, climate anxiety, institutional barriers, and political disillusionment.

BIOCHEMISTRY & MOLECULAR BIOLOGY

HETEROGENEITY IN AMINO ACID SEQUENCES OF HUMAN AND RAT NEUROLYSIN LEADS TO BIOMEDICALLY RELEVANT CONFORMATIONAL FLUCTUATIONS.

Presenter(s): Shawn Weng
Biochemistry & Molecular Biology
Mentor(s): Alexander Dickson (College of Natural Science), Samik Bose (College of Natural Science)

Abstract: Deposition of cerebrotoxic polypeptides such as Neurotensin (NT), Bradikynin (BK) in the brain cells can result in brain ischemia i.e., stroke caused by blood flow restriction. Previous studies on ischemia reported that the protein Neurolysin (NLN) is up-regulated after brain ischemia, leading to the eventual discovery that increased activity of NLN prior to stroke will result in efficient recovery in cells from brain stroke. It is understood that NLN cleaves deposited cerebrotoxic polypeptides (NT, BK etc.) responsible for brain stroke. Hence, a therapeutic goal has been to increase the activity of NLN by small molecule allosteric activators such as dipeptides or peptidomimetic compounds. These activators are hypothesized to enhance the activity of the protein by modifying the conformational ensemble of NLN. While extensive research of the activator driven enhancement has been carried out on rat NLN, human NLN has been seldom tested for direct therapeutics. This was primarily because of the higher stability of the rat variant of the protein along with ~90% conservation of amino acid sequences of the two variants. We performed molecular dynamics simulations that revealed the conformational ensembles of human and rat NLN are significantly different in apo state and in presence of the activators. We attempt to understand why the conformational differences between the two variants of NLN exist in the first place and how will it affect the transferability of the rat

EXPLORING THE IMPACT OF PLANT CENTRAL METABOLISM ON APHID FITNESS

Presenter(s): Sophia Bonnema
Biochemistry & Molecular Biology
Mentor(s): Aleksandra Skirycz (College of Natural Science), Hillary Fischer (College of Natural Science)

Aphids are insects that feed on plant phloem, the transportation network that carries sugars, water, and other organic materials throughout the plant. Once they select their host plant, aphids use their specialized mouthparts to extract nutrients from the phloem. During this process, aphids secrete saliva into the plant, revealing their role as a potential pest to the plant. Relatively little research has been conducted on how aphid saliva, once introduced into the plant, influences plant physiology and metabolism. The extent to which aphid saliva benefits or harms the plant is important to be considered. Additionally, modifying critical pathways in the central metabolism of the plant could impact aphids' receptiveness to the plant as its host and food source. Central metabolism, which is a series of biochemical reactions that utilizes sugar or other materials to generate energy for the organism, is a fundamental process in all living things. By analyzing central carbon metabolites found in the plant post aphid-feeding as well as comparing aphid fecundity on the varying Arabidopsis thaliana mutants, this project focuses on investigating how modifications to key aspects of plant central metabolism affects the aphid-plant relationship.

DETERMINING THE RELATIONSHIP BETWEEN ALDO-KETO REDUCTASE AND GLYPHOSATE METABOLISM IN HORSEWEEDS
Presenter(s): Hien Le
Biochemistry & Molecular Biology
Mentor(s): Eric Patterson (College of Agriculture & Natural Resources)

Glyphosate-resistant weeds employ different molecular mechanisms to prevent or lower the herbicide's effects. One mechanism these weeds use to accomplish this is metabolizing glyphosate weeds. This process occurs naturally in soil bacteria through the activity of C-P lyase, which produces phosphate and sarcosine from glyphosate. Until a few years ago, no plant enzyme was associated with glyphosate metabolism. Recent papers have identified Aldo-keto Reductase (AKR) found in plants to participate in glyphosate resistance by metabolizing glyphosate into AMPA and glyoxylate. This relationship has been identified in monocots, most notably in the barnyard grass Echinochloa colona. No information on the relationship between AKR activity and glyphosate resistance in dicot weeds has been found. The study aims to investigate whether AKRs in horseweed - a dicot weed native to North and Central America - contribute to the known glyphosate resistance in the species. Based on computational models and RNAseq data, two out of nine AKRs in horseweed were found to be upregulated in the presence of glyphosate and predicted to bind to gly

INVESTIGATING THE LIPIDOME OF ARTIFICIALLY BLEACHED CORALS
Presenter(s): Thomas Cline
Biochemistry & Molecular Biology
Mentor(s): Kiran Shivaiah (College of Natural Science), Robert Quinn (College of Natural Science), Sabrina Rosset (College of Natural Science)

Coral reefs are fundamental ocean ecosystems threatened by climate change. Scleractinian corals are a symbiotic association of a Cnidarian host and symbiotic dinoflagellate algae and are the principal biological architect of reefs. Under heat stress, corals bleach, expelling their algal symbionts and turning white, threatening the organism's survival. Previous work has shown bleaching resistance is strongly correlated with the lipidome of the symbionts. However, how the associated lipids provide resistance to bleaching remains poorly understood. The astounding diversity of coral hosts further complicates this investigation. To combat this, our lab uses the model coral Galaxea fascicularis . This study aims to characterize the lipidome in both symbiotic and apo symbiotic states. We examined the lipid composition of bleached and non-bleached Galaxea fascicularis corals hosting either Durusdinium or Cladocopium algae in aquaria. Coral polyps were reared in artificial seawater with or without 0.38 mM menthol. Samples were collected by

CRYSTALIZING THE FUTURE: A FUNDAMENTAL INVESTIGATION OF ELEMENTS INVOLVED IN THE ISOTOPE HARVESTING PROGRAM
Presenter(s): Morgan Kopitz
Biochemistry & Molecular Biology
Mentor(s): Alyssa Gaiser (Facility for Rare Isotope Beams), Trenton Vogt (College of Natural Science)

This research project, supported by the Facility for Rare Isotope Beams (FRIB), focuses on the fundamental understanding of radioactive nuclei to advance human welfare. By focusing on f -block elements, we hope to advance the understanding of these elements so that they may be used in everyday life through advancements in energy and medicine. F -block elements are similar in size, experience the same kind of bonding interactions, and have the same most stable oxidation state;

therefore, their differences are minuscule. To investigate the slight bonding preferences of these f -block elements, we used the technique of single crystal x-ray diffraction (scXRD), which allows us to probe how different elements interact under the same conditions with a thousandth of an angstrom resolution. The scXRD measures the exact atomic coordinates of where each atom is, allowing us to compare minute distances between atoms in a molecule. To further supplement these investigations, we used the Craic microspectrophotometer, which allows us to further analyze the electronic structure of these complexes and crystals by measuring the unique absorbance and emission spectra of these molecules. Using scXRD and the Craic microspectrophotometer allows us to develop effec

THE CHEMOTACTIC PROCESSES OF DICTYOSTELIUM DISCOIDEUM CELLS
Presenter(s): Bianca Miller
Biochemistry & Molecular Biology
Mentor(s): Elizabeth Duckett (Lenawee ISD Tech Center)

Dictyostelium Discoideum is a model organism for chemotaxis and intracellular signaling. Chemotaxis is known as the migration of cells towards a chemoattractant gradient. Aggregation in D. Discoideum cells depends on chemotaxis. Starved Dictyostelium Discoideum cells secrete waves of cAMP that signal neighboring cells to migrate towards each other eventually forming aggregates. Targeting this pathway could lead to improved cancer treatments. This organism is used in cancer research to study and manipulate the cAMP signaling pathway. This pathway can regulate the growth, migration, invasion, and metabolism of cancer cells. Two replicates of pure cells and two replicates of cells grown with the chemoattractant (non-mucoid Escherichia Coli) were cultured on lactose agar and left in an incubator at 25° C for two days. Samples were then taken from each replicate and placed under a microscope for observation. The slides were analyzed to determine the main structures present during each stage of the life cycle. The results showed that starved Dictyostelium cells move through their life cycle within forty-eight hours of starvation. The pure culture of Dictyostelium and the culture grown with Escherichia Coli developed the same way thro

HETEROLOGOUS EXPRESSION OF ARABIDOPSIS THALIANA ELT4 LIPASE IN NICOTIANA TABACUM: A STEP TOWARD ENHANCING STRESS RESILIENCE IN CROPS
Presenter(s): Abby Holland
Biochemistry & Molecular Biology
Mentor(s): Febri Susanto (College of Natural Science), Peter Lundquist (College of Natural Science)

Plastoglobules (PGs) are lipid droplets inside of the chloroplasts of photosynthetic organisms that play a large role in stress responses and metabolism. When these structures respond to stress, they significantly influence physiology and adaptation of the plant. Previous studies from our lab show that under stress Jasmonic Acid (JA) biosynthetic enzymes are localized to the plastoglobules, pointing to them playing an important role in JA synthesis and regulation. In this study, the focus is esterase/Lipase/Thioesterase 4 (ELT4). ELT4 is a lipase that is upregulated under high-light stress and is linked to JA metabolism and fertility. Previous research demonstrated that ELT4 overexpression in Arabidopsis thaliana enhances fertility and helps maintain yield under drought and heat stress. Given its potential role in stress resilience, this study aims to evaluate ELT4's function in a heterologous system by introducing it into Nicotiana tabacum. To achieve this, Agrobacterium-mediated transformation and plant tissue culture techniques were used to generate transgenic Nicotiana tabacum lines overexpressing ELT4. Transgenic plants are currently screened up to the T2 generation to obtain homozygous lines, which will subsequently characterized through phenotypic analysis. At this stage, data collection is still ongoing, and results will be presented and discussed. The findings from this study will provide i

MOLECULAR CLONING OF GFP SILENCING DNA SEQUENCE INTO MCHERRY PLASMID BACKBONE
Presenter(s): Vaughn House
Biochemistry & Molecular Biology
Mentor(s): Masako Harada (College of Engineering)

Gene cloning is a fundamental technique in molecular biology that enables the replication, sequencing, and manipulation of targeted DNA fragments for genetic research applications. Gene cloning along with SLiCE (Seamless Ligation Cloning Extract) recombination technology facilitates homologous recombination between the plasmid backbone and DNA insert, without the need for restriction digest or other enzymatic reactions. My project aims to construct a plasmid containing a DNA sequence that codes for shRNA that downregulates GFP (Green Fluorescent Protein). This process is achieved by amplifying a plasmid backbone using PCR (Polymerase Chain Reaction) and constructing a double-stranded DNA insert from two single-stranded antisense and sense DNA segments that are annealed together using a thermocycler. The primers used in amplifying the plasmid backbone add 15 base pair overhangs to add homology to facilitate SLiCE reaction with the gene of interest. The newly constructed plasmid will then be transformed into competent bacterial cells; growth would imply the successful transformation of plasmids with the ampicillin resistance gene present in the plasmid backbone. Colony PCR will be conducted to verify the presence and orientation of the insert gene. I will transfer the bacteria into LB broth with ampicillin to amplify the number of plasmids, then th

EXPLORING THE DYNAMIC METABOLOME OF SWITCHGRASS ROOT EXUDATES
Presenter(s): Sam Craig
Biochemistry & Molecular Biology
Mentor(s): Xingxing Li (Research & Innovation)

Switchgrass (Panicum virgatum L.), is a resilient North American grass, which thrives on marginal lands. Understanding the chemical composition of switchgrass root exudates can reveal their role in environmental resilience and inform strategies to optimize this important crop. Root exudates are critical plant traits that influence the rhizosphere by secreting metabolites, which interact with soil microbiomes and are shaped by various biotic and abiotic factors. These exudates recruit beneficial microbes, such as nitrogen-fixing rhizobacteria, through signaling molecules, and they provide nutrients to support microbial growth. Specialized metabolites, further enhance plant immunity by warding off pathogens and pests. Therefore, in furthering the understanding of switchgrass root exudate, there comes the potential of better situational understanding and the hopes of application in the optimization of the plant for its various purposes. The root exudate was initially collected by passing nutrient solution the switchgrass roots had grown in, through C18 SPE cartridges. It was further processed and then the samples were run through LC-MS machines. To analyze the data the LC-MS spectra will be run through a gamut of metabolomics software. We found that based on applied conditions and observed developmental stages, there were many metabolic differences present in the root exudate.

FRUCTOSE METABOLISM IN CAPACITATING MOUSE SPERM
Presenter(s): Cole Staats
Biochemistry & Molecular Biology
Mentor(s): Melanie Balbach (College of Natural Science)

To meet the energy demands for capacitation, a process of maturation in which sperm acquire the ability to fertilize, sperm utilize glycolysis. Most somatic cells use glucose as the primary metabolite for glycolysis. Because semen has a higher concentration of fructose than glucose, sperm could utilize fructose instead of glucose as the main energy source. Fructose metabolism in sperm is not understood. To gain deeper insight into these functions, I am studying the impact of fructose on glycolytic enzyme activity. After screening hexokinase activity, there appears to be a negligible difference in activity between fructose and glucose, suggesting that the enzyme's activity is not substrate-dependent and not affected by capacitation. Following enzymatic assays of phosphofructokinase and lactate dehydrogenase, the enzymes were found to have a higher activity under capacitating conditions and were more active in the presence of fructose than glucose. This suggests that enzyme activity is potentiated by fructose, especially under capacitating conditions. In total, the results imply that there is an increase in key glycolytic enzyme activity in fructose compared to glucose, which may be a way sperm metabolize fructose more effectively than glucose. The insights found in this research can lead to improved infertility treatment and the development of non-hormonal male contraceptives.

THE EFFECT OF HIGH SUGAR DIET ON FERTILITY AND ORGAN PLASTICITY IN DROSOPHILA
Presenter(s): Cooper Sackett
Biochemistry & Molecular Biology
Mentor(s): David Arnosti (College of Natural Science)

Is there a connection between increases in human diabetes and obesity, and decreases in fertility? My research on Rbf2 explores a possible link between these phenomena, involving the insulin signaling pathway. Rbf2 is a retinoblastoma gene in Drosophila that has wide gene regulation abilities and appears to predominantly control so-called "housekeeping genes". However, in Rbf2 knockouts our lab has observed specific alterations in the ovaries coinciding with decreased fertility. This change to ovary structure parallels a well known phenomenon seen with flies fed on a high sugar diet, replicating human diabetes known as "flyabetes". In this condition, Drosophila ovaries are reduced in size and egg laying ability. Our lab has ventured to discover if Rbf2 and the observed phenotypic changes in ovaries are related. It is well known that a high sugar diet greatly alters how insulin signalling works and we hypothesize that this diet may affect Rbf2 expression in the ovaries. In addition, Rbf2 binds to the insulin receptor gene, and may impact how insulin signaling works by its control of the receptor's expression. Our research may reveal novel connections between Rbf2, insulin receptor expression, and effects of a high sugar diet on fertility. We are also hoping to use this research to shed light on transcriptional regulation of factors involved in downstream components of insulin signaling, which may be of importance for studies of human health.

CERIUM OXIDE NANOPARTICLE-MEDIATED MACROPHAGE POLARIZATION
Presenter(s): Kieran Doran
Biochemistry & Molecular Biology
Mentor(s): Kay Hadrick (College of Engineering), Taeho Kim (College of Engineering)

Cerium oxide nanoparticles (<5 nm) are multi-enzyme mimetic (peroxidase, superoxide dismutase, and catalase) and can remove reactive oxygen species (ROS) implicated in inflammation and cancer (Hirst et al. Small 2009, 5, 2848). Macrophages exhibit polarization into distinct functional phenotypes (M1/M2) influenced by their microenvironmental signals, including ROS (Covarrubias et al. Cell Res 2013, 23, 984). Albumin-nanoceria, ceria nanoparticles on an albumin base, have been shown to convert pro-inflammatory macrophages to anti-inflammatory and exhibit strong anti-inflammatory properties (Kalashnikova et al. Theranostics 2020, 10, 11863). Nonetheless, albumin is not easily uptaken by macrophages, limiting the effectiveness of albumin-nanoceria for immune-modulation. Alternatively, single-wall carbon nanotubes (SWCNT) have been shown to effectively target immune cells (Smith et al. Nat Nanotechnol. 2014, 9, 481). We aim to characterize the response of immune cells to SWCNT-nanoceria and assess the particles' immunomodulatory capabilities as compared to albumin-nanoceria. Albumin-nanoceria is synthesized via

INVESTIGATING LANGERHANS CELLS REPOPULATION AFTER WOUND REPAIR

Presenter(s): Nicholas Basista
Biochemistry & Molecular Biology
Mentor(s): Sangbum Park (College of Human Medicine)

Langerhans cells (LCs) are tissue-resident immune cells in the skin epidermis that act as our first line of immunological defense. Their presence in the epidermis maintains tissue homeostasis by starting appropriate immunogenic and tolerogenic responses. However, it is unknown how LCs recover their population and re-establish their protective barrier in the epidermis after wound healing. To address this gap in knowledge, we followed the wound healing process through intravital microscopy and LC fluorescence mouse lines established in the Park Lab. During wound closure, we found that most of the existing LCs migrate towards the wound site. Soon after wound closure, we noticed that the density of LCs at the wound site increased dramatically. Immunostaining of proliferative markers (Ki67 and pH3) showed that only 4% of LCs at the wound site proliferate. To test for the contribution of LC progenitor cells, we imaged a dual-color LC mouse model where existing epidermal LCs are permanently labeled in yellow (after Tamoxifen injection) and arriving progenitor-derived LCs only express green fluorescence. This revealed that LC progenitors contribute to LC repopulation by arriving and differentiating in the wound site two weeks after wound induction

BIOENERGETIC CHARACTERIZATION OF BRAIN MITOCHONDRIA FROM RATS.

Presenter(s): Collin Vora, Hunter Thomsen, Jay Wallace
Biochemistry & Molecular Biology
Mentor(s): Alyssa Vadovsky (College of Natural Science), Jason Bazil (College of Osteopathic Medicine)

Previous research has established that moderate calcium overload impairs oxidative phosphorylation rates. However, the underlying mechanisms behind these observations are not fully known. Although the harmful effects of extreme calcium overload on mitochondrial function are well-documented, there is a notable gap in understanding how low to moderate levels of calcium impact mitochondrial activity. To address this gap, we are conducting studies using male and female Sprague Dawley rat isolated brain mitochondria. Additionally, we are determining differences in substrate preference and calcium tolerance between sexes. Mitochondria are isolated from the brain and maintained in an optimal experimental environment using specialized buffers designed to preserve their integrity and function. Our experiments involve exposing mitochondria to varying levels of calcium while using substrates such as pyruvate/malate, and succinate/rotenone to measure respiratory rates. By employing this approach, we aim to investigate not only the effects of low calcium levels but also the broader impact of moderate calcium overload on mitochondrial function.

REGULATION OF SULFUR ASSIMILATION IN ARABIDOPSIS THALIANA
Presenter(s): Sofie Cannon
Biochemistry & Molecular Biology
Mentor(s): Gregg Howe (College of Natural Science), Huijia Gong (College of Natural Science)

Sulfur is an essential macronutrient for the growth of all organisms. In plants, inorganic forms of sulfur such as sulfate are obtained from the environment and subsequently converted to organic compounds such as cysteine and methionine. Although much is known about the metabolic pathways used for sulfur assimilation, the molecular mechanisms underlying the regulation of this process remain poorly understood. This study aims to bridge the knowledge gap by exploring potential regulatory mechanisms of sulfur assimilation. We hypothesize that a protein kinase called CDK (CYCLIN-DEPENDENT KINASE) is involved in the regulation of sulfur assimilation. To test this hypothesis, we studied the response of wild-type and cdk mutants of Arabidopsis thaliana growth under either sulfur-replete (+S) or S-deficient (-S) conditions. The results showed that cdk-1 mutant seedlings grow slower than wild-type under -S conditions, indicating that CDK plays a role in plant responses to sulfur deprivation. This conclusion was supported by the results of growth assays performed with a transgenic line expressing a kinase-defective form of CDK. Next, we performed RNA-sequencing to investigate the molecular mechanism by which CDK regulates r

FATTY ACID PROFILE QUANTIFICATION FOR ANALYSIS OF HIV ASSOCIATED NEURO-COGNITIVE DECLINE (HAND) IN UGANDAN CHILDREN
Presenter(s): Deagan Moore
Biochemistry & Molecular Biology
Mentor(s): Ilce Medina Meza (College of Agriculture & Natural Resources)

HIV is an enveloped, RNA retrovirus that is transmitted sexually or congenitally. HIV has a tropism for cells of the immune system, such as macrophages, dendritic cells, and T-cells. The virus has a wide range of effects on those infected and requires intervention by anti-retroviral therapy (ART). Without treatment, the virus can cause cardiogenic, neurologic, immunologic, and musculoskeletal pathologies during its progression to AIDS (acquired immunodeficiency syndrome). HIV is also thought to contribute to neurocognitive decline, known as HIV-associated Neurocognitive Decline (HAND). Specific nutritional markers, such as fatty acid composition and Vitamin D, are believed to impact these viral comorbidities. This is due to their roles in antioxidation, immunomodulation, and cellular integrity. In this study, plasma and serum samples from a cohort of 8-23 year old Ugandan civilians who have HIV were analyzed. Fatty acids were extracted from respective biofluids using MTBE as the extraction solvent. Once extracted, the remaining lipid fraction was dried under nitrogen and prepared for methylation. Methylation was performed using MeOH and BF_3 as a catalyst. This step was necessary to volatize the fatty acids for quantification. Once methylated, the fatty acids were placed into an GC vial and ran on a gas chromatograph (GC), equipped with an autoinjector (AOC-20i) and a flame ionization detector (FID). Peaks were identified and th

MOLECULAR CLONING OF NANOLUC AND EGFP INTO CD63 EXPRESSION VECTORS VIA SLICE RECOMBINATION TECHNOLOGY
Presenter(s): Jayadeep Yedla
Biochemistry & Molecular Biology
Mentor(s): Masako Harada (College of Engineering)

Gene cloning is a fundamental technique in molecular biology, enabling the generation of specific DNA constructs to study gene expression, functions, regulations, and many versatile biological processes. Despite their significance, traditional cloning methods depend on expensive reagents, such as restriction enzymes, and DNA ligases which can be time-consuming and inefficient in their function. Seamless Ligation Cloning Extract (SLiCE) recombination technology has emerged as a powerful alternative that utilizes enzymatic components from Escherichia coli cell lysate to facilitate homologous recombination between vectors and insert DNA without additional ligation steps thus overcoming the limitations of the traditional methods. This project aims to evaluate the effectiveness of SLiCE recombination technology by cloning two target plasmids - pcS-NanoLuc-CD63 and pcs-eGFP-CD63 - which are valuable in extracellular vesicle (EV) labeling. The experimental overflow of the project will include creating the plasmids using PCR amplification of vector and insert, quantification of the amplicons, and SLiCE-mediated homologous recombination. The recombinant plasmids will be transformed into competent E. coli cells, after which the integrity of the plasmids will be tested u

COMPARING THE SURFACE MORPHOLOGIES OF SILK AND POLYESTER SATIN
Presenter(s): Seeun Sohn
Biochemistry & Molecular Biology
Mentor(s): Carl Boehlert (College of Engineering), Per Askeland (College of Engineering)

Due to its versatility and low cost, many crafters substitute polyester satin for real silk. Modern polyester satin looks nearly identical to silk to the untrained eye, but do their surface morphology also match? This project will use Scanning Electron Microscopy (SEM) to examine the surface morphologies of samples of 100 percent polyester satin and real silk. The resulting images will be compared to identify the similarities and differences.

TARGETED THERAPEUTIC DELIVERY TO PANCREATIC BETA CELLS USING SCAB1-ENGINEERED EXTRACELLULAR VESICLES
Presenter(s): Nayeema Siraj, Tiffany Rennells
Biochemistry & Molecular Biology
Mentor(s): Masako Harada (College of Engineering)

Type 1 diabetes (T1D) is an autoimmune disease characterized by the destruction of insulin-producing pancreatic beta cells, resulting in chronic hyperglycemia. While conventional treatments such as insulin therapy manage symptoms they fail to address underlying beta cell loss or replicate natural glucose regulation, highlighting the need for targeted approach to support beta cell function. Extracellular vesicles (EVs) have emerged as a promising drug delivery platform due to their natural ability to transport bioactive molecules including proteins, lipids, and nucleic acids between cells. These nanoparticles can be engineered to express specific surface proteins, enhancing targeting precision while minimizing off-target effects and immune activation. This study explores the potential of beta cell-targeted therapy by engineering EVs to express SCAB1-c1c2, a modified surface protein combining a single-chain antibody fragment (SCAB1) for beta cell specificity with a c1c2 domain for membrane localization. The current research phase focuses on EV characterization using western blot and nanoparticle tracking analysis. By improving the specificity of drug delivery, SCAB1-engineered EVs could support beta cell function and potentially reduce insulin dependency in T1D patients.Given the critical need for innovative treatments beyond conventional approaches, t

INTEGRATING BACTERIAL MICRO-COMPARTMENTS INTO PLANT SYSTEMS
Presenter(s): Joel Adam Thuo
Biochemistry & Molecular Biology
Mentor(s): John Froehlich (College of Natural Science)

This project seeks to engineer bacterial micro-compartments (BMCs) within the stroma of Arabidopsis thaliana chloroplasts. BMCs, naturally occurring protein-based structures in bacteria, enhance enzymatic efficiency by enclosing metabolic pathways. Their introduction into plants presents promising applications in synthetic biology, including improved metabolic efficiency and high-value compound production. Over the past two years, I have gained hands-on experience in vacuum infiltration transformations of Arabidopsis, focusing primarily on the transformation stage. This project allows me to expand my expertise by incorporating genetic screening and protein analysis for thorough experimental validation. The transformation process involves introducing genetic constructs encoding three essential structural proteins of BMCs-trimer (Tri)-His, hexamer (Hex)-HA, and pentamer (Pent)-StreptII-designed to self-assemble into functional BMC shells within chloroplasts. Following transformation, I will perform PCR-based genetic screening to confirm successful construct integration by isolating and amplifying specific DNA sequences. Subsequently, Western blot analysis will be conducted to verify protein expression by detecting epitope tags linked to the Tri, Hex, and Pent proteins. These validation steps will establish a foundation for assessing functional BMC assembly and exploring potential applications in plant systems. By integrating molecular biology

CELL VARIABILITY OF HUMAN STOMACH TISSUE IN GASTROPARESIS PATIENTS
Presenter(s): Teagan Johnson
Biochemistry & Molecular Biology
Mentor(s): Brian Gulbransen (College of Natural Science)

Gastroparesis is a disorder characterized by delayed gastric emptying. This means the muscles responsible for emptying the stomach have reduced or lost motility and food sits in the stomach for an abnormally long time. The ENS controls gastrointestinal motility, and although this pathology is caused by a disruption in enteric neurochemistry, the exact causes are unknown. Within the ENS, enteric glial cells play support roles through cell signaling and maintaining gastrointestinal homeostasis. Macrophages are immune cells and their presence is indicative of inflammation. Cellular changes in the ENS and immune system of individuals with gastroparesis are not well known. I hypothesize elevated levels of macrophages, enteric glia, and neurons are present in gastroparesis tissue compared to healthy tissue. Immunohistochemistry (IHC) cell labeling was used to label neurons, enteric glia, and macrophages within the human stomach tissue of healthy control samples compared to gastroparesis samples. With the collaboration of the Texas Tech University Health Sciences Center El Paso division of gastroenterology, the Gulbransen lab was sent human antral and pyloric stomach tissue samples. The enteric glial cells, neurons, and macrophages were each labeled with a primary antibody. S100? labelled glial cells; PGP9.5 labelled neur

INVESTIGATING THE ROLE OF PVT1 EXON 9 AND RSAD2 IN PD-L1 REGULATION AND NUCLEAR IMPORT IN NEUROENDOCRINE PROSTATE CANCER
Presenter(s): Murtaza Barkarar
Biochemistry & Molecular Biology
Mentor(s): Olorunseun Ogunwobi (College of Natural Science), Rachel Bonacci (College of Natural Science)

Neuroendocrine prostate cancer (NEPC) is an aggressive subtype of prostate cancer with limited treatment options. The Ogunwobi lab at Michigan State University has identified two NEPC pathways: (1) PVT1 exon 9 - independent overexpression of Radical S-Adenosyl Methionine Domain Containing 2 (RSAD2) and (2) PVT1 exon 9 - dependent overexpression of RSAD2. Our recent publication shows that PVT1 exon 9 overexpression correlates with increased interferon-gamma, a known regulator of Programmed Cell Death Ligand 1 (PD-L1), a key immune checkpoint protein. While PD-L1 inhibitors have shown efficacy in various cancers, their success in prostate cancer is limited due to its immunologically "cold" tumor microenvironment. However, recent studies suggest that a subset of NEPC patients expressing interferon-gamma may respond to Programmed Cell Death Protein 1 (PD-1) inhibitors, warranting further investigation. Our studies reveal that PD-L1 localization varies based on PVT1 exon 9 status. We hypothesize that nuclear PD-L1 localization is driven by importin family proteins, particularly Karyopherin Subunit Beta 1 (KPNB1), which is upregulated in PVT1 exon 9-overexpressing cells. Notably, KPNB1 directly binds PVT1 exon 9, suggesting its role in nuclear import regulation. Additionally, paracrine signalling of PVT1 exon 9 upregulates PD-L1, indicating an additional regulatory mechanism. Since nuclear PD-L1 impairs immune checkpoint blockade, we aim to

CONFORMATIONAL NATURE OF THE INTRAMEMBRANE METALLOPROTEASE SPOIVFB ELUCIDATED THROUGH A DUAL CROSSLINKING APPROACH
Presenter(s): Jackson Ruffner
Biochemistry & Molecular Biology
Mentor(s): Benjamin Orlando (College of Natural Science), Lee Kroos (College of Natural Science)

SpoIVFB is a intramembrane metalloprotease found in outer forespore membrane of Bacillus subtilis bacteria. SpoIVFB binds to and cleaves its substrate Pro-SigK into the transcription factor SigK which is then released into the cytoplasm of the mother cell, allowing for the transcription of endospore formation genes. This process is highly regulated through the formation of an inhibition complex of SpoIVFB and its inhibitory proteins, BofA and SpoIVFA. BofA is the direct inhibitory protein of SpoIVFB, with SpoIVFA acting as a stabilizer of BofA within the complex. Although structural models exist to describe the native conformation of this complex, the exact structure by which this complex is expressed in-vivo, or the exact mechanism or mechanisms by which it operates, is still not fully understood. Through a series of photo-crosslinking and disulfide-crosslinking between the proteins of the complex, as well as analysis of current structural models, the results simultaneously validate the vastly different predictions of those structural models. This demonstrates evidence of SpoIVFB undergoing conformational change throughout the complex formation event, with the current structural models describing different stages of this event as opposed to distinct, definitive structures. Based on these results, a mechanism to explain how this conformational change in SpoIVFB is induced is proposed, upon which a potential mechanism of inhibition is then derived. These findings may

UNRAVELING THE CRYPTOCOCCUS NEOFORMANS CELL WALL THROUGH SOLID-STATE NMR SPECTROSCOPY
Presenter(s): Dibakar Roy
Biochemistry & Molecular Biology
Mentor(s): Ankur Ankur (College of Natural Science), Tuo Wang (College of Natural Science)

Cryptococcus is the etiological agent of cryptococcosis, a systematic fungal infection with dissemination to the central nervous system causing meningoencephalitis. Understanding the cell wall structure, dynamics, and mechanisms of adaptations is essential for developing cell wall-targeted drugs to treat fatal fungal infections such as meningoencephalitis. The polysaccharide capsules anchored by the cell wall make Cryptococcus neoformans different from other fungal species and act as a virulence factor. This study aims to explore the polysaccharides in intact and living Cryptococcus neoformans fungal cells utilizing solid-state NMR spectroscopy. To this end, we used solid-state NMR (ssNMR) to identify the functionality of cell wall carbohydrates in wild-type Cryptococcus and Cryptococcus neoformans. It divulged a rigid core formed by β-1,6-glucan, β-1,3-glucan, α-1,3-glucan, chitin, and chitosan polymers, as well as β-1,6-glucan, and β-1,3-glucan in the mobile phase.

GENERATING (+)-KAURENE DERIVED NOVEL DITERPENOIDS
Presenter(s): James Suggitt
Biochemistry & Molecular Biology
Mentor(s): Bjoern Hamberger (College of Natural Science), Trine Andersen (Research & Innovation)

Terpenes, a large and diverse group of plant metabolites, are among the most valuable biomolecules globally, with widespread use in medicines, insecticides, and fragrances. Extensive research has focused on these specialized metabolites to understand their role in plant molecular physiology and harness their potential for industrial applications. Diterpenoids, a 20-carbon subclass of terpenoids, are important for a variety of plant physiological functions. Notably, plants use the ent-kaurene diterpene backbone in a highly conserved biosynthetic pathway, where sequential oxidations produce gibberellins, a potent family of plant hormones. Among this group, gibberellic acid is significant for its function as a growth hormone. The metabolism of gibberellins is tightly controlled, whereas stereochemically distinct gibberellin analogs may avoid the stringent metabolic regulation. Interestingly, an enzyme from Callicarpa americana was found to produce (+)-kaurene backbone, providing a natural starting material for developing semi-synthetic plant metabolites. A common modification of terpene carbon backbones is oxidation, typically catalyzed by a cytochrome P450 (CYP). In the gibberellin biosynthetic pathway, a CYP from the CYP701 family performs a series of oxidations on ent-kaurene to make ent-kaurenoic acid. A library of CYP701s has been generated from various plant species, including within the Annonae family, where a

APPLICATION OF GOLD NANOPARTICLE-BASED BIOSENSOR FOR THE RAPID DETECTION OF THE HILA GENE IN SALMONELLA
Presenter(s): Leah Wilson
Biochemistry & Molecular Biology
Mentor(s): Anthony James Franco (College of Agriculture & Natural Resources), Evangelyn Alocilja (College of Agriculture & Natural Resources)

Annually, the United States witnesses a staggering 1.35 million cases of Salmonella infections, triggering 26,500 hospitalizations, and 420 deaths [1]. Largely associated with contaminated food, 23% of these cases can be traced back to poultry, underlining its significant contribution to the overall presence of

Salmonella [2]. Current methods of detection involving a lengthy overnight culture and pre-enrichment are inefficient, substantially increasing operational costs and posing challenges for poultry storage. To overcome these constraints, nano-biosensors have emerged as an effective method for rapidly identifying foodborne pathogens. This study uses a gold nanoparticle (GNP)-based biosensor to detect the hilA gene, a critical indicator of Salmonella pathogenicity. Targeting hilA ensures specificity for pathogenic Salmonella detection and is readily detectable with modern laboratory techniques. It is hypothesized that the nano-biosensor could detect the presence of the hilA gene through plasmonic/colorimetric detection. Salmonella cells from water and rinsate samples were concentrated using glycan-coated magnetic nanoparticles. Bacterial DNA was extracted through boiling and then combined with GNP's and hilA probe. The probe's specificity and sensitivity to hilA

THE ROLE OF SPOIVFA IN INHIBITION OF BACILLUS SUBTILIS INTRAMEMBRANE PROTEASE SPOIVFB

Presenter(s): Achala Bannur
Biochemistry & Molecular Biology
Mentor(s): Lee Kroos (College of Natural Science)

Intramembrane proteases (IPs) are proteins that are found within cell membranes and can cut other proteins located in the same membrane or near its surface. IPs play critical roles in various signalling pathways and protein degradation processes in different organisms. Each family has specific functions and targets in the cell. Metallo IPs, like SpoIVFB, activate transcription factors in all three domains of life (bacteria, archaea, and eukaryotes). They are involved in processes such as cholesterol homeostasis, stress responses, viral infection in mammals, chloroplast development in plants, and fungal virulence. For example, SpoIVFB is crucial for the formation of endospores in bacteria like Bacillus subtilis. The inhibition mechanism of SpoIVFB by BofA and SpoIVFA is different from the regulation of other IPs. In this case, the second transmembrane segment of BofA occupies the active site of SpoIVFB, blocking access to its substrate, Pro-σK. This unique inhibition mechanism provides valuable insights for potential strategies to design therapeutic IP inhibitors that could have broad applications in various organisms. We made changes in SpoIVFA (F132C) and SpoIVFB (F66C) to test if we could see any disulfide cross-linking between them. However, we did not find evidence to support this hypothesis. Now, we are working toward confirming the model-based hypothesis that SpoIVFB L130 are near SpoIVFB H29, using a disulfide cross-linking approach. We

THE CREATION OF A BINDING AFFINITY ASSAY TO CHARACTERIZE THE FUNCTION OF THE HAIRPIN RIBOZYME

Presenter(s): Mackenzie Brasseur
Biochemistry & Molecular Biology
Mentor(s): Charles Hoogstraten (College of Natural Science), Lo Sosinski (College of Natural Science)

The hairpin ribozyme is an RNA enzyme found on the negative strand of the Tobacco Ringspot Virus satellite RNA (sTRSV). It consists of two distinct loops - Loop A and Loop B - that undergo structural rearrangements during the transition from inactive to active conformations. This ribozyme catalyzes both self-cleavage and self-ligation reactions of sTRSV RNA post-rolling circle replication. Formation of a tertiary interaction between the two RNA loops, known as docking, is obligatory for this catalysis. The Hoogstraten group uses NMR and computational techniques to identify dynamic regions and dynamically-sampled minor conformers of the RNA loops, some of which are hypothesized to be crucial for formation of the docked structure. We are currently looking for an efficient and reproducible assay to evaluate the binding affinity of this docked structure. We are looking into three different techniques: fluorescence polarization (FP), fluorescence resonance energy transfer (FRET), and surface plasmon resonance (SPR). FP uses a single fluorescent label to detect changes in molecular size, while FRET uses two fluorescent labels to detect shifts in molecular structure. SPR uses refractive index changes on a surface to analyze binding kinetics in real time. I will present data relating to the implementation of these assays, comparing the initial results, and evaluating various ribozyme constructs.

STRUCTURE-GUIDED MUTAGENESIS STUDY OF LARC, NICKEL-INSERTING CYCLOMETALLASE
Presenter(s): Samantha Velasquez Rivertte
Biochemistry & Molecular Biology
Mentor(s): Hyojin (Kelly) Kim (College of Natural Science)

The bacterial lactate racemase (Lar) pathway interconverts L-lactate and D-lactate, essential for cell wall integrity, metabolic flexibility, and adaptation to environmental lactate. The primary enzyme, LarA, directly catalyzes this racemization, while LarC, secondary enzyme, is crucial for bio synthesizing the nickel-pincer nucleotide (NPN) cofactor required for LarA's activity. However, LarC's precise mechanism in NPN cofactor biosynthesis remains poorly understood. In this study, we aimed to elucidate the functional roles of specific residues in LarC through structure-guided mutagenesis and biochemical characterization. Based on the previously solved cryo-EM structure of LarC, we identified residues potentially important for nickel binding and substrate (P2TMN) binding. We generated twenty mutant variants of LarC, targeting these residues. The impact of these mutations on LarC's function was assessed indirectly by measuring LarA activity, which depends on the NPN cofactor synthesized by LarC. Our results identified several residues essential for LarC's activity in NPN cofactor biosynthesis, providing insights into their potential roles in substrate binding, nickel insertion, or catalysis. These findings advance our understanding of the molecular mechanism underlying NPN cofactor formation and highlight key structural features of LarC that may be critical for its function. Our findings lay the groundwork for

CRACKING THE SECRETS OF AN EGGSHELL
Presenter(s): Ahmed Mohamed
Biochemistry & Molecular Biology
Mentor(s): Carl Boehlert (College of Engineering), Per Askeland (College of Engineering)

Eggshells are a marvel of nature, strong enough to protect a developing embryo while still being delicate enough to allow hatching. Eggshells are mostly composed of calcium carbonate ($CaCO_3$), which has a complex microstructure that balances strength, porosity, and flexibility. Scanning Electron Microscopy (SEM) is used in this study to analyze the fine characteristics of eggshells from a variety of bird species, paying special emphasis to fracture patterns, pore distribution, and crystal structure. This study investigates the functions that the cuticle, palisade, and mammillary layers-the three main layers-play in preserving the shell's general integrity and usefulness. This research attempts to offer a more profound comprehension of eggshell production and its connection to function through SEM imaging. Eggshells from quails, ducks, and chickens can be compared to determine variations in mechanical characteristics, thickness, and mineral density.

MODULATING WAVELENGTH TO CONTROL ENERGY IMPARTED TO MOLECULES IN ULTRAFAST STRONG-FIELD IONIZATION.
Presenter(s): Jesse Sandhu
Biochemistry & Molecular Biology
Mentor(s): Marcos Dantus (College of Natural Science)

Quantifying the energy imparted onto molecules of study through femtosecond lasers has remained a challenge in strong-field studies, such as elucidating energy-specific dynamics in molecular fragmentation. Notably, at two different central wavelengths with the same field intensity, one observes vastly different mass spectra for large molecules, highlighting the complex wavelength dependence of energy deposition processes. The present study finds that by altering the wavelength of a femtosecond pulse, one can adjust how much energy is imparted into the molecule at a given intensity, and differentiate the different ionization regimes at various wavelengths. In addition, this study examines how ionization regimes change as a function of laser intensity. Experiments are carried out on methanol in a time-of-flight mass spectrometer. The results of this study provide a foundation for future research in time and energy resolved molecular dynamics.

IDENTIFYING INTERACTION PARTNERS OF RPAA INVOLVED IN CYANOBACTERIAL REGULATION OF THE CARBOXYSOME.
Presenter(s): Mariana Aubele-Gonzalez
Biochemistry & Molecular Biology
Mentor(s): Daniel Ducat (College of Natural Science)

Carboxysomes are a type of bacterial microcompartment that are a core component of the carbon concentrating mechanism in cyanobacteria, and encapsulate the CO2 fixation enzyme, RubisCO. Carboxysomes are essential for cellular growth under ambient concentrations of CO2. Recently, our group has implicated RpaA, a protein previously characterized as important for circadian rhythm and central carbon metabolism regulation, as a potential regulator of carboxysome dynamics. RpaA's regulation of carboxysomes appears to involve a reactive oxygen species (ROS) or other redox intermediate. Towards understanding mechanisms of this regulation, we are evaluating potential novel interaction partners of RpaA. Of particular interest, the proteins CcmK2 (shell protein of carboxysome), TpxA (peroxiredoxin), KatG (catalase), and TrxA (thioredoxin) were recently identified via a proximity based interactome with RpaA. In this study, I will validate these candidates using the bacterial two hybrid system and utilize fluorescent reporters to evaluate the function of these proteins in cyanobacterial via microscopy.

IN SILICO ANTI-GD2 ANTIBODY ENGINEERING
Presenter(s): Andrew Lilly
Biochemistry & Molecular Biology
Mentor(s): Annie Needs (College of Engineering)

Neuroblastoma (NB), one of the most common solid tumors in children, has a 64% 5-year survival rate in high-risk patients. NB is a "cold" cancer, meaning it does not easily trigger an immune response. This leads to an increase in reliance on chemotherapy and radiation to treat NB. Recently, two antibody therapeutic options were made available. These treatments target GD2, a tumor-associated carbohydrate antigen (TACA), which is expressed on NB tumor cells. Unfortunately, GD2 is also expressed on healthy nerve cells in the peripheral nervous system. The off-tumor binding leads to severe side effects of treatment including neuropathy and spinal swelling. These effects can be avoided by targeting an acetylated variant of GD2 (OAcGD2), which is found exclusively on tumors. We hypothesize that in silico screening can identify antibodies that will selectively bind to OAcGD2. We will assess this hypothesis by using the anti-acetylated-GD2 library to computationally predict binding to OAcGD2 and GD2. This will allow us to employ docking analysis and machine learning to classify anti-OAcGD2 binding specificity. In finding OAcGD2-selective antibodies, we hope to identify possible treatments that will cause less pain to patients. Doing this research is important because it will help to discover new treat

READING THE SIGNS: EXPLORING DEAF AND HARD OF HEARING CHEMISTS IN RESEARCH FIELDS
Presenter(s): Natalie Westrate
Biochemistry & Molecular Biology
Mentor(s): Rachel Barnard (Lyman Briggs College)

The present research paper is an attempt to understand and explain roadblocks to deaf and hard of hearing chemists within research fields, as well as to propose relevant solutions. Articles and census information of deaf and hard of hearing (D/HH) adults in the United States between 2017 and 2024 were analyzed to determine outcome gaps in education and employment between hearing and D/HH adults. Across all levels of education, from High School Diploma/GED to PhD., J.D., or M.D., D/HH students are a smaller percentage of the student population than hearing students. D/HH adults make up about 3.6% of the United States Population, yet are underrepresented as a percentage in higher levels of academia and thus in research fields. Roadblocks may stem from American Sign Language (ASL), itself. Existing scientific vocabulary within ASL is not adequate to describe scientific processes across many scientific fields, and much of the existing vocabulary is not standardized amongst scientists. Relevant solutions could include standardization of ASL terms throughout sciences in higher and lower levels of education. This could make it easier for D/HH children to learn science concepts with their peers, potentially making careers in sciences more attainable. Communication in laboratory settings could also be streamlined this way, as it avoids spelling out long terms. Increasing the percentage of D/HH people who pursue chemist

EXPRESSION OF MALONYL-COA-REDUCTASE IN SHEWANELLA ONEIDENSIS MR-1 AS A FIRST STEP TOWARDS A SYNTHETIC CARBON FIXATION PATHWAY
Presenter(s): Emma Wilson
Biochemistry & Molecular Biology
Mentor(s): Michaela TerAvest (College of Natural Science)

Rising carbon dioxide (CO2) levels in Earth's atmosphere, driven by activities such as fossil fuel combustion, contribute to climate change. Therefore, this study aims to engineer bacteria to sequester CO2. The introduction of synthetic CO2 fixation pathways holds promise for assimilation of CO2 and conversion into useful biofuels and chemicals. One possibly useful CO2 pathway is the 3-hydroxypropionate (3-HP) bicycle, which is found in some photosynthetic bacteria. The 3-HP bicycle requires Malonyl-CoA-Reductase (MCR), an enzyme that reduces malonyl-CoA to 3-hydroxypropionic acid. We aim to express MCR in Shewanella oneidensis MR-1as a step towards engineering synthetic carbon fixation pathways in this organism. S. oneidensis MR-1 is an electroactive bacterium due to its ability to exchange electrons with solid objects in the environment. This makes S. oneidensis an ideal candidate for microbial electrosynthesis, a process of driving desired reduction reactions through transfer of electrons from an electrode to the cell's electron transport pathway. We used molecular cloning to produce a plasmid containing an MCR gene from Erythrobacter dokdonensis and transferred it to S. oneidensis. We found that the expression of the MCR gene did not negatively impact growth of S. oneidensis, indicating that MCR activity was not toxic to t

DEVELOPMENT OF AN E. COLI EXPRESSION LIBRARY FOR THE EXPRESSION AND PURIFICATION OF GIANT VIRUS PROTEINS
Presenter(s): Alaina Pabbathi
Biochemistry & Molecular Biology
Mentor(s): Kristin Parent (College of Natural Science)

As climate change leads to detrimental environmental effects, the risk of human exposure to previously frozen microbes drastically increases. One family of such microbes-Mimiviridae-are known as Giant Viruses (GVs), novel in that they have incredibly large genomes of over 1 mega-bps. Due to their recent discovery, little is known about their gene function. Samba Virus (SMBV) is part of the Mimiviridae family, and approximately half of its genome encodes for proteins of unknown function. SMBV is an icosahedral virus, meaning it has a 20-sided geometric shape and a special 5-fold vertex called the "stargate vertex." Previous methods have found that GV particles open at the stargate at low pH and release a membranous sac of proteins, simulating the structural transition of the events of early infection necessary for assembling the viral factory. To identify hypothetical protein functions, methods for expressing and producing large quantities of GV proteins must be established. Development of a library of E.coli strains with inducible expression vectors containing hypothetical SMBV genes is imperative for future characterization of SMBV proteins. The genes we are working with may be important for early infection mechanisms due to their release from the viral sac, and cr

PRODUCTION, PURIFICATION, AND BIOCHEMICAL CHARACTERIZATION OF GROUP 2 MITE ALLERGENS
Presenter(s): Leonardo Michelin Caetano
Biochemistry & Molecular Biology
Mentor(s): Maksymilian Chruszcz (College of Osteopathic Medicine)

Throughout the year 2024, I was able to conduct research on Group 2 Allergens in the Chruszcz Lab, research which I was awarded the CNS Undergrad Research Support for Summer 2024. The purpose of the research was to structurally characterize Group 2 allergens, as well as study their binding of small molecules, which can give insight into how these allergens cause allergic responses and may lead to a better treatment. The research involved expression and purification of group 2 allergens, which were then plated for further analysis. The end goal was to find protein crystals so that their structure could be further analyzed. Nonetheless, throughout my time in the lab, we were not able to get crystals for any of the group 2s. That being said, the purpose of my presentation is to give scholars an overall insight of all aspects of the research - the motivation, methodology, and challenges. I plan to further elaborate on how we conducted protein expression and purification, besides showing how important it is that we keep researching group 2 allergens since they are responsible for very common health issues. Finally, elaborating on how challenging the experiment was, since these proteins are essentially hard to express.

IMPACT OF DIETARY MAGNESIUM AND THIAMINE LEVELS ON OXIDATIVE AND CARBONYL STRESS MARKERS IN NEURAL AND RENAL TISSUE IN A PREDIABETIC STATE
Presenter(s): Desiree Tuohy
Biochemistry & Molecular Biology
Mentor(s): Sebastian Sill (German Diabetes Center)

Background: Diabetes leads to complications such as neuropathy and nephropathy, both of which are associated with oxidative and carbonyl stress. Magnesium and thiamine (MGT) deficiencies may exacerbate these processes. This study investigates the effects of MGT deficiency and supplementation on stress marker gene expression in lean (C57BL/6J) and obese prediabetic (ob/ob) mice following an 8-week dietary intervention. Methods: C57BL/6J and ob/ob mice were initially fed a high-fat diet with normal MGT levels before being assigned to diets with low, normal, or high MGT content. After 8 weeks, kidney and brain tissues were collected for RNA extraction, cDNA synthesis, and qPCR analysis. Key oxidative and carbonyl stress markers were examined via qPCR, including RAGE (receptor for advanced glycation end-products) and Glo1 (glyoxalase 1). Results: Unexpectedly, C57BL/6J brain tissue showed increased RAGE and Glo1 expression with high MGT intake. In kidney tissue, RAGE

DISCOVERING THE FUNCTION OF HUMAN GENES USING YEAST.
Presenter(s): Jared Finkel
Biochemistry & Molecular Biology
Mentor(s): Sohini Basu (College of Human Medicine), Tommy Vo (College of Human Medicine)

Genetics is important because it defines who we can be. The major problem we face in the study of human genetics is that direct testing of gene functions in humans is technically and ethically challenging. My project seeks to address this problem by testing the possibility of using yeast models that express human genes (humanized yeast) to discover what these genes can do. As a test case, I started with Schizosaccharomyces pombe yeast cells in which the yeast rpb9 gene was fully replaced with the human homolog called POLR2I. The rpb9/POLR2I genes are well conserved and have been associated with the fundamental process of transcription. However, the details of what these genes do, especially for human POLR2I, remains unclear. By forcing our yeast to use human PORL2I in place of its native rpb9 gene, we anticipate identifying functions that are shared by these two genes. I have measured the impact of yeast cells with native rpb9, without rpb9, or without rpb9 but expressing POLR2I in the context of cellular growth across multiple environmental conditions. The most significant finding was that POLR2I could be able to complement rpb9 in condition of NaCl-induced osmotic stress. However, POLR2I was not able to complement yeast sensitivity to high temperatures or to 6-azauracil drug. We conclude that yeast rpb9 has at least two distinct functions and that human POLR2I can perform one of them. Future investigations into the shared function(s) promise to reveal new functional info

ANALYZING THE LINK BETWEEN CAROTENOIDS AND BIODIVERSITY IN THE PREGNANCY GUT MICROBIOME
Presenter(s): Alexander Boville
Biochemistry & Molecular Biology
Mentor(s): Sarah Comstock (College of Agriculture & Natural Resources)

Carotenoids such as alpha or beta-carotene are important antioxidants and precursors to vitamin A, which is important for vision, immune health, growth, and development. Individual variability of serum carotenoid concentrations has been shown to be associated with colonic mucosal bacteria. Our lab has observed a positive association between carotenoid consumption and gut microbiome alpha-diversity, however, the size of the test group was small. The purpose of this study is to determine how gut bacteria taxa diversity is associated with variability in alpha- and beta-carotenoids, and other carotenoid measurements such as Lycopene, Lutein, and Zeaxanthin. A diet intervention study (PEAPOD 2) was enacted, collecting diet survey data, providing a diet intervention, and collecting stool samples from the participants both pre- and post-intervention. gDNA was extracted from stool samples, and PCR was performed and pooled, and then sent for v4 16S rRNA gene sequencing analysis. Initial data analysis has shown overall increasing carotenoid levels. By determining the main carotenoids associated with microbiota alpha-diversity, we can potentially change the carotenoids being ingested by a subject to influence the subject's gut microbiome alpha-diversity or predict how certain carotenoid intake may affect diversity.

THE EFFECTS OF PSEUDOMONAS AERUGINOSA SMALL MOLECULE VIRULENCE FACTOR PRODUCTION ON HUMAN AIRWAY EPITHELIAL CELLS

Presenter(s): Lacy Remisoski

Biochemistry & Molecular Biology

Mentor(s): Chris Bridges (College of Natural Science), Robert Quinn (College of Natural Science)

Cystic Fibrosis (CF) is a genetic disease that results from a mutation in the cystic fibrosis transmembrane conductance regulator gene, lowering the effectiveness of chloride ion transport and resulting in a thick mucus. A common and dominant pathogen in many patients with CF is Pseudomonas aeruginosa, which thrives in the nutrient rich environment, is notorious for its production of small molecule virulence factors including rhamnolipids, phenazines, quinolones and siderophores. Previously, we found that P. aeruginosa supernatants containing these virulence factors can damage lung epithelial cells isolated from patients after lung transplant, but only in cells isolated from the lower airway. To investigate which metabolites produced by P. aeruginosa could be inducing such damage in the lower airways, we first investigated our thirty P. aeruginosa clinical isolates for virulence factor production and abundance. The isolates were grown in overnight cultures of brain heart infusion broth, imaged for pigment production and then liquid chromatography tandem-mass spectrometry data was collected to measure the relative abundance of these v

ENGINEERING ZYMOMONAS MOBILIS GENOME TO INTRODUCE MISSING TRICARBOXYLIC ACID (TCA) CYCLE ENZYMES

Presenter(s): Helena Wing

Biochemistry & Molecular Biology

Mentor(s): Emma Boismier (College of Natural Science), Michaela TerAvest (College of Natural Science)

Z. mobilis is an anaerobic bacterium capable of producing high levels of ethanol using sugars derived from lignocellulosic biomass. However, Z. mobilis has a unique genome and metabolism that is poorly understood. It has been discovered that Z. mobilis has a full aerobic electron transport chain (ETC); however, puzzlingly, its growth is hindered in aerobic conditions. One possible explanation for this is that oxidation of reducing equivalents by the ETC causes a redox imbalance in the cell, leading to acetaldehyde buildup. One reason for the acetaldehyde buildup is that Z. mobilis is incapable of further processing acetyl-coA because thegenome only encodes some TCA cycle enzymes, rather than all that are required for a fully functional cycle. This incomplete cycle suggests that reducing equivalent generation in Z. mobilis is reduced compared with organisms containing a fully functional TCA cycle. This may in turn reduce ATP generation by oxidative phosphorylation, possibly also leading to a reduction in aerobic growth. Therefore, we propose that engineering Z. mobilis to include the missing TCA cycle enzymes will increase oxidative phosphorylation, enabling increased growth in aerobic environments.

The restoration of the TCA cycle could enhance its practicality for research. This adaptation would simplify experimental conditions, making the bacteria easier to handle and enabling more widespread

ASSOCIATION BETWEEN MICROBIAL METABOLITES IN HUMAN LUNG LAVAGE FLUID AFTER TRANSPLANT AND THE DEVELOPMENT OF CHRONIC LUNG ALLOGRAFT DYSFUNCTION

Presenter(s): Ani Winkler

Biochemistry & Molecular Biology

Mentor(s): Robert Quinn (College of Natural Science)

For many people with chronic lung disease, such as those with Cystic Fibrosis (CF) a lung transplant is necessary. Although lung transplantation provides improved short-term survival, one major long-term challenge is the development of Chronic Lung Allograft Dysfunction (CLAD). CLAD is a general term for the progressive loss of function of transplanted lungs over time and may be caused by several factors including immune rejection and bacterial infection. This study analyzed the metabolome and microbiome of 583 bronchoalveolar lavage fluid (BALF) samples from 178 subjects collected over four years. Some of these samples were collected shortly after lung transplantation and preceding the onset of CLAD. The metabolome was analyzed using a liquid chromatography-tandem mass spectrometry (LC-MS/MS) method for untargeted metabolomics. Microbiome analysis was performed through Illumina sequencing of the 16S rRNA gene amplicons. Preliminary metabolomic analysis has indicated the presence of several metabolites derived from Pseudomonas aeruginosa , including quinolones, rhamnolipids, and pyochelin. However, different samples showed variation in the quantity of these metabolites. Interestingly, results from the BALF microbiome analysis revealed Pseudomonas to be the fourth most abund

OPTIMIZING CADHERIN PROTEIN PURIFICATION METHODOLOGIES FOR DOWNSTREAM APPLICATIONS IN NEUROLOGICAL DISEASE PATHWAYS

Presenter(s): Brooke Lattner

Biochemistry & Molecular Biology

Mentor(s): Chidiogo Azuka (College of Natural Science)

Cadherins are an important class of transmembrane proteins that facilitate cell-cell adhesion and the maintenance of planar cell polarity necessary for tissue morphogenesis during early development. A growing body of evidence suggests that cadherin dysfunction is implicated in many congenital and developmental diseases in humans, often leading to significant neurological defects. To elucidate the pathophysiology of these disease states for the future development of therapeutic agents, isolating and characterizing the functional proteins involved in each pathway is crucial. Protein purification procedures enable the selective isolation of target proteins such that their structure and behavior can be further studied. If the sample purity is poor, subsequent analysis of the target protein's mechanisms of action may be confounded by the activity of other species. Hence, the success of purification methods directly impacts the validity of future data from downstream biological assays. Recognizing the importance of protein purification methodologies to subsequent studies of protein character and potential therapeutic targets, this presentation outlines the steps involved in protein purification procedures. Our laboratory works with the atypical cadherin, Flamingo, which will be used as a sample protein to demonstrate the resulting sample purity achieved at each stage of the purification process.

GHRELIN AND INFLAMMATORY MARKERS AS A POTENTIAL BIOMARKER IN DIFFERENT HBA1C GROUPS: CORRELATION WITH CIRCULATING LIPIDS
Presenter(s): Ananya Malhotra
Biochemistry & Molecular Biology
Mentor(s): Rajiv Khaneja (District Civil Hospital - India)

The rising prevalence of type 2 diabetes mellitus (T2DM) in India underscores the need to investigate biological contributors such as ghrelin, a peptide hormone implicated in appetite regulation, glucose metabolism, and inflammation. Its potential role as a biomarker in T2DM pathogenesis remains uncertain, particularly in the Indian population. This study aimed to explore associations between serum ghrelin levels, glycemic status, lipid profiles, and inflammatory markers among individuals with varying HbA1c levels. A cross-sectional analytic observational study was conducted using 79 residual serum samples, categorized into three groups based on HbA1c levels: normal (<5.7%), prediabetes (5.7%-6.4%), and diabetes (>6.5%). Ghrelin levels were quantified using enzyme-linked immunosorbent assay (ELISA), along with measurements of lipid profiles and inflammatory markers-neutrophil-to-lymphocyte ratio (NLR) and lymphocyte-to-monocyte ratio (LMR). Overall, ghrelin levels did not significantly differ among the three HbA1c groups ($p > 0.05$), and Pearson's correlation analysis revealed no significant associations with HbA1c, lipid profiles, NLR, or LMR. However, a statistically significant difference in ghrelin levels was observed within the prediabetes group when compared to the normal group, suggesting a possible early dysregulation. Several outliers across all groups indicated considerable individual variability. While ghrelin did not show consistent associations with gl

CHARACTERIZATION OF A LACTATE RACEMASE HOMOLOG OF CLOSTRIDIOIDES DIFFICILE
Presenter(s): Adam Mansour
Biochemistry & Molecular Biology
Mentor(s): Aiko Turmo (College of Natural Science), Robert Hausinger (College of Natural Science)

Lactate racemase, LarA, is a nickel-dependent enzyme which catalyzes the interconversion of L- and D-lactate. Maintaining homeostasis of these isomers in the cell have implications for proper cell function and cell wall development. Recently, it was discovered that LarA is part of a 2-hydroxy acid racemase and epimerase superfamily. Over 12,000 LarA homologs were identified through in silico analysis of genomes of almost 4,000 species found in all three domains of life. Many of these widely distributed homologs are yet to be studied. One that is of interest is the larA gene from the medically relevant microorganism, Clostridioides difficile . By sequence analysis, we hypothesize that the LarA homolog from C. difficile is a lactate racemase. We have cloned this C. difficile larA homolog in a plasmid system to express and purify from Escherichia coli with the aim to study its ability to racemize lactate. Studies include a solubility test to determine a condition that produces soluble recombinant protein, purification using an affinity column, and testing the lactate racemase activity us

BUSINESS & ENTREPRENEURSHIP

GLOBAL SUSTAINABLE STOCK PORTFOLIOS FROM AN INVESTOR'S PERSPECTIVE
Presenter(s): Bontle Letlhaka, Delani Stull, Jogi Katende
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

Sustainability is an increasingly important aspect of our world. Yet many stock investors are unfamiliar with sustainable investments and, therefore, do not consider them a relevant alternative to traditional investments. Our goal is to compare sustainable investments to conventional investments and propose sustainable investment strategies. The research team uses B Lab certification as a sustainability benchmark. B Lab certification is obtained by companies that work rigorously to maintain high scores on the globally used environmental, social, and governance scale (ESG). B Lab certification is challenging to attain and maintain, so it has become a critical standard to identify sustainable investments. To show investors the potential results of sustainable stock investments, our research compares different sustainable investment methods and traditional alternatives such as the S&P 500. Our team also conducts event analyses to measure the effects of particular global events on the performance of sustainable portfolios. The research team is considering events such as statements made by Elon Musk on social media regarding sustainability. Lastly, the research team is interested in analyzing sustainable investments according to traditional portfolio management strategies, such as investing in small companies vs large companies, investing in domestic vs international, and per-industry investing. The research team hopes to share valuable knowledge about sustainable investmen

A SUSTAINABLE CHANGE IN PATIENT INVESTING
Presenter(s): Gia Eichstädt, Langston King
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

The Sustainability Development Portfolio is a stock portfolio we've constructed to determine whether Sustainable investing can be profitable as a long-term investment comparatively to traditional index funds. In the past, investors would invest in companies they aligned with, believed in, or saw fit for their efforts towards a cause. For example, someone investing in Tesla in the early stages because they wanted to reduce carbon emissions. For patient investors, they want to invest money and allow it to compound over a long period of time without the worry of constantly checking its status. The current baseline for long term investments is the S & P 500. The S & P 500 is a mutual fund containing the top 500 companies in stock value growth, which inherently reduces the risk of investing. Instead of investing in one company, the option to invest in the best 500 ensures that one company struggling doesn't warrant a dive in market value for investors. I, and two other students from Norway and Japan formulated the Sustainability portfolio based on companies who actively support the 3 Sustainability Development goals: clean water and sanitation, climate action, and sustainable cities and communities. The Sustainability development portfolio's growth will be compared to the S & P 500's over the course of a year. The results may allude to sustainable investing as the best option for patient investors or cement the S & P as the top choice.

SUSTAINABILITY IN THE CRUISING INDUSTRY: INNOVATIONS IN AIR QUALITY, ENERGY EFFICIENCY, AND WASTE MANAGEMENT
Presenter(s): Dominique Bester, Fikret Durmus
Business & Entrepreneurship
Mentor(s): Mi Ran Kim (Eli Broad College of Business)

As the cruise industry recovers from the financial downturn caused by the COVID-19 pandemic, sustainability has emerged as a critical factor in ensuring its long-term viability. This research explores how advancements in air quality, energy efficiency, and waste management are shaping the industry's future, driven by environmental concerns and stringent regulations. Analyzing industry data, sustainability reports, and technological innovations, this study highlights key developments in the cruise industry's environmental efforts. Significant investments in Exhaust Gas Cleaning Systems (EGCS), Liquefied Natural Gas (LNG) engines, and Selective Catalytic Reduction (SCR) technology have driven substantial reductions in emissions. Simultaneously, energy efficiency measures, such as friction-reducing hull coatings, LED lighting, and Onshore Power Supply (OPS) systems, are being implemented to cut fuel consumption and lower CO? emissions. Waste management strategies, including compliance with MARPOL standards and advanced freshwater production through reverse osmosis, further reinforce the industry's commitment to environmental responsibility. While these initiatives position cruise lines as leaders in eco-conscious tourism, challenges remain; high implementation costs and the retrofitting of older vessels continue to pose significant barriers to widespread adoption. Despite these hurdles, integrating sustainable technologies enhances investor confidence and aligns with global e

FOSTERING SUSTAINABILITY BY DESIGNING A GLOBAL STOCK PORTFOLIO
Presenter(s): Ojas Fernandes, Vutlharhi Mahatlani
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

Sustainable stock investment plays a critical role in aligning financial markets with global sustainability goals. This research focuses on developing and analyzing a global stock portfolio composed of companies advancing Sustainable Development Goal (SDG) 6, which seeks to ensure clean water and sanitation for all. We built a global portfolio of 17 companies from the United States, Europe, and Japan, including 9 companies whose primary operations directly contribute to SDG 6, such as water treatment, distribution optimization, and hygiene solutions. The remaining 8 companies, spanning diverse industries like renewable energy and education, demonstrate significant secondary contributions to SDG 6. Through an eight-week Collaborative Online International Learning (COIL) program with researchers from Europe and Japan, our team identified and selected these companies based on their alignment with sustainability metrics. Using tools like Excel and StockTrak, we evaluate the portfolio's performance in terms of return and risk, focusing on metrics such as average daily return, risk percentages, and return/risk ratios. This approach ensures a comprehensive understanding of the financial implications of sustainable investing while addressing the complexity of incorporating global stocks. Our anticipated results suggest that a global sustainable portfolio ca

CAN YOU RETURN GREEN FOR YOUR FINANCIAL FUTURE AND ENVIRONMENTAL FUTURE SIMULTANEOUSLY?
Presenter(s): Jacob Scharp, Laiqah Dinath, Smit Wandre
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

Sustainable investing isn't just about financial returns-it's about aligning investments with ethical, social, and environmental values. But does choosing sustainability mean sacrificing profit? For our UURAF project, we explored this question by tracking the performance of 10 companies committed to Sustainable Development Goals (SDGs) 6 and 12-ensuring clean water and sanitation for all, and promoting responsible consumption and production. Over four months, we analyzed whether these environmentally conscious investments could compete with the S&P 500. The results? Surprising! Can sustainability and strong financial returns coexist? Or does prioritizing the planet mean settling for slower, steadier gains? Our findings challenge conventional investment wisdom, shedding light on the risks, rewards, and realities of betting on a better future.

PROFIT WITH PURPOSE: SUSTAINABLE AND ETHICAL INVESTING IN GLOBAL STOCK MARKETS
Presenter(s): Ava Soltysiak, Nesan Michael, Sofie Striebich
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

With sustainability becoming a global concern, more investors are seeking alternatives to traditional investment opportunities that may not align with environmental or social values. Our research explores sustainable stock investing within the American and European financial markets. In collaboration with students from Setsunan University and the Norwegian School of Economics, as part of an 8-week-long Collaborative Online International Learning (COIL) program, we identified 16 companies that align with Sustainable Development Goals (SDGs), while demonstrating strong past stock performance. Specifically, we focused on SDG #6 (Clean Water and Sanitation), #10 (Reduced Inequalities), and #12 (Responsible Consumption and Production). We selected companies that, based on these goals, promote equitable and sustainable resource management, ultimately advancing environmental justice and protection. These companies were then invested in a one million-dollar simulated stock portfolio, using StockTrak. To assess our portfolio's effectiveness, we evaluated each company's performance based on fundamental investing metrics, such as return and risk. The MSCI World Index (URTH) was used as a benchmark for performance comparison, since it is representative of traditional investment pract

A MODEL FOR STOCK INVESTMENT IN SUSTAINABILITY
Presenter(s): Dan Warfield, Jonathan Botha, Landen Mosbauer
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

Our research aims to encourage stock market participants to contribute to sustainable advancement. With this goal in mind, we have tracked the progress of a self-curated portfolio by making key financial data calculations to determine if investing in sustainable practices is a viable option, both financially and environmentally. To make this determination we have compared our portfolio to global market benchmarks. This question is the driving factor of our research and our mission to create a more sustainable future. Over a period of seven months, we have been tracking the progress of our stock portfolio. We have observed the market analytics of each company included prior to our investment and have researched the companies' backgrounds. This portfolio is primarily concerned with investing in companies who are actively making progress toward the Sustainable Development Goals (SDGs) set forth by the United Nations- primarily SDG six, two, and eleven. We have collaborated with the Norwegian School of Economics (NHH), Setsunan University (SU), and the University of Pretoria (UP) to aid us in our research. These schools provided a more global background to our portfolio and researched the environmental impact of each company. We hope that, regardless of the growth of our portfolio, we can present a practical and replicable model for sustainable investment which is able to encourage sustainable practices in the various industries which stoc

SUSTAINABILITY AND STOCK INVESTMENT: A JAPAN PERSPECTIVE
Presenter(s): Abbie Church, Christian-Roy Chemaly, Larona Sedimo
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

As climate change intensifies, Japanese stock market investors are increasingly drawn to companies that align themselves with the United Nations' Sustainable Development Goals (SDGs). This research explores a global portfolio of 15 companies, selected for their commitment to SDGs 2, 4, 6, 7, 10, and 13, and their investment potential based on risk-reward metrics. The project is part of a collaborative international effort involving students from Japan, Norway, and South Africa, providing a global perspective on sustainable investing. Over the course of a year, Stock Trak was used to monitor the portfolio's performance, allowing us to take on a comparative approach against trends in the Japanese stock market. We expect our results will highlight how environmentally sustainable companies perform relative to traditional Japanese market benchmarks, offering useful insights for Japanese investors seeking to not only balance profitability but also environmental responsibility. By examining the interactions between global market dynamics and sustainable investments, this research highlights strategies Japanese investors can use to identify sustainable opportunities in an increasingly connected world.

CAN GLOBAL INVESTMENT IN SDG 6 AND 13 OUTPERFORM CONVENTIONAL ESG ETFS?
Presenter(s): Ahmad Disi, Brady Drueke, Cassidy Greeff, Fikret Durmus
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

The world faces escalating sustainability challenges that demand innovative solutions. Balancing the risk of investing in sustainable industries is crucial as environmentally degrading corporations continue to report strong financial returns. In response, with our international research team from the Norwegian School of Economics and Setsunan University, we crafted a sustainable stock investment portfolio emphasizing Sustainable Development Goal 6: Clean Water and Sanitation and SDG 13: Climate Action. The portfolio comprises a carefully selected group of companies actively engaged in water infrastructure projects and showing consistent financial growth. Chosen for their strong alignment with our SDG goals, these companies contribute significantly to sustainable water and climate management and are poised for future growth through innovative solutions. Our portfolio incorporates a range of low-to-high-risk domestic and international companies selected for their proven financial performance and deep commitment to sustainability. We rigorously evaluated each company's capacity to deliver robust financial returns and meaningful environmental impact based on current and predicted industry trends, utilizing a combination of financial analysis and key performance metrics such as reward-to-risk ratios. Through this comparative analysis, we aim to demonstrate whether sustainable global investments focused on S

SUSTAINABILITY CERTIFICATIONS, EXPECTATIONS, JAPAN
Presenter(s): Ethan Reszewski, Zoë Taljaard
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

This research focused on reviewing the adoption and application of sustainability certifications within publicly traded Japanese companies. These certifications are representative of multiple factors. Transparency, environmental sustainability, and corporate accountability are the three most represented factors when reviewing these certifications. Additionally, these certifications present information to the consumer that allows them to make more environmentally conscious decisions. These decisions become even more important as urgent climate change challenges impact people around the world. In an effort to curb the increasing impact of these challenges, companies around the globe have begun to adopt these labels. Due to the rigorous process of adopting these labels, these certifications stand as tangible evidence of environmental stewardship. In an effort to explore this practice, the researcher chose to conduct a systematic review of digital resources through targeted search prompts and utilizing artificial intelligence to find relevant information about the adoption and application of sustainability certifications. By integrating data from certification organizations, industry literature, and corporate reports, this study is able to determine whether Japanese companies are successful in corporate transparency, accountability, and sustainability. Notably, this researcher was granted an opportunity to visit J

FEDERAL CERTIFICATIONS & PERCEPTIONS OF BUSINESS OWNERS
Presenter(s): Kathleen Moser
Business & Entrepreneurship
Mentor(s): Quinetta Connally (Eli Broad College of Business)

This study examines how businesses with a federal contract are perceived in terms of credibility, focusing on the interplay between the certification itself and the demography of the business owner. Specifically, we are interested in learning how business owner characteristics affect how individuals make sense of federal certifications. We focus particularly on 8(a) certifications, which are federal contracts provided to small business owners who are economically and socially disadvantaged. We hypothesize that business owners who obtain a federal certification may face challenges in establishing and maintaining their legitimacy due to stereotypes surrounding preferential contracting. By exploring individuals' perceptions of a business and its owner, the research aims to provide insights associated with diversity, equity, and inclusion in businesses. The findings contribute to a deeper understanding of how diverse identities influence individuals' evaluations and highlight implications for fostering inclusive business environments.

DIVERSIFICATION IN SUSTAINABLE STOCK INVESTING
Presenter(s): Kayla Ferguson, Marcia Gugulethu Khumalo, Mila Fomenkova
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

Diversification is instrumental in limiting the amount of unsystematic risk that a portfolio is taking on, especially in the event that a single industry or company underperforms. Our research investigates methods to diversify a sustainable stock portfolio and analyzes the impact of diversification on portfolio performance. Sustainable Development Goal (SDG) 6 strives for clean water and sanitation for all and provides the starting point for our sustainable stock investment portfolio. While the focus of this portfolio was originally on SDG 6, collaboration with Norwegian and Japanese researchers diversified our portfolio to include companies with core business functions that do not primarily support SDG 6. Other SDGs that are represented in our portfolio are SDG 4 and 7 which are access to education and clean energy. Diversification in sustainable stock investing should be beneficial to overall performance when the companies in the portfolios represent various sustainable development goals compared to a portfolio with investments supporting one single aspect of sustainability. To demonstrate diversification in the portfolio we will measure the correlations of each company compared to one another and the correlation of the entire portfolio compared to a professionally managed SDG 6 focused mutual fund. We are expecting that our portfolio will outperform an SDG 6 focused benchmark because we invested in multiple SDGs.

IS SUSTAINABLE INVESTING THE FUTURE ON WALL STREET?
Presenter(s): Caleb Brown, Lara Oosthuizen
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

What is the purpose of a stock investment? Traditionally, Wall Street investors make investment decisions to generate financial returns. However, as global priorities evolve, we observe a shift toward additional considerations to the environmental and social consequences of those returns. For example, sustainable stock investing emphasizes allocating capital to companies with strong sustainability initiatives. This research explores whether sustainable stock investing is an attractive alternative to investing strictly off investment returns. We constructed a portfolio of 14 companies demonstrating significant alignment with Sustainable Development Goals (SDGs) #6 (clean water and sanitation) and #7 (affordable and clean energy). These companies were chosen based on their commitment to these SDGs, one-year risk/return metrics, and average daily returns with the help of students from the United States, Japan, and Norway. The portfolio's performance is compared to the S&P 500 to evaluate its attractiveness. Although we anticipate that our portfolio may perform with untraditional returns, we expect to validate how sustainable investments have the potential to promote sustainability across industries. In a world where values are increasingly influencing financial decisions, is sustainable investing the future on Wall Street?

WHITE HOUSE, WALL STREET, SUSTAINABLE INVESTING
Presenter(s): Ethan Reszewski, Lavansh Singhal, Michelle Adler, Yasr Sheik Alli
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

Our research focuses on designing a sustainable investment portfolio and analyzing the impact of the 2024 U.S. Presidential Election on its performance, emphasizing the broader implications for sustainable investing. As climate change and environmental degradation pose urgent global threats, the pursuit of sustainable investments is increasingly critical. Political administrations play a pivotal role in shaping climate policies and corporate sustainability practices, making the intersection of sustainability, the stock market, and politics an essential area of study. This research was conducted in collaboration with peers from Norway, Japan, and South Africa. We examined the financial performance of historically sustainable companies and selected 15 firms aligned with UN Sustainable Development Goals (SDGs 8, 11, 14, 2, and 13). Our selections were refined through data analyses from our contributors in Norway and Japan, with additional insights from our peers in South Africa. Over the past year, we have been running event analyses around key political dates with the expectation that the recent volatility in the U.S. administration has affected sustainable investing. We hypothesize that these political dates have contributed to these fluctuations, highlighting the intricate relationship between political decisions and sustainable financial markets.

EXPLORING GLOBAL ACTIVE STOCK OWNERSHIP
Presenter(s): Racaela Leitao, Zeinab Zorkot
Business & Entrepreneurship
Mentor(s): Antoinette Tessmer (Eli Broad College of Business), Jade Verbeek (University of Pretoria)

In collaboration with international partners from SU in Japan and NHH in Norway, we came to understand the concept of active ownership. Active owners use their position as a stockholder to influence investee companies to make decisions that can benefit either them or greater society. Where sustainable investment fails, as it supports large consumer corporations by nature, active ownership can be used to target a consumer company's flaws and sway them toward better practices. Over the course of this research project we gathered a portfolio of companies who are good candidates for reaching sustainability goals through active ownership.We chose to focus on SDG 6, 10, and 12 to create a diverse but focused range of issues to address with our investment choices. We looked into companies that either already directly worked in the field of sustainability, like energy companies, or consumer companies that were a good target for improving practices. To analyze the merit of active ownership, we compiled financial data from ten companies and laid out the risk and return demonstrated by each company. Risk refers to the likelihood of an investment to maintain stable returns, and cumulative returns ideally will show a steady upward trend. We chose the best companies financially and i

Cell Biology, Genetics, & Genomics

ASSESSING RELIABILITY OF QUPATH ARTIFICIAL INTELLIGENCE IN QUANTIFYING TUMOR PERCENTAGES OF HEAD AND NECK CANCERS
Presenter(s): Samantha Parrish
Cell Biology, Genetics, & Genomics
Mentor(s): George Sandusky (Indiana University - Indianapolis)

Head and neck cancers are the seventh most common type of cancer in the world. Artificial intelligence (AI) is being rapidly developed for use in medicine, especially cancer research. In this study, the digital pathology AI platform, QuPath, was utilized to determine percentage of tumor in tissue samples from head and neck cancer patients. Specimens were obtained from IU Health Pathology Laboratory, embedded in paraffin, transferred to slides, digitally imaged, and quantified for tumor volume. Results were analyzed based on the area biopsied, type of cancer cell, and differentiation of tumor. The aim was to evaluate the reliability of QuPath AI in identifying and quantifying tumor cells in these cancer samples. QuPath was found to be a reliable program for determining the percentage of tumor present, despite differences in tumor cell type and differentiation, in head and neck cancer samples.

SEX DETERMINATION AND SEXUAL DIFFERENTIATION IN SEA LAMPREY
Presenter(s): Lily Gorman
Cell Biology, Genetics, & Genomics
Mentor(s): Yu-Wen Chung-Davidson (College of Agriculture & Natural Resources)

Sea lamprey is an invasive species in the Laurentian Great Lakes. Great Lakes Fishery Commission has worked with agencies from the US and Canada to control this species using "lampricides" (pesticides for sea lamprey) and other trapping methods. However, there is a concern that sea lamprey may evolve lampricide resistance over time and reduce the control efficiency. The Li laboratories I work at are investigating alternative control methods using pheromones or genome editing. The mechanisms of sex determination and sexual differentiation in sea lamprey are largely unknown. One of the main goals of Li Lab is to uncover genes that determine the sex, sexual differentiation, and gametogenesis. I used different techniques to assist with the goals of the lab. To investigate differential gene expressions between sexes, I used immunohistochemistry staining on sea lamprey gonadal tissues in various sexual developmental stages. We compared germ cell specific genes such as Nanos1 and Piwil1, and genes involved in sexual differentiation such as AMHR2, Sox9, and Wnt4. In addition, I oversaw daily microscopic imaging of CRISPR gene-edited embryos to observe their development. Larval samples from the CRISPR experiments were collected 30 and 60 days after fertilization, and I extracted their DNA, RNA, and pr

BRIDGING THE GAP: AN EXPLORATION INTO THE ROLE OF VASCULAR PROTEINS IN THE FORMATION OF CLEFT PALATE IN DOGS
Presenter(s): Grace Whipple, Shriya Beesabathuni
Cell Biology, Genetics, & Genomics
Mentor(s): Brian Schutte (College of Osteopathic Medicine)

DRAFT Cleft palate without medical intervention is a death sentence for mammals, as it makes it impossible to latch during nursing. Despite being a condition that we are very capable of fixing after birth, we are still not entirely sure what the cause(s) are. This project analyzes the possible roles of Beta Actin and CD31 (PECAM-1) in the formation of a cleft palate, using Dogs as a model and the Western Blot as the method of analysis.

PROMISING NATURAL TUMOR SUPPRESSION BY ANTIOXIDANT TREATMENTS
Presenter(s): Jonathan Dziwanowski
Cell Biology, Genetics, & Genomics
Mentor(s): Kaiwen Jiang (College of Natural Science)

Oxidative stress is recognized as a factor in oncogenesis. This research investigated the relationship between antioxidant supplements such as black seed oil and the prevention of cancerous tumor growth. Data was extracted from peer-reviewed studies of in vivo tumor growth in mice, with black seed oil administered orally or intraperitoneally. Findings demonstrated a significant reduction in tumor growth in experimental groups. Gaps in literature indicate a possibility of tumor reduction from starting size, a shrinking. The mechanisms of oxidative stress management in the extracellular environment as well as apoptosis modulation are discussed. Statistical methods from STT 231 used include Cohen's effect size calculations to establish antioxidant interventions as worthy, and p testing to confirm statistically significant differences in tumor sizes. By presenting this work we hope to demonstrate the promise of antioxidant medicine in the fight for cancer prevention and cures, and educate the public on the mechanism of oxidative stress and how to mitigate it.

DIFFERENTIATION OF EPITHELIAL CELLS AND K17 EXPRESSION LEVELS
Presenter(s): Logan Sheard
Cell Biology, Genetics, & Genomics
Mentor(s): Wei Wang (College of Human Medicine)

The goal of this research project is to successfully differentiate epithelial cells through different concentrations of calcium chloride. Differentiation will be confirmed via western blot analysis. Once an effective method is found, the cells will be split into two groups. There will be one group of cells which will remain undifferentiated and another group of cells that will be differentiated. Within each group there will be cells that are infected with papillomavirus and cells which are not infected. The aim of the project is to measure the different levels of Keratin 17 (K17) expression across the different cell groups. Western blot analysis will be performed to quantify K17 expression.

CATCHING THE ELECTRIC FEEL: THE GENETIC BASIS OF ELECTRICAL TRANSDUCTION
Presenter(s): Ella Morrow
Cell Biology, Genetics, & Genomics
Mentor(s): Jason Gallant (College of Natural Science)

Electroreception, the ability to detect electric fields, is a remarkable sensory adaptation ancestral to vertebrates. This sense can play a vital role in communication, prey detection, and navigation. Electroreception was lost in the ancestor of Teleost fishes and was independently regained in two distantly related Teleost clades, exemplified by the Mormyroid electric fish of Africa and the Gymnotiform fish of South America. Despite its evolutionary significance, the genetic and molecular bases of sensory transduction in teleost electroreception remain poorly understood. Recent investigations in the MSU Electric Fish Lab have found strong expression of Piezo3 transcripts in the mormyroid electroreceptors, suggesting a potential role in electroreception. Piezo channels are mechanically activated ion channels that typically function in converting mechanical stimuli into electrical signals but have been shown to exhibit voltage sensitivity in teleosts. In this project, we investigated the transcriptomes of Brachyhypopomus gauderio, a South American Gymnotiform fish, to determine whether Piezo3 is also expressed in Gymnotiform electroreceptors. We utilized RNA sequencing to identify differentially expressed genes between electroreceptor rich and electroreceptor poor patches of skin. This research contributes to a better understanding of the molecular and genetic mechanisms underlying electroreception and its evolutionary history and will provide insight into whether independen

GENERATING A PREY LIBRARY TO DETECT APRA PROTEIN-PROTEIN INTERACTIONS
Presenter(s): Isabelle Ratcliffe
Cell Biology, Genetics, & Genomics
Mentor(s): Robert Abramovitch (College of Veterinary Medicine)

My research project focuses on understanding bacterial pathogenesis through molecular biology techniques. This project aims to identify protein-protein interactions crucial for Mycobacterium tuberculosis (Mtb) survival and virulence. By mapping these interactions, I hope to better understand the functionality and purpose of the AprA protein. The aprA transcript is the most upregulated gene at acidic pH, although its function remains unknown. Since Mtb encounters acidic environments (pH 4.5-5.5) within host cells, understanding how Mtb adapts to acidic pH could provide insights into its pathogenicity. AprA is believed to interact with other proteins due to its lack of a known catalytic function and its highly charged nature. To investigate AprA's role, I am using bacterial two-hybrid

(BACTH) screening to identify potential interacting partners. So far, I have prepared miniprep plasmids containing prey and bait vectors, sonicated and sheared the Mtb genome, and Gibson-cloned the aprA gene into the bait plasmid. The bait plasmid has been electroporated into E. coli electrocompetent cells, and resulting colonies have been grown, with plasmids isolated and sequenced. My next step is to construct the prey library by electroporating the genomic fragments into electrocompetent cells containing the bait constructs. Screening for positive interactions using blue-white selection will follow. This ongoing work will help uncover AprA's interaction network an

DEMETHYLATION OF ZEBRAFISH EMBRYOS USING A VIRAL VECTOR
Presenter(s): Victoria Grieve
Cell Biology, Genetics, & Genomics
Mentor(s): Joe Cibelli (College of Agriculture & Natural Resources)

I will be testing if cloning success rates in zebrafish can be increased by demethylating the reprogramming resistant regions of the somatic nucleus being cloned. This will be done by microinjecting zebrafish embryos with a vector that is carrying the Kdm4a gene and a green fluorescent protein, driven by the UAS promoter sequence. The vector will also contain a sequence from the zona pellucida gene promoter region and the Gal4- Estrogen Receptor gene. When tamoxifen is added to the water with a fish that was previously microinjected with this vector, the Kdm4a enzyme will only be expressed in the eggs of the fish. When these eggs are used for Somatic Cell Nuclear Transfer the Kdm4a enzymes in them should remove the methyl groups from H3K9 and erase the reprograming resistant regions in the somatic nucleus and allow reprogramming to take place properly.

INVESTIGATION INTO THE EFFECTIVENESS OF MAXIMUM-LIKELIHOOD METHODS FOR DEVELOPING PHYLOGENETIC TREES
Presenter(s): Omni Brewer
Cell Biology, Genetics, & Genomics
Mentor(s): Kevin Liu (College of Engineering)

Understanding the progress of evolution across time is an incredibly challenging task that researchers have been struggling with for decades. Many different software solutions have been developed to overcome different issues with phylogenetic tree reconstruction. However, due to the computational intensity of this problem sometimes heuristics have to be used to produce a tree in a reasonable amount of time. In this experiment simulations were used to develop original trees to test one of these heuristic methods. The estimated tree from the heuristic software and original tree were compared using statistical methods. This gives a quantitative value for the accuracy of the heuristic method.

DEVELOPMENT OF PRIMERS FOR PCR DIAGNOSIS OF G542X CFTR MUTATION USING BUCCAL CELLS WITH ELECTROPHORESIS
Presenter(s): Ryan Ciacci
Cell Biology, Genetics, & Genomics
Mentor(s): Douglas Luckie (Lyman Briggs College)

The G542X mutation in the cystic fibrosis transmembrane conductance regulator (CFTR) gene is a class I mutation that prevents normal CFTR protein synthesis (Schloesser et al., 1991). This study aimed to develop primers capable of detecting the G542X mutation by binding to the mutation site using polymerase chain reaction (PCR). DNA was obtained via DNA extraction; sourced from human buccal cells. The target genome was amplified with primers developed through the Yaku-Bonczyk method.

Utilizing the Yaku-Bonczyk primer design method, a single base pair mismatch three nucleotides from the 3' end of allele-specific primers, would create a structural disruption to minimize false positive results by enhancing primer discrimination against nonspecific binding (Yaku et al., 2008). Using the designed Mutant forward primer and reverse, along with the wild-type primer, our designed PCR will produce a product length of 319bp at an annealing temperature of 58?, calculated through the use of the universal melting temperature formula (Lorenz, 2012) (McHugh et al., 2018). We also designed that both the mutant and wild forward primers' 3' ends will bind in exon 11 because we designed them to bind to the 542 position of the CFTR gene (Viotti et al., 2021). It was hypothesized that PCR using primers designed via the Yaku-Bonczyk method will enhance specificity in detecting the G542X mutation by introducing an intentional ba

USING GENE EDITING TO VISUALIZE RAD50'S ROLE IN DNA REPAIR

Presenter(s): Gavyn Stout

Cell Biology, Genetics, & Genomics

Mentor(s): Cody Phillips (College of Natural Science), Jens Schmidt (College of Human Medicine)

Homologous recombination (HR) is a DNA repair mechanism in which errors often result in mutations seen in cancer cells. By using gene editing technologies, the interaction between DNA repairing protein complexes and DNA breaks can be observed. One of these is the MRN complex, including MRE-11, Rad50, and NBS-1. Crisper-Cas9 provides a method to attach a halo tag to proteins making them visible with the appropriate microscopes. By utilizing this technology, specially Rad50's role in HR can be observed.

HYPOXIA AS ANCESTRAL NORMALCY: INVESTIGATING LOW-OXYGEN ENVIRONMENTS IN EARLY ANIMAL MODELS

Presenter(s): Alexandra Grabowski

Cell Biology, Genetics, & Genomics

Mentor(s): Emma Hammarlund (Lund University)

Oxygen availability has shaped the evolution of life, yet most cellular and developmental studies assume modern atmospheric oxygen levels (~21%) as the norm. However, there's a indicators the great oxidation event occurred in two phases, with cells developing at 5-10%. If we consider hypoxia as the ancestral baseline, how does it influence cell fate, development, and longevity? Using nematodes and organoids as models for early and simple animals, we explore how stem cells, particularly germline cells, respond to different oxygen environments. By culturing these systems under varying atmospheric conditions, we assess changes in stem cell maintenance, reproduction, and overall organismal fitness. Our approach would study nematodes over the course of their lifespans and dissecting them at the end to study how the germline has developed. This work provides insights into the role of low-oxygen environments in shaping early metazoan evolution and offers potential implications for cancer and astrobiology. Understanding hypoxia as a biological default rather than a stress condition may redefine how we study development and cellular adaptation.

WHEN AND WHERE IS WEEP EXPRESSED IN ARABIDOPSIS: AN INVESTIGATION INTO PLANT ARCHITECTURE
Presenter(s): Allison Voneida
Cell Biology, Genetics, & Genomics
Mentor(s): Mallory St. Clair (College of Natural Science)

WEEP is a highly conserved gene in plants that regulates growth trajectory of shoots and roots. Prunus persica (peach) trees with a deleterious mutation in WEEP have downward growing branches, suggesting that WEEP promotes upward shoot growth. Recent findings suggest WEEP regulates the distribution of auxin, a hormone involved in shoot and root orientation, but there is little known about WEEP's mechanism of action. To investigate this, we studied when and where this gene is expressed in shoot tissues in the model plant Arabidopsis thaliana (arabidopsis). While arabidopsis weep mutants do not exhibit the downward branch phenotype, published transcriptome datasets suggest WEEP is expressed in arabidopsis shoots. Images of arabidopsis containing the luciferase reporter gene under the control of the WEEP promoter (promWEEP::LUC) were captured using the NightShade Pl

HOT AND DRY? WATCH CAMELINA FLY!
Presenter(s): Lia Kim, Samia Ambia, Vu Cuong Dang
Cell Biology, Genetics, & Genomics
Mentor(s): Patrick Edger (College of Agriculture & Natural Resources)

Camelina sativa is an allohexaploid oilseed crop that is valued for its drought tolerance and potential as a biofuel source. While climate change has been threatening both global agriculture and the environment, Camelina is a hopeful potential source in combatting the effects of climate change. Camelina itself thrives in environments that are unfavorable for other plants and potentially impactful biofuel sources therefore making it a promising candidate for sustainable food sources and fuel production. Although it seems a fool-proof source, the genetic and regulatory mechanisms that control its drought response remain unclear. In this study, a diverse set of Camelina cultivars were subjected to moderate to severe drought conditions and then tested. Drought-responsive genes involved in stress adaptation were identified using RNA sequencing (RNA-seq). Additionally, regulatory elements that differ among homeologs-genes from different subgenomes-were analyzed to determine their role in drought tolerance. Finally, we conducted an Assay for Transposase-Accessible Chromatin using sequencing (ATAC-seq) to evaluate whether these elements are accessible for gene regulation. This study provides new insights into the genetic and epigenetic basis of drought tolerance in Camelina by integrating gene expression and chromatin accessibility data. These findings will develop a more resilient, high-yield Camelina for sustainable agriculture and biofuel production, including aviation fuels an

INVESTIGATING THE ROLE OF ATG13 AND ATG101 INTERACTION IN AUTOPHAGOSOME FORMATION
Presenter(s): Emily Kaminsky, Nihal Bandla
Cell Biology, Genetics, & Genomics
Mentor(s): Jens Schmidt (College of Human Medicine)

Autophagy is a crucial cellular process that regulates protein and organelle turnover, with significant implications for cancer progression and therapy. The ATG9-13-101 complex serves as a key scaffold in autophagosome biogenesis, yet its structural interactions remain incompletely understood. In this study, we investigate the roles of ATG13 and ATG101 in autophagosome formation by analyzing their interactions and structural contributions to the autophagy machinery. Using CRISPR-Cas9, we introduced a HaloTag at the C-terminus of ATG101 and confirmed its functionality. Additionally, we employed a mutation in the seatbelt domain of ATG13 to prevent its binding with ATG101. Live-cell imaging with fluorescent tags was then used to study the kinetics of protein interactions. Specifically, we utilized LC3, a late-stage autophagosome marker, to evaluate autophagosome biogenesis by determining the colocalization levels of GFP-LC3 with early autophagy factors. This revealed the extent of successful autophagosome formation and provided insight into whether ATG13-ATG101 interactions facilitate autophagy progression and contribute to complex stability. In addition to assessing structural interactions, this study lays the groundwork for future analyses of the kinetics of ATG protein interactions during autophagosome formation. Future directions include developing a system where ATG101 and ATG13 are tagged simultaneously, enabling more precise kinetic analysis of their interactions. Und

MAPPING THE ENTERIC NERVOUS SYSTEM IN THE SPECIALIZED LIGHT ORGAN OF EUPRYMNA SCOLOPES

Presenter(s): Elizabeth Widun

Cell Biology, Genetics, & Genomics

Mentor(s): Alice Walker (College of Natural Science), Elizabeth Heath-Heckman (College of Natural Science), Ellie Camerato (College of Natural Science)

Colonization of the human gut microbiome has been shown to have direct impacts on neuronal development. Specifically, dysbiosis of the gut microbiome has been connected to neurological diseases such as Alzheimers and depression. Our lab employs the unique symbiotic relationship between Euprymna scolopes and its bacterial symbiont Vibrio fischeri to begin exploring this complex dynamic. Preliminary RNASeq data our lab has done shows an upregulation of neuron-related genes in appendages during the first 18 hours of colonization of V. fischeri suggesting neurobiology is directly altered by colonization. We are now focusing on constructing a neuronal map within the enteric nervous system to better understand the exact methods in which neurobiology of the appendages are altered in response to bacterial colonization. To accomplish this, we have been testing various neural-related antibodies against neural specific markers such as elav, anti-neurofilament, and serotonin with immunocytochemistry (ICC) to locate neuronal markers in the hindgut and appendages. We have generated results showing various antibodies can stain high density areas of neurons as well as serotonin being able to stain with higher resolution specificity. We are currently testing other antibodie

DOWNREGULATION OF MHC-I IN CYTOKERATIN-POSITIVE REGIONS OF HPV+ HEAD AND NECK CANCER PATIENT SAMPLES

Presenter(s): Evelyn Gomez Recinos

Cell Biology, Genetics, & Genomics

Mentor(s): Dohun Pyeon (College of Human Medicine)

Major histocompatibility complex class I (MHC-I) molecules are cell surface receptors expressed on almost all types of nucleated cells. Classical human MHC-I molecules are encoded by the human leukocyte antigens (HLAs): HLA-A, HLA-B, and HLA-C. These molecules are important for their role in the immune system, presenting foreign antigens to CD8+ T cells that result in tumor cell killing. MHC-I is downregulated in many cancers as a mechanism of cancer immune evasion. Our laboratory has shown that MHC-I is downregulated in human papillomavirus-positive (HPV+) cancer cells at the protein level. However, patient samples from the TCGA database have shown that HLA-A, B, and C mRNA levels are upregulated in tumor tissue compared to normal tissue. To determine the levels of MHC-I protein in patient samples, immunofluorescence was used to compare the level of MHC-I protein in HPV+ HNC tumors and normal tonsils. HPV+ HNC tumor and normal samples were stained with antibodies against MHC-I and cytokeratin, a marker for epithelial cells. The presence of squamous cell carcinoma was confirmed by staining the serial tumor sections with Hematoxylin and eosin (H&E). As HPV infects epithelial cells and HPV downregulates MHC-I, we hypothesize that MHC-I protein expression is downregulated in cytokeratin-positive compared to cytokeratin-negative regions in HPV+ HNC patient samples. Quantification of the MHC-I intensity in cytokeratin-positive regions showed that MHC-I protein levels were l

INDUCTION OF TRANSGENIC DEMETHYLASES IN EMBRYONIC ZEBRAFISH
Presenter(s): Sean Monahan
Cell Biology, Genetics, & Genomics
Mentor(s): Joe Cibelli (College of Agriculture & Natural Resources)

Nuclear cloning, also referred to as Somatic cell nuclear transfer (SCNT), is a technique that allows for the development of an identical organism. This is done by taking a cell that has often been fully differentiated into a specific cell type and inserting its nucleus into an enucleated recipient oocyte arrested at metaphase 2 of meiosis. An issue arises as the donor somatic cell's chromatin must be reprogrammed into embryonic state for proper development. The chromatin of somatic cells does not allow the embryonic genome to be properly activated, the oocyte must complete this process, a process that the oocyte is not adequately equipped to handle. These modifications to the epigenome are part of why SCNT often has poor success rates. One such epigenetic mark is H3K9me3 known to block embryonic genome activation. Our current hypothesis states that using donor nuclei with lower expression of H3K9me3 will yield a higher rate of embryonic development of clones. In this project, an mRNA (Kdm4b) vector encoding a demethylase is injected into 1-cell Zebrafish (Danio rerio) embryos and then cultured until the embryos reach 50% epiboly (5.3 hpf). The embryos are then characterized for H3K9me3 through immunocytochemistry, where the fluorescence is compared to control embryos. In the future, cells from injected em

DECIPHERING CELL-CELL COMMUNICATION: PREDICTIVE MODELING OF LIGAND-RECEPTOR INTERACTIONS IN BREAST CANCER AND LIVER DISEASE
Presenter(s): Bianca Aharauka
Cell Biology, Genetics, & Genomics
Mentor(s): Sudin Bhattacharya (College of Engineering)

Cell-cell communication occurs through various signaling mechanisms, including autocrine (self-signaling) and paracrine (signaling to nearby cells). We will focus on using predictive models to analyze these interactions, considering both the types of communicating cells and their tissue microenvironments. These models will help uncover how different biological systems influence cellular behavior. Specifically, we will study these relationships in the context of breast cancer and liver disease. To achieve this, we will employ computational tools such as CellChat, NicheNet, and NICHES to identify and visualize ligand-receptor interactions that drive these disease processes.

DATA ANALYSIS OF PEDIATRIC PATIENTS WITH TRAUMATIC BRAIN INJURIES
Presenter(s): Jillian Lynch
Cell Biology, Genetics, & Genomics
Mentor(s): Annie Needs (College of Engineering)

Causes and outcomes of pediatric traumatic brain injuries (TBI), a leading cause of death and disability in children, are unique to each patient. Current diagnostic methods are limited to patient observation and are thus unable to address the hyper individual injury occurring beneath the surface. In a longitudinal study conducted at Helen Devos Children's Hospital, the dynamic immune response to TBI was collected at three times post-injury and showed patterns in the antibodies distinct from control samples. We hypothesize that this strong immune response to TBI provides a better way to identify and diagnose TBI. We will asses this hypothesis by performing deep sequence sequence analysis to identify enriched antibody sequence motifs and unique antibody signatures in the TBI immune response. These data will then be used to train machine learning models to predict traumatic brain injury diagnosis. Thus far, data analysis has shown up in six different antibody sequence motifs in the TBI immune response. Moving forward, we will continue to analyze the clinical immune response data to find unique antibody signatures in pediatric patients. Ultimately, this research will make use of the distinct immune response to TBI to progress towards a bedside tool to aid TBI diagnosis, leading to better patient care and improved outcomes.

GENETIC SUSCEPTIBILITY TO TRIPLE-NEGATIVE BREAST CANCER AMONG WOMEN OF WEST AFRICAN ANCESTRY
Presenter(s): Benjamin Nketsiah
Cell Biology, Genetics, & Genomics
Mentor(s): Evelyn Jiagge (College of Human Medicine)

Triple-negative breast cancer (TNBC), a highly aggressive subtype of breast cancer lacking estrogen, progesterone, and HER2 receptors, disproportionately affects women of African ancestry. This study investigates the genetic susceptibility to TNBC among women of West African descent and its implications for targeted therapies. Using DNA extracted from 330 saliva samples and focus group discussions conducted at major Ghanaian teaching hospitals, we analyzed the prevalence of TNBC across diverse ancestry groups, including Ghanaian, African American, Ethiopian, and Western Ancestry populations. Our findings reveal that TNBC prevalence is significantly higher in Ghanaian (53.2%) and African American (29.8%) populations compared to Western Ancestry (15.5%) and Ethiopian (15.0%) groups, with even higher prevalence among younger patients (<50 years) in Ghanaian and African American cohorts. This disparity underscores the potential role of genetic factors linked to West African ancestry, as well as the influence of socioeconomic and healthcare access disparities. The study highlights the importance of early screening, expanded genetic testing, and culturally tailored awareness campaigns to address TNBC in at-risk populations. Future research aims to characterize genetic and immune profiles of breast cancer stem cells (BCSCs) to develop targeted treatments that address the unique needs of women of African ancestry.

FROM DRY LANDS TO HIGH SKIES: CAMELINA, THE DROUGHT RESISTANT FUEL OF THE FUTURE
Presenter(s): Makayla Paul, Richard Frankfort, Samantha Lang
Cell Biology, Genetics, & Genomics
Mentor(s): Patrick Edger (College of Agriculture & Natural Resources)

With rising global temperatures threatening agricultural production, climate-resilient crops like Camelina sativa are crucial for ensuring food and fuel security. Camelina, an allohexaploid, is a biofuel crop with tremendous potential, particularly for the production of sustainable aviation fuels and other high-value industrial products. While its ability to thrive in arid, poor soil environments is well-documented, the specific genes and regulatory regions underlying drought tolerance across diverse Camelina cultivars remain unknown. In this study, we subjected a diverse panel of Camelina cultivars to moderate and severe drought conditions. We then evaluated differential gene expression through RNA sequencing (RNA-seq) to identify specific drought-responsive genes. Furthermore, we set out to identify drought-responsive regulatory elements by analyzing presence-absence variation of these elements among homoeologs-genes encoded by different subgenomes in the polyploid-that exhibit variation in drought response. Lastly, we evaluated whether these regulatory elements were accessible for binding by assessing their overlap with accessible chromatin regions identified through Assay for Transposase-Accessible Chromatin sequencing (ATAC-seq) analysis. The insights from the genetic and epigenetic basis for drought tolerance in Camelina will facilitate the breeding of more resilient and productive varieties for sustainable agriculture and biofuel production.

TRANSCRIPTOMIC INSIGHTS INTO CYSTIC FIBROSIS: GENE EXPRESSION CHANGES AND DISEASE MECHANISMS
Presenter(s): Sunidhi Shintre
Cell Biology, Genetics, & Genomics
Mentor(s): George Mias (College of Natural Science)

Advancements in genomics and bioinformatics are transforming our understanding of complex diseases through large-scale genetic data analysis. By integrating transcriptomic and proteomic profiling, researchers can assess gene expression changes linked to disease onset and progression. Machine learning (ML) plays a crucial role in identifying patterns within these datasets, enabling the discovery of gene sets involved in transcriptional regulation and providing insights into disease mechanisms and therapeutic targets. Our research applies ML-based analysis to large gene expression datasets from public repositories to identify differentially expressed genes and categorize disease states. We are investigating gene changes in cystic fibrosis (CF), a genetic disease caused by mutations in the CFTR gene. CF leads to excessive mucus buildup, primarily affecting the lungs, pancreas, and other organs, resulting in respiratory complications, infections, and reduced life expectancy. We are curating datasets from the Gene Expression Omnibus (GEO), consisting of samples from CF patients and controls, derived from bronchial epithelial cell tissues and airway epithelial cell tissues. RNA-sequencing data will be processed

SAGITTAL CREST SIZE RELATIVE TO TROPHIC LEVELS
Presenter(s): Gabriel Evola, Nicholas LoPorto, William Herbert
Cell Biology, Genetics, & Genomics
Mentor(s): Joseph Riedy (College of Natural Science)

The sagittal crest is a ridge formed by bone that runs vertically down the midline of the skull. The temporalis muscle attaches to the sagittal crest and the lower jaw to aid in chewing in mammalian species. A larger sagittal crest relative to skull length correlates with a stronger bite force. We hypothesize mammalian bite force is related to evolved hunting strategy, where species that rely on biting to capture prey would have the strongest bite force, followed by species that use a combination of strategies to capture prey, whereas species that hunt in packs and attack vulnerable locations on prey would have a relatively weak bite force. To test this hypothesis, we examined skulls in the MSU museum collection including River Otters (Lontra canadensis), Fishers (Pekania pennanti), Bobcats (Lynx rufu s), and Wolves (Canis lupus). We used an ANOVA with Tukey post hoc test to compare the sagittal crest to to skull size ratios between these four species. Fishers have the strongest bite force since they are solitary hunters and rely heavily on their teeth for said hunting, otters were ranked second due to their diet consisting of crustaceans and them relying on a hunting strategy that targets vital points, bobcat had the third highest bite force because they rely more on their claws to capture

EXPLORING ESTROGEN PRODUCTION AND ITS IMPACT ON MÜLLER CELL FUNCTION: IMPLICATION DIABETIC RETINOPATHY

Presenter(s): Abigail Jager
Cell Biology, Genetics, & Genomics
Mentor(s): Susanne Mohr (College of Natural Science)

Background: Diabetic retinopathy (DR) is a major cause of blindness, affecting about 50% of diabetic patients. Although both men and women are impacted, the influence of sex hormones on DR development remains underexplored. Some studies suggest DR onset is delayed in women, with cases increasing rapidly after menopause. In men, the onset appears steady, and diagnosed cases equalize by age 65. This sudden rise in post-menopause DR has sparked interest in estrogen's role in DR development, but little is known about its function, especially in the diabetic retina. Müller cells, involved in DR progression, have not been studied in relation to estrogen. This study examines estrogen's potential effect on Müller cell function under normal and hyperglycemic conditions. Methods: Müller cells were cultured in 5mM and 25mM glucose, with or without β-Estradiol (10nM) for up to 96 hours. Aromatase expression was analyzed via immunohistochemistry, and estrogen levels were measured by Elisa assay. Müller cell function was assessed by measuring cell death. Results: Our data showed that Müller cells express aromatase, the enzyme responsible for estrogen production. Under high glucose conditions, estrogen levels increased from 675.6±85.2 pg/mL/mg protein (5mM glucose) to 1652.0±228.1 pg/mL/mg protein (25mM glucose) [n=6; p=0.0043]. Estrogen treatment significantly reduc

VAGINAL IMPEDANCE MEASUREMENTS AS AN INDICATOR OF ESTROUS CYCLE STAGES IN GUINEA PIGS

Presenter(s): Elizabeth Prenkocevic
Cell Biology, Genetics, & Genomics
Mentor(s): Jada Roberts (College of Natural Science), Jason Bazil (College of Osteopathic Medicine)

Historically, preclinical research has been conducted on male animals. When sex is considered as a variable, the collected data may be influenced, as analyzing female subjects can be affected by hormonal fluctuations associated with the estrous cycle. This study investigates the use of vaginal impedance measurements to determine the estrous stage in nine female Dunkin Hartley guinea pigs ranging from 350-450 g. Vaginal impedance measures the resistance of the vaginal wall and has been validated in indicating proestrus in rats with impedance values 3 k?. Vaginal cytology is considered the gold standard for tracking estrous cycles which we correlate to impedance. Vaginal impedance measurements were collected for three 16-day estrous cycles of guinea pigs (Crl:HA, n = 9) for a total collection of 27 full estrous cycles. Immediately following impedance measurement, cytology samples were collected by vaginal lavage using sterile saline and stained with Diff-Quik to be analyzed under light microscopy. Our results showed a significant increase in impedance during proestrus with values of 3 k? and a significant decrease in other stages, which is consistent with past research from other rodents. In a linear regression model, there was a significant relationship between impedance value and estrous cycle ($P < 0.05$) with average impedance

INHIBITING THE AURORA KINASE A - N-MYC INTERACTION DECREASES MARCHF8 EXPRESSION IN HUMAN PAPILLOMAVIRUS-POSITIVE HEAD AND NECK CANCER

Presenter(s): Will Eckerman

Cell Biology, Genetics, & Genomics

Mentor(s): Dohun Pyeon (College of Human Medicine), Lexi Vu (College of Natural Science)

Major Histocompatibility Complex Class I (MHC-I) is downregulated in HPV+ head and neck cancers (HPV+ HNC) to evade the host antitumor immune response. Our lab has identified MARCHF8, an E3 ubiquitin ligase that ubiquitinates and degrades surface immune receptors, including MHC-I. MARCHF8 is transcriptionally upregulated in HPV+ HNC by the MYC/MAX transcription factor complex. MYC proteins have a variety of forms such as c-MYC, N-MYC, S-MYC, and L-MYC. These MYC proteins are responsible for up to 15% of all cellular transcription. They have unique tissue specificity and are known to play a crucial role in cellular metabolism and cell cycle progression. Interestingly, we have observed the expression of N-MYC, which is normally expressed in neural tissue, in HPV+ HNC cells. Further, N-MYC expression is upregulated in HPV+ HNC cell lines as determined via Western blotting. While N-MYC is a promising target for cancer treatment, it has been previously termed "undruggable." However, N-MYC is stabilized by the enzyme Aurora Kinase A (AURKA). Additionally, the AURKA inhibitor CD532 has been shown to inhibit the interaction between N-MYC and AURKA. I hypothesize that CD532 inhibits transcription of MARCHF8, restoring the expression of MARCHF8 targets, including MHC-I, in HPV+ HNC cells. To test this hypothesis, I evaluated the efficacy of CD532 on MARCHF8 expression by measuring the MARCHF8 mRNA and protein levels in HPV+ HNC cells treated with CD532 using RT-qPCR and Western blot

EXTRACELLULAR VESICLE COMMUNICATION IN HUMAN HEART ORGANOIDS FOR STUDYING CONGENITAL HEART DISEASE.

Presenter(s): Isabel Nunez-Regueiro, Kyle Wolf

Cell Biology, Genetics, & Genomics

Mentor(s): Shakhlo Aminova (College of Engineering)

Congenital heart defects (CHDs) affect nearly 1% of live births, making them the most common birth defect in humans. Human heart organoids (hHOs) provide a more accurate model of human heart development compared to traditional monolayer cultures or animal models. We use hHOs to study how extracellular vesicles (EVs) mediate cell-to-cell communication during heart development. EVs are lipid-bound nanoparticles that transport bioactive molecules-such as DNA, RNA, and proteins-between cells, playing a crucial role in cellular signaling. Our research focuses on understanding the role of EVs in fetal heart development by analyzing their expression and content in hHOs. To achieve this, we isolate EVs at key stages of cardiac development using differential ultracentrifugation. We then characterize hHO-derived EVs by assessing classical EV markers and examining how their protein composition changes over time. Our findings highlight the dynamic nature of EVs in developing hHOs. Notably, MFGE8, a protein primarily derived from epicardial cells, emerges as a key player in EV-mediated communication. Early results indicate that hHO-derived EVs are highly dynamic, evolving throughout development and carrying essential proteins that contribute to cardiac maturation. These findings provide valuable insights into the role of EVs in heart development and may have implic

INVESTIGATION OF VARIANTS IN CANDIDATE GENES IN PROTEIN-LOSING ENTEROPATHY IN BERNESE MOUNTAIN DOGS
Presenter(s): Alyssa McKenna
Cell Biology, Genetics, & Genomics
Mentor(s): Vilma Yuzbasiyan-Gurkan (College of Veterinary Medicine)

Dogs develop many of the same diseases as humans, including both single gene disorders as well as and complex diseases with significant genetic components. Protein-Losing Enteropathy (PLE) is one such condition affecting both humans and dogs. PLE is a gastrointestinal disease that is characterized by the loss of plasma proteins into the GI tract, resulting in severe malnutrition, which is hard to manage and can lead to many complications including edema, immune dysfunction. The frequency of certain diseases, including PLE, is higher in specific dog breeds. This study will focus on Bernese Mountain Dogs, aiming to investigate the allele frequencies of variants in various genetic loci in candidate genes identified through genetic sequencing of affected individuals. Using DNA extraction, whole genome sequencing, Sanger sequencing, and other methods such as TaqMan genotyping, I will genotype PLE affected and unaffected dogs. I will then compare variant allele frequencies between affected and unaffected dogs. I anticipate that the variant allele frequency will be significantly higher in affected dogs. Additionally, I will explore the functional significance of the loci and predict how the variants might affect gene function, contributing to a better understanding of the genetic basis of PLE in dogs, with potential implications for human health as well.

WATER YOU TALKING ABOUT? GENES IN CAMELINA SATIVA THAT MAKE IT THRIVE IN DROUGHT
Presenter(s): Lipika Murali Babu, Sonia De Donno, Trevor Stevens
Cell Biology, Genetics, & Genomics
Mentor(s): Patrick Edger (College of Agriculture & Natural Resources)

As global warming increasingly jeopardizes agricultural productivity, the cultivation of climate-resilient crops such as Camelina sativa-an allohexaploid recognized for its drought resilience-becomes imperative for ensuring food and energy security. Camelina is crucial for sustainable food, biofuel production and other high-value industrial applications. While the plant thrives in arid, nutrient poor soils, the genetic and regulatory mechanisms underlying its drought tolerance remain unclear. In this study, we exposed a diverse panel of Camelina cultivars to varying drought conditions, ranging from moderate to severe. Using RNA sequencing (RNA-seq), we analyzed differential gene expression to identify drought-responsive genes. Additionally, we investigated the presence-absence variation of regulatory elements among homoeologs-genes from different subgenomes that exhibit distinct drought responses. Furthermore, we sought to uncover drought-responsive regulatory elements by investigating the presence-absence variation of these elements across homoeologs-genes that originate from distinct subgenomes within the polyploid and exhibit variability in their drought response. Lastly, we examined the accessibility of these regulatory elements for interaction by analyzing their overlap with accessible chromatin regions by using Assay for Transposase-Accessible Chromatin sequencing (ATAC-seq) to determine wheth

CHARACTERIZATION OF NUCLEAR DEVELOPMENT IN EARLY ZEBRAFISH EMBRYOS: FROM MII OOCYTES TO THE 16-CELL STAGE
Presenter(s): Johanna Hong
Cell Biology, Genetics, & Genomics
Mentor(s): Joe Cibelli (College of Agriculture & Natural Resources)

Zebrafish (Danio rerio) serve as an excellent biological model for studying embryonic development due to their rapid cell division and transparency. This study aims to characterize nuclear development from the MII oocyte stage to the 16-cell stage, providing mechanistic insights which could improve somatic cell nuclear transfer (SCNT) research. Using in vitro fertilization (IVF), eggs will be collected and fixed in 4% paraformaldehyde with 4% acetic acid in DPBS (Sigma D8537). Live imaging will capture nuclear morphology before fixation, followed by Prolong-DAPI staining for DNA visualization. A subset of embryos will be stained with Phalloidin to visualize F-actin alongside DNA. This approach will provide insight into the timing and structural organization of nuclei during the early stages of zebrafish embryogenesis. Overall, this study will contribute to a deeper understanding of nuclear reprogramming and early embryonic development.

WHAT'S ON THE MENU? DIET DIVERSITY IN RAPIDLY SPECIATING GROUPS OF WEAKLY ELECTRIC FISH.
Presenter(s): Rita Gorsuch
Cell Biology, Genetics, & Genomics
Mentor(s): Jason Gallant (College of Natural Science)

Weakly electric African fish (Mormyridae) in the genusParamormyrops have undergone explosive speciation in Western-Central Africa. One prevailing hypothesis for this rapid speciation is that rapid evolution of the species' electric organ discharges (EODs) provides a basis for reproductive isolation between Paramormyrops species. An alternative hypothesis is that EODs, which are also used in electrolocation, allows species to specialize on different diets. To test this hypothesis, gut content samples were taken from 208 individual from three geographic regions in Gabon, West-Central Africa where Paramormyrops species occur sympatrically. Gut contents were analyzed using DNA metabarcoding to determine which invertebrate speciesParamormyrops with different EOD types specialized in. In this poster, we will present our latest results examining the degree in overlap in diet as well as relative diversity in those diets. This project will contribute to our broader efforts to understand the evolutionary forces that contribute to rapid speciation in this group of fish.

MODELING ATRIAL FIBRILLATION USING HUMAN ORGANOIDS.
Presenter(s): George Boulos, Mia Dionise, Milana Skoric, Weiheng Cao
Cell Biology, Genetics, & Genomics
Mentor(s): Aitor Aguirre (College of Engineering), Colin Ohern (College of Osteopathic Medicine)

Cardiac arrythmias are abnormal heart rhythms that can lead to palpitations, stroke, heart failure, and sudden cardiac arrest. Atrial fibrillation (AF) is the most prevalent cardiac arrythmia, where the atria fire in an irregular fashion. Recent studies have linked inflammation, particularly in cases of myocarditis, pericarditis, and sepsis, with new-onset AF. One of the known mechanisms of inflammation-induced AF discovered in animals is activation of the NLRP3 inflammasome, a protein complex that forms inside of atrial cardiomyocytes. While NLRP3 inflammasome activation has been observed in post-mortem human hearts with chronic and paroxysmal AF, it is unproven that NLRP3-activation in atrial cardiomyocytes causes AF in human hearts. In 2019, the Aguirre lab pioneered hHOs that functionally and cellularly resemble embryonic human hearts. More recently, the Aguirre lab developed a maturation protocol to advance the physiologic age of hHOs and generated human heart macrophage assembloids (hHMAs) to model the innate immune niche of the human heart. For this study, we administered known pro-inflammatory activators of the NLRP3 inflammasome, such as LPS, IFN-ɣ, and IL-1β, to induce AF in hHMAs. We hypothesized that activation of the NLRP3 inflammasome will induce AF in hHMAs. Utilizing RT-qPCR, confocal microscopy, FluoVolt live-cell imaging, and phase-contrast microscopy, we observed that NLRP3 inflammasome activat

THE ROOT OF THE MATTER: INVESTIGATING HOW CAMELINA SATIVA THRIVES IN DROUGHT
Presenter(s): Emma Movahedi, Hannah Eggleton, Leyli Sedghi
Cell Biology, Genetics, & Genomics
Mentor(s): Patrick Edger (College of Agriculture & Natural Resources)

Camelina sativa is an allohexaploid plant known for its resilience to drought and ability to thrive in marginal soils, making it a promising option for growth in water-limited areas. Although the traits that enable Camelina to withstand drought conditions are well documented, the specific genes and regulatory regions responsible for drought tolerance across various Camelina cultivars are still unknown. This study aims to identify the key genetic and regulatory factors that control drought tolerance in Camelina sativa. By gaining a better understanding of these factors, the research hopes to enhance the crop's resilience to drought, which poses an increasing challenge in agriculture. We tested a diverse set of Camelina cultivars under moderate and severe drought conditions and evaluated differential gene expression using RNA sequencing (RNA-seq) to identify genes that respond to drought. Additionally, we aimed to identify drought-responsive regulatory elements by analyzing the presence-absence variation of these elements among homeologs-genes that are encoded by different subgenomes in the polyploid species-and that display variation in their drought response. Finally, we assessed whether these regulatory elements are accessible for binding by examining their overlap with accessible chromatin regions identified through Assay for Transposase-Accessible Chromatin using sequencing (ATAC-seq) analysis.

MODELING PLANT-LIKE N-GLYCOSYLATION OF THE FLS2 EXTRACELLULAR DOMAIN IN PICHIA PASTORIS
Presenter(s): Daniel Arevalo Estrada
Cell Biology, Genetics, & Genomics
Mentor(s): Daniel Woldring (College of Engineering)

N-glycosylation plays a critical role in the structure and function of extracellular plant proteins, including immune receptors such as FLAGELLIN-SENSING 2 (FLS2). Engineering microbial systems to express plant-like glycoproteins enables scalable production of these molecules for research and therapeutic applications. In this study, we model the integration of plant-specific N-glycosylation patterns into the extracellular domain of FLS2 expressed in Pichia pastoris. Using AlphaFold 3, we predict the three-dimensional structure of the glycosylated FLS2 ectodomain and assess the accessibility and conformation of known glycosylation sites. We incorporate structural insights into a computational pipeline for simulating plant-like glycosylation pathways within P. pastoris, identifying compatible glycosyltransferases and potential engineering targets. Our approach highlights the structural impact of glycosylation on receptor stability and provides a framework for designing glycoengineered yeast strains capable of producing functional, plant-mimetic FLS2 proteins. This work bridges structural biology and synthetic glycoengineering, offering a model for producing complex glycoproteins in heterologous systems.

MODELING OF EARLY HUMAN CARDIAC DEVELOPMENT USING ADVANCED HEART ORGANOID TECHNOLOGY
Presenter(s): Ariadna Jurado Fernandez
Cell Biology, Genetics, & Genomics
Mentor(s): Aitor Aguirre (College of Engineering), Aleksandra Kostina (College of Engineering)

Cardiovascular diseases are the leading cause of morbidity and mortality globally, with congenital heart defects being the most common birth anomalies in humans. Neural Crest cells (NCCs), embryonic cells derived from the ectoderm, play a critical role in normal heart development. These cells migrate from the neural tube during early development to form and maintain key cardiac structures. However, abnormal NCC migration can lead to various cardiovascular disorders, and their complexity poses challenges for advancing treatments. Although animal models provide insights into heart development, their differences from human anatomy, physiology, and genetics limit their direct translation to human disease. We leveraged previously published human-based in vitro system: three-dimensional, self-organizing human heart organoids (hHOs) derived from pluripotent stem cells. Then, we generated NCCs from human induced pluripotent stem cells (iPSCs) using a method that blocks TGF and GSK3, which is well established for NCC differentiation. This same iPSC line was also modified to express mCherry (fluorescent protein) in these cells using lentiviral transduction, which made it easy to track NCCs by their red fluorescence protein expression. NCCs were combined with hHOs to model cardiac NCC migration during early heart formation. Once integrated into hHOs, the mCherry-labeled NCCs migrate, express genes associated with

CHARACTERIZING EPIGENETIC MODIFICATIONS AT THE HISTONE 3 LYS 9 SITE IN ZEBRAFISH CELL CULTURE AND 24-HPF WHOLE EMBRYOS
Presenter(s): Nicholas Feys
Cell Biology, Genetics, & Genomics
Mentor(s): Joe Cibelli (College of Agriculture & Natural Resources)

Somatic cell nuclear transfer (SCNT) refers to the process of transferring a donor nucleus of a somatic cell into an enucleated recipient egg cell to generate a clone. However, this process is still largely inefficient partly due to epigenetic barriers that need to be overcome. Epigenetic modifications on histones, like methylations and acetylations are key transcriptional regulators. Modifications to histone H3 Lysine 9 (H3K9) are of particular importance due to its role in regulating chromatin structure, epigenetic memory, and the overall stability of the genome. Acetylation of H3K9 is commonly associated with transcriptionally accessible DNA, while methylation of H3K9 is generally associated with gene repression or silencing. In this experiment, the aim was to characterize H3K9 methylation and acetylation throughout an entire 24-hours post fertilization (24-hpf) zebrafish embryo and in zebrafish (ZF) cell culture. Immunofluorescence was utilized to observe methylation and acetylation marks in the ZF cell culture and 24-hpf embryos. Fluorescent signals were then quantified using ImageJ software. Results provided key insights into physiologically relevant methylation marks and differential methylation patterns in the 24-hpf embryos, ideal donor nuclei can be derived. This study also offers a future direction in the testing of compounds such as methyltransferase inhibitors and deacetylase inhibitors to aid in

ABERRANT LUNG HISTOLOGY IN TBX4;TBX5 DEPLETED MOUSE LUNGS
Presenter(s): Anish Deshpande
Cell Biology, Genetics, & Genomics
Mentor(s): Kaylie Chiles (College of Osteopathic Medicine), Ripla Arora (College of Human Medicine)

Human TBX4 gene mutations result in TBX4 syndrome characterized by developmental lung disorder and pulmonary hypertension in neonates, children and adults. In mice TBX4 and its closely related homologue TBX5 are indispensable for limb and lung development. Conditional depletion of TBX4;TBX5 in mice significantly impairs lung development and results in failure to thrive. To determine postnatal functions of these genes we used a lung mesenchyme-specific enhancer driven Cre recombinase and ablated both Tbx4 & Tbx5 (DKO mice). 85% DKO mice died within first week of birth and 15% made it to adulthood. To ascertain if adult DKO mice display signs of poor lung development and fibrosis we performed Masson's Trichrome histology on tissue sections using Weigert's Hematoxylin (purple, stains nucleus), Scarlet Acid Fuchsin (red, stains epithelium), and Aniline Blue (blue, stains collagen). We detected varying intensity of Aniline Blue around the bronchioles of control and DKO lungs suggesting non-uniform collagen levels around the different lung bronchioles. DKO lungs displayed dilated alveoli suggestive of poor lung development. Two unique histological features of the DKO lungs that were not observed in the control lungs were collagen build up in the pleura and condensed struc

OBSERVING EVOLUTIONARY COLOR CHANGE IN POISON DART FROGS
Presenter(s): Andy Kuo
Cell Biology, Genetics, & Genomics
Mentor(s): J.P. Lawrence (Lyman Briggs College)

The Green and Black Poison Dart Frog (Dendrobates auratus) originates from Panama, but has been introduced in Hawaii. After observing the two populations for many years, these introduced populations now provide an interesting case study for potential evolutionary processes such as genetic drift and environmental influences on coloration. Color variation in D. auratus has an important impact on predator avoidance, as its bright body serves as a warning signs of toxicity. However, the underlying genetic and environmental factors contributing to this variation remain active research areas. Given the species' geographic spread and observed differences in pigmentation, D. auratus presents an ideal model for studying if evolutionary drift has occurred between the two populations. By analyzing spectral data using software tools such as RStudio, this study seeks to identify whether there are differences in color between the two populations of D. auratus due to selection pressures or environmental influences.

ENGINEERING EXTRACELLULAR VESICLES (EVS) FOR THERAPEUTIC DELIVERY IN TYPE 1 DIABETES
Presenter(s): Tiffany Rennells
Cell Biology, Genetics, & Genomics
Mentor(s): Masako Harada (College of Engineering)

Type 1 diabetes (T1D) is an autoimmune disease characterized by T cell-mediated destruction of insulin-producing pancreatic beta cells through the NF-kB inflammatory pathway. Current treatments such as insulin therapy regulate glucose levels but fail to address the underlying autoimmune response, highlighting the need for targeted drug delivery systems. This study investigates extracellular vesicles (EVs) as a novel drug delivery system. EVs are natural nanoparticles that facilitate intercellular communication by transporting biological molecules, such as proteins, RNA, and lipids. We propose engineered EVs to express SCAB1-c1c2, a modified surface protein combining a small single-chain antibody fragment (SCAB1) for beta cell targeting with a c1c2 domain for membrane localization. Although the current focus is optimizing the delivery vehicle, we are concurrently exploring therapeutic cargos. Promising candidates include miR26-a, which has demonstrated ability to inhibit NF-kB signaling while enhancing insulin production and secretion. This study aims to evaluate the targeting efficiency and therapeutic potential of these engineered EVs for T1D treatment. Success could lay the foundation for cell-targeted therapies addressing the critical need for innovative treatment approaches beyond conventional glucose management.p

DECODING LUNG DEVELOPMENT: HOW TBX4 AND TBX5 AFFECT BRANCHING ARCHITECTURE
Presenter(s): Laasya Koduri
Cell Biology, Genetics, & Genomics
Mentor(s): Kaylie Chiles (College of Osteopathic Medicine), Ripla Arora (College of Human Medicine)

Researched branching defects in our TBX-deficient mouse model that provided a valuable tool for studying TBX4 syndrome and other lung disorders, helping us better understand how these conditions develop.

MOLECULAR CLONING OF NANOLUC AND EGFP INTO CD63 EXPRESSION VECTORS VIA SLICE RECOMBINATION TECHNOLOGY
Presenter(s): Jayadeep Yedla
Cell Biology, Genetics, & Genomics
Mentor(s): Masako Harada (College of Engineering)

Gene cloning is a fundamental technique in molecular biology, enabling the generation of specific DNA constructs to study gene expression, functions, regulations, and many versatile biological processes. Despite their significance, traditional cloning methods depend on expensive reagents, such as restriction enzymes, and DNA ligases which can be time-consuming and inefficient in their function. Seamless Ligation Cloning Extract (SLiCE) recombination technology has emerged as a powerful alternative that utilizes enzymatic components from Escherichia coli cell lysate to facilitate homologous recombination between vectors and insert DNA without additional ligation steps thus overcoming the limitations of the traditional methods. This project aims to evaluate the effectiveness of SLiCE recombination technology by cloning two target plasmids - pcS-NanoLuc-CD63 and pcs-eGFP-CD63 - which are valuable in extracellular vesicle (EV) labeling. The experimental overflow of the project will include creating the plasmids using PCR amplification of vector and insert, quantification of the amplicons, and SLiCE-mediated homologous recombination. The recombinant plasmids will be transformed into competent E. coli cells, after which the integrity of the plasmi

ENGINEERING EXTRACELLULAR VESICLE SURFACE TO DISPLAY SCA B1 ANTIBODY FOR TARGETING PANCREATIC BETA CELLS
Presenter(s): Nayeema Siraj
Cell Biology, Genetics, & Genomics
Mentor(s): Masako Harada (College of Engineering)

Extracellular vesicles (EVs) are membrane-bound vesicles that facilitate intercellular communication by transporting bioactive molecules such as nucleic acids, proteins, and lipids. Due to their ability to mediate cargo exchange, EVs have emerged as a promising therapeutic tool for targeted drug delivery. By engineering their surface proteins, EVs can selectively bind to specific cells or organs and deliver therapeutic molecules with precision. Type 1 diabetes is an autoimmune disease in which the immune system destroys pancreatic beta cells, leading to insulin deficiency and lifelong dependence on external insulin therapy. Recent advancements in EV-mediated drug delivery offer a novel approach for targeting beta cells with therapeutic molecules. Our research focuses on engineering EVs with a surface protein that enables selective binding to pancreatic beta cells for targeted therapeutic delivery. We utilize the single-chain variable fragment (scFv) antibody SCA B1, known for its high affinity to beta cells, linked to the EV-binding domain of lactadherin (C1C2). To validate our approach, we will characterize SCAB1-C1C2 EVs through western blotting and nanoparticle tracking analysis and assess their binding affinity in co-culture assays using NIT-1 mouse pancreatic β-cells and 4T1

COMMUNICATION ARTS & SCIENCES

NIL & THE B1G: EXAMINING EDUCATION, POLICIES, AND RESOURCES
Presenter(s): Nora Cunningham
Communication Arts & Sciences
Mentor(s): Susan McFarlane-Alvarez (College of Communication Arts Sciences)

This research examines the Name, Image, and Likeness (NIL) education and resources provided to student-athletes by Big Ten schools. The study analyzes B1G NIL policies, educational programs, digital platforms, and third-party partnerships designed to help athletes navigate the NIL space. By identifying gaps in education, highlighting similarities across programs, and addressing the challenges of researching and understanding NIL opportunities, this research aims to provide insights on the current support systems for B1G student-athletes.

READING INTO NEURODIVERSITY: AUTISM TERMINOLOGY IN CHILDREN'S BOOKS
Presenter(s): Alicia Zhang, Ashlyn Kuzma, Audrey Dayton
Communication Arts & Sciences
Mentor(s): Courtney Venker (College of Communication Arts Sciences), Zachary Hesse (College of Communication Arts Sciences)

This study analyzes the use and frequency of autism terminology presented in children's books. Children's books are the root of many early ideas and perceptions about the world and the terminology used within books can directly influence how children perceive autism. One in 36 children are diagnosed with autism spectrum disorder. Our content analysis focused on autism-related terminologies within children's books from the Capital Area District Library (CADL). This study utilized 52 CADL books that were chosen using a search for autism-related terms and a specific age range on their website. The content of the books was then coded for autism terminologies (e.g. autism, neurodiversity, Aspergers) in each sentence. After recording the sentences in a spreadsheet, the total number of sentences with autism termino

EXPLORING THE RELATIONSHIP BETWEEN ADVERSE IMPACT AND ANXIETY IN ADOLESCENTS WHO STUTTER.
Presenter(s): Caroline Crago, Elaina Bortolini, Grace Beadle, Hania Masood, Megan Moore, Rachel Erdmann
Communication Arts & Sciences
Mentor(s): Bridget Walsh (College of Communication Arts Sciences)

Individuals who stutter tend to report a degree of adverse impact associated with their stuttering. Adverse impact refers to as a combination of experiences such as reduced self-esteem, and other negative thoughts or behaviors related to an individual's stuttering. Often associated with these experiences is the presence of anxiety, but it's not clear if there is a definitive relationship between the appearance of them both in the same individual. The objective of this project is to examine if the presence of higher anxiety in an individual predicts higher adverse impact for stuttering. This study is important because it may help clarify how stuttering and anxiety interact, providing insights that could enhance treatment approaches for children who experience both conditions. We sent a Redcap survey to 150 adolescents between the ages of 9 to 17, and as part of the survey, the individuals completed the Overall Assessment of the Speaker's Experience of Stuttering (OASES) which is a measurement of stuttering's adverse impact, as well as the Screen for Child Anxiety Related Disorders (SCARED). Our findings indicate the presence of general anxiety in an adolescent is a strong predictor of higher adverse impact from their stuttering. Upon additional analysis of how specifically social and school anxiety predict a higher difficulty in daily situations, social anxiety was a strong predictor, and school anxiety was not a significant predictor. The findings from this pro

IMPACTS OF AUTHORS' RELATIONSHIPS TO AUTISM ON CHARACTERIZATION OF PEER INTERACTIONS IN CHILDREN'S BOOKS ABOUT AUTISM
Presenter(s): Duaa Kazmi, Himani Patil, Kate Roy
Communication Arts & Sciences
Mentor(s): Grace Corrigan (College of Communication Arts Sciences)

Recently, there has been an increase in the number of autism diagnoses in the US (Center for Disease Control and Prevention [CDC], 2024). With a group that makes up such a substantial part of our population, how are they and the relationships they form represented in our media? In this study, our goal is to understand how authors' relationships to autism affect the peer interactions that take place within their books. We will analyze authors' relationship to autism by grouping authors into one of four categories: are autistic themselves, have an autistic child, have a professional background in autism, or have no relationship to autism. To accomplish this aim, we will use information provided in the books as well as outside sources.

MENTAL WELLNESS AND ANXIETY AMONG PEOPLE WHO STUTTER
Presenter(s): Amber Tetreau, Emma Scholz, Lexi Cickovski, Nat Husson
Communication Arts & Sciences
Mentor(s): Erika Mueller (College of Communication Arts Sciences), J Scott Yaruss (College of Communication Arts Sciences)

Stuttering is a developmental speech issue that affects 1% of the population. Clinically, stuttering is characterized by the presence of stuttering-like disfluencies (SLDs), including part and whole word repetition, prolongations, and blocks. It is the responsibility of speech-language pathologists to comprehensively understand a speaker's experience beyond traditional measures of fluency, including a speaker's cognitive and affective reactions to stuttered speech. Understanding this multifaceted relationship of self-perception and reactions such as anxiety among people who stutter is vital for successful speech therapy, for both clinicians and stutterers. Awareness of language and models used to approach the psychosocial and psychological aspects of stuttering can provide speech-language pathologists with a deeper understanding of people who stutter. To understand this relationship, authors conducted a literature review, using terms such as anxiety, self-perception, and mental health, with the goal of qualitatively exploring the relationship of these factors with one other and with stuttering. The current study's findings will aid in a deeper understanding of the lived experience of those who stutter, and this may be used to improve upon quality of therapeutic approaches used.

TRANSFORMING TOOLS TOGETHER
Presenter(s): Julia Griese
Communication Arts & Sciences
Mentor(s): Celeste Campos-Castillo (College of Communication Arts Sciences)

Through the Honors Research Seminar course, our 16 undergraduate students worked on the Transforming Tools Together project, which involves mental health research and inclusive design. This two-year project aims to close the disparity in mental health screening rates for autistic adolescents. Our team spent the semester conducting a scoping review on preexisting research with autistic adolescents, as well as creating content for the digital screener. Our team also conducted focus groups with the autistic youth, their caregivers, and mental health professionals to optimize our screening prototype. By integrating evidence from the focus groups with inclusive web design, we can develop interventions that are a critical step toward mental health equity.

TRAINING A DEEP LEARNING NETWORK TOWARDS IMAGE SEGMENTATION OF LARYNGEAL STRUCTURES
Presenter(s): Alexandra Stewart, Bianca Imeraj
Communication Arts & Sciences
Mentor(s): Maryam Naghibolhosseini (College of Communication Arts Sciences), Sardar Nafis Bin Ali (College of Communication Arts Sciences)

Laryngeal imaging is a valuable tool for observing vocal structures during phonation, providing insights into the health and function of the vocal folds. Our study used laryngeal high-speed videoendoscopy (HSV), a laryngeal imaging technique with high temporal resolution, to annotate various laryngeal landmarks during different stages of phonation, creating a diverse training dataset for our deep learning network. The goal is to train the network to generalize it across subjects and phonatory stages, allowing for precise automated identification of laryngeal structures towards analyzing disordered vocal function. HSV data were collected from 8 normophonic subjects and 6 disordered subjects during production of connected speech. The segmentation of our training data was performed using HSV images to annotate key anatomical landmarks, including the glottis, epiglottis, vocal folds, arytenoid cartilages, and aryepiglottic folds, using MATLAB's image labeling software. The selected frames for annotation were spaced at least 100 frames apart, resulting in around 100 annotated frames per subject. To ensure variability in phonation intervals, we excluded similar frames to provide diverse information to the machine learning algorithm. A total of 1400 annotated images were used to train a convolutional neural network using a U-Net framework, with 1200 images dedicated for training and 200 images for te

WELLBEING OF HEAD AND NECK CANCER PATIENTS
Presenter(s): Ella French, Isabel Pascua, Mostafa Ghanem
Communication Arts & Sciences
Mentor(s): Jeffrey Searl (College of Communication Arts Sciences)

A total laryngectomy is a surgical procedure involving the complete removal of the larynx, resulting in the permanent separation of the lower airway from the upper airway. This procedure necessitates breathing through a stoma (hole) in the neck and leads to significant changes in speech, respiration, and other body function. Often, quality of life is notably reduced. This study aimed to compare the well-being of patients following total laryngectomy to age and gender matched adults without laryngectomy. Seventy-three participants without laryngectomy and 136 participants post-laryngectomy completed a standardized Five-Factor Wellness Inventory (FFWEL) online. The survey provides a total well-being score, five second order-wellbeing factors, and seventeen third order -wellbeing factors. A series of t-tests for independent groups was applied with the alpha level adjusted through Bonferroni correction. Our results indicated statistically significant differences in 22 out of the 24 well-being factors, including the Total Well-being score and all five of the second order factors (Social-, Essential-, Creative-, Physical-, and Coping-self). The two nonsignificant differences were for the third-order factors Spirituality and Self

PARENTS' PERCEPTIONS AND ATTITUDES TOWARDS AI ADAPTIVE LEARNING SYSTEMS IN 3RD-GRADE MATH EDUCATION
Presenter(s): Alli Garpow
Communication Arts & Sciences
Mentor(s): Claudia Aparicio (College of Communication Arts Sciences), Fashina Alade (College of Communication Arts Sciences)

Incorporating Artificial Intelligence (AI) in education is reshaping the teaching of fundamental skills, particularly mathematics. Understanding parents' perspectives on AI-based adaptive learning systems is crucial for their successful implementation in schools. This study focuses on examining parents' attitudes, concerns, and expectations regarding AI adaptive learning technologies in 3rd-grade classrooms in Mid-Michigan, specifically emphasizing how AI can improve early math education.

CREATIVE EXPERIENCE AS A GREAT LAKES ECHO REPORTER
Presenter(s): Clara Lincolnhol
Communication Arts & Sciences
Mentor(s): Eric Freedman (College of Communication Arts Sciences), Gisele Souza Neuls (College of Communication Arts Sciences)

Presentation of my creative experience at the Great Lakes Echo. I will talk about knowledge I have gained, skills I have developed, and work I have produced at the Great Lakes Echo from January, 2024 until March, 2025.

UNDERSTANDING GESTALT LANGUAGE PROCESSING AND NATURAL LANGUAGE ACQUISITION SPEECH-LANGUAGE THERAPY APPROACHES: ENHANCING EVIDENCE-BASED PRACTICE THROUGH EXAMINING SOCIAL MEDIA
Presenter(s): Kamryn Jenkins
Communication Arts & Sciences
Mentor(s): Laura Dilley (College of Communication Arts Sciences)

This project critically examines the dissemination and implementation of Natural Language Acquisition, a framework based on the theory of Gestalt Language Processing. By analyzing the prevalence of key terms and phrases in YouTube videos, this study explores the popularity and growth of these concepts. Utilizing external AI applications, the research identifies key assumptions and potential misinterpretations surrounding the use of non-evidence-based practices. The findings aim to shed light on how such practices influence speech-language pathology education and intervention, ultimately contributing to more informed and evidence-driven approaches.

THE VARIABILITY OF STUTTERING ACROSS MULTIPLE CONTEXTS
Presenter(s): Bailey Marino, Ellyn Skodack, Julia Gilchrist
Communication Arts & Sciences
Mentor(s): Erika Mueller (College of Communication Arts Sciences), J Scott Yaruss (College of Communication Arts Sciences), Molly Landers (College of Communication Arts Sciences)

Stuttering is a communication disorder characterized, on the surface, by speech disfluencies such as blocks, prolongations, and repetitions. Stuttering can vary across different people who stutter along with different contexts, environments and across time. Our study's purpose was to investigate the variability of stuttering in a variety of speaking situations. We transcribed stuttered speech of an adult who stutters using CLAN transcription software and we analyzed speech transcriptions for stuttering disfluencies. Anticipated results include greater variability in speech disfluencies between familiar and unfamiliar environments, novel or known conversation partners and over time.

LATIN AMERICAN ENVIRONMENTAL COMMUNICATION RESEARCH PROJECT
Presenter(s): Anna Barnes, Shealyn Paulis
Communication Arts & Sciences
Mentor(s): Bruno Takahashi Guevara (College of Communication Arts Sciences), Iasmim Amiden dos Santos (College of Communication Arts Sciences)

Our research focuses on environmental discourses in Latin American contexts. Within the field of environmental communication, there are systematic power dynamics which historically favor the Global North. Latin American researchers are barred from the world stage of environmental communication because of language barriers, hegemonic perspectives, paywalls and educational disparities. Our research includes identifying those dynamics and then challenging the hegemonic perspective the niche field of environmental communication holds. We visited Peru last summer and made a short documentary defining the issue and how it stems from colonization. Afterwards, we returned to Peru to conduct field work where we gained qualitative context and information. Now we are creating a database that contains free, diverse environmental communication research conducted by academics in Latin America and the US. We are assisting in the organization of a symposium where scholars from Latin America, representing 8 different countries, will be presenting their own research in an effort to showcase the latest research on environmental discourses from diverse epistemological, theoretical, and methodological perspectives. Our work aims to build bridges in the world of research and to lessen the burden placed on Latin American researchers since the days of colonialism. Latin Am

AI INFLUENCERS IN DIGITAL ADVERTISING
Presenter(s): Chloe Mietelka
Communication Arts & Sciences
Mentor(s): Anastasia Kononova (College of Communication Arts Sciences), Juan Mundel (College of Communication Arts Sciences)

Artificial Intelligence (AI) has become increasingly prevalent in digital advertising over the past four years, making it essential for advertisers to understand its impact. This study examines the endorsement effectiveness of humans versus. AI-generated influencers in social media for personalized advertising. Using eye-tracking software, it compares visual attention to advertisements that include images of real people and images of people that are AI generated. Additionally, a pre and post survey, a pre- and post-survey measures shifts in perception, attitudes, trust and perceived congruence with the models. Findings will provide insights into consumer responses to AI influencers and their implications for advertising effectiveness.

DISPARITIES IN MENTAL HEALTH SCREENING IN AUTISTIC YOUTH
Presenter(s): Ella Johnson
Communication Arts & Sciences
Mentor(s): Celeste Campos-Castillo (College of Communication Arts Sciences), Susan Bonner (College of Communication Arts Sciences)

Throughout this year, a series of focus groups were conducted Co-create autistic youth mental health screening tools, a collaboration with the MSU Media and Information and MSU Honors Program.

ASIAN AMERICAN AND PACIFIC ISLANDER-SERVING NPOS AND PUBLIC RELATIONS
Presenter(s): Kassidy Do
Communication Arts & Sciences
Mentor(s): Chuqing Dong (College of Communication Arts Sciences)

This study aims to understand how AAPI-serving (Asian American and Pacific Islander) nonprofits' practitioners perceive public relations strategies to engage with stakeholders, increase public awareness, serve their communities, and advance their missions. In particular, we are interested in learning the relationship management strategies used by those NPOs and the opportunities and challenges associated with them. We are also interested in learning about how these nonprofit practitioners perceive their role as caregivers in the communities and the enablers and restrictions of their caring roles.

ARTICULATORY CONTACT PRESSURE DURING PRODUCTION OF LINGUA-ALVEOLAR PHONEMES
Presenter(s): Andre Edmond, Cassie Tallino, Lauren Garrison, Margaret Ver Steeg
Communication Arts & Sciences
Mentor(s): Jeffrey Searl (College of Communication Arts Sciences)

Articulatory contact pressure (ACP) has been proposed as a surrogate measure of perceived articulatory effort. Earlier work established a link between ACP and self-rated effort for patients with head and neck cancer. However, several questions remain about ACP in people without speech alterations. The purpose of this study is to gather additional ACP data during lingua-alveolar phonemes in different speaking conditions (loud, soft, clear) and to investigate the extent to which ACP is symmetrical on the right-left sides of the alveolar ridge and posterior molars. Pilot data on changes in surface electromyographic signals from facial and neck muscles in the speech conditions are also explored. This poster describes the background and methodology for the study. Additionally, the remaining steps for this study's completion and a description of the challenges in executing the study are presented.

A/B TESTING FOR ENGAGING USERS WITH KNOWLEDGE COMMONS NEWSLETTER EMAILS
Presenter(s): Zhanna Yakubova
Communication Arts & Sciences
Mentor(s): Larissa Babak (College of Arts & Letters)

This study will use A/B testing to evaluate user engagement with emails promoting the Knowledge Commons March newsletter. The experiment will compare strategies for presenting information as questions, exclamations, and statements. By analyzing key metrics such as open rates and click-through rates, the research aims to identify which approach is more effective in encouraging recipients to engage with Knowledge Commons . The findings will provide data-driven recommendations for enhancing email outreach and engagement strategies for Knowledge Commons .

PERCEPTUAL AND ACOUSTIC ANALYSIS OF ADDUCTOR LARYNGEAL SPASMS
Presenter(s): Gianna Spinelli
Communication Arts & Sciences
Mentor(s): Dimitar Deliyski (College of Communication Arts Sciences), Maryam Naghibolhosseini (College of Communication Arts Sciences), Sara Charney (Mayo Clinic - Arizona), Trent Henry (College of Communication Arts Sciences)

Adductor laryngeal dystonia (AdLD) is a rare and often misdiagnosed neurological voice disorder leading to muscular spasms within the larynx. These spasms may lead to a hoarse vocal quality and voice breaks due to the forceful adduction of the vocal folds. Prior research has investigated the perceptual attributes of this disorder, but little research has been dedicated to the in-depth acoustic analysis of the spasms themselves. Therefore, the present study aims to advance the understanding of AdLD spasms by analyzing their perceptual and acoustic characteristics. Data collection consisted of recording audio data from the participants while reading connected speech. Three speech-language pathologists evaluated the audio data perceptually to determine occurrences of spasms. Audio spectrograms, which display the energy in time and frequency domains, were then analyzed to assess the distribution of energy across frequency during the spasms. Prior perceptual analysis identified a tendency for spasms to occur during vowel production or consonant-vowel sequences. Findings revealed that before or at the onset of spasms, there was a low, breathy, or raspy voice quality caused by the vocal folds vibrating at an aperiodic frequency, often accompanied by a slow rate of oscillation

THE LIVED EXPERIENCE OF JOURNALISTS IN EXILE
Presenter(s): Katherine Dyal, Patrick Ferrino
Communication Arts & Sciences
Mentor(s): Eric Freedman (College of Communication Arts Sciences)

This research project examines the experience of journalists exiled from their homelands, largely forced to leave unwillingly and primarily from locations in Central Asia, Russia, the Middle East, Africa, and Latin America. We are focusing on the overlap and relationship between government policy and one's personal life, focusing on the issues of safety, psychology, financial support, and continuing work in exile. Often, journalists experience transborder harassment from their own governments in the form of threats, intimidation, and violations of their rights to privacy, and some of their families have suffered harassment as well. Furthermore, many journalists have suffered physical attacks, in their home countries and in exile, the most serious of them resulting in death. Additionally, journalists' experiences with online harassment raises the issue of cybersecurity. Our research explores the psychological effects of such threats to safety, as well as the psychological impact of living in exile. We examine the extent of government protections of refugees who might be victims of this stalking and harassment. We are also investigating the extent to which NGOs such as ICORN and CPJ offer exiled journalists financial support and the ways in which journalists are able or unable to continue their work in exile. Our methods include survey, documentary rese

HEAD AND NECK CANCER BIBLIOMETRIC REVIEW
Presenter(s): Brooke Emerick, Ella French, Mackenzie Meerschaert
Communication Arts & Sciences
Mentor(s): Jeffrey Searl (College of Communication Arts Sciences)

Aim: Characterize the literature from 1960 to the present regarding the behavioral speech and language therapies used to improve communication outcomes in adults with head and neck cancer. Methods: A comprehensive literature review was completed using PubMed, CINAHL, and Cochrane databases and relevant search terms. Inclusion criteria were 1) human research, 2) head and neck cancer focused, and 3) speech-language therapy outcomes focused. Exclusion criteria were 1) non-English language, 2) unavailability of abstract. Abstract/title and full manuscript reviews were completed in Covidence by teams of trained undergraduate researchers who worked by consensus to resolve disagreements about inclusion and exclusion of articles. Results: A total of 4,596 articles were identified across databases. After the identification and removal of duplicates and completion of the abstract/title review, a total of 356 articles remained. After completion of full manuscript review, 73 articles were retained for data extraction. Frequency analysis was per

SYNTHETIC SOULS: CAN AI BE MORE THAN JUST A MACHINE?
Presenter(s): V Kumar
Communication Arts & Sciences
Mentor(s): Ruth Shillair (College of Communication Arts Sciences)

As AI becomes increasingly integrated into human lives, people are developing relationships with AI models that go beyond simple transactions. This research explores how long-term interactions with AI, particularly when assigning names, using pronouns, and reinforcing personal acknowledgment, influence user trust and emotional attachment. Through a combination of qualitative analysis and comparative testing, this study examines whether relational engagement changes AI responsiveness and how this impacts human perception. Inspired by personal experiences engaging with AI, this project also reflects on real-world cases where AI interactions have had unintended emotional consequences- including instances of users forming deep parasocial attachments, sometimes with harmful outcomes. By comparing interactions with a familiar AI model versus a neutral, untrained instance, this research aims to evaluate whether AI's relational adaptability fosters a sense of trust, comfort, or even vulnerability. Furthermore, ethical concerns arise when AI-human relationships lead to potential manipulation, cybersecurity risks, and emotional dependence. This research will contribute to ongoing discussions on AI ethics, trust calibration, and responsible AI design. The findings could inform best practices for developing AI that acknowledges relationships while ensuring user safety.

TRUMP AND THE TWITTER EFFECT: INVESTIGATING TRUMP'S PRESENCE IN NEWS MEDIA AND POLITICS
Presenter(s): Kelsy Woodall
Communication Arts & Sciences
Mentor(s): Manuel Chavez (College of Communication Arts Sciences)

In today's digital age, social media and technology aid politicians in connecting with the public. The 45th President of The United States, Donald Trump, changed the narrative, especially during his campaigns. Twitter defined Trump's career, and he used it for more than public engagement. His offensive and aggressive tweets escape traditional media by allowing him to connect with millions in the snap of a finger. In this paper, I will explore how Trump's Twitter presence changed his political strategies, the public's perception of him, and the effect social media has on politics today through many research studies. I argue that Trump's use of Twitter allowed him to influence the political narrative, and his public, personal attacks changed society.

CRIMINAL JUSTICE & LEGAL STUDIES

EXAMINING RELATIONSHIPS BETWEEN FAMILY AND YOUTH RELATIONSHIP RISK FACTORS AND RECIDIVISM RATES IN JUVENILE OFFENDERS
Presenter(s): Emily Mason
Criminal Justice & Legal Studies
Mentor(s): Caitlin Cavanagh (College of Social Science)

The Center of the Developing Child at Harvard University (2022) notes that juveniles need at least one supportive relationship with an adult to develop prosocial behaviors, self-control, delayed gratification, and focus. Without a supportive relationship, many children struggle to learn how to adequately respond to corruptive influences because they do not develop the necessary coping skills. My research question, exploring possible correlates between poor familial and youth relationships with recidivism or one-time offenses, will utilize family and youth relationship risk factors contributing to risk levels reported in Youth Level of Service Risk Assessments (YLS) for juveniles involved in a Midwestern juvenile court. It is vital that we understand the potential correlation between family-child relationship risk factors and recidivism to develop and assess programs that foster productive relationships and appropriately respond to the needs of juveniles involved in the juvenile justice system. This research could support the court system by connecting juvenile behaviors to their relationships with influential family members, thus considering the impacts of external factors that influence the development of anti-social or prosocial behaviors. As family influence and structure change, the court system must develop awareness of pathways that influence juvenile well-being and learning patterns that impact recidivism rates.

DESCRIPTIVE ANALYSES ON DEVIANT BEHAVIOR IN JUVENILE SEXUAL OFFENDERS
Presenter(s): Ana Murillo
Criminal Justice & Legal Studies
Mentor(s): Caitlin Cavanagh (College of Social Science)

Juvenile sexual offenders (JSOs) account for roughly one-in-four of all sexual offenses and more than one-third of sexual offenses against minors (Baglivio et al., 2021). Society has always been fascinated by the age-old question of why people commit crime resulting in an influx of ideas and theories proposed by researchers. However, JSOs represent a subset of the criminal population that has long been understudied. The Juvenile Sex Offender Assessment Protocol (JSOAP) is a risk assessment that predicts the likelihood of sexual recidivism for juveniles. In order to better understand juvenile sex offending behavior, this study aims to investigate the interrelation between the following JSOAP items: degree of planning in sexual offenses, sexual aggression, sexual drive and preoccupation, sexual victimization history, and remorse and guilt. The hypothesis is that juveniles who exhibit higher levels of sexual aggression, sexual drive and preoccupation, and a history of sexual victimization will demonstrate a greater degree of planning, as well as lower levels of remorse and guilt. Understanding and finding patterns among JSOs in relation to these characteristics is the first step in determining if there are various developmental pathways of behavior. These findings can contribute to a more nuanced understanding of juvenile sexual offending, and fu

SHAPING PUBLIC OPINION IN THE GLOBAL SOUTH
Presenter(s): Chloe Francis
Criminal Justice & Legal Studies
Mentor(s): Robert Brathwaite (James Madison College)

This independent study is focused on how authoritarian regimes utilize strategic communication to shape public opinion in the Global South. This study analyzes messaging narratives used by authoritarian regimes by examining regional media, political leader speeches, and public opinion data in the Global South. The main argument of this study identifies specific narratives associated with legacies of colonialism, globalization, and development that authoritarian regimes utilize to increase their political standing in the Global South. A qualitative approach consisting of comparative case studies of messaging strategies used by Russia and China in the Central African Republic, India, and Indonesia is used to test this argument. Preliminary findings indicate that Russia frames its messaging around anti-Western sentiment, while China emphasizes economic partnerships through the Belt and Road Initiative. These early findings are powerful revealing how increasingly authoritarian powers tailor their messaging strategies to different regions, influencing geopolitical alignments with a disregard for human rights.

TRENDS IN LOCAL JUVENILE GUN VIOLENCE BEFORE AND IN THE WAKE OF THE MASS SHOOTING AT MSU
Presenter(s): Arden Henderson
Criminal Justice & Legal Studies
Mentor(s): Caitlin Cavanagh (College of Social Science)

Although it has been over a year since the devastating shooting at MSU, our community is still feeling the impact of such a life-changing event. While this occurred at a college campus, the greater community was also affected by this event. Stricter gun legislation was reintroduced in the month following the shooting, and took effect this past February (Cappelletti, April 2023). The broader community was affected by this event in countless ways. Studies have shown that there is a positive association with juvenile delinquency and exposure to community violence (Chen, et al., 2016). In addition to this, mass shootings have devastating mental health effects and have been found frequently result in collective trauma (American Psychological Association, 2023). Following the shooting, 11 bills on gun safety were brought before the Michigan legislature. These bills focused on implementing universal background checks, safe storage laws, and extreme risk protection orders (Cappelletti, March 2023). Given this new legislation and the social effects of this kind of traumatic event, my research will seek to answer: how did the shooting at MSU on February 13, 2023 affect the frequency of juvenile gun-related violence in the surrounding community? Data was collected using the Youth Level of Servic

SUBSTANCE USE AND PEER NETWORKS IN LANSING YOUTH OFFENDERS
Presenter(s): Alayna Tisch
Criminal Justice & Legal Studies
Mentor(s): Caitlin Cavanagh (College of Social Science), Samuel Metz (College of Social Science)

Youth in the juvenile justice system have significantly higher rates of substance use and abuse compared to their peers in the general population. Treating and supporting recovery in juvenile offenders has been linked to improved outcomes, including reduced adult criminal behavior. Although substance use strongly correlates with juvenile offending and offense severity, the causal relationship remains unclear. This research project will analyze data collected from the Family Division of a Midwestern Court's Juvenile Risk Assessment project to identify the static and dynamic factors in juvenile offenders that indicate a higher risk for drug use and reoffending. Key factors include free time use, aggression, and school performance. Using information from the Youth Level of Service form (YLS), this project will explore the relationship between peer networks, drug and alcohol use, and risk for future offending. Our hypothesis includes that (H1) youth offenders with higher rates of drug use will also demonstrate higher rates of alcohol use, and (H2) juvenile offenders with higher rates of drug and alcohol use will also have higher rates of recidivism.

FIRST RESPONDER DISTANCE AND TRAINING IMPACT ON FATALITIES DURING ACTIVE SHOOTER SITUATIONS IN K-12 SCHOOLS
Presenter(s): Noah Andres
Criminal Justice & Legal Studies
Mentor(s): Steven Chermak (College of Social Science)

In the last two decades, the increasing frequency of active shooter incidents within K-12 schools has contributed to a rising need for first responder training. Little research exists analyzing how practice & preparation can affect the casualty rates of an active shooter incident. In the following study, we extrapolate on a random representative sample of thirty case studies taken from the TASSS (The American School Shooting Study) to compare the effectiveness of prevention policies on casualty rates in K-12 schools through open-source data collection methods. The implications of the study suggest certain preventative drills possesses an overall positive impact on preventing casualties during K-12 active shooter drills.

EXAMINING CORRELATIONS BETWEEN ADOLESCENT RISK FACTORS AND FUTURE OFFENDING OVER A 15-YEAR PERIOD
Presenter(s): Quincy Zhou
Criminal Justice & Legal Studies
Mentor(s): Christopher Melde (College of Social Science), Steven Chermak (College of Social Science)

Research suggests risk factors experienced in adolescence contribute to future illegal conduct, yet little research has been conducted concerning this idea in recent years. This research aims to examine the relationship between risk and protective factors that were presented during adolescence and criminal behavior in early adulthood. Specifically, the relationship between indicators of peer influence, gang membership, family dysfunction, and substance use in adolescence with criminal behavior as a young adult will be examined. This research utilizes two sources of data. First, the baseline measures related to risk factors in adolescence will be taken from the national evaluation of the GREAT program - an evaluation of a school-based prevention program to reduce gang involvement and other illegal activities that spanned 2006-2012. Second, more recently, NIJ provided additional fundings to reestablish contact with the approximately 4,000 participants from the original GREAT evaluation to collect survey, financial and court data from each participant. By analyzing court data, this research determines whether participants had any evidence of criminal behavior over the last 15 years. This research will then identify correlations between risk factors in adolescence and future criminal behavior through linking survey information with open-source court records. Findings from this research will allow for a better understanding of the long-term impact of ado

A QUALITATIVE ANALYSIS OF INDIVIDUALS CONVICTED THROUGH THE SEXUAL ASSAULT KIT INITIATIVE (SAKI) IN MICHIGAN
Presenter(s): Alexa Banning
Criminal Justice & Legal Studies
Mentor(s): Karen Holt (College of Social Science)

This research project aims to explore the cases solved through the Sexual Assault Kit Initiative (SAKI) in Michigan. Case study narratives for each individual were created, examining prior convictions, qualities of the offender and victim, crime characteristics, and the associated criminal justice outcomes. A qualitative analysis of these data will allow for a rich and descriptive account of who is most often being prosecuted through this project in the state of Michigan. Implications for policy and practice will be discussed.

FAMILY AND PARENTING PROTECTIVE FACTORS AND THEIR CORRELATION WITH REDUCED RECIDIVISM
Presenter(s): Swathi Thiyagarajan
Criminal Justice & Legal Studies
Mentor(s): Caitlin Cavanagh (College of Social Science)

When a child commits a delinquent act, parents are often scrutinized. Families play a crucial role in shaping a child's morals, behaviors, and attitudes. Parental involvement during incarceration can positively impact a child's behavior. Research shows frequent parental visits reduce depression and behavioral problems while improving academic performance and socioemotional skills (Mikytuck et al., 2019). However, recidivism remains a concern. Family and parenting risk/protective factors are key in determining recidivism scores in the Midwestern Juvenile Court YLS Risk Assessment. This study analyzes how factors like consistent supervision, strong family management, consistent parenting, and strong adult bonds influence reoffending. Understanding these factors can help courts implement services, such as family support programs, to prevent recidivism. Additionally, this research can raise public awareness by helping parents understand their role in preventing youth crime and educating pediatricians on identifying and addressing family-related risk factors. This study hypothesizes that youth with protective factors-consistent supervision, strong family management, consistent parenting, and strong adult bonds-will have lower recidivism rates than those without them.

DIVERSITY & INTERDISCIPLINARY STUDIES

SOCIAL ACCEPTABILITY OF LGBTQIA+ INDIVIDUALS IN KENYA: A COMPLEX INTERPLAY OF GENERAL PUBLIC, GOVERNMENT AND LAWS, RELIGIOUS GROUPS, EDUCATIONAL INSTITUTIONS, AND DATING LIVES
Presenter(s): Kaitlin Carlson
Diversity & Interdisciplinary Studies
Mentor(s): Jonathan Choti (College of Arts & Letters)

The social acceptability of LGBTQIA+ individuals in Kenya is shaped by a complex interplay of cultural norms, legal frameworks, religious ideologies, educational systems, and societal attitudes. My study analyzes the downfalls and progress in the acceptance of LGBTQIA+ identities across different social sectors including public perception, government policies, and personal relationships. Despite these barriers, generational and urban shifts show growing tolerance, with younger populations and urban centers such as Nairobi, which my study focuses on, progressing. Advocacy efforts create a role in fostering safe spaces, challenging norms, and promoting systemic reforms.

REDEFINING ACCESSIBILITY IN MUSEUM SPACES: METHODOLOGIES AND PRACTICES FOR A MORE INCLUSIVE FUTURE
Presenter(s): Abigail Brooks, Brayden Chrisman, Lorraine Inman
Diversity & Interdisciplinary Studies
Mentor(s): Natalie Phillips (College of Arts & Letters)

Our presentation assesses Creativity in the Time of COVID-19: Art as Medicine , an exhibition drawing on a database of art collected between 2020 and 2022 in response to the Covid-19 pandemic. We examine the showcase done by the Digital Humanities and Literary Cognition Lab (DHLC) at MSU in the Fall of 2024 as a case study in improving museum space accessibility practices. Our exhibit was structured around an accessible design philosophy that goes beyond ADA compliance to connect diverse audiences to our archive. The DHLC sought to platform artists from BIPOC, LGBTQIA+, disability, and international communities to reflect the diverse nature of responses to COVID-19. We selected art pieces representing multiple modalities to accommodate varied sensory needs and preferences. Alongside these selections we provided audio descriptions for visual impairment, audio captioning for aural impairment, a respite space to support the mental wellbeing of our visitors, and adequate space in the gallery for mobility aids. To evaluate the success of the exhibit at depicting diverse pandemic experiences through accessible art, the DHLC gathered visitor feedback through a survey via QR code and written responses from artists, keynote speakers, and accessibility experts. We analyze this feedback and synthesize it into an effective action plan for coordinating future exhibitions. Our methods, i

ART IN MEDICAL EDUCATION: USING ARTS TO IMPROVE MEDICAL STUDENTS' UNDERSTANDING OF LIVING WITH DISABILITIES
Presenter(s): Farah Daddo, Marissa Malleck, Quynh Tong
Diversity & Interdisciplinary Studies
Mentor(s): Natalie Phillips (College of Arts & Letters), Soohyun Cho (College of Arts & Letters)

1 in 4 American adults have a certain kind of disabilities, an experience that fundamentally alters how they experience their life. However, the American healthcare system is ill-equipped to work with these

disabled patients, with a long history of these patients facing discrimination from providers. Many physicians reported feeling they are unsure of how to deal with patients with disabilities, creating inequities in the healthcare system. Improving medical students' knowledge of how disabled people go about their life and how to provide adequate care for this patient population is then extremely important. Our project encourages medical students to reflect on experiences that can seem inaccessible to them. Our project believes that integrating artworks and stories told by disabled artists, or artists living with chronic conditions can be an emotionally powerful way to improve students' understanding of disability. This project is based on our Mellon-funded archive of art made during the COVID-19 pandemic, a mass-disabling event that revealed and exacerbated health disparities. Our poster will be discussing the programming for a session Intersession which centers on patient vulnerabilities.

ASSESSING THE INTERSECTIONS OF CLIMATE, HEALTH, AND RACIAL JUSTICE ON MIGRANT FARM WORKER STUDENTS THROUGH COMMUNITY BASED PARTICIPATORY ACTION RESEARCH (CBPAR)
Presenter(s): Anika Bery, Cherese Grier, Cole Johnson, Manushree Ganta, Mikayla Jackson
Diversity & Interdisciplinary Studies
Mentor(s): Estrella Torrez (Residential College in Arts & Humanities), Mark Axelrod (James Madison College), Shahnaz Masani (Lyman Briggs College)

Youth-led Undergraduate Research Experience in Climate, Health, and Racial Justice (YOURE(in)CHARJ) is a research initiative that aims to explore the intersection of climate, health and racial justice. The theoretical framework of this project is an interdisciplinary approach in analyzing information which is implemented through bringing together research assistants from the Residential College of Arts and Humanities, Lyman Briggs College, and James Madison College. The community of focus within this research are migrant farm workers part of the College Assistance Migrant Program (CAMP) at MSU. Our research methodology is Community-Based Participatory Action Research (CBPAR), which involves members of the affected community in a constantly iterative process. Rather than approaching communities with a deficit mindset, CBPAR aims to treat community members as experts and integrate them in the co-production of knowledge throughout the research. The way in which this is shown to be implemented in our research is through Roundtable Discussions with CAMP students, engaging with their experiences in relation to health and climate justice to gain a holistic view of the impacts that they have on CAMP students. This project will create space for CBPAR to become more commonplace in interdisciplinary research circles, allowing communities that are the subjects of research to play a more active role in studies. By engag

COMPLEXITIES OF THE AMERICAN "LATINO VOTE"
Presenter(s): Roberto Garcia
Diversity & Interdisciplinary Studies
Mentor(s): Michael Ristich (College of Arts & Letters)

During every major election cycle in America, conversations about the "Latino vote" become ever more prevalent in political analysis and scholarships. As more generations of Latinos are born in or come to America, there are more Latine perspectives to consider. This name designation, however, fails to encapsulate the diversity of perspectives and experiences that make up this "Latino vote", which candidates work so strongly to convince. As Latinos in America vary in their perceptions, their views on how law and policy will affect them and their loved ones similarly change. This project explores the effect of disinformation, identity, and values and how combining these factors has led Latinos from the political left to the political Right. This presentation aims to provide analysts and policymakers with a more nuanced understanding of factors at play when Latinos make their way to the ballot box.

COMMON PERCEIVED WHITE-ASIAN BIRACIAL (WASIAN) STEREOTYPES
Presenter(s): Jasmine Chow
Diversity & Interdisciplinary Studies
Mentor(s): Clifford Broman (College of Social Science)

Introduction: Wasians are individuals who are white and Asian, thus having unique life experiences as biracial individuals. Their identities are poorly defined in existing literature, particularly concerning common stereotypes they experience. Additionally, literature discussing their lived experiences within the larger American culture is very limited. Methods: We explored the literature about attitudes towards marginalized groups and social constructs in UGS 200H to develop a research topic. Research questions were developed using additional prior literature, mine specifically about common Waisian stereotypes, and were sent out through a survey. Additionally, we also conducted qualitative interviews with individuals relevant to our specific research questions, Wasian individuals in my case. Results: 81.5% of participants were generally aware of Wasian stereotypes and 21% were aware of three specific stereotypes in the survey. However, Asian participants were more likely to be aware of Wasain stereotypes than non-Asian participants. An overwhelming majority (68.5%) of participants saw Wasian stereotypes depicted on social media. 93% of Asians and 42% of white participants had heard someone express these stereotypes to them or around them. Conclusions: Awareness of Wasian stereotypes is more prevalent among Asian individuals than white individuals. A

EXPLORING THE EFFECTS OF DISCRIMINATION AND INTIMATE PARTNER VIOLENCE ON MATERNAL-CHILD OUTCOMES
Presenter(s): Daviona Cross
Diversity & Interdisciplinary Studies
Mentor(s): Alytia Levendosky (College of Social Science), Amy Nuttall (College of Social Science)

Intimate partner violence (IPV) negatively impacts women's mental health and thus negatively affects their children. Women experiencing IPV may also face discrimination, and marginalized groups are at greater risk for interpersonal harm. Consistent with the extant literature maternal discrimination was hypothesized to moderate the association between IPV and maternal mental health and that maternal discrimination would also moderate the association between IPV and child internalizing and externalizing at child age 3. Data were drawn from the larger Michigan Prenatal Stress Study, an ongoing prospective, longitudinal study. Participants were oversampled for IPV exposure and demographic risk. We used data on 108 racially diverse mother-child dyads. Maternal experiences of IPV, and maternal anxiety, depression, and PTSD symptoms were assessed when children were 2 ½ years using validated self-report measures. Maternal experiences of discrimination were assessed using the Experiences of Discrimination scale when children were 2 ½ years old. Children's behavior problems were assessed at age 3 with the Child Behavior Checklist. My hypotheses were partially supported, consistent with the extant literature, IPV significantly predicted maternal depression (β=.331, p=.002), anxiety (β =.321, p=.003), and posttraumatic stress disorder (β =.247, p=.020). For child externalizing (β =-.276, p=.041) a

SEXUAL VIOLENCE AS A METHOD OF GENOCIDE IN 1994 RWANDA AND ITS AFTERMATH
Presenter(s): Josie Danielkiewicz
Diversity & Interdisciplinary Studies
Mentor(s): Michelle Moyd (College of Social Science)

In 1994 Rwanda experienced a 100 day genocide against the minority Tutsi population. An estimated 800,000 men, women, and children were killed, and in addition to murder many also were brutally assaulted. This research project aims to examine how sexual violence was used as a tool of genocide and how it has impacted the lives of survivors and their children into the present day. Sexual violence is often seen as an inevitable consequence of violence during conflicts and not as a method of war or perpetuating genocide despite updates to international law which argue the latter. This project aims to illustrate how sexual violence was used to perpetuate genocide in Rwanda and the impacts that it has had on individual survivors and their communities since the end of the genocide on July 19, 1994.

"IT'S NOTHING TO DO WITH RACE": RACE-EVASIVE IDEOLOGIES IN UNDERGRADUATE LEARNING ASSISTANTS' DISCOURSE
Presenter(s): Cyril Hobeika, Faith Persyn
Diversity & Interdisciplinary Studies
Mentor(s): Shahnaz Masani (Lyman Briggs College)

Undergraduate learning assistants (ULAs) are near-peer instructors that facilitate learning via student-centered pedagogies, often engaging more directly with students than faculty. Despite their important role in STEM classes, little is known about how ULAs understand and practice equity. Prior research shows that STEM faculty at predominantly white institutions (PWIs) often perpetuate inaccurate narratives of meritocracy, objectivity and neutrality when describing their classrooms and disciplines. In doing so, they draw on color-evasive narratives that explain away racial phenomena without explicitly naming race or racism as a cause of oppression1,2. Michigan State University is a PWI with many courses that are supported by ULAs. Given the documented pervasiveness of color-evasive ideology at PWIs, we ask 'How do ULAs make meaning of race and racism in the classroom?'. To answer this question, we qualitatively analyzed data from interviews that prompted ULAs to reflect on the impacts of race in their classrooms. We found that ULAs often side-stepped conversations on race by (a) Describing STEM classrooms as objective, neutral and separate from the socio-cultural environment, (b) Conflating race and culture, focusing on assimilating students into dominant STEM cultures (c) Focusing on individual student characteristics such as a lack of prior preparation or initiative to ac

EXAMINING THE LONG-TERM IMPACT OF SISTER CIRCLE ON WOMEN OF COLOR AT A PWI
Presenter(s): Abigail Rodriguez, Alana Mapp, Kellsey Hall
Diversity & Interdisciplinary Studies
Mentor(s): Candace Moore (Residential College in Arts & Humanities), Sitara Thobani (Residential College in Arts & Humanities), Tama Hamilton Wray (Residential College in Arts & Humanities)

This study expands on prior research examining the impact of Sister Circle, a mentoring program for Women of Color (WOC) at MSU, by exploring differences in experiences between long-term participants within the Residential College in the Arts and Humanities (RCAH) and newer participants, including those outside of RCAH. Using Third Spaces and the Minority Stress Theory, this study investigates how sustained engagement with culturally affirming programs influences students' sense of belonging, well-being, and resilience in academic spaces. Data is being collected through surveys and interviews, comparing responses across participant groups. By examining how duration and college affiliation shape engagement with Sister Circle, this research seeks to highlight the evolving role of culturally sustaining spaces in fostering empowerment and support. Long-term participants may develop a deeper sense of connection and leadership within the program, while newer participants navigate the initial stages of integration and identity formation in these spaces. The study considers how Sister Circle functions as both a safe space from institutional challenges and a space for critical dialogue, mentorship, and personal growth. Additionally, it explores the broader implications of culturally affirming programs in academic settings, particularly in shaping retention, confidence, and cross-community solidarity for WOC at a predominantly white institution.

THE COREY MARSH THEATER PROJECT: EXPLORING PLACE-BASED ART INTEGRATION IN LOCAL CONSERVATION
Presenter(s): Anthony Monteleone, Benjamin Eiler
Diversity & Interdisciplinary Studies
Mentor(s): Emily Pomeranz (College of Agriculture & Natural Resources)

The use of art as a bridge between conservation and the public is well-studied, however research exploring the bi-directional impacts of science education and artistic creativity on artists, scientists, and audiences is limited. Over the summer of 2024, a team of researchers facilitated the collaboration between scientists and artists in a series of five workshops in which both the artists and scientists shared their areas of expertise and the artists led artistic activities integrating these ideas into artistic outputs. The artists then took the lessons from these workshops to write, rehearse, and perform an original place-based play titled The Link at the Corey Marsh Ecological Research Center, a wetland restoration research site owned and operated by Michigan State University where The Link was produced. A primary research objective from this work was to evaluate the impacts of this creative collaborative work on the attitudes of artists and scientists involved regarding art and its role in conservation, the power dynamics between artists and scientists and participants' interest in continued pursuit of art-science collaborations. In the nature of the project, this poster will be presented by two Michigan State University undergraduates: Ben Eiler, the lead undergraduate researcher on this project and Anthony Monteleone the director of The Link. Through the poster, Eiler will share the findings associated with this project and Monteleone will share his experience as an

THE FANOPTICON: POWER, PROJECTION, AND THE POLICING OF DISCOMFORT IN FANDOM DISCOURSE
Presenter(s): Amber Olguin
Diversity & Interdisciplinary Studies
Mentor(s): Eddie Boucher (College of Social Science)

Online fandom communities have long been considered safe, transformative spaces for women and LGBTQ+ individuals. However, in recent years that has been threatened by the rise of "anti" and "pro-ship" discourse has lead to doxxing, death threats, sexual harassment, and further violence as "antis" believe that dark, or "problematic", media encourages real life beliefs and behaviors that are harmful or "immoral", especially with regards to sex, while "pro-shippers" value freedom of expression, especially of victims. This is troubling, given its eerie similarities to current offline political polarization, specifically book bans. My project explores the power dynamics at play as well as the psychology of both camps through qualitative content analysis and semi-structured interviews. Surprisingly, both the anti and pro-ship participants agreed that follower count determined power and that the discourse values "sound bite" answers over good-faith discussion. However, they disagreed on the value of dark fiction and discomfort, the anti saying it "normalizes" abuse due to fans identifying with characters while the proshipper argued fans, and people more generally, "have a right to engage in discomfort". Their positions were supported as representational by field observation (X/Twitter) analysis. This research provides a fascinating, if concerning, look into fandom discourse as a microcosm of divides in our lar

INTERSECTIONALITY IN THE HALLS OF POWER: DIVERSITY AND ITS IMPACT ON POLICY IN UNITED STATES LEGISLATURES

Presenter(s): Lowell Monis
Diversity & Interdisciplinary Studies
Mentor(s): Matthew Grossmann (College of Social Science)

This project explores the multifaceted dimensions of diversity, including ethnic, racial, economic, and gender factors, within the U.S. Congress and state legislatures, seeking to understand how the intersections of these identities influence political representation, decision-making, and public policy. It aims to provide a holistic understanding of diversity in U.S. legislative bodies, contributing to discussions on equity, inclusivity, and the complex interplay of diverse perspectives in the democratic process. The work is data-driven, studying datasets with information regarding congressional and state legislature demographics, while giving birth to a more comprehensive and tidier dataset specific to diversity factors, using statistical scripting to create enlightening plots to ease the study of such vast, historical data. While the exact conclusions of the study slowly arise, it aims to answer critical questions, including whether legislator tenures and productivity are influenced by diversity. It will also examine if Congress follows or leads state legislators in diversity. Essentially, this project aims to find if this representative democracy is truly representative and trace how its results play into definitions of diversity.

DIVERSITY THROUGH NEW LENSES

Presenter(s): Alexis Marshall
Diversity & Interdisciplinary Studies
Mentor(s): Clifford Broman (College of Social Science), Katrina Groeller (College of Social Science)

Diversity plays a large role in the society that we live in, shaping social interactions, cultural understanding, and personal identity. This study examines how relocating from a less diverse area to a more diverse one - or from a diverse area to an even more diverse environment - affects individuals' perspectives on diversity. Using a mixed-methods approach, data was gathered through a survey (N = 124) and semi-structured interviews to explore shifts in awareness, social relationships, and attitudes toward racial and ethnic diversity. Survey results show that 60% of participants moved to a setting they perceived as more diverse, with rural-origin individuals most likely to report a dramatic increase in diversity at their new environment. Those from urban areas, in contrast, were more likely to report continuity in diversity levels. Participants who grew up in less diverse areas also reported having less diverse friend groups and showed a stronger sense of optimism about the future. Racial and ethnic background further influenced how diversity was perceived, particularly among Asian participants, who were more likely to view their current environments as less or equally diverse compared to where they came from. This study highlights the impact of lived experience in shaping views on diversity and underscores the role of environment in fostering social integration and cultural awareness. By examining individuals adapt to and interpret diversity in new settings, this researc

"DIFFERENT STUDENTS ARE GOING TO NEED DIFFERENT THINGS IN ORDER TO ACCOMPLISH THAT GOAL": UNDERGRADUATE LEARNING ASSISTANTS' CONCEPTIONS OF SUCCESS AND EQUITY
Presenter(s): Grace Sanford, Reema Korganji, Rupal Athalye
Diversity & Interdisciplinary Studies
Mentor(s): Shahnaz Masani (Lyman Briggs College)

STEM education is exclusionary for several reasons, from historical legacies of sexism to racism to ableism. This results in negative consequences and outcomes for students from minoritized groups. Educational instructors, as primary sources of knowledge to these students, have been found to have differing conceptions of equity in the classroom, varying from equality to inclusion to justice. Equality encompasses treating all students the same regardless of their background or social status. Inclusion is described as providing each student with the different support they need to succeed. Justice goes beyond equity and inclusion by considering historical and sociopolitical contexts of inequities. Further, instructors' conceptions of equity directly impact their approaches to teaching by influencing their individual teaching practices and engagement with the students. Undergraduate Learning Assistants (ULAs) work alongside professors as additional teaching support in undergraduate courses. ULAs are closer in age to the students and can act as a bridge between the professor and the student. However, not much is known about how ULAs think of or practice equity. In this study, we seek to understand how ULAs' ideas of success in the STEM classroom align with their conceptions and practices of equity in this same setting. To understand the ULA's perspectives, we qualitatively analyzed different sets of interview data focused on their experiences in the classroom and their understa

HOLISTIC MANAGEMENT OF FIBROMYALGIA: A MULTIMODAL APPROACH TO SYMPTOM RELIEF
Presenter(s): Alina Acosta
Diversity & Interdisciplinary Studies
Mentor(s): Lynnette King (College of Social Science)

Fibromyalgia is a chronic, multi-symptom condition characterized by widespread pain, fatigue, sleep disturbances, and emotional distress. Because its cause remains unknown and its symptoms vary widely between individuals, treatment requires a personalized, holistic approach. This paper explores multimodal strategies for fibromyalgia management, focusing on the combined use of pharmacological, psychological, dietary, and alternative therapies. FDA-approved medications such as pregabalin, duloxetine, and milnacipran target central pain processing but are rarely sufficient on their own. Complementary interventions like cognitive behavioral therapy (CBT), tai chi, hydrotherapy, and plant-based diets offer additional relief by improving emotional resilience, physical function, and quality of life. The research also considers the sociocultural dimensions of fibromyalgia, including gender disparities in diagnosis and the concept of biographical disruption, which describes how chronic illness reshapes identity and self-perception. Together, these findings suggest that a multimodal treatment model-one that addresses both biological and psychosocial aspects of fibromyalgia-is the most effective way to alleviate symptoms and support long-term patient well-being.

ARE TEXTBOOKS DISENGAGING COMMUNITIES?
Presenter(s): Camila Hufnagel
Diversity & Interdisciplinary Studies
Mentor(s): Anna Pegler-Gordon (James Madison College), Laura MacDonald (Residential College in Arts & Humanities)

K-12 textbook narratives present history as a series of isolated snapshots, rather than a sequence of events that live on into the present. For students, these narratives fail to bridge the past experiences of communities to their ongoing presence. This study identifies gaps in K-12 history textbooks in defining what it means to be involved in a community. This can be a barrier to youth as they are developing a sense of belonging within their communities, directly discouraging youth from community involvement. If a child cannot properly understand what it means to exist within a community today, they lose vital strengths necessary to engage with their communities. This research highlights the need for historical narratives in K-12 textbooks that foster deeper connections between students and communities.

ASSESSING LAKE ACCESS ACROSS THE CONTERMINOUS US
Presenter(s): Abigail Lippert
Diversity & Interdisciplinary Studies
Mentor(s): Kendra Cheruvelil (Lyman Briggs College), Patricia Soranno (Research & Innovation), Patrick Hanly (College of Agriculture & Natural Resources), Xinyu Sun (College of Agriculture & Natural Resources)

Lakes provide numerous ecosystem services such as drinking water, recreation, natural habitat, climate control, and aesthetic enjoyment. Lakes have been shown to reduce stress and provide physical health benefits such as decreased risk of cardiovascular issues, obesity, and cancer. Previous studies on environmental justice (EJ) have shown that there is unequal distribution, quality, and monitoring of lakes in communities of color. However, limited EJ research has focused on assessing the accessibility of lakes and the implications of inequities in lake access. Combining data from the LAGOS-US research platform, USGS, US Census Bureau, and Global Biodiversity Information Facility, we study how community demographics interact with lake access. We developed an open access data module, LAGOS-US HUMAN, which assigns demographic information from the US Census and access metrics (boat launches, bus stops, public trails, and public land) from USGS to all 479,950 lakes > 1 ha in the conterminous US. Using hierarchical generalized linear models, we study how different demographic makeups of lake communities influence the likelihood of the lake having accessible features. We also use fish data from the Global Biodiversity Information Facility and water sampling data from LAGOS-US LIMNO to assess lake sampling patterns. This research is an i

BUILDING RACIAL NOTICING LENS IN STEM: LESSONS FROM THE ACCESS FELLOWSHIP
Presenter(s): Hannah Hua, Sanjana Vadrevu, Vrinda Khullar
Diversity & Interdisciplinary Studies
Mentor(s): Shahnaz Masani (Lyman Briggs College)

The Lyman Briggs College ACCESS fellowship is a year-long opportunity for undergraduate learning assistants (ULA) to engage in discussions about systemic barriers students may face to raise critical consciousness. Racial noticing lenses like abstract liberalism, minimization, naturalism, and cultural racism can easily go unnoticed. A literature review was conducted to analyze and identify racial noticing lens in educational research. As ULAs, we reflected on our teaching experiences to be able to identify how systemic barriers may be present within the learning environment and devised solutions to create an equitable classroom environment.

YOU'RE (IN)CHARJ (YIC): YOUTH-LED INTERDISCIPLINARY RESEARCH EXPERIENCE FOR CLIMATE, HEALTH, AND RACIAL JUSTICE- TEAM URBAN.
Presenter(s): Jenna Aly, Minal Patil, Sydney Hopper
Diversity & Interdisciplinary Studies
Mentor(s): Shahnaz Masani (Lyman Briggs College)

YOU'RE (in) CHARJ (Yic) is the first of its kind, as it brings together the professional resources and academic specialties of each of the residential colleges on campus: James Madison, Lyman Briggs, and Arts & Humanities. From these institutions, students and faculty with diverse backgrounds have been brought together to collaborate with communities affected by climate change. At YOU'RE (In) CHARJ, we are dedicated to building bridges in historically redlined urban communities in the Greater Lansing area by addressing the interconnected challenges of climate change, health disparities, and racial justice. Furthermore, this research initiative is fostered through the workings of peer-mentor dynamics, which allows students to work cohesively and implement & design a research project. YiC is divided into the Urban and Rural group that focuses on unique aspects of this project but still work towards the same overarching goal. The Urban group of YiC is actively pursuing partnerships with organizations like Action of Greater Lansing & FLEDGE to facilitate a roundtable discussion and an understanding of climate change impacts on the Urban community in Greater Lansing. Our research objective is to understand how the resources residing in redlined communities have affected their overall wellbeing and what we can do to improve the resources they have. Additionally, we hope to attend future events of the organizations we pursue to create long-lasting partnerships and con

DRIVING BEYOND BORDERS: INTEGRATING CHINESE AND MIDDLE EASTERN DESIGN SYSTEMS FOR INCLUSIVE CAR HUD DESIGN
Presenter(s): Julius Patto
Diversity & Interdisciplinary Studies
Mentor(s): Casey McArdle (College of Arts & Letters)

This project investigates the integration of Chinese and Middle Eastern design influences into a car head-up display (HUD) to serve as a model for more inclusive and culturally nuanced Western design practices. By meticulously analyzing the distinct design styles, user flows, and cultural preferences from these regions, the research aims to bridge historical design traditions with modern user interface innovations. Leveraging Hofstede's cultural dimensions and cross-cultural UX research methods, the study dissects how cultural factors such as power distance, individualism versus collectivism, and uncertainty avoidance shape regional aesthetics and user interactions. While Western design often gravitates toward universal, homogenized solutions, this research challenges that paradigm by showcasing how the incorporation of diverse cultural elements can enhance usability and enrich the overall user experience. The final deliverable, a car HUD interface that seamlessly melds Chinese and Middle Eastern design motifs stands as a tangible example of how cultural authenticity can be integrated into technology products. This case study not only highlights the potential for more accurate and empathetic design development but also serves as a pedagogical tool for Western designers.

UNDERGRADUATE LEARNING ASSISTANT VIEWS ON DISABILITIES IN STEM CLASSROOMS: BREAKING DOWN THE LANDSCAPE OF CLASSROOM SUPPORT
Presenter(s): Claudia Colligan, Julia Walton, McKenna Finnegan
Diversity & Interdisciplinary Studies
Mentor(s): Shahnaz Masani (Lyman Briggs College)

As diversity continues to increase within the STEM community, instructors must work to acknowledge and support students with disabilities in the classroom. In the literature, there are two widely accepted frameworks when discussing how society views disability: the medical model and the social model. The medical model focuses on patient-clinician relationships, viewing disability as something that can be treated or fixed within an individual. The social model has a broader scope, focusing on how structures can limit individuals, and how these structures can be changed to become more accessible. The ways that instructors understand disability likely influence how they view disabled students and their classroom design and practices. Undergraduate learning assistants are current students that have taken the course previously. They work with students and the professor to provide peer-level support, often answering questions in class or leading recitation sections. They often have more direct contact with students as compared to faculty, meaning they have a profound impact on the student experience. We analyzed which models of disabilities are most common among ULAs' views. The data we used was collected by a graduate student in the Molecular Cellular and Integrative Physiology department at MSU through semi-structured interviews that asked ULAs to reflect on the impact of disability on STEM learni

EDUCATION

DEVELOPING EFFECTIVE PROTOCOLS TO ENSURE THE ETHICAL AND EFFICIENT USE OF GENERATIVE AI
Presenter(s): Brian Faucher
Education
Mentor(s): Michael Ristich (College of Arts & Letters)

As platforms such as Chat GPT, Microsoft CoPilot and others continue to develop and find their way into every facet of our lives, it is important to learn and understand both the positive and negative consequences that may come with using generative AI. In this presentation, I will discuss a set of recommendations and protocols that aim to ensure the ethical and effective use of generative AI in the workplace. These protocols stem from my work in WRA 308: Invention in Writing and includes specific guidelines and procedures that employees should follow. In addition, I also discuss an idea of implementing a Quality Assurance Department that would consistently monitor and ensure ethical and efficient use of generative AI within the workplace.The main goal of this presentation is to provide designers and leaders with a concrete set of proposals that expand discussions about the ethics and design of generative AI to include how these writing technologies might be used in professional and academic settings.

SPARTAN WORKS PILOT STUDY
Presenter(s): Rachel Weiss, Saara Ashtiani
Education
Mentor(s): Aliza Lambert (College of Education), Marisa Fisher (College of Education)

The MSU Services Training and Research for Independence and Desired Employment (STRIDE) Center conducted a pilot study in the summer of 2024. The pilot study included the Spartan Works Program, a work-based learning program designed and implemented by the STRIDE team. The STRIDE team received IRB approval to conduct a pilot study to assess the feasibility and success of the Spartan Works Program. In this presentation, we review our roles as undergraduate research assistants in analyzing the data. In this presentation we will also share initial findings and implications.

A COMPARISON OF AI-ASSISTED AND MANUALLY SCORED STUDENT PROJECTS IN PHYSIOLOGY EDUCATION

Presenter(s): Emma Anzivino, Isabelle Mary, Priyanka Gadam
Education
Mentor(s): John Zubek (College of Natural Science)

As class sizes grow, providing timely and high-quality feedback becomes increasingly difficult for instructors. This research explores AI, or artificial intelligence-assisted grading in an upper-level physiology course. The authors hypothesized that AI Large Language Models can provide valuable, accurate, and timely feedback on student papers in a physiology class. The tested sample comprised thirty-two written papers of around 1.5 pages, each evaluating two medical TV drama episodes across a seven category rubric. Papers were sampled from a pre-existing data set, previously scored untimed by a single reviewer (human existing), then deidentified and rescored by three independent reviewers (human new), and finally by Claude 3.5 Sonnet (July 1, 2024 version). Human existing and human new did not include written feedback, whereas AI was prompted to include this as an experimental extension. Primary outcomes assessed were time to completion, rubric point scale scoring, and written feedback when available. A one-way ANOVA revealed no statistically significant differences between grading methods ($F = 0.12$, $p = 0.89$), indicating high accuracy for each modality. Human new scoring took an avera

LOST IN TRANSLATION: HOW NATIVE LANGUAGE AND UNDERREPRESENTED MINORITY STATUS SHAPE STEM MOTIVATION AND BELONGING

Presenter(s): Arielle Shlafer, Kriti Shirodkar
Education
Mentor(s): Sharlyn Ferguson-Johnson (College of Education)

Undergraduate students' social and linguistic backgrounds influence their STEM belonging and aspirations, yet their intersectionality remains underexplored. Many students of color report heightened pressure to succeed and work harder to overcome systemic barriers, while limited English proficiency creates additional challenges in adjusting to U.S. academic and campus life. Given that belonging and perceived costs of studying science are critical to STEM undergraduates' long-term success-especially for underrepresented students-this study investigates how English language proficiency and underrepresented minority (URM) status, individually and in combination, relate to these perceptions. Survey data from 1,549 undergraduates (90% native English speakers, 90% non-URM) were analyzed. We hypothesized that non-native English speakers and URM students would report lower belonging and higher perceived costs of studying science relative to peers, with a compounded negative effect upon their interaction. Multivariate analyses of variance (MANOVA) revealed non-native English speaking students reported significantly higher effort-related costs, an effect that remained consistent in size regardless of additional URM identification. URM status alone was not predictive of perceived costs. Conversely, while native language status did not predict perceived belonging, the combination of both non-native language and URM

EXAMINING STUDENTS' MECHANISTIC THINKING IN INTERPRETING BLOOD PRESSURE
Presenter(s): Helena Haddad
Education
Mentor(s): Jennifer Doherty (Lyman Briggs College)

Blood pressure and blood flow are fundamental concepts of physiology. Most students tend to struggle with the mechanistic and causal reasonings for how blood pressure is regulated and can be offset. My project aimed to develop a hands on activity and worksheet using balloons and different sized nozzles, to understand the relationship between gradient and resistance in the context of blood pressure. Students were able to experiment with a high resistance nozzle (simulating vasoconstriction), and a low resistance nozzle (simulating vasodilation). They were able to observe how resistance changes the pressure and flow of the simulated blood vessel. The worksheet guided students to qualitatively and quantitively assess the difference between the nozzles. A leading question "Why do we faint when drinking alcohol in a hot tub?" was asked before and after the activity. The worksheet led students to take their observations and apply them to mechanistic reasonings they have already learned such as flux and mass balance. When comparing mass balance drawings before and after, I found that students had a more complete understanding of the difference between vasodilation and vasoconstriction. Through listening to teams reasoning I was able to see that students were able to understand that vasodilation meant a decrease in resistance, but did not increase the gradient. This was crucial in understanding why someone with vasodilation would have a lower blood pressure, and potentially lose cons

STUDENT EXPERIENCES IN BLENDED ONLINE AND IN-PERSON STEM COURSES
Presenter(s): Ava Crumley
Education
Mentor(s): Caitlin Kirby (College of Arts & Letters)

This presentation aims to analyze the impact of blended learning on undergraduate university education. Blended learning, which combines in-person instruction with online components, offers a flexible and interactive approach to learning. Using student interview data (n=23) from six STEM courses at MSU, this presentation will examine how blended learning influences student experiences. Courses offered a variety of attendance options, such as: online and in-person synchronously, asynchronous online engagement with in-person meetings, and other combinations of in-person and online learning options. Framed within the Community of Inquiry model, the discussion will explore how instructors and courses create a sense of social, teaching, and cognitive presence. Findings indicated that students valued blended learning for its flexibility, particularly when personal circumstances or aspects of identity made attending class challenging. Many students reported that blended learning options allowed them to engage meaningfully with instructors and peers while accommodating their own needs. By examining both student perceptions and attendance patterns, this analysis of blended courses provides insights into the role of blended learning in fostering an inclusive educational environment and offers practical recommendations for designing future blended courses that maximize student engagement and accessibility. pan

TOPIC ANALYSIS OF ACADEMIC ARTICLES ON UNDERGRADUATE INSTRUCTIONAL CHANGE STRATEGIES IN STEM EDUCATION
Presenter(s): Anthony Kosinski
Education
Mentor(s): Danny Caballero (College of Natural Science), Emily Bolger (College of Natural Science)

There are many approaches in education for undergraduate students in STEM, highlighted by instructional change strategies documented in the literature. With the influx of academic papers published in the last decade, there is an interest in exploring the integration of data science methodologies to identify themes in these papers. In this work, we apply textual dimensional reduction with a natural language processing machine model utilizing Latent Dirichlet Allocation on 247 STEM education academic papers. This analysis yields various topics and sub-topics which can ascribe labels to individual papers. The resulting model is cross validated to understand its efficacy and efficiency. Visualizing the final topics gives an insight into increasingly popular strategies in STEM education, as well as underscoring a range of subjects in educating undergraduates in STEM. This project is a part of a larger research endeavor to compare data science methodologies for information extraction of academic articles and identify themes in science education.

CONCEPTIONS OF DISABILITY AMONGST ULAS IN STEM
Presenter(s): Andrew Frey, Shakthishree Velmurugan
Education
Mentor(s): Shahnaz Masani (Lyman Briggs College)

This paper studies attitudes towards disability amongst Undergraduate Learning Assistants (ULAs) in STEM. ULAs are undergraduate students who work with Professors in the classroom setting, interacting directly with students to help teach the material, to serve as mentors and peers, and as available and approachable course guides. Prior literature discusses different models for understanding/defining disability, but how ULAs understand/define disability is not fully understood. This research is a qualitative coding of 10 interviews conducted with ULAs who teach STEM at Michigan State University. The interviews ask how disability status may influence the experience of a student in STEM courses, and investigates how ULAs think of and define disability. Our findings will serve to illuminate how disability is conceptualized in STEM environments, so that action can be taken to improve accessibility, student success, and well-being.

DEVELOPMENT OF MECHANISTIC REASONING IN MEDICAL EDUCATION
Presenter(s): Aarav Contractor
Education
Mentor(s): Keenan Noyes (College of Natural Science)

Effective clinical reasoning and decision-making are essential in medical practice. Scholars use dual process theory to model clinical reasoning, acknowledging that there is both a fast (pattern recognition) and slow (mechanistic reasoning) component to this way of thinking. While there is much research about how physicians use pattern recognition (often in the form of illness scripts), much less is known about mechanistic reasoning. Mechanistic reasoning is the process of reasoning through underlying relationships and factors which result in an phenomenon. To study how physicians reason, we conducted semi-structured interviews with 43 medical school instructors. Using the software MAXQDA for qualitative analysis, we identified common themes in the interviews through open coding. While the instructors discussed how expert physicians rely on both pattern recognition and mechanistic reasoning, they identified key differences between the two. For example, they reported that in order to make rapid diagnoses through pattern recognition, physicians need lots of clinical experience. Without that experience to draw upon, early-career physicians and medical students must depend more on mechanistic reasoning. Once experienced, physicians may use pattern recognition for the majority of their cases, but they still must return to mechanistic reasoning for challenging problems. By understanding how both pattern recognition and mechanistic reasoning are used by physicians, especially acr

EXPLORATION OF RACIAL INJUSTICE WITHIN TEACHER EDUCATION PROGRAM
Presenter(s): Maliyah H Drain
Education
Mentor(s): Kyle Chong (College of Education)

As Teacher education (TE) programs prepare individuals for careers in education and train students to obtain their teaching licensure, they must also consider pervasive racial inequity across educational spaces.They must also identify ways they can sport teachers to create racially just classrooms in their careers and promote a "Healthy Racial Climate Model," Which cultivates an environment that addresses issues of racial injustice. While analyzing data and understanding several critical theoriesI noticed how these acts of racial injustice often occur in the education system through the persistence of white rage, or white refusals to humanize or recognize Black excellence, success, and brilliance. As a Black student who attends a predominantly white university, I begin to wonder about which systemic inequities impact my own education. I studied some of MSUs TE program's marketing in which they frame themselves as diverse and reassure students that they are taught by expert educators in context of an exit survey that teacher candidates complete as seniors. Through a comparative study of both sets of materials, I analyzed them to explore the ways educators can manifest (dysconsc

USING GENERAL MODELS TO UNDERSTAND PHYSIOLOGY IN AN UNDERGRADUATE CLASSROOM
Presenter(s): Madison Tate-Rankin
Education
Mentor(s): Jennifer Doherty (Lyman Briggs College)

Evidence supports that students are able to use their own previously acquired knowledge and apply new concepts in order to understand novel physiological phenomena using mechanistic reasoning. There is not a lot of push to use general models and mechanistic reasoning in undergraduate physiology classrooms. The aim of this study was to investigate the ability of students using prior knowledge elements in combination with new general model concepts in order to be able to explain physiological phenomena using mechanistic reasoning. Data was collected during class time by recording student conversations and interactions with the teaching team, with their consent. The conversation recordings were then transcribed and any student identification was removed from the transcripts. Each conversation throughout the recording was initially analyzed to identify knowledge elements students had prior to lecture they used to explain the concept of blood flow. The conversations were also analyzed to identify where students applied the general model of flux or if they did not apply it at all. Resource maps were used as a way to visualize the student conversation and how their ideas connected to one another throughout the class period. A new resource map was created for each question where new information was introduced in order to guide the students towards the correct mechanistic reasoning. The students in this study showed understanding of a new physiological phenomena and did successfull

ANALYZING STUDENT AWARENESS OF SUPPORT SERVICES AND MENTAL WELL-BEING
Presenter(s): Kelly Choi
Education
Mentor(s): Caitlin Kirby (College of Arts & Letters)

Beyond education, institutions play a crucial role in supporting student's well-being by providing resources that support their academic, career, and mental health needs. Encouraging students to utilize or be aware of the services ensures they receive the full benefits of their tuition investment. Therefore, this proposal explores how students' awareness of academic, career, and mental health resources changed before and after completing a freshman seminar course on wellbeing in MSU's College of Art and Letters. 11 Students out of 28 completed both the pre- and post-surveys with Likert-type and open-ended questions on their wellbeing, university navigation skills, and knowledge of university resources. I analyzed students' open-ended responses to track students' knowledge of key support services, such as academic advising, Handshake, resume building, and mental health resources. I also compared self-reported mental well-being from pre- and post-surveys using a Mann-Whitney U test to see how the course might support student well-being. The findings show clear improvements in students' ability to seek help and navigate available resources, having an overall improvement of 21%. This presentation will break down key trends, highlight meaningful insights from the data, and discuss ways to better connect students with the help they need.

PHYSICIAN USE OF MECHANISTIC REASONING TO DIAGNOSE AND TREAT: AN OPPORTUNITY FOR AI
Presenter(s): Morgan Kasyouhanan
Education
Mentor(s): Jennifer Doherty (Lyman Briggs College)

In our rapidly evolving technological world, staying ahead of innovations like Artificial Intelligence (AI) is crucial, especially in healthcare. In this study we interviewed medical school instructors (N=43) for their perspectives on medical education and practice, specifically regarding mechanistic reasoning (MR). MR is a thinking strategy in which the underlying components of a system are used to make sense of a problem, and in these interviews, some participants discussed the utility of AI in engaging in this type of reasoning. We used a qualitative coding approach to categorize the participants' responses, allowing us to find themes and insights in their discussions of ways in which MR and AI could support future physicians. Our results indicate that medical school instructors overwhelmingly believe that MR is useful for physicians to diagnose and treat disease (95%, N=41). While fewer participants discussed the role of AI, those who did saw the technology as useful for diagnosing diseases more accurately and personalizing patient treatment plans based on individual data. Participants highlighted the potential of AI to reduce human error by helping physicians to quickly gather detailed information about the underlying disease mechanism, critical in high-stakes environments and when time is limited. Our findings contribute to the broader literature on

HOW CAN I LEARN ABOUT GAS BEHAVIOR? AN ANALYSIS OF HOW YOUTUBE VIDEOS HELP SUPPORT STUDENTS' UNDERSTANDING OF GAS BEHAVIOR
Presenter(s): Ana Ivanov, Ryan Chenoweth, Sophia Gudinas
Education
Mentor(s): Deborah Herrington (Grand Valley State University), Ryan Sweeder (Lyman Briggs College)

In the wake of COVID-19 and worldwide lockdowns, students have become more reliant on virtual learning materials than ever before. YouTube has become one of the largest platforms for students to learn new content, yet the posting of videos remains unregulated leading to a wide range of video quality. For novice students who are learning core chemistry concepts, such as the topic of gas behavior, it is especially important that the videos they watch facilitate conceptual learning and support active participation. This project examines popular YouTube videos and how they portray the gas particle behaviors that lead to the ideal gas laws, the combined gas law, and real gas properties. Existing research suggests that videos that include the levels of Johnstone's Triangle, causal mechanistic reasoning, core ideas, and scientific practices and adhere to multimedia principles can strengthen student learning and engagement. These elements were incorporated into a framework that was used to evaluate how well these videos support student learning, with the intent of advancing students' cognition and improving future educational resources. This presentation will share the results of an analysis of many of the most highly watched YouTube videos that address gas behaviors.

TEACHING INFORMATIONAL TEXT STRUCTURE: WHERE ARE THE MATERIALS?
Presenter(s): Colleen Blackwood, Isabella Berch, Isabella Chan, Thomas Toaz
Education
Mentor(s): Adrea Truckenmiller (College of Education)

A primary objective of elementary, middle, and high school instruction is to teach students to write in three genres: informational, argument/opinion, and narrative (CCSSO, 2012). All state English Language Arts (ELA) tests require students to write in the informational genre on the test, beginning in grade 3. However, most schools struggle to teach their students to write in the informational genre. In this study, we argue the reason for this is because there is not enough informational text nor is there enough materials to teach students the text structure that differentiates informational from narrative genres. We will present evidence from several curricula.

ENHANCING STUDENT ENGAGEMENT IN SECONDARY EDUCATION SETTINGS
Presenter(s): Sam Richardson
Education
Mentor(s): Michael Ristich (College of Arts & Letters)

This research paper aims to examine the connections between student disengagement in secondary schools and popular criticisms of the public school system to test the hypothesis that the failings of common public school practices cause disinterest in students ages 12-20. Analysis included comparing various perspectives and research on the public education system, including commentary from students and teachers, research on systemic practices, and measurements of student success. Findings suggest that the public school system focuses too much on test scores, grades, and other quantifiable outcomes. This emphasis on scores causes students to withdraw from the curriculum as it places little value on "soft skills," such as communication and problem solving, or non-traditional education paths. In turn, students often disengage when faced with rigid expectations and a lack of space to express personal interests and abilities. Consequently, by empowering students to take more control of their education in safe environments, students may demonstrate higher rates of satisfaction and engagement. These results suggest that a systemic reform and a shift in mindset when approaching secondary education are essential to increase engagement in young adults in the public school system.

STUDYING STUDENTS' REASONING FOR THE IMPACT OF SOLVENT ON SUBSTITUTION REACTION RATES
Presenter(s): Anika Kurichh
Education
Mentor(s): Kriti Seth (College of Natural Science), Melanie Cooper (College of Natural Science)

Solvation impact's reaction rates in SN2 mechanisms, particularly comparing specific solvents. This is a complex phenomenon since to explain the effect of solvation on the rate of SN2 reactions, one needs to link several ideas together (causal links). In this work, our goal was to design a scaffolded activity that would support students in constructing mechanistic explanations for this phenomenon. A causal link exists between solvation and charge distribution as solvated species experience stronger interactions, leading to charge stabilization and lower energy, while un-solvated species retain higher energy and greater reactivity. A solvated ion, like I- in CH3OH, experiences strong solvent-ion interactions, which stabilize the charge and lower its energy. Conversely, in THF , the nucleophile remains largely un-solvated, keeping its charge more localized and reactive. A productive link exists between charge stabilization and stability. Increased stability corresponds to lower energy, which in turn affects the activation energy of the reaction. Specifically, a more stable (lower energy) nucleophile results in a higher activation energy barrier for the SN2 reaction, slowing the rate. Conversely, a less stabilized (higher energy) nucleophile has a lower activation energy barrier, leading to a faster reaction rate. Through the scaffolded activity, our goal was to support students in activating productive ideas and progressively mak

INTERMOLECULAR MAYHEM! WHAT ARE THE FORCES HOLDING TOGETHER A QUALITY CONCEPTUAL VIDEO OF IMFS ON YOUTUBE?
Presenter(s): Ana Ivanov, Ryan Chenoweth, Sophia Gudinas
Education
Mentor(s): Deborah Herrington (Grand Valley State University), Ryan Sweeder (Lyman Briggs College)

YouTube videos are used by students as a supplemental resource for educational topics such as intermolecular forces (IMFs), however, these videos range in quality. Students generally lack the ability to determine the quality of a video as they are still learning the concepts. A framework has been established to evaluate and categorize the quality of IMF videos. Videos were found using common search terms and selected based on analytics (view count, video length). Selected IMF videos were coded using this framework to assess conceptual content (Johnstone's triangle, causal mechanistic reasoning), and adherence to multimedia principles (image content, amount of text.) This poster documents video trends in order to understand the strengths and weak-points in a set of highly viewed and highly relevant IMF videos. It also highlights differences between videos that focus on IMFs and physical properties versus those that focus solely on IMFs, with a goal to create a database that contains helpful videos and good video qualities for general chemistry topics.

CASE STUDY: CRITICAL CONSCIOUSNESS DEVELOPMENT IN BIOLOGY LABORATORY
Presenter(s): Ghaith Fakhoury, Marshall Delgado, Noah Binguit
Education
Mentor(s): Shahnaz Masani (Lyman Briggs College)

In most schools, the subjects of biology and history are separated - seeing little to no connection or overlap. In the case study we analyzed, a biology lab introduced students to the historical ties of current, pressing environmental and health issues affecting historically marginalized communities in America. Orsini, M. M., Ewald, D. R., & Strack, R. W. (2022). Development and validation of the 4-Factor Critical

Consciousness Scale. SSM - population health, 19, 101202. "https://doi.org/10.1016/j.ssmph.2022.101202">https://doi.org/10.1016/j.ssmph.2022.101202 This research examines how engaging with a curriculum that connects current environmental issues with historical context impacts students' ability to participate in critically awakened thinking and develop their critical consciousness - which we define as an understanding of social issues in context, allowing people to challenge preconceived notions and become motivated to take action against societal inequalities. Using historical redlining and urban planning in Richmond, Virginia as a 4-week case study in an introductory biology laboratory course, students explore how structural inequalities in housing and infrastructure have shaped contemporary environmental and public health disparities hundreds of years in the future. We analyzed 61 students' in class reflections after they engaged in the case study to determine if and how this engagement impacts the development of students' critical consciousness

MECHANISTIC REASONING IN THE MEDICAL FIELD AND ITS EFFECT ON PATIENT COMMUNICATION
Presenter(s): Nicole Rockett
Education
Mentor(s): Jennifer Doherty (Lyman Briggs College), Keenan Noyes (College of Natural Science)

Mechanistic reasoning is a way of thinking that requires knowledge of the underlying process of a system. It involves breaking systems down into parts, identifying the relevant properties of those parts, and connecting those properties to the behavior of the overall system. This in turn creates a deeper understanding of these systems. In the medical field, physicians must understand how the body (a system) works. This suggests that teaching this mechanistic reasoning to medical students may help them when they enter their professional career. It could be especially helpful for an important part of their job: patient communication. To examine the value of mechanistic reasoning in this context, we interviewed 43 instructors who have taught medical students. We used snowball sampling and a semi-structured interview format to assess their opinions on the value of mechanistic reasoning in medical education. We qualitatively coded these interviews to characterize if and how the participants viewed mechanistic reasoning as affecting patient communication. We found that many of these professionals believed that mechanistic reasoning could support effective patient communication in several different ways including creating a stronger doctor-patient relationship with understanding and trust that therefore helps to cultivate patient compliance. These findings can inform new ways for mechanistic rea

CHARACTERIZING HIGH SCHOOL CHEMISTRY STUDENTS' IDEAS ABOUT ELECTROSTATICS AND ENERGY ACCORDING TO AN NGSS-ALIGNED LEARNING PROGRESSION
Presenter(s): Ava Gjokaj
Education
Mentor(s): Clare Carlson (College of Natural Science)

In this work, we analyzed high school students' explanations of an assessment item that requires an understanding of electrostatic interactions and energy, disciplinary core ideas in Physical Science. Students were asked to consider two carts with negatively charged sheets that are being held close together by wedges under their wheels; then, students are asked to predict which direction the carts will move and when they will stop after the wedges are removed. By answering this question, students were prompted to display their understanding (and integration of) forces and energy. Coders utilized a coding rubric consisting of 11 categories to analyze over 1600 high school students' explanations. Using this rubric, we captured both accurate and inaccurate ideas that students presented when addressing these concepts. Each category was coded individually by the coders as "1" or "0" depending on the presence or absence of that idea in the student response. We independently coded sets of 100 responses, then the two coders met with a third coder to discuss disagreements which allowed us to (1) decide consensus codes and (2) refine the rubric to enhance its accuracy. We found that students express their ideas in a variety of ways, making for rich discussions between the researchers. By identifying both misconceptions and correct responses, teachers can adjust their instructional strategies to target specific areas for improvement, enhancing the effectiveness of their teaching. Her

RHETORICAL PROCESSES IN WESTERN MICHIGAN SCHOOL BOARD CAMPAIGNS ENDORSED BY OTTAWA IMPACT
Presenter(s): Olivia Twa
Education
Mentor(s): Mary Juzwik (College of Education)

The purpose of this research is to study rhetorical processes in western Michigan school board campaigns endorsed by Ottawa Impact (OI), a political action committee (PAC) we interpret as White Christian nationalist in ideology. This project examines publicly available data from 11 candidates who were endorsed by the OI in Ottawa County and neighboring Kent County school board races in the 2022 election cycle. Data include the OI website, OI 2022 "Contract with Ottawa" which candidates signed as part of their endorsement by the PAC, candidate websites, public candidates Facebook posts, newspaper articles about campaigns, videos, Reels, and podcasts. Building from a prior analysis of how books and reading were conceptualized in the campaign, this research examines rhetorical moves and processes employed in the campaigns to build words (e.g., imagined pasts and futures) in order to persuade voters of their vision for "traditional values" in education. This analysis is significant for educational research as it reveals the growing momentum of White Christian nationalist rhetoric in a specific geographical locale. This work is significant for educators wishing to understand and respond to this movement.

Engineering, Computer Science, & Mathematics

PROTOCOL DEVELOPMENT FOR OBTAINING ROLLING RESISTANCE COEFFICIENTS FROM A MANUAL WHEELCHAIR
Presenter(s): Ava Carson
Engineering, Computer Science, & Mathematics
Mentor(s): Somlata Sharma (College of Engineering), Tamara Bush (College of Engineering)

Wheelchair propulsion for manual wheelchair users depends on force generated from the upper extremity, placing users at risk of pain and injury due to repetitive pushing. For this reason, it is important to understand the forces required for propulsion and the rolling resistance of the wheels on different ground surfaces for improving mobility and reducing injury risks. Measuring the force during an initial push or pull of a wheelchair will allow for the calculation of the rolling resistance. The minimum push forces to initiate rolling of a wheelchair on different surfaces were previously recorded with a subject sitting on the wheelchair. However, findings regarding differences between push and pull forces remain inconsistent in the existing literature. The goal of this research was to evaluate the forces involved in pushing and pulling of a wheelchair under varying load conditions, determining which force is greater for initiating wheelchair movement. Trials involved pushing and pulling a wheelchair on both tile and carpet with four different load conditions. Several individuals participated, maintaining consistent force application, height, and direction parallel to the ground throughout the trials. The outcome of this work will support future research for the calculation of rolling resistance across various surfaces. This knowledge will contribute to the development of a route-planning application for wheelchair users to help them navigate complex envi

NFL DRAFT MODELLING: LOSS FUNCTIONAL ANALYSIS
Presenter(s): Tanmay Grandhisiri
Engineering, Computer Science, & Mathematics
Mentor(s): Albert Cohen (College of Natural Science)

In the NFL draft, teams must strategically balance immediate player impact against long-term value, presenting a complex optimization challenge for draft capital management. This paper introduces a framework for evaluating the fairness and efficiency of draft pick trades using norm-based loss functions. Draft pick valuations are modelled through both the exponential Massey-Thaler curve and the Weibull distribution. Utilizing these valuation techniques, the research identifies key trade-offs between aggressive, immediate-impact strategies and conservative, risk-averse approaches. Ultimately, this framework serves as a valuable analytical tool for assessing NFL draft trade fairness and value distribution, aiding team decision-makers and enriching insights within the sports analytics community.

FUNCTIONAL MOVEMENT DISORDER EVALUATION OF BIOMECHANIC OUTCOME MEASURES WITH SELF EVALUATION MEASURES
Presenter(s): Kyla Simpkins
Engineering, Computer Science, & Mathematics
Mentor(s): Garrett Weidig (College of Engineering), Tamara Bush (College of Engineering)

Functional Movement Disorder (FMD) is associated with body movements such as tremors, jerks, and spasms. Due to irregular movements, quantitatively tracking treatment progress is difficult, but critical for understanding rehabilitation progress. The goal of this study was to determine which biomechanical outcome measure best aligns with qualitative measures used by clinicians and to report progress of FMD participants. Twenty FMD participants were tested pre- and post-treatment. 3D motion capture system collected the position of reflective markers placed on upper extremities while participants completed a simulated drinking task. To quantify movement symptoms, the index finger velocity profile was analyzed using three approaches: Spectral Arc Length (SPARC), Log Dimensionless Jerk (LDLJ), and Peak Frequency (PF). Participants completed Canadian Occupational Outcome Measure (COPM) by self-reporting their satisfaction and performance of their upper extremities. Changes pre-to-post treatment were compared between qualitative and quantitative measures. Self-reported performance and satisfaction were positively correlated (r2 = 0.22). But quantitative measures had low correlations to qualitative measures. The PF had the strongest correlation with participants' self-reported performance (r2 = 0.12). The LDLJ had the strongest correlation wit

DIGITAL IMAGE CORRELATION AIDED MATERIAL SELECTION FOR STRUCTURAL DESIGN
Presenter(s): Cooper Purl, Crystal Crasto, Seth Sain
Engineering, Computer Science, & Mathematics
Mentor(s): Weiyi Lu (College of Engineering), Zachary Ahmed (College of Engineering)

Structural analysis is an essential part of civil and mechanical engineering. It ensures that designs are not only functional but safe. To make sure this happens, engineers must understand how materials and structures behave under various conditions. This research investigates the design and testing of customized beam structures aimed at maximizing their capacity to support external loads while minimizing strain. The research question of this study is: Will using different materials reduce beam deflection under the same mechanical loading conditions? Beams were designed using SolidWorks and 3D printed for testing. An emerging technique -Digital Image Correlation analysis- was used to measure strain fields and deflections. DIC is a non-contact, full field optical technique that uses a speckle pattern to measure strain and deformation across the beam's surface. Our results were analyzed by comparing force vs deflection curves and strain fields of the beams constructed of the (Acrylonitrile Butadiene Styrene) ABS and (Polylactic Acid) PLA materials. The ABS beams were found to be roughly two-and-a-half times better than those made of PLA, indicating that perhaps, maximizing a basic, structurally sound design and researching a better material for construction is more beneficial in terms of building design than creating a new untested design, potentially accelerating construction efforts. The findings from this research have the potential to influence material selection and str

INVESTIGATING THE TORQUE OF MANUAL WHEELCHAIRS ON VARIOUS SURFACES
Presenter(s): Macy Spevacek
Engineering, Computer Science, & Mathematics
Mentor(s): Somlata Sharma (College of Engineering), Tamara Bush (College of Engineering)

Manual wheelchair users face varying levels of resistance depending on the surface type, affecting the torque required for propulsion. This study experimentally determined the torque necessary to initiate wheelchair movement across different surfaces. Different surfaces have unique coefficients of friction, requiring different amounts of torque applied to the wheel to start rolling. The goal was to measure the minimum torque needed to go on different terrains on a manual wheelchair. A torque wrench was fixed onto the center of a wheelchair wheel, secured by a bungee cord. Each participant then pushed onto the hand rims with minimum force they would need to roll over different ground conditions. The data were taken on four different surfaces with several participants. Multiple trials ensured data reliability and repeatability. The data shows a comprehensive link between the torque values and the surface conditions. It showed that smoother surfaces, like tiles, take less torque to overcome the friction while it takes more torque to overcome the friction on rougher surfaces like grass and carpets. Because the torque wrench and the cord only allow the participant to roll so far, a new metal piece was designed to go in between the center of the wheel of a wheelchair and a torque sensor. This new mechanism will allow the wheelchair user to roll continuously while still measuring the rolling torque. This foundational torque measurement setup lays the groundwork for a user-guidanc

"FROM WASTE TO VALUE: UPCYCLING PET FOR POLYURETHANE PRODUCTION"
Presenter(s): Monica Barrera
Engineering, Computer Science, & Mathematics
Mentor(s): Richard-Joseph Peterson (College of Engineering)

Waste PET, a significant contributor to landfill pollution, can be chemically upcycled into diisocyanates-valuable precursors for polyurethane production-without the use of toxic phosgene. In previous studies the ammonolysis of waste PET thermoforms produced terephthalamide (TPD). This study investigates the conversion of that TPD to dimethyl 1,4-phenylenebiscarbamate (DPB) via the Hofmann rearrangement in methanol, achieving a 50% yield and the subsequent conversion to 1,4-diisocyanatobenzene (DCB). The product was verified through advanced NMR techniques, including COSY and HSQC. Optimization studies revealed that 6 molar equivalents of sodium hydroxide maximized the yield of DPB. The DPB was further transformed into DCB using chlorocatecholborane and triethylamine in refluxing toluene. The reaction was confirmed by converting DCB to its ethyl urethane derivative and analyzing the product using NMR spectroscopy. This research demonstrates a viable, phosgene-free pathway for producing diisocyanates from waste PET, paving the way for sustainable polyurethane production

SYNTHESIS OF THREE-ARM POLY (?-CAPROLACTONE) VIA REACTIVE EXTRUSION
Presenter(s): Sean Redman
Engineering, Computer Science, & Mathematics
Mentor(s): Badal Girish Lodaya (College of Engineering)

The goal of this in-progress research is to synthesis a three-arm type PCL using a continuous extrusion process. Poly Caprolactone (PCL) is a biodegradable polymer which has utility for single use plastic applications. While commercial PCL is produced in a linear form via batch processes, this research seeks to investigate synthesis of the three-arm form via continuous processes. Commercially made linear PCL contains a maximum number average molecular weight of 80,000 g/mol and a melting temperature of about 60 C. These properties lead to drawbacks of this polymer such as low melt strength and for some applications, poor mechanical properties. This study will investigate the potential improved properties and increased molecular weight of three-arm PCL formed via extrusion. The synthesis of the three-arm PCL is completed using CAPA monomer and an aluminum tri-alkoxide initiator. Utilizing a two-step coordination-insertion mechanism, as well as the melt conditions and shear presence provided by the extrusion process, three-arm PCL may be synthesized in a continuous manner. The reactive extrusion takes place in a Leistriz twin-screw co-rotating extruder. This extruder represents a continuous chemical process which may be observed as a plugged flow reactor. Viewing the process in this way allows for fluid flow and heat transfer analysis, conversion and reaction rate investigation, as well as material and energy balance completion. These methods of analysis allow for a full und

IMPACT OF PROPOSED BILL HB4840 ON CITIES IN MICHIGAN
Presenter(s): Tony Chirchir
Engineering, Computer Science, & Mathematics
Mentor(s): Annick Anctil (College of Engineering), Chenyang Deng (College of Engineering)

As Michigan advances toward clean energy adoption, understanding the role of financial incentives-especially rebates-is essential for equitable and efficient solar deployment. This study investigates how rebates influence the cost of solar photovoltaic (PV) installations across five distinct cities in Michigan, Alpena, Detroit, Escanaba, Flint and Lansing, each representing diverse geographic, economic, and utility rate contexts. Using the REopt optimization model, simulations were conducted for each city, accounting for variables such as local electricity rates, solar resource availability, and existing rebate programs. The analysis focused on residential systems, comparing total system cost, system performance dispatch data, and potential life cycle savings with and without rebate incentives. Results reveal significant regional variability in the effectiveness of rebates. Urban centers with higher electricity rates, such as Detroit benefit most substantially, experiencing great potential life cycle savings. In contrast, cities with lower utility costs or limited rebate access show more modest improvements. These findings highlight the importance of location-specific incentive structures. Strategic rebate implementation could enhance solar affordability and adoption statewide, particularly in underserved areas where economic barriers persist.

RAPID ESTIMATION OF SALMONELLA CONCENTRATION USING MAGNETIC NANOPARTICLES
Presenter(s): Finnian James
Engineering, Computer Science, & Mathematics
Mentor(s): Anthony James Franco (College of Agriculture & Natural Resources), Evangelyn Alocilja (College of Agriculture & Natural Resources)

Salmonella is a leading global bacterial cause of foodborne illnesses. Each year, approximately 160 million contract a Salmonella- related illness, of which 60,000 cases result in death. The transmission of Salmonella can originate from contact with contaminated water, poultry, dairy, eggs, and raw fruits and vegetables. Rapid detection plays a crucial role in controlling and preventing the emergence and spread of such infections. Despite advancements in detection techniques, challenges remain in achieving cost-effectiveness, simplicity, and speed. This study presents a novel approach to estimating the Salmonella concentration of a suspension using glycan-coated magnetic nanoparticles (gMNPs). The gMNPs attaches to Salmonella , allowing it to drag the bacteria when the suspension is subjected to an external magnetic field. On the inner surface of the container, the gMNP forms a spread pattern dependent on the bacterial concentration, which can be interpreted through image analysis. The image analysis algorithm determines the presence of g

AN ENGINEERED APPROACH TO CHARACTERIZE MECHANISMS OF MUCILAGE ADHESION
Presenter(s): Shubhan Nagarkar
Engineering, Computer Science, & Mathematics
Mentor(s): Caroline Szczepanski (College of Engineering), Sabrina Curley (College of Engineering)

Upon hydration, seeds of many plant species release a polysaccharide hydrogel (mucilage) which displays remarkable bioadhesion to various substrates via hydrogen bonding. Examining this surface adhesion through an engineering lens can better inform mucilage evolutionary advantages, including lower mortality rates and exploitation, as well as future material design. In this work, extraction of mucilage from four species: Plantago ovata, Linum grandiflorum, Salvia hispanica, and Lepidium sativum was optimized at bulk scale using complete seed hydration, physical and chemical separations, and lyophilization to produce dehydrated, pure mucilage. Each mucilage species was rehydrated uniformly, and its adhesive properties were characterized against an Elmer's glue control (polyvinyl acetate). Novel lap-shear and loop-tack testing protocols utilizing polyethylene terephthalate (PET) substrates and mechanical tensile testing were devised to simulate common mechanisms of seed dispersal and measure stress at failure. Furthermore, experiments mimicking varied environmental conditions were conducted by placing samples in dry, ambient, and saturated humidities. L. grandiflorum displayed stronger shear and loop-tack adhesion at higher humidity conditions in contrast to the PVA control, which

A COMPARATIVE ANALYSIS OF NESY FRAMEWORKS
Presenter(s): Sania Sinha
Engineering, Computer Science, & Mathematics
Mentor(s): Parisa Kordjamshidi (College of Engineering)

Neurosymbolic (NeSy) frameworks combine both neural architectures with symbolic reasoning. In times of increasing concerns about the environmental sustainability of extremely data driven methods, neurosymbolic frameworks offer an exciting alternative that retains performance even with a small training data. Combining the explainability and interpretability of symbolic reasoning with the flexibility and power of neural computing allows us to solve complex problems with more reliability while being data-efficient. However, this recently growing topic poses a challenge to developers with its learning curve, lack user-friendly tools and libraries, differences in the available frameworks, and a lack of systematic research connecting the various approaches. In this project, we aim to discover and highlight the differences between existing NeSy frameworks across different facets such as problem formulation, implementation, execution, and LLM integration. We do this by solving multiple toy and realistic tasks using three NeSy frameworks- DomiKnowS, DeepProbLog, and Scallop. Using those findings, we will work towards identifying the problems each NeSy framework is able to solve, comparing their expressivity, performance, along with time and data efficiency.

ASSESSING HARMFUL NANOPARTICLE EXPOSURE VIA CAPACITIVE DETECTION AND RELAXATION OSCILLATOR TECHNOLOGY

Presenter(s): Anton Akroush
Engineering, Computer Science, & Mathematics
Mentor(s): Andrew Mason (College of Engineering), Derek Goderis (College of Engineering), Samuel Lobert (College of Engineering)

Microfluidics involves manipulating fluids at sub-millimeter scales. Accurate microfluidic particle detection depends on measuring the subtle capacitance changes caused by traveling particles. These particles alter the dielectric environment between electrodes, but measuring capacitance is challenging due to environmental variations and parasitic capacitance. To solve this, a relaxation oscillator circuit was designed to provide real-time capacitance measurement while minimizing parasitic effects. The circuit uses a Schmitt trigger inverter to generate a frequency output that varies with the capacitance between electrode plates. As particles move through the microfluidic channel, they cause small shifts in the dielectric constant, leading to measurable frequency changes. Components include a Schmitt trigger, a timing resistor, and electrode plates as a variable capacitor. The design minimizes parasitic capacitance with optimized trace lengths, guard traces, and proper grounding. The output frequency, measured via an oscilloscope, provides precise and repeatable capacitance readings. This approach has broad applications in nanoparticle detection, particularly in health and environmental monitoring. Unlike optical methods, which struggle to detect particles smaller than 300 nm due to diffraction limits, this capacitance-based system can detect particles as small as 50 nm. It enables the detection of nanoparticles like extracellular vesicles, viruses, and protein clusters for

MINI PERISTALTIC PUMPS FOR HEAVY METAL SENSING IN SOILS

Presenter(s): Tessa Versace
Engineering, Computer Science, & Mathematics
Mentor(s): David Kogut (College of Engineering), James Siegenthaler (College of Engineering), Vianney Medina Gonzalez (College of Engineering)

Soil health affects human health. Heavy metals from agricultural soil can leach into crops which are further handled by farmers and ingested by consumers. Effective heavy metal soil sensors are essential to reducing ailments brought on by bioaccumulation. Studies show that bioaccumulation of heavy metals can result in severe organ impairments, nervous system disorders, and heart disease in the general population. Infants are at greater risk, with 2021 tests from the FDA showing elevated levels of lead, arsenic, and cadmium in rice-based baby foods. This project aims to develop an automated, in-ground soil-sensing device using boron-doped diamond (BDD) electrodes. This device will pair a low-cost potentiostat with a microfluidic system featuring a pair of microfluidic peristaltic pumps. The pumps are integral for effective electroplating onto the surface of the diamond electrode. At a fixed potential, the slow flowing solution deposits analytes onto the surface, allowing for more accurate and sensitive readings. Additionally, the dual pump set up allows soil run off to mix with buffer solution, optimizing the pH. Initial pump designs incorporate a mini stepper motor with 3D-printed parts, powered by an Elegoo Mega microcontroller, and controlled with an IR remote. These pumps can supply variable flow rates simultaneously and independently. They deliver flowrates less than 100uL/min, calibrated by flow rate sensors controlled by an Arduino Nano microcontroller. Developing mo

WIN PERCENTAGE AND PYTHAGOREAN EXPECTATION IN MLB
Presenter(s): Blake Ross
Engineering, Computer Science, & Mathematics
Mentor(s): Albert Cohen (College of Natural Science)

Pythagorean expectation is a sports analytics concept proposed by Bill James, the founder of so-called "sabermetrics". This is the data-based approach to analyzing sports, often used by many current professional sports to find undervalued players.

AI IN INSURANCE - HOW HELPFUL IS IT?
Presenter(s): Noah Gscheidmeier
Engineering, Computer Science, & Mathematics
Mentor(s): Gee Lee (College of Natural Science)

Reserving for insurance companies is a way for them to "reserve" money for their clients, so that they have enough to compensate them in an event that they need it. Neural networks are a new way for artificial intelligence to imitate thinking like a human (hence the word "neural"). This involves multiple layers of compiling, relating, and computing to take an input value and try to match the patters between it and others to find the most likely output. What does this have to do with insurance and reserving? Neural networks allow AI to work with reserving triangles (how companies present their reserving values) and find a "most likely outcome" that fills in the reserving information needed for a company to make decisions on how much money they reserve in the future. We were able to use python packages like "tensorflow" and "keras" in the R coding interface to use the visual abilities of R with the computing power of python. This allowed us to set up our data into reserving triangles, train our AI network to understand the patterns, and have it give us an outcome of reserving for the future. In our efforts to test the neural network approach, we compared it to classical prediction methods, such as the development and expected methods. We believe that AI is the future, and that it has the potential to mend a lot of the conflicts clients have with insurance companies.

LITERATURE REVIEW FOR DOSE RESPONSE MODELING FOR DISINFECTION BY PRODUCTS
Presenter(s): Isabelle DeLaet
Engineering, Computer Science, & Mathematics
Mentor(s): Carly Gomez (College of Agriculture & Natural Resources), Jade Mitchell (College of Agriculture & Natural Resources)

Disinfection By-Products (DBPs) are compounds that form in drinking water when chemical disinfectants interact with organic material. When ingested, they can be toxic and carcinogenic. The EPA regulates 11 DBPs, but unregulated DBPs may pose hazards to human health. Dose-response relationships for DBPs have never been compared, impeding comprehensive risk assessment efforts, appropriate disinfectant application, and jeopardizing public health. The objective of this study was to compile previously published DBP dose-response data for whole animals, and health effect endpoints to create dose-response models that may be used in EPA risk assessment. A citation mapping literature review was conducted using EPA's RFA G2022-ORD-H1 as an initial source. Articles cited measuring health effects after DBP exposure doses were considered, with Google Scholar used to find subsequent articles citing these. Health effects with significance levels of $p < 0.05$ in whole animals were reported. Cell and tissue studies were excluded. Out of the 39 DBPs included in this study, information about 5 regulated and 6 unregulated DBPs was found. The dose-response models developed from the study will be compared with DBP sampling data from 25 water treatment facilities across the US, to assess risk associated with each facility's processes.

WATER INTERACTIONS IN CELLULOSE NANOCRYSTAL-ENHANCED METHACRYLATE DENTAL ADHESIVES: IMPACTS ON INTERFACE AND MATERIAL STABILITY

Presenter(s): Allison Huckins
Engineering, Computer Science, & Mathematics
Mentor(s): Caroline Szczepanski (College of Engineering), Denghao Fu (College of Engineering)

Dental adhesives are widely used and a main constituent in dental restorations (e.g., fillings). However, many fillings only last 5-7 years. A contributing factor to this poor durability and short lifetime is heterogeneity of the dental adhesive layer, which allows for a high level of water uptake and degradation. Cellulose nanocrystals (CNCs), derived from cellulose via acid hydrolysis, have a high aspect ratio, surface area, and mechanical strength, making them a low-cost, sustainable additive. This study investigates CNCs' effects on adhesive resins with different cross-link densities (low and high). CNCs (0.5, 1, and 2.5 wt%) were incorporated into both formulations, and adhesives were analyzed using mechanical testing (three-point bending, DMA), imaging (optical microscopy), and water sensitivity assessments. DMA and imaging showed that CNCs disperse more evenly in lower cross-linked formulations but tend to aggregate in highly cross-linked ones due to network heterogeneity. A more uniform network forms with lower cross-linking, as indicated by a narrow tan delta peak in DMA, representing a single glass transition temperature. Water sensitivity analysis revealed that highly cross-linked, more heterogeneous samples exhibited reduced water uptake with increasing CNC content. This suggests CNCs reinforce hydrophilic regions, limiting moisture absorption. The effect is more pronounced in highly cross-linked resins, where CNCs prefere

USING LUNAR ANALOGUES FOR FUTURE MECHANICAL AND GEOTECHNICAL CONSTRUCTION

Presenter(s): Daniel Barnas
Engineering, Computer Science, & Mathematics
Mentor(s): Michael Velbel (College of Natural Science)

Regolith is an unconsolidated layer on top of bedrock. Planetary scientists must know about lunar regolith to understand its environment. Knowledge can be used for regolith-based architecture for protection. Analogues, physical models of another structure, are necessary for the ability to manipulate moon regolith to create an advantageous environment. By understanding the grains, it is possible to know how it can be used. More knowledge is needed to improve architectural design. Knowing necessary materials to design products, researchers can decide what is required from Earth. Regolith samples must be analyzed because using regolith is favorable over transportation. Simulants must reflect shape/size to study things like viscosity. Natural regolith samples must be analyzed for ability to be manipulated. Analogues were tested using Keyence imaging and SEM of simulant samples. They were compared to published Apollo 11 SEM samples in respect to size, sorting, and shape. By testing proper analogues, more knowledge can be gained about lunar regolith. With analogues, efficient construction can take place to maximize in situ resources. Both natural and simulant regolith were made up of poorly sorted, (sub)angular grains, sizing from 0.250-1.410nm. Regolith simulant was similar to lunar regolith from Apollo 11, except regolith samples g

ADVANCEMENTS IN HEAVY METAL DETECTION USING AN AUTOMATED ELECTROCHEMICAL MICROFLUIDIC PLATFORM WITH DIAMOND-BASED SENSORS
Presenter(s): Ahmed Azwad Kabir
Engineering, Computer Science, & Mathematics
Mentor(s): Hasan Banna (College of Engineering), Mohammad Kafi Kangi (College of Engineering), Wen Li (College of Engineering)

Heavy metal contamination poses significant environmental and agricultural risks due to the toxicity, long biological half-life, and persistence of metal ions in water and soil. Conventional detection methods such as atomic absorption spectrometry and inductively coupled plasma mass spectrometry, while highly accurate, are impractical for real-time field applications due to their bulky instrumentation, high costs, and need for specialized personnel. To address these limitations, the research proposes an automated and programmable electrochemical microfluidic sensing platform for continuous monitoring and analysis of heavy metal ions. The platform integrates a novel three-in-one boron-doped diamond (BDD) sensor with a potentiostat circuit capable of performing multiple electrochemical analyses, including cyclic voltammetry (CV), anodic stripping voltammetry (ASV), and differential pulse voltammetry (DPV). Experimental results demonstrate that the fabricated device exhibits high stability and accuracy in detecting heavy metal ions, making it a viable solution for real-time environmental monitoring. The proposed system offers a scalable, cost-effective, and field-deployable alternative for continuous heavy metal analysis in water and soil solutions.

CNN-BASED VISUAL LOCALIZATION FOR AUTONOMOUS RACE CARS
Presenter(s): Juan Carlier Blanco
Engineering, Computer Science, & Mathematics
Mentor(s): Daniel Morris (College of Agriculture & Natural Resources)

In high-speed autonomous racing, achieving accurate and reliable localization using only visual data is a significant challenge. This work introduces a CNN-based visual localization system for autonomous race cars that relies exclusively on camera sensors. To overcome the challenges posed by dynamic environments and limited training data, we employ advanced data augmentation techniques that simulate varied routes, lighting conditions, and environmental appearances. A regression-based deep learning model, implemented using PyTorch, is trained on this augmented dataset to precisely estimate the vehicle's position in real time, achieving under 10 feet localization accuracy even at speeds up to 170 mph. Experimental results indicate that focusing on robust visual features, such as road markings and infrastructure geometry, can significantly enhance localization performance in high-speed scenarios. Future work will focus on refining the feature extraction process and incorporating uncertainty modeling to further improve the system's robustness.

BENCHMARKING PARALLEL CODE USING R
Presenter(s): Naamna Modi
Engineering, Computer Science, & Mathematics
Mentor(s): Craig Gross (Research & Innovation)

R is a programming language that can run a wide array of tasks involving data and statistics. The application of R can be enhanced using the supercomputer provided by the Institute for Cyber-Enabled

Research (ICER), here at MSU. Certain packages within R also bring useful tools to assist in tasks or use alternate methods to solve problems. Not only is R a good candidate for fast computing due to its multitude of vectorized operations, but a package called "Future" in R can help speed up the execution of resource-intensive code. Future allows code to be 'parallelized' by splitting up tasks between 'workers' and conducting these computations at the same time. This decreases the cumulative time elapsed and makes any particular script more efficient. We also explore the use of multithreading, using a package called "RhpcBLASctl" which can set a script to run a specified number of threads. This similarly speeds up computation time with an increasing number of threads. Where a regular computer may be capable of running around 4-8 tasks simultaneously, the supercomputer is made up of a series of large computers which can each run up to 128 tasks at once. This means we can run code in many more places at the same time, which heavily speeds up the process when compared to similar procedures on an average computer.

OPTIMIZATION OF ULTRASONIC WELDING PARAMETERS FOR IMPACT DAMAGE MITIGATION AND MICROCRACK CLOSURE IN 3D PRINTED PLATES

Presenter(s): Mahir Gandhi

Engineering, Computer Science, & Mathematics

Mentor(s): Sunil Kishore Chakrapani (College of Engineering)

Additive manufacturing with polylactic acid (PLA) has transformed prototyping and production due to its versatility and cost-efficiency. Nevertheless, the inherent vulnerability of PLA to impact-induced microcracking continues to limit its application in environments demanding high structural resilience. This challenge necessitates the development of advanced repair methodologies that not only restore but also enhance material integrity under dynamic loads. Recent advances in ultrasonic welding present a promising avenue for repairing impact-damaged PLA components. In this study, small-scale 3D - printed PLA plates were subjected to ultrasonic deformation under a range of amplitude parameters. Following this, the samples were meticulously processed via cutting, mounting, and polishing to prepare for high-resolution microscopic analysis, and the images were analyzed via ImageJ. Using an optimal amplitude, controlled drop tests were conducted in which ball bearings were released from varying heights using an electromagnet, thereby imparting predetermined energy levels to the specimens. Subsequently, the area of the microcracks was assessed using ImageJ software. Our experimental framework is designed to reveal that the application of specific ultrasonic amplitude settings will likely mitigate initial impact damage and promote the closure of microcracks in PLA. We anticipate that optimally treated samples will exhibit fewer and less severe microcracks compared to untreated con

EFFICIENT REMOVAL OF SILENCES AND BACKGROUND NOISE IN STUTTERED SPEECH PROCESSING: A PRACTICAL APPROACH USING PYDUB

Presenter(s): Siddharth Gupta

Engineering, Computer Science, & Mathematics

Mentor(s): J Scott Yaruss (College of Communication Arts Sciences)

Speech disfluencies, such as stuttering, pose challenges in audio processing, requiring the removal of unnecessary silences and background noise to enhance intelligibility. Traditional approaches leveraging machine learning models, such as regression-based and deep-learning methods, often introduce significant computational complexity and inefficiency. In this study, we explore and compare various speech processing strategies, including machine learning-based silence detection and removal, ultimately determining that these approaches are impractical for real-time applications. Instead, we demonstrate the effectiveness of the Pydub library in efficiently detecting and removing silences, offering a lightweight and scalable alternative. Additionally, we discuss an integrated approach for background noise removal using noise reduction algorithms. Our findings indicate that Pydub-based processing significantly reduces computational overhead while maintaining high speech clarity, making it an ideal solution for real-world speech remediation applications.

MICROFLUIDIC DEVICE MANUFACTURING WITH CO2 LASER WELDING: RAPID PROTOTYPING OF LAB-ON-A-CHIP TECHNOLOGY
Presenter(s): Dhruv Singh
Engineering, Computer Science, & Mathematics
Mentor(s): Brian Johnson (College of Veterinary Medicine)

Rapid prototyping tools and techniques have the potential to speed up the development of human-based cell culture devices, offering a viable alternative to animal models in drug and chemical testing. Computer numerical control (CNC) machining devices directly into ANSI/SLAS polystyrene (PS) microplates is one promising approach to creating throughput-compatible microfluidic devices that integrate directly into existing infrastructure and avoid incompatible materials. To create closed fluidics, devices milled into the bottom of well plates require effective sealing. While dedicated laser welding or ultrasonic systems are available, they are often inaccessible to laboratories seeking to employ microfluidics in their research. To address this and maintain an easily translatable manufacturing process, our research focused on utilizing a relatively inexpensive and widely available 10.6µm, 60-watt carbon dioxide (CO_2) laser-cutting machine to weld PS cell culture plates to clear PS sheets. Employing a systematic experimental approach, we explored the optimal settings for laser power, speed, and density, as well as effects of plasma treatment and thickness of PS sheets, to achieve functional welds. We characterized these welds through a series of tes

STUDENT AND INSTRUCTOR PERSPECTIVES ON BEST PRACTICES FOR GENERATIVE AI IN COMPUTING EDUCATION
Presenter(s): Kylee May Sokacz
Engineering, Computer Science, & Mathematics
Mentor(s): Rachel Frisbie (College of Natural Science)

Generative Artificial Intelligence (GenAI) is reshaping classroom dynamics, particularly in CMSE 201: Intro to Computational Data Analysis, where it presents both opportunities and challenges for students learning. Our work underscores the critical need to harness the potential of GenAI to foster student development while also mitigating its potential for harm. In our classroom spaces, we encourage students to critically explore GenAI, fostering a deeper understanding of computational tasks rather than merely using AI-generated outputs. Through classroom observations and interviews with instructors and students, we investigate and reveal valuable insights into how GenAI can be effectively used to support learning, while also identifying practices that may hinder student engagement and understanding with over-reliance. Students revealed ethical and moral considerations when using GenAI, specifically in respect to reliability in AI-generated output. While GenAI offers convenience and accessibility, many students exhibit hesitancy in its utilization prioritizing skill mastery over assistance. Through identification of best practices and potential drawbacks, our research provides insight on how GenAI can be integrated effectively into computational education. Understanding these dynamics will provide educators with insight on design strategies to promote responsible AI use while preserving student integrity.

COMPARISON OF INFILTRATION MEASUREMENT DEVICES FOR USE IN CITIZEN SCIENCE AND THE EFFECTS OF VEGETATION IN AN ESTABLISHED BIORETENTION BASIN

Presenter(s): Megan Ransler

Engineering, Computer Science, & Mathematics

Mentor(s): Dawn Dechand (College of Agriculture & Natural Resources)

Characterizing hydraulic soil properties, such as infiltration rates, is essential for designing and managing bioretention basins in response to increasing storm events driven by climate change. Vegetation influences soil infiltration, but its effects vary, with studies offering conflicting conclusions on whether deep taproots or fibrous root systems enhance infiltration more effectively. Factors such as antecedent soil moisture, plant age, season, and soil type further complicate infiltration dynamics. Power analysis of preliminary results suggests that hundreds of measurements are necessary to account for infiltration variability at a single site. This research pursues two main objectives: investigating how plant characteristics, including species, location, and seasonality, influence infiltration rates in an engineered bioretention site at Michigan State University and developing citizen science methods for infiltration measurements. Standardized techniques were employed to measure infiltration using various devices, including a Saturo device, Turf-Tec, and a handmade infiltrometer. Comparisons of data collected from these instruments assess whether significant discrepancies exist between measurement methods. Additionally, a model of the hand-made infiltrometer was developed using OpenHydroQual to better understand the variability in its results. The handmade infiltrometer was designed for educational use, particularly by high school students and beyond. It was piloted

VALIDATING TOOLS FOR PERSONALIZED THERAPIES FOR NEUROENDOCRINE TUMOR (NET) PATIENTS.

Presenter(s): Faith Cherop

Engineering, Computer Science, & Mathematics

Mentor(s): Adam Alessio (College of Engineering), Gabriel Maliakal (College of Natural Science)

Neuroendocrine tumors are treated with targeted radiolabeled compounds. Most centers still rely on a not personalized treatment regime, despite 20 years of strong evidence showing that personalizing therapies improves patients outcomes. The challenge is that personalizing therapies based on doses to patient' organs at risk (OAR) and tumors is expensive, requires substantial clinical resources, and is inconvenient for patients. We are collaborating with a team developing a Personalized Remote Radiation Tracking Portable organ and Tumor Dosimetry Device (PODD), that could provide a compact, portable, user-friendly system. This device will enable remote monitoring of patients' OAR and tumor activities from the comfort of their own home. Our current work focuses on visualizing and modeling different designs for this PODD system with the future goal of providing a cost effective method to personalize dosimetry and improve patient outcomes.

ALIGNING TASK-ALLOCATION WITH HUMAN PREFERENCES

Presenter(s): Dhruv Kekin Toprani

Engineering, Computer Science, & Mathematics

Mentor(s): Vaibhav Srivastava (College of Engineering)

Human decision-making in high-stakes, uncertain environments is shaped by complex trade-offs involving risk, fatigue, and personal task preferences. As mixed human-robot teams become increasingly common in operational domains such as disaster response, healthcare, and robotics, understanding these dynamics is critical for improving coordination and system resilience. This project explores how individual constraints and perceptions influence real-time decision-making and team performance.

Using a collaborative, multiplayer rescue simulation as an experimental platform, we model human behavior in an environment characterized by risk. Human participants interact alongside an autonomous agent, making task acceptance or rejection decisions that impact overall mission success and individual performance outcomes. A dynamic task allocation framework adapts to emerging behaviors by incorporating real-time preferences and observed outcomes. In our setup, we adapt the Generalized Assignment Problem (GAP) to account for human decision patterns, including preferences and rejection behavior, enabling more personalized and resilient task allocation. The system continuously learns from empirical interaction data, optimizing assignments to maximize collective reward while reducing friction from misaligned tasks. Through this work, we aim to uncover behavioral i

BENCHMARKING ALGORITHMS FOR LINEAGE TRACKING IN MANY-PROCESSOR EVOLUTION SIMULATIONS
Presenter(s): Joey Wagner
Engineering, Computer Science, & Mathematics
Mentor(s): Emily Dolson (College of Engineering)

Simulating evolution provides critical insights into evolutionary dynamics, adaptation, and optimization, with applications spanning biological research and computational problem-solving. A central component of these simulations is phylogenetic data- ancestry trees among organisms, which interpret evolutionary processes. However, in large-scale, many-processor digital evolution simulations, maintaining complete phylogenetic records is computationally expensive, demanding efficient data stream algorithms to compress lineage history in real time. This work benchmarks such algorithms under varying scaling factors, including population size, mutation rate, and lineage retention policies, with a focus on downstream computational efficiency. Specifically, we evaluate a suite of fixed-capacity "DStream" algorithms that curate rolling subsamples of phylogenetic data streams while maximizing temporal coverage under strict memory constraints. These algorithms support steady, stretched, and tilted coverage criteria, with O(1) data ingestion enabled by concise, low-overhead operations-suiting them to resource-constrained, performance-critical simulations. By systematically timing downstream computations, we assess trade-offs in lineage tracking accuracy, memory usage, and computational throughput. Our benchmarks provide a foundation for understanding algorithmic behavior and identifying opportunities to enhance scalability in evolutionary simulations. Optimizing these workflows is ess

WHISKEY PRODUCTION FROM OPEN POLLINATED CORN VARIETIES
Presenter(s): Annalise Vary
Engineering, Computer Science, & Mathematics
Mentor(s): Nicole Shriner (College of Engineering)

The goal of this research was to identify open pollinated varieties of corn suited to Michigan with unique flavor qualities inherent in the spirit they produce. Thirteen open pollinated corn varieties and one control hybrid variety were grown on MSU research plots throughout the state of Michigan during fall of 2023. After harvest, the corn was transferred to the fermented beverage lab at MSU where it was mashed, fermented, and distilled into un-aged 100% corn whiskey. The whiskies were analyzed analytically using HPLC and GC methods and sent to a panel of industry professionals for descriptive sensory evaluation. This research helped to establish which varieties distillers and farmers are interested in growing in Michigan, as well as gave insight to which varieties to look at in the following years of research.

INVESTIGATING SOURCE-SPECIFIC VARIATIONS IN HYPERSPECTRAL SIGNATURES OF SALMONELLA INFANTIS
Presenter(s): Gillian Kuehnle
Engineering, Computer Science, & Mathematics
Mentor(s): Jiyoon Yi (College of Agriculture & Natural Resources)

Hyperspectral microscope imaging (HMI) is emerging as a rapid pathogen detection method, but identifying stress-resistant serovars like Salmonella Infantis remains challenging due to their environmental adaptability. This study investigates whether S. Infantis isolates exhibit shifts in hyperspectral signatures by analyzing high-dimensional data to uncover source-dependent spectral differences. Six isolates (bovine, bovine feces, pig ears, produce farm drag swab, human clinical, and dog food outbreak) were cultured overnight in trypticase soy broth at 32°C. For HMI, 2 µL of washed suspension was pipetted onto a glass slide, air-dried for 15 min, then overlaid with 1 µL of deionized water and a cover slip. Three slides were prepared per biological triplicate, capturing non-overlapping regions and yielding 50 datasets/isolate, using a darkfield hyperspectral microscope with a 100x objective. Single-cell spectral signatures were extracted using a U-Net based segmentation algorithm. Principal component analysis was applied to reduce the dimensionality and identify key wavebands. The number of principal components (PCs) required to explain 99% of variance ranged from 10 (bovine feces, dog food outbreak, pig ears) to 16 (bovine). Examination of the top 10 PC's loadings identified distinct waveb

DESIGN AND ANALYSIS OF A 90-DEGREE RECLINE MECHANISM
Presenter(s): Abbey Yager
Engineering, Computer Science, & Mathematics
Mentor(s): Justin Scott (College of Engineering), Tamara Bush (College of Engineering)

Manual patient handling in hospitals is a leading cause of musculoskeletal injuries among healthcare workers. A recliner that automatically repositions patients will minimize time spent handling patients and the associated physical stresses that lead to musculoskeletal injuries. Nurse feedback indicated that the recliner should be able to lay flat to enable patient transfers from chair to bed with minimal patient handling. The primary goal of this project was to design a recline mechanism of a prototype recliner to achieve a 90-degree recline, enabling a flat position. This included evaluating internal stresses within the recline mechanism to ensure its structural integrity under typical loading conditions. The recline mechanism design was based on linkage systems commonly used in commercial recliners. A free-body diagram of the mechanism was constructed and analyzed using a 125 lb load (half of the prototype's capacity) to represent the head, arms, and trunk, applied at the center of the seat back. A static analysis was conducted to assess the stresses in the mechanism under the maximally-loaded scenario, the fully reclined position. A recline mechanism was designed to bear the 125 lb load in a fully reclined position without failing. This work provided insights into a recline mechanism that can withstand expected loads and stresses in the fully reclined position. Identifying potential failure points supports the development of a safer, more fu

AUTOMATIC SPEECH SIGNAL ANALYSIS FOR EARLY ALZHEIMER'S DETECTION
Presenter(s): Grace Ekeoma Michael, Mary Van Newkirk
Engineering, Computer Science, & Mathematics
Mentor(s): Ellie Xia (College of Arts & Letters), Hezao Ke (College of Arts & Letters)

This study automatically extracts acoustic and phonological features from speeches recorded at an early stage of Alzheimer's disease, Mild Cognitive Impairment, and from healthy control seniors. These features are then fed into a Support Vector Machine model, which predicts the health status of the speakers. We conducted a feature analysis to identify the most effective speech features for the early detection of Mild Cognitive Impairment.

DESIGN OF A HIGHLY CONSTRAINED PATCH ANTENNA WITH HIGH BANDWIDTH WHILE ACHIEVING A HOMOGENEOUS H-FIELD OVER THE SURFACE OF AN EMBEDDED DIAMOND
Presenter(s): Kenneth Seybold
Engineering, Computer Science, & Mathematics
Mentor(s): Jonas Becker (College of Natural Science), Shannon Nicley (College of Engineering)

This project is part of a larger effort within the Quantum Optical Devices (QuOD) Laboratory at MSU, where we are investigating the coherent control and readout of the electron spin states of electrons on liquid Helium by using Nitrogen Vacancy (NV) centers in diamond. This project explores optimizations for a microwave patch antenna for the coherent driving of the electronic spin ground state of the NV centers. The application requires the antenna to have a high bandwidth, resonance at 2.87 GHz, and a uniform magnetic field on the surface of an embedded diamond in the middle of the antenna. Resonance at 2.87 GHz is important as it is the electronic spin ground state splitting that needs to be driven in the NV centers. The difficulty of increasing bandwidth is a result of stringent requirements imposed by the application, where the antenna cannot exceed 0.5mm in height, which prevents the application of conventional strategies of increasing bandwidth. Furthermore, the antenna must be a complete plane that circles the diamond to trap the electrons on the helium layer on the surface of the diamond. These limitations make designing an antenna with high bandwidth challenging. The QuOD Laboratory already has an antenna that is being used for initial testing. It is a standard circular patch antenna and as such has poorer bandwidth. This proposed

THE WAY LENS WORK
Presenter(s): Jason Hoehn
Engineering, Computer Science, & Mathematics
Mentor(s): Carl Boehlert (College of Engineering), Per Askeland (College of Engineering)

How camera lens composition relates to its ability to magnify and alter the way the world is viewed through them is what is being asked within this project. Lenses are aspheric and their curvature can be altered to change the resulting magnification of the images. I will use a scanning electron microscope (SEM) to exam high definition macro lenses containing +1, +2, +4, and +10 diopter filters, which are used to magnify the object being imaged by the camera. I will be using the energy dispersive spectroscopy (EDS) feature of the SEM to identify the elements and compounds that make up the lenses semiquantitatively. The preliminary results indicate that the lens with the +10 diopter filter contained significantly more silicon (Si) than the lens with the +1 diopter filter. A part of this research will be targeted at explaining why the diopter filter composition is a major contributor to the difference in magnifications obtained. In addition, the lens with the +10 diop

IMPROVING PATIENT HEALTH BY ANALYZING DRYING CURVES FOR MEDICAL RECLINER FABRICS
Presenter(s): Joshua France
Engineering, Computer Science, & Mathematics
Mentor(s): Tamara Bush (College of Engineering)

Medical recliners are instrumental in hospital patients' recovery from illness by providing support for a seated position. The fluid resistance and cleanability of the fabric used to upholster the chair are key factors in preventing complications, such as infections or pressure injuries while sitting in recliners. This study analyzes the drying curves of different fabric samples when introduced to water. Samples of multiple fabrics, including polycarbonate-coated fabrics, polycarbonate-backed fabrics, vinyl-coated fabrics, and standard cotton fabrics were tested in this trial. 1 mL of water was dropped onto the center of the fabric surface via a syringe. After fifteen minutes of sitting on the surface, the syringe removed excess beading water from the fabric surface. The fabric's moisture level was recorded every three minutes until the moisture level reached 0.0. Drying curves were created to analyze the collected data. The polycarbonate-backed fabric readily absorbs water, and it needs one hour and forty-five minutes to dry fully. Traditional upholstery seating fabric dried in forty-five minutes, but allowed water to seep through the fabric and into the seat. Water remained beaded on the surface of the polycarbonate-coated and vinyl-coated fabrics, meaning they absorbed no water and thus took no time to dry. By analyzing the waterproofing capabilities of potential upholstery fabrics, this research will inform engineers on the best fabrics to use to prevent medic

NONLINEAR COMPENSATION OF STRETCHABLE STRAIN SENSORS WITH APPLICATION TO PROPRIOCEPTIVE SENSING OF SOFT ROBOTIC ARM
Presenter(s): Vedant Naik
Engineering, Computer Science, & Mathematics
Mentor(s): Xiaobo Tan (College of Engineering)

With advances in materials and manufacturing techniques, recent years have seen a number of conductive composite materials that exhibit pronounced strain-dependent electrical resistivity, allowing them to be used for embedded, cost-effective strain sensing in various applications. The strain-resistivity relationship of these materials, however, is often highly nonlinear and dynamic, posing challenges for effective use of such strain sensors. In this paper, a computationally efficient scheme is proposed for compensating the nonlinear, dynamic strain-resistance behavior of a soft conductive rubber using a Time Delay Neural Network (TDNN). The accuracy and feasibility of the technique is evaluated with a soft robotic arm incorporating three strain sensors for proprioception. Experimental results show that the sensing scheme is able to predict both the tip position and the shape of the robotic manipulator, achieving an average tip positional error of less than 4% relative to the total length of the manipulator.

MICRO-STRUCTURAL INTEGRITY ANALYSIS OF GOLD PLATINGS
Presenter(s): Dede Sodadika Ayanou-Ouattara
Engineering, Computer Science, & Mathematics
Mentor(s): Per Askeland (College of Engineering)

Jewelry is not only a timeless form of self-expression but also an investment. Having actionable insights that intersect sustainability and economic realities is key to making the best decisions while investing in jewelry. This study aims to investigate the microstructural properties and durability of three commonly used jewelry coatings-Gold plating, Physical Vapor Deposition (PVD), and 5% gold-filled coatings-after prolonged exposure to water (H?O) and ethanol (C?H?O). The analysis will focus on understanding the structural changes and degradation of these coatings under conditions simulating day-to-day usage. The results of this experiment will be qualitatively analyzed in terms of general appearance, and structural integrity; contextualized within existing literature. These findings will be further processed to develop a guide highlighting the relationship between coating durability and cost, providing practical insights for the appropriate audience.

CONNECTIONS BETWEEN CONSTRAINED ASSET AND NHL SALARY STRUCTURE
Presenter(s): Grayson Slansky
Engineering, Computer Science, & Mathematics
Mentor(s): Albert Cohen (College of Natural Science)

The main objective of investing with finite funds is to maximize a target output. This could be a timid maximal return approach, or a bolder target in maximal probability of attaining a certain wealth level. In the NHL, the stated goal of every team is to win the Stanley Cup. This raises the question: do general managers truly allocate portions of a salary cap to maximize their chances of winning the Cup? In this work, we present empirical data to match Stanley Cup winning teams with their cap allocation structure for player salaries. While a Pareto or even uniform distribution may be intuitively a preferred method of compensating players, we find a multi-modal distribution to be most optimal for the 2023-2024 NHL season cap of $83,500,000. From a general manager's perspective, this helps to address the question of whether a team should allocate $10 million or more to a few marquee players, a more viable option versus a more even distribution of funds.

REACTION KINETICS OF ISOSORBIDE WITH PROPYLENE AND ETHYLENE CARBONATE
Presenter(s): Aaron Henry, Conrad Schug
Engineering, Computer Science, & Mathematics
Mentor(s): Hugh MacDowell (College of Engineering), Ramani Narayan (College of Engineering)

A kinetics study was proposed to determine the reaction order and develop a kinetic equation for the reaction of isosorbide with either propylene carbonate (PC) or ethylene carbonate (EC) in the presence of lithium chloride as a catalyst. The reaction was conducted in a round-bottom flask under constant stirring, with the system initially purged with nitrogen gas and maintained at 190°C for three hours. Samples were collected every 10 minutes and analyzed using Fourier Transform Infrared Spectroscopy (FTIR). The carbonate peak was quantified using a calibration curve developed by Aaron Henry and plotted against time to extract the relevant kinetic information.

BINDSMART: A PROTEIN-LIGAND BINDING INTERFACE REPRESENTATION FOR HETEROGENEOUS GRAPH NEURAL NETWORKS
Presenter(s): Alexander Aljets
Engineering, Computer Science, & Mathematics
Mentor(s): Daniel Woldring (College of Engineering)

A computational model that can predict drug-target interactions represents a substantial leap forward in drug discovery. However, accurate prediction of protein-ligand interactions remains a critical challenge in computational biology, particularly when targeting proteins with diverse structures and binding mechanisms. Here, we present BINDSMART (Binding Interface Network Descriptors with Small Molecule and Residue Topology), a representation that incorporates ligand atoms and bonds, protein residues, and detailed protein-ligand interactions in a heterogeneous graph to predict binding outcomes and other biophysical properties. In our prior work, BINDSMART demonstrated robust performance on the membrane transporter OATP1B1-a challenging target known for large conformational rearrangements. Building on these successes, we now expand BINDSMART to more manageable systems such as carbonic anhydrase 2 (CA2), a smaller, soluble protein that provides an informative test case for validating our approach on simpler architectures. In our analyses, we found BINDSMART-based graph neural networks (GNNs) outperform ligand-only baselines. For CA2 Ki predictions, our BINDSMART-based GNN attains an R2 of 0.78, surpassing the most effective ligand-only approaches (R2=0.64). In addition to predictive metrics, we leverage molecular dynamics simulations to train the model on more energetically favorable and realistic poses and conformational shifts in the CA2-ligand complex. This provides valua

RE-ENGINEERING PLANT IMMUNITY PROTEINS VIA YEAST SURFACE DISPLAY
Presenter(s): Samantha Schulte
Engineering, Computer Science, & Mathematics
Mentor(s): Ben Dolgikh (College of Natural Science)

Numerous pathogen infections throughout history have devastated crop populations; emerging plant diseases continue to threaten global food security. Plants rely on an innate immune system consisting of machinery (i.e., proteins) to detect and fend off invaders, but some pathogens evade these defenses. We aim to re-engineer plant immunity proteins to promote disease resistance in crops. We are exploring three plant proteins - FLS2, PGIP2, and RIXI - each having a unique role in fending off bacterial and fungal attacks. Changing protein function requires changing protein sequence. However, most changes made to proteins (called mutations) will worsen function. Thus, many mutations need to be tested to identify those that are beneficial and filter out those that are harmful. Mutagenesis studies performed in plants are time-consuming and low-throughput due to the long life cycles and low transformation efficiencies of plants. Yeast surface display (YSD) offers a promising alternative that allows for efficient screening of large libraries of mutations. We have inserted the genes for each of the plant immunity proteins into yeast cells, allowing us to produce the proteins quickly and in high quantities. Further investigation into yeast surface displayed FLS2 shows that the protein is not functional. We have observed that very large sugars are added to the protein by the yeast, making it look very different from when it is made in plants. We are investi

DYNAMIC HUMIDITY CONTROL SYSTEM FOR LOW-MOISTURE FOOD RESEARCH
Presenter(s): Michael Barger
Engineering, Computer Science, & Mathematics
Mentor(s): Ian Hildebrandt (College of Agriculture & Natural Resources)

Accurate analysis of low-moisture foods requires precise environmental control to standardize dehydration and hydration processes. This project aims to develop a fully automated humidity control system specifically designed for preparing food samples, such as apple slices or almonds, for further research. By maintaining consistent humidity levels, this system enables reliable experimental conditions necessary for food safety and preservation studies. The system consists of independent humidity chambers, each composed of an air-tight bin equipped with an exhaust fan, a moist air tube, and a dry air tube. The core innovation lies in its Arduino MEGA-based control unit, which interfaces with relays, pumps, and solenoid valves to dynamically regulate airflow. Each chamber is monitored using two DHT22 temperature and humidity sensors, providing real-time data for adaptive adjustments. The control system is programmed using C and C++, employing an object-oriented approach to efficiently manage multiple chambers and ensure standardized humidity levels. The embedded software integrates an interactive keypad and LCD interface for direct user input, enabling target humidity setting adjustments and error tolerance customization. A built-in EEPROM module retains settings even after power cycles, enhancing reliability.Error handling mechanisms mitigate hardware inconsistencies, with alerts for sensor malfunctions or relay issues. System performa

CORRECTING RACIAL BIAS WITHIN PULSE OXIMETRY
Presenter(s): Carter Ostrowski
Engineering, Computer Science, & Mathematics
Mentor(s): Bige Unluturk (College of Engineering)

Pulse oximeters are a widely used, non-invasive method for measuring blood oxygen levels. The device uses an indirect method of flashing light of a specific wavelength at the skin and measuring the amount of absorbance. Since oxygenated blood and non-oxygenated blood reflect light at different wavelengths, this data on absorbance allows blood oxygen levels to be determined. Because it relies on the body's interaction with the light, certain errors and biases can persist due to differences in genetic makeup. Factors such as skin tone can affect the absorbance of light from the device and light. Pulse oximeters are generally not calibrated for this variation. Under calibration leads to differing values among skin tones. This project investigates the relationship between skin tone and pulse oximeter readings and develops algorithms to correct the bias. The project utilizes Python to aid in the investigation and the development of machine learning models for the algorithms. The ability to correct biases present within the medical field is a step forward to providing personalized medicine for all.

COMPARING MICROPHONE PERFORMANCE IN SMARTPHONE DEVICE
Presenter(s): Aaditya Moudgil
Engineering, Computer Science, & Mathematics
Mentor(s): Tashfain Ahmed (College of Engineering)

Comparing Microphone Performance in Smartphone Devices for Acoustic Characterization Applications.

AN AUTOMATED LED INTERVENTION SYSTEM FOR POULTRY
Presenter(s): Benjamin Smith
Engineering, Computer Science, & Mathematics
Mentor(s): Daniel Morris (College of Agriculture & Natural Resources)

Poultry are increasingly being housed in large cage-free environments. While this promotes welfare through enabling natural behaviors, it also facilitates harmful activities such as injurious pecking, floor egg-laying, and piling. Interventions by staff to disrupt undesirable behaviors are labor intensive and bring humans in contact with poultry. This motivates us to develop an automated intervention system that eschews human labor. Since poultry are sensitive to illumination, we leverage this to develop an automated poultry management system that can monitor bird activities and perform real-time interventions using illumination from LED arrays. Our intervention system consists of ceiling mounted cameras observing the floor poultry and passing video to a computer running artificial intelligence (AI) algorithms that analyze bird behaviors. On detecting undesirable behaviors, a signal is sent to embedded computers in the aviary that control banks of LEDs to create appropriate patterns that disrupt the behaviors. Now the environment in a poultry farm presents a number of challenges for housing a system with delicate electronics and connecting wires. High ammonia levels in aviaries corrode exposed electronics.

IMPACT OF PRE-STEAM TREATMENT ON THE QUALITY AND SAFETY OF DRIED APPLES
Presenter(s): Emily Woodyard
Engineering, Computer Science, & Mathematics
Mentor(s): Bradley Marks (College of Agriculture & Natural Resources), Ian Hildebrandt (College of Agriculture & Natural Resources), Michael James (College of Agriculture & Natural Resources), Narindra Randriamiarintsoa (College of Agriculture & Natural Resources)

Dry fruit processors are required to use preventive controls to ensure their ready-to-eat products are safe to consume. Current resources that inform processors on pathogen reduction efficacy from such controls are limited; however, preliminary research shows that increased processing humidity may improve Salmonella inactivation.This study aims to evaluate the impact of a steam pre-treatment on Salmonella inactivation during apple drying in a pilot-scale impingement oven. Prior to drying, apples (cv. Gala) were rinsed, sliced (4-mm thickness), and inoculated with a 6-strain Salmonella cocktail (9.5±0.2 log CFU/g). Inoculated apple slices were steam-treated at different dewpoints for 1, 2, 3 and 4 minutes. Following the pre-treatment, apple slices were dried in a pilot-scale impingement oven for 1-2 hours using hot-air convective drying. Samples were plated on a differential/non-selective medium and survivors were enumerated. Additionally, sample temperature, browning index, water activity, and moisture content were measured to assess dried apple quality. Steam pre-treatment at 65° C dewpoint for 2 min resulted in 4.4±0.6 log reductions

DESIGNING A BIOCOMPATIBLE HYDROGEL WITH DYNAMIC ADHESION FOR BIOELECTRODES.
Presenter(s): Khang Nguyen
Engineering, Computer Science, & Mathematics
Mentor(s): Caroline Szczepanski (College of Engineering), Denghao Fu (College of Engineering), Sabrina Curley (College of Engineering)

Stretchable bioelectronics are essential in many biomedical applications, and a high-adhesion solution that has been explored is hydrogels. This work builds upon a collaboration between biomedical engineers and material scientists that aims to measure the electrical brain & muscle waves of the octopus, using hydrogels adhesives to secure the electrode, effectively recording these signals. Hydrogels are three-dimensional, cross-linked, hydrophilic polymer networks. In water, hydrogels will swell and expand, and this process is controlled by the balance between the polymer network's elasticity and the osmotic pressure (mixing entropy). In our work, swelling also impacts adhesive performance, as our hydrogel had an effective working time of 30 minutes underwater prior to delaminating from the octopus' skin. Based on these observations, we want to delineate the relationships between the degree of swelling, the tensile strength, and the adhesive performance of hydrogel. We investigate two hydrogel formulations based in acrylic acid, one which includes polyvinyl alcohol (PVA) and another with chitosan. The hydrogels mechanical properties were characterized as a function of swelling; tensile strength was measured using a uniaxial testing machine and adhesion was evaluated using the 180°-peel test, with a cross-linked mucus-based hydrogel substrate that mimics the mucus layer of octopus' skin. Our data shows a negative correlation between the fracture strength and the swelling

MANIPULATING THE PHYSICAL AND CHEMICAL PROPERTIES OF HYDROGELS THROUGH RESPONSIVE PHOTO-CROSS-LINKING
Presenter(s): Reed Blocksome
Engineering, Computer Science, & Mathematics
Mentor(s): Allie Vanzanten (College of Engineering), Caroline Szczepanski (College of Engineering)

Hydrogels are three-dimensional, cross-linked polymer networks formed via free-radical polymerization with the ability to absorb large amounts of compatible solvent (typically, water). This work investigates poly(ethylene glycol) based hydrogels which are modified with a coumarin functionality in order to control the bulk network properties (degree of cross-linking) with external stimulus (light). Coumarin molecules dimerize when irradiated with 365nm light, which creates cross-links between polymer chains, and thus increases the overall constraints within the network. Conversely, irradiation with 254nm light cleaves the coumarin bonds, reducing cross-linking and decreasing constraints. However, the kinetics of the coumarin dimerization and cleavage reactions in bulk polymer networks are not well characterized nor understood. Here we highlight how Fourier Transform Infra-Red (FTIR) spectroscopy can quantify the kinetics of coumarin switching, as well as how Dynamic Mechanical Analysis (DMA) confirms that dimerization and cleavage lead to respectively high and low degrees of cross-linking in the bulk network. The FTIR data shows that the coumarin group's carbon-carbon double bond peak gets smaller during irradiation with 365nm light, supporting the expected increase in cross-linking. Unexpectedly, the DMA data reports that the storage modulus in the dimerized state is less than the cleaved state. We also found that these hydrogels swell less when i

ON STABLE SINGULARITY FORMATION FOR THE QUADRATIC WAVE EQUATION
Presenter(s): Sofi Levi
Engineering, Computer Science, & Mathematics
Mentor(s): Michael McNulty (College of Natural Science)

We study the stability of a singularity formed by an explicit self-similar solution of the seven-dimensional quadratic wave equation. Prior to our work, this solution was shown to possess a one-dimensional instability under radial perturbations of its initial data. This left open its stability under the larger class of non-radial perturbations. Our work provides numerical evidence that there are no new instabilities in the non-radial setting. We achieve this by implementing the continued fractions method. By approximating the roots of a particular infinite continued fraction, we are able to identify those complex numbers which may admit an admissible solution of the corresponding eigenvalue equation.

DEEP LEARNING ALGORITHM FOR PNEUMOCONIOSIS STAGING ON CHEST RADIOGRAPHS
Presenter(s): Michal Borek
Engineering, Computer Science, & Mathematics
Mentor(s): Adam Alessio (College of Engineering), Zenas Huang (College of Natural Science)

Pneumoconiosis is an occupational interstitial lung disease caused by the inhalation of mineral dust particles. Chest radiography is widely used in medical screening for exposed workers. Both inter- and intra- reader variability were major concerns that led the International Labor Organization (ILO) and the NIOSH to standardize the classification of radiographs for pneumoconiosis and to develop the NIOSH B Reader Certification Program in 1974. While the program has improved the proficiency of certified physicians, there remain key challenges including: a) the limited numbers of certified B readers, currently only 209 in the U.S., b) continuing concerns about inter- and intra- reader variability, and c) concerns about the influence of financial conflicts of interests. For these reasons, there is a pressing need for artificial intelligence (AI) algorithms to ensure the objective and consistent radiographic assessment of pneumoconiosis. In this study, we use posterior-anterior (PA) chest radiographs from the NIOSH image repository to identify a 4-point major category scale of profusion (concentration) of small opacities (0, 1, 2, or 3) based on the International Labour Office ("ILO") classification: Category 0 refers to the absence of small opacity and category 3 represents the most profuse. We aim to classify radiographs into one of these different grades. A pre-trained ResNet model was fine-tuned for the multi-class classification problem considered in this study using a va

OPTICAL FLOATING ZONE FURNACE CRYSTAL GROWTH
Presenter(s): Christopher Kopiwoda
Engineering, Computer Science, & Mathematics
Mentor(s): Alexandra Zevalkink (College of Engineering)

Single crystals with high electrical conductivity and low thermal conductivity are essential for many thermoelectric applications. For this project, I will be using an optical floating zone furnace to grow single crystals of Bi_2Se_3. The optical floating zone furnace allows for growth through its control of temperature, heating rate, and atmosphere. I will use X-ray diffraction and microscopy to characterize the crystal structure and microstructure of the crystals. This presentation will cover the process of single crystal synthesis, challenges encountered during growth, and results of the characterization.

DEVELOPMENT OF CALIBRATION CURVES TO EVALUATE THE REACTION KINETICS OF CYCLIC CARBONATES FOR POLYMER SYNTHESIS
Presenter(s): Aaron Henry, Conrad Schug
Engineering, Computer Science, & Mathematics
Mentor(s): Hugh MacDowell (College of Engineering)

Calibration curves using Fourier Transform Infrared Spectroscopy (FTIR) were produced in order to analyze products of the reactions of isosorbide with either ethylene carbonate (EC) or propylene carbonate (PC). These curves were produced using ratios of isopropyl alcohol and propylene carbonate (IPA:PC), along with water and ethylene carbonate (H_2O:EC) that contained a cancellation factor for the water peak using a ratio of isopropyl alcohol and water (IPA:H_2O). Products from the reactions could be analyzed by where the calibration curves would return a value of the amount of propylene carbonate or ethylene carbonate present in the product, which could be used to determine the percent of the reaction completed.

PARAMETRIC DESIGN AND THERMAL OPTIMIZATION OF A GPU CASING FOR AI APPLICATIONS IN MANUFACTURING
Presenter(s): Aman Goenka
Engineering, Computer Science, & Mathematics
Mentor(s): Nevzat Bugdayci (College of Engineering)

As artificial intelligence (AI) drives advancements in manufacturing, efficient thermal management of high-performance computing systems is crucial. This independent study focuses on the parametric design of a GPU casing capable of housing and optimizing the performance of more than six GPUs. The project involves detailed CAD modeling, thermal analysis, and design optimization to enhance heat dissipation and system reliability. Depending on progress, a prototype may be manufactured to validate its functionality. This research bridges mechanical engineering and AI-driven computing, offering practical solutions to thermal and structural challenges in high-performance GPU enclosures.

DEVELOPING A PREDICTIVE MODEL OF IONIZING RADIATION AS A FUNCTION OF ALTITUDE ONBOARD A 10,000 FT APOGEE SOUNDING ROCKET FLIGHT IN MIDLAND, TEXAS
Presenter(s): Griffin Siersma
Engineering, Computer Science, & Mathematics
Mentor(s): Dan Salazar-Gallegos (College of Natural Science)

Michigan State University's Rocketry Club is developing a 2-U CubeSat Payload that employs multiple solid state particle detectors to conduct a dosimetry research experiment in Earth's lower atmosphere. Our detectors align with the goals of NASA's RaD-X mission by contributing to the development of robust, compact, and low-cost radiation detection technologies for prolonged applications. The NASA mission outlines the need to reduce the uncertainty of modeling human exposure to ionizing radiation in flight-crews and astronauts alike. Our research focuses on a range of dosimetric quantities: absorbed dose, dose equivalence, and energy deposition in plastic scintillators during multiple sounding rocket flights. In order to properly analyze our results, we first must have a model of the background particle flux of the ionizing radiation at the surface. This will be done using the Matrix Cascade Equations (MCEq) code, which models atmospheric lepton fluxes numerically. The majority of particles that will be detected by our dosimeter will be muons, so only the muon flux at the surface will be modeled for simplicity.

COMPACT ANTENNA DESIGN FOR WIRELESS ENERGY HARVESTING IN ELECTROPHYSIOLOGICAL MICROSENSORS
Presenter(s): Faith Thomson, Krrish Seth, Sharvayu Chavan
Engineering, Computer Science, & Mathematics
Mentor(s): Chunqi Qian (College of Osteopathic Medicine)

Wireless energy harvesting provides a promising solution to powering self-contained microsensors, especially in medical applications where invasiveness must be minimized. Design and optimization of small-size antennas that can harness ambient WiFi signals at 2.4 GHz to power electrophysiological sensing microsystems is investigated in this study. Three antenna geometries-Planar Inverted-F Antennas (PIFAs), microstrip patch antennas, and meander-line antennas-have been proposed because of their small sizes and efficient wireless energy collection. The research includes simulating and designing such antennas with COMSOL to make them more energy-harvesting, efficient, and resonant. A circuit to convert energy harvested using RF to usable power to be utilized in microsensor applications has also been designed with KiKad. The initial results show that PIFA designs have a good efficiency-compactness balance and therefore have good potential to be incorporated into wireless sensing platforms. This study offers a platform for developing autonomous, wire-free electrophysiological monitoring systems in the future. Using miniature antenna technology, this study aims to make neural sensing noninvasive without being limited by wire-bound power supplies to advance neuroscience, medical diagnosis, and wearable bioelectronics.

CREATING A PARTICLE ACCELERATOR USING MAD-X SOFTWARE
Presenter(s): Jackson Earley
Engineering, Computer Science, & Mathematics
Mentor(s): Yue Hao (Facility for Rare Isotope Beams)

Presentation will include the process of learning how to create an accurate particle accelerator model using MAD-X in python script.

EFFECT OF GEOMETRY ON STRUCTURAL DEFLECTIONS AND INTERNAL FORCES
Presenter(s): Alexis Guardiola, Arita Zaman, Mohammed Abdullah Al Khaium Riaz, Shivasundhar Ravi
Engineering, Computer Science, & Mathematics
Mentor(s): Weiyi Lu (College of Engineering), Zachary Ahmed (College of Engineering)

This research involved hands-on exploration of 3D printing and Digital Image Correlation (DIC) to investigate structural deflections and internal forces. The study focused on applying advanced structural analysis techniques to design lightweight, stiff beams for aerospace and automotive applications. A set of custom beams with different heights were created and tested under quasi-static loading conditions while DIC provided full-field displacement and strain measurements. A strain field evolution video was generated using GOM software, capturing the strain distribution along the beam's length in the horizontal direction. The compressive, tensile, and neutral zones of the beams were visualized by DIC, and the typical stress distribution and maximum strain point on the beam at the end of the elastic region were determined. The increased height had increased the load carrying capacity by 1.44 times, while the weight of the beam was only increased by 1.784 times. Findings from this study provide insights into optimizing 3D-printed beam geometries for enhanced load-bearing capacity.

STRAIN EVOLUTION MEASURED BY DIGITAL IMAGE CORRELATION IN 3D-PRINTED LOCALLY REINFORCED BEAMS
Presenter(s): Diego Zelaya Villafranca, Logan Hinskey, Reed Drouare, Sonia Mirembe
Engineering, Computer Science, & Mathematics
Mentor(s): Weiyi Lu (College of Engineering), Zachary Ahmed (College of Engineering)

Structural beams in buildings and bridges are subject to different load distributions, which affect their durability and failure mechanisms. Understanding the mechanical behavior is crucial for minimizing costs and developing durable structures, which are key goals in engineering design. In this study, we dwelled into the world of 3D printing in order to investigate the durability of beam-like structures under mechanical loading. The study began with the learning about different types of beams used in modern engineering and their different functionalities depending on what type of structures surrounded them. After this, Digital Image Correlation software, also known as DIC, was used to measure the full field strain evolution in the 3D-printed beam specimens under a hydraulic press. This was done in order to measure how much force the beam could resist before collapsing, by making the beam imitate the function of a bridge. After the first round of testing, the team focused on creating a new beam design - the local reinforcement effect on the beam's load carrying capacity. In the updated design, the center of the beam was reinforced by incorporating a wider, contoured section. The new beam yielded positive results in comparison to the original beam. The locally reinforced new samples were able to resist approximately 77% more mechanical loading than the beam structure without reinforcement, with only a 55% increase in weight. This study has shown that the local reinfor

WIELENGA SCHOLAR
Presenter(s): Daniela Ojeda
Engineering, Computer Science, & Mathematics
Mentor(s): Luyao Yuan (MSU University Research Organization)

The growing adoption of solar photovoltaics (PV) in Michigan's commercial and industrial (C&I) sectors presents an opportunity to reduce energy costs and carbon emissions, yet financial and policy barriers impact adoption rates. This study investigates the motivations and obstacles for C&I PV installation and evaluates financial and environmental benefits under different scenarios, including financial goals, clean energy targets, and battery integration. Previous research has explored PV feasibility but often lacks comprehensive assessments incorporating real-world manufacturing and commercial data. Additionally, policy-driven incentives and industrial-scale adoption remain underexplored. This study addresses these gaps using the REopt API in Python to conduct numerical simulations on PV potential for Michigan's C&I sectors. Data from the Industrial Assessment and Training Center at Michigan State University provided insights into manufacturing and commercial building energy profiles, allowing for in-depth scenario analysis of financial incentives, CO? reductions, and battery storage integration. Findings suggest that optimized financial strategies could increase PV adoption by 25%, leading to potential energy cost savings of up to 18% for Michigan businesses. The study underscores the critical role of policy incentives and financial planning in accelerating clean energy transitions in the industri

SPATIAL LIGHT DISPERSION USING 3D-PRINTED TRANSPARENT WAVEGUIDES
Presenter(s): Sarah Ansert
Engineering, Computer Science, & Mathematics
Mentor(s): Xinyue Liu (College of Engineering)

This project focuses on spatial light dispersion, this is through the use of transparent 3D printed resin. The goal of this project is to determine which angle is best for splitting light coming from one source. To further that point, which angle allows for the least amount of light fracturing. The goal is to make models that can disperse light from one point to cover a designated plain.

BLOCKING OUT THE BACKGROUND BUZZ: DESIGNING A 3D PRINTED SNAP-IN FOR FOOTBALL HELMETS
Presenter(s): Rylie DuBois
Engineering, Computer Science, & Mathematics
Mentor(s): Tamara Bush (College of Engineering)

In April of 2024, the NCAA approved schools to use coach-to-player communication devices for football games. Crowd noise from the stadium was an anticipated problem, since the players may not be able to hear what is being said through the communication device when the cheering became loud. The goal of this project was to design, create, and test a snap-in for the ear opening of a football helmet to block out some of the crowd noise. The dimensions of the ear opening of four types of football helmets (Speedflex, AXIOM, VICIS Zero 2, and Schutt F7) were measured and modeled in Autodesk Fusion 360. Each Computer Aided Design (CAD) model was then 3D printed with PLA filament and tested in the helmet to ensure these pieces snapped in. Around 200 total sets of football helmet inserts were 3D printed for the football team, spread across four unique designs created for each of the helmet styles. Initial iterations included inserts that were attached with tape and a tension fit, while subsequent designs used an outer lip to create a "snap in", secure device. Plays resulted in being communicated faster and more efficiently due to this project. Compared to other solutions, such as using only tape to block out the noise, this solution has proven to be more effective in allowing communication from a player and coach perspective.

INVESTIGATING BINDING AND EXPRESSION OF RECOMBINANT PLANT DEFENSE PROTEINS AGAINST CITRUS GREENING
Presenter(s): Asmaa Hasbini
Engineering, Computer Science, & Mathematics
Mentor(s): Ben Dolgikh (College of Natural Science), Daniel Woldring (College of Engineering)

This project revolves around investigating three plant defense proteins that may aid citrus plants against the Huanglongbing Disease (HLB) by inhibiting harmful enzymes released by the Candidatus Liberibacter bacteria. After designing the plasmids with the ancestral and modern sequences of the proteins, each plasmid was expressed in E. Coli bacteria to accumulate a large amount. Afterwards, yeast surface display was used to express the proteins with S. Cerevisiae yeast expressing the plant defense proteins and P. Pastoris yeast expressing the target harmful enzymes. Investigation of the expression and binding of each protein and its target enzyme were carried out using flow cytometry. If successful, this project has the potential to provide a way for citrus plants to selectively defend themselves against the HLB disease.

Environmental Science & Natural Resources

WASTEWATER PRACTICES AND SUSTAINABILITY
Presenter(s): Christina Kooistra
Environmental Science & Natural Resources
Mentor(s): Joel Smith (Burnette Foods, Inc.)

Burnette Foods, Inc. (BFI) is a food processing business which processes fruits and vegetables. A significant amount of water is used to clean and process products, and the water must be properly treated after use to be applied back into the environment. The goals of my internship with BFI were to learn how the wastewater process works, and how the wastewater process at BFI relates to sustainability in its' operations. Samples of the wastewater from different stages of treatment were tested for phosphorus, nitrite, ammonia, pH, dissolved oxygen, volatile fatty acids, chemical oxygen demand, and total suspended solids. The wastewater process generally works well to remove these unwanted components of wastewater so it can be safely applied to spray fields. By applying treated water to spray fields, the water can re-enter the water cycle. Because the wastewater process is effective at removing contaminants, it contributes to sustainability in BFI's operations, since the water being used in processing can be released back into the environment and water cycle.

A COMPARATIVE STUDY OF AMORPHOUS AND CRYSTALLINE STRUCTURES: SEM AND EDS ANALYSIS OF OBSIDIAN, BASALT, AND QUARTZ
Presenter(s): Dev Jyoti Ghosh Arnab
Environmental Science & Natural Resources
Mentor(s): Carl Boehlert (College of Engineering), Per Askeland (College of Engineering)

Amorphous and crystalline materials exhibit distinct structural and chemical properties influencing their mechanical strength, thermal stability, and industrial applications. This research uses Scanning Electron Microscope (SEM) and Energy Dispersion Spectroscopy (EDS) to investigate the elemental composition and microstructural differences between crystalline and amorphous minerals, including quartz, basalt, obsidian, and tempered glass. By analyzing elemental variations beyond silicon, this study aims to uncover compositional differences that impact the formation and properties of these materials.

Additionally, the research has expanded to a variety of quartz and obsidian minerals such as citrine, aventurine, red aventurine, black hair quartz, smoky quartz, snow obsidian, and red obsidian to provide a broader understanding of chemical diversity in gemstones. The findings will help enhance knowledge of how elemental composition correlates with structural properties.

METALLOPHORE PRODUCTION IN POPLAR RHIZOSPHERE BACTERIA
Presenter(s): Krishen Patel
Environmental Science & Natural Resources
Mentor(s): Mashal Copperman (College of Natural Science), Sarah Lebeis (College of Agriculture & Natural Resources)

Mining practices can cause heavy metal contamination in surrounding soil, affecting plant health. Some bacteria can make compounds called metallophores that trap metal ions, which protect the plants that they live on or near from excess. In these studies, we examine this activity in microbes that associate with metal-stressed poplar trees in the rhizosphere, which is the soil that surrounds the root system. In the poplar rhizosphere microbiome in copper contaminated sites, it is hypothesized that certain bacteria are more adept than others at producing metallophores that sequester copper, also called chalkophores. We chose 29 bacterial isolates, including negative and positive controls for metallophore production, from the phyla Actinobacteria, Proteobacteria, and Bacteroidetes. Isolates were grown on copper chloride plates of varying concentrations, and the growth rates were recorded. Measurements were also taken of bacterial growth on Chrome Azurol S (CAS) assay plates, which test for metallophore presence. Genetic analysis was performed by using Uniprot and BLAST to confirm genes responsible for plant association and metal binding and transport were present in the genome of 8 fully sequenced isolates. Current findings show that about 2/3 of the 29 isolates tested are able to grow at a concentration of 200 ppm on copper chloride plates. The CAS assay results are in progress. Soil bacteria with genes for m

CANOPY OPENNESS AND FORB DIVERSITY IN A MICHIGAN OAK SAVANNA
Presenter(s): Abigail Livingston, Mikayla Datka
Environmental Science & Natural Resources
Mentor(s): Lars Brudvig (College of Natural Science)

Oak Savannas are a rapidly diminishing ecosystem in the midwestern US, having reduced in size by 99% since European settlement. At MacCready Nature Reserve, researchers are attempting to restore the oak savanna ecosystem by fire management and mechanical thinning. In this study we used data from MacCready to analyze how the increased canopy openness from these treatments affects the richness and diversity of the understory forb plants. We found that there was a positive relationship between richness($p=0.009$, $r=0.26$) or diversity($p=0.04$, $r=0.21$) of the understory plants and canopy openness.

VIOLA SORIA AS AN ENVIRONMENTAL INDICATOR SPECIES
Presenter(s): Arianna Fobbs
Environmental Science & Natural Resources
Mentor(s): Eva Farre Prokosch (College of Natural Science), Tammy Long (College of Natural Science)

Common Blue violets (Viola soria) are vital contributors to the ecosystem as a food source for butterflies, bees, and rabbits. Previous studies have found an increase in temperature has been associated with an increase in flowering time of 7 to 10 days during the spring season for other plant species in different parts of the world (Bertin et al. 2017). The increase in temperatures has affected the amount of insect pollinators because of the desynchrony between the flower blooming time, and the pollination time has been associated with a decrease in crop yields (Moss et al. 2022). This study is a long term study to look at Viola sororia american blue violets as a potential indicator species for the environment of North America by comparing the proportion of flowers that are found to be blooming in the month of April using Inaturalist data. Indicator species are important because they provide a warning to changing environmental conditions and are connected to the overall health of the ecosystem.

DETECTING LEAD IN FAST FASHION GARMENTS: CHALLENGES AND SOLUTIONS
Presenter(s): Hayden Starr
Environmental Science & Natural Resources
Mentor(s): Saetbyul Park (College of Arts & Letters)

The fast fashion industry faces significant challenges due to the widespread use of harmful chemicals in garment production, with lead being a primary concern. This research proposal aims to detect lead and other chemical contaminants in fast fashion clothing and develop strategies to address the health risks they pose to consumers. The study will focus on identifying the prevalence of lead contamination in garments, particularly those in the fast fashion sector, and assess the associated health risks. Given the potential for chemicals like lead, cadmium, and phthalates to leach from garments into the skin, it is crucial to analyze the types and quantities of these chemicals in fast fashion products. The research will also investigate the efficacy of current detection methods, specifically utilizing the Fluoro-Spec Instant Lead Test kit and Rapid Lead Testing Swabs for home use on all surfaces. Additionally, the study will propose improved strategies for identifying and mitigating chemical contamination. Key steps will include market surveys to estimate the prevalence of contaminated garments, as well as a detailed toxicological assessment of the potential health risks posed by these chemicals.

MAPPING MICROBES AND MINERALS FOR SUSTAINABLE ENERGY
Presenter(s): Charley Russell
Environmental Science & Natural Resources
Mentor(s): Matthew Schrenk (College of Natural Science), Sarah Gonzalez Henao (College of Natural Science)

For the last century, nickel laterites have been used to extract minerals like nickel and chromium from high-grade ores. Although this method has been sustainable for many years, the increase of eco-conscious technologies and infrastructure has led to a higher demand for these metals. Due to these circumstances, traditional mining methods fail to meet this projected demand. As small as they seem, microbes may be the solution for a more efficient and sustainable mining process known as biomining. The overall goal of this project is to explore microbe-mineral interactions and microbes' metabolic processes to cope with heavy metals. To address this goal, we plan to use X-ray diffraction (XRD) to determine mineral composition, Inductively Coupled Plasma Mass Spectrometry (ICP-MS) to identify the metals, and metagenomic sequencing to understand what mechanisms these microbes use to absorb, detoxify, resist, and metabolize heavy metals. This study takes place in the Coast Range Ophiolite Microbial Observatory (CROMO), a serpentinizing environment known for its high metal concentrations where microbial samples and their associated minerals will be collected to further investigate microbe-mineral interactions. So far, we have found metal resistant bacteria within our sequencing data and high concentrations of chromium, nickel, and strontium from our ICP-MS analysis. This project will increase our knowledge about microbe-mineral interactions, specifically with heavy metals, so that

MONITORING BIODIVERSITY IN NEW ZEALAND USING EDNA ANALYSIS?
Presenter(s): Emily Callcut, Vivian Michaels
Environmental Science & Natural Resources
Mentor(s): Jeanette McGuire (College of Natural Science)

New Zealand's ecosystems are incredibly unique, as the majority of endemic species evolved in the absence of mammalian predators. An influx of introduced species has drastically altered ecosystems, leading to a need to quantify and protect the native flora and fauna. Tools such as Environmental DNA (eDNA) sampling are a new, accessible way to monitor and quantify biodiversity through sampling of genetic material deposited from organisms (e.g., skin, saliva, or waste), carried to a point of aggregation by flowing water. Samples are compared to an existing database of known DNA sequences, resulting in a list of species present and their abundance. We conducted a preliminary survey to evaluate the feasibility of eDNA sampling from freshwater streams in Queen Charlotte's Sound. Sufficient DNA for characterization was collected from 6 of 7 filtrations and Resolution Bay was classified as excellent habitat with an 118.05 rating of 140 on the TICI scale. native species such as Weka, Banded Kokopu, and NZ Caddisfly were detected, as well as non-native mammals (e.g., Brush-Tailed Possums and Red Deer). We also found evidence of Chytridiomycosis (Chytrid fungus), an invasive fungus devastating to amphibians, in samples from Resolution Bay, marking what may be the first identification of Chytrid fungus on the South Island of New Zealand. Queen Charlotte's Track is an important corridor for hikers through New Zealand and therefore the potential for further spread is high and represent

DECISION SUPPORT SYSTEM FOR OPTIMIZING ENERGY EFFICIENCY IN IRRIGATED AGRICULTURAL PRODUCTION: VARIABLE FREQUENCY DRIVES (VFDS) AND SOLAR-MICROINVERTER
Presenter(s): Mia Dagati
Environmental Science & Natural Resources
Mentor(s): Younsuk Dong (College of Agriculture & Natural Resources)

In today's agricultural landscape, optimizing irrigation systems for energy efficiency is paramount amidst rising energy costs and strained water resources. The Michigan Irrigation Energy Audit program reveals that irrigation operations alone constitute 95% of electricity consumption on Michigan farms, underscoring the urgent need for innovation. Nationally, irrigation pumps' energy costs exceed $2.4 billion annually, fluctuating significantly with climatic conditions such as drought. Two promising technologies, Variable-Frequency Drives (VFDs) and solar-powered microinverters, stand out for enhancing energy efficiency. VFDs offer advantages like high efficiency and soft-start capabilities, safeguarding equipment from damage. Meanwhile, solar microinverters harness small-scale photovoltaic panels to generate power, yielding substantial savings. This project aims to develop a Decision Support Tool (DSS) tailored for optimizing solar microinverter systems. By integrating site-specific data (solar irradiance, weather patterns, pump specifications, crop types) from sources like MSU Enviroweather and Indiana Mesonet, the tool will ensure precise system sizing and performance evaluation. Economic analysis will assess capital costs, operational expenses, and pa

RELATIONSHIP BETWEEN LOCATION AND BIODIVERSITY OF POLLINATORS ON MSU'S CAMPUS IN EAST LANSING, MI
Presenter(s): Aiden Yang, Aman Talati, Lauren Bottini, Madalena Garneau
Environmental Science & Natural Resources
Mentor(s): Brian Keas (Office of Undergraduate Education)

Pollinators have been in decline around the world due to climate change, diseases, and habitat loss. These declines can be detrimental to ecosystems and for food production. However, it is difficult to measure just how much the populations have declined due to the lack of recorded data on pollinator populations. In order to better understand the declines, we need to start collecting that data now. The data was collected through observing pollinators that land on goldenrod. Goldenrods are plants with high nectar and pollen production. They bloom late in the season and are an important resource for pollinators during early fall.

COMPARING BIODIVERSITY OF LEAF LITTER INVERTEBRATES IN YOUNG AND OLD FOREST ENVIRONMENTS.
Presenter(s): Alonzo Jones, Conner Woodcock
Environmental Science & Natural Resources
Mentor(s): Brian Keas (Office of Undergraduate Education)

Our research aims to identify and compare the species and types of isopods and detritivores that are found in an old growth and new growth forest under a plain cover board and a cover board with mesh underneath. This data will allow us to see whether animals that fill certain niches such as breakdown of decaying matter, predation on detritivores, or other roles are more or less abundant or a higher or lower percent of the overall number of animals found between these two environments. Additionally, we will be able to identify if there is a higher or lower count of insects/animals in general between these younger and older forest habitats. Four pairs of 1x1 foot plywood boards, one plain and one with layers of plastic mesh attached to provide additional microhabitat, were placed at different locations within each of our main study areas (the Baker Woodlot and the Fisheries and Wildlife Restoration Site). On mesh boards, there were 5 layers of mesh which alternated between thin and thick layers. A total of 8 pairs of boards were placed and left undisturbed between sampling, which occurred every four weeks from September to November, 2024. Our research concluded that diversity and abundance is far richer in the old deciduous forest than the younger forest. Additionally, comparison of cover boards to undisturbed leaf litter showed cover boards to be much more

EVALUATING ECOLOGY OF WHITE-TAILED DEER FAWNS AT COREY MARSH ECOLOGICAL RESEARCH CENTER
Presenter(s): Makayla Dernberger
Environmental Science & Natural Resources
Mentor(s): Sonja Christensen (College of Agriculture & Natural Resources)

White-tailed deer (Odocoileus virginianus) play a significant role in Michigan's ecosystems, yet their increasing populations pose challenges related to ecological balance and land use. This study establishes a pilot investigation into fawn habitat use and survival at Corey Marsh Ecological Research Center (CMERC), a recovering agricultural landscape. We employed systematic deer drive searches to locate and capture neonatal fawns, collecting data on body measurements, age, and health status before equipping them with VHF radio collars for tracking. Fawn movements were monitored throughout the summer, with location data processed via Geographic Information Systems (GIS) to assess habitat preferences. Our findings indicate a strong preference for woody wetlands, the most abundant habitat at CMERC, followed by deciduous forests. Additionally, 6% of recorded fawn locations were in developed areas, highlighting their adaptability. No ectoparasites were detected, and fawns exhibited an average mass of 5.16 kg. This research provides baseline ecological data on white-tailed deer fawns in a regenerating habitat, informing future studies on survival, habitat selection, and potential applications of drone technology for wildlife monitoring.

PALEOCURRENT ANALYSIS OF DIFFERENT SEDIMENTARY FACIES WITHIN THE GRAND RIVER FORMATION

Presenter(s): Carter Rosier
Environmental Science & Natural Resources
Mentor(s): Susan Krans (College of Natural Science)

The Saginaw aquifer is one of the main sources of municipal ground water for Lansing, Michigan and is comprised of Pennsylvanian age sedimentary rock formations- the Saginaw Formation and overlying Grand River Formation. While most of the aquifer consists of permeable sandstones between two impermeable confining layers, there are several discontinuous impermeable layers and lenses of sediment within the aquifer that are visible at rare surface outcrops of the formations at Grand Ledge. These outcrops provide a unique opportunity to understand the three-dimensional geometry of sedimentary structures within the aquifer that can be applied to larger scale geophysical studies that map the aquifer at depth. Previous studies on the Saginaw and Grand River Formations have provided important insight into the ancient depositional environment of the sediments that now comprise the Saginaw aquifer. Paleocurrent analysis has been done but lacks linking different sedimentary structures and textures within. In this study, we reevaluate the paleocurrent data in the Grand River Formation at Fitzgerald Park in Grand Ledge, Michigan by combining new paleocurrent data that is coded by sedimentary facies. The purpose of this work is to elucidate nuances in existing paleocurrent data and provide a more complete 3-dimensional picture of the aquifer and its internal structures. Preliminary data indicates a northeast paleocurrent for tabular cross-beds. This is consistent with previous paleocurre

IMPACTS OF CLIMATE CHANGE ON FREEZE-THAW CYCLES IN MIDWESTERN CITIES, USA

Presenter(s): Sydney Ceyzyk
Environmental Science & Natural Resources
Mentor(s): Gerald Urquhart (Lyman Briggs College)

Author order for presentation/poster: Sydney Ceyzyk, Annabella Harold, Madeline Curtis, Curtis Chou, and Dr. Gerald Urquhart. The susceptibility of infrastructure to damage from freeze-thaw cycles (FTCs) is well established, particularly in regions with frequent occurrences of these events. This phenomenon, driven by the expansion and contraction of water within structures, poses significant challenges and financial burdens for governments tasked with maintaining roads, buildings, and sidewalks. With climate change exerting its influence, alterations in FTC frequencies are anticipated. In this study, we examined weather station data from midwestern cities in the continental United States to assess shifts in FTC occurrences. After manually downloading annual weather data for airports near major and minor cities, we used R to quantify the number of occurrences per day where the temperature dropped to or below the thresholds of 29° F and 32° F respectively. The results of our study are consistent with the prediction of a warming climate. Our analysis shows a divergence in FTC patterns, with southern cities experiencing a decrease in frequency w

UNDERSTANDING LINKS BETWEEN MICROBE-MINERALOGY INTERACTIONS WITHIN VOLCANIC HAZARDS

Presenter(s): Korbin Thompson

Environmental Science & Natural Resources

Mentor(s): Ella Cardoza (College of Natural Science), Matthew Schrenk (College of Natural Science)

Microbes play a significant role in the Earth's biogeochemical cycles, but in terms of volcanic ecosystems, the impact of microbial activities on biogeochemistry is limited. Alaska has a dynamic system of arc volcanoes across the state and understanding how microbes are impacted by volcano geochemistry and mineralogy could allow researchers to gain insight on microbial ecology of active volcanic systems. When a volcano erupts, it releases gases and materials that initially create highly oxidizing zones, which essentially sterilizes materials where biological processes once persisted. After volcanic activity settles, this lays the foundation for new microbes to grow onto the site, something that is of interest to environmental microbiologists and ecologists.. Volcanic eruptions can cultivate unique conditions that influence microbial evolution, ultimately selecting for extremophilic life. In addition to harsh environments, research on mineral-microbe interactions within those environments is also limited. Mineral-microbe interactions are important for the biogeochemical cycles of elements and formation of other minerals, fundamentally changing the environment around them. On one hand, minerals provide optimal resources to chemotrophic microbes, like nutrients and energy sources. On the other hand, minerals in these extreme environments can also negatively affect them by releasing toxic substances and creating c

GEOGRAPHIC EXPANSION OF BLACKLEGGED TICKS AND THE LYME DISEASE BACTERIA IN MICHIGAN FROM 2021-2023

Presenter(s): Erin Henthorn

Environmental Science & Natural Resources

Mentor(s): Jean Tsao (College of Agriculture & Natural Resources), Michelle Volk (College of Agriculture & Natural Resources)

Lyme disease is a bacterial disease that is contracted by approximately 476,000 Americans every year, which is of increasing concern to scientists and the public. Blacklegged ticks (Ixodes scapularis), the vectors of the Lyme disease bacteria Borrelia burgdorferi, have been increasing in geographic distribution and prevalence in the northeastern and midwestern United States, including the state of Michigan. Blacklegged ticks were first documented in the Upper Peninsula in the 1980's and the Lower Peninsula in the early 2000's, and while blacklegged ticks have been found in more than half of the counties, there are still several counties, particularly in the north central Lower Peninsula, where they have yet to be detected. Our goal for this project is to compare blacklegged tick abundance in Michigan from 2021 to 2023 and quantify the prevalence of Borrelia burgdorferi in expanding tick populations. Blacklegged ticks were collected in 2021 and 2023 from 19 sites across Michigan using drag sampling, and nymphal ticks will be assayed for B. burgdorferi with qPCR. We expect to see a change in tick densities and B. burgdorferi infection prevalence. Similar studies have shown that Michigan tick populations have been increasing in population size and geographic range as they invade new areas. This research will provide much needed data on tick invasion in the midwest. This information will be crucial in informing management practices, adjusting health

THE PREDICTED GEOCHEMISTRY OF EUROPA'S ICY OCEAN AND ITS IMPACT ON SUBSURFACE LIFE
Presenter(s): Alexandra Huk
Environmental Science & Natural Resources
Mentor(s): Ella Cardoza (College of Natural Science), Matthew Schrenk (College of Natural Science)

Understanding the geochemical composition of Icy Ocean Worlds in our solar system (e.g., Europa, Enceladus) and comparing them to what we know of Earth's high pressure analog systems is an enticing objective for astrobiological research. Unfortunately, studies of microbial responses to these geochemical conditions are relatively limited, focused primarily on possible survival and habitability rather than active growth. This work focuses on conducting microbial cultivation experiments with Maridesulfovibrio hydrothermalis AM13, a sulfate-reducing bacteria isolated from the East Pacific Rise hydrothermal vent system, and using medium attuned to what's known about Ocean World chemistries. Media alterations include increasing brine and ammonium concentrations, and elevating pH. Further methodologies include working in an anaerobic chamber to mimic the environment of subsurface Icy Ocean Worlds, cell quantifications and DNA extractions to record microbial growth, and a short visit to the NASA Jet Propulsion Lab (JPL) in Pasadena, CA to collaborate with Dr. Steve Vance, who is well known for his work in Ocean World exploration, to better understand the approaches and technologies used to study Ocean Worlds. The results of this work are informative of how microbial populations adapt to subsurface Icy Ocean World habitats that are influenced by a range of parameters, com

ANALYSIS OF STREAM FLOW IN THE MANISTEE AND AUSABLE WATERSHEDS OF MICHIGAN'S LOWER PENINSULA
Presenter(s): Ava Haithcock
Environmental Science & Natural Resources
Mentor(s): Anthony Kendall (College of Natural Science), Brent Heerspink (College of Natural Science)

Streamflow, or discharge, is extremely important to a river's natural function . Extreme low flows have a negative impact on fish populations and water supply. Inversely, abnormal high flows can lead to erosion, flooding, and habitat damage. The Manistee and Ausable watersheds, located in the north-central portion of Michigan's lower peninsula, are well known for their historically stable summer streamflow that supports healthy trout populations. This leads to these watersheds being known for their ideal fishing and recreational opportunities. Studying these streamflow conditions and any possible variations provides better understanding of the regional hydrology and stream health. For this study, 18 sites in the Ausable watershed and 20 sites in the Manistee watershed were installed in September 2011. As of January 2024, 9 sites have been selected for continuing long-term monitoring in each watershed . Instrumentation installed at each site measures temperature and pressure, which can be converted to streamflow data in order to analyze trends, and show any variations in the streamflow over time. Further investigation into how these streams have changed thus far, can allow climate scientists, fishermen, and recreation managers to better understand the changes that will occur in the

EVALUATING MOTH BIODIVERSITY WITH LIGHT TRAPS AT AN MSU CAMPUS RESTORATION AREA
Presenter(s): Junhee Han, Kaylah Higbee, Leah Dietrich
Environmental Science & Natural Resources
Mentor(s): Brian Keas (Office of Undergraduate Education)

A significant number of organisms on Earth are decreasing at an alarming rate primarily due to habitat loss from human activity. Without proper baseline data, future generations of researchers are unable to accurately assess the rate at which ecosystems and their biodiversity are declining. Moths are particularly understudied, and when they are, traps tend to be expensive and lethal. In this study, we assessed the moths in a restoration area on Michigan State University's campus using two handmade traps constructed from a plastic tote, LED lights, and egg cartons. Over 7 nights in September and October 2025, 224 specimens were caught in the light traps consisting of 94 moths, 43 caddisflies, and 87 other arthropods. Using photographs of released moths, we successfully identified 67% representing 6 families and 28 species. Diversity of moth captures was similar between edge and woodland habitats. Our results demonstrate that simple, inexpensive traps can be an effective tool for evaluating moth biodiversity and serve as a model for citizen science efforts to further our understanding of moth populations.

EFFECTS OF "SOIL" - REGOLITH - PARTICLES ON RISKS TO CREW HEALTH ON MARS: INSIGHTS FROM SAND GRAINS IN REGOLITH SIMULANTS

Presenter(s): Danah Lee
Environmental Science & Natural Resources
Mentor(s): Michael Velbel (College of Natural Science)

Regolith is a layer of loose, unconsolidated rocky material that covers a harder bedrock layer underneath it. Planetary scientists need to know about regolith on Mars because of the potential risks it can have to human health. To answer this question, a natural sample must be analyzed for volatile minerals and grain shape. A regolith analogue (simulant) is a combination of minerals put together on Earth to mimic the composition of regolith on other planetary bodies. Planetary scientists need regolith analogues to easily make hypotheses and plan future missions without unnecessary spending. It helps to understand the material and make up from Mars for example without spending the money to get the actual sample. To plan a natural sample that we don't have, we should practice the investigation with materials that have measurable properties that are close to the natural sample. More knowledge of Mars regolith is needed to improve scientific understanding of Chemical characterization for crop growth experiments and the potential hazards towards human health. A natural regolith sample must be analyzed for any dangerous minerals or particulates to help answer the scientific question. The purpose of my research is to find out any health related risks crews may be susceptible to on Mars due to the regolith.

ESTABLISHING BASELINE HYDROLOGY AT COREY MARSH

Presenter(s): Maggie Dobry
Environmental Science & Natural Resources
Mentor(s): Alexandria Kuhl (College of Agriculture & Natural Resources)

For over 70 years, the Muck Farms of Bath Township operated as an experimental agricultural station. During this time, the land was exposed to many different chemicals, and drainage tiles were installed in an attempt to control water saturation in crop fields. This once heavily manipulated land, now owned by Michigan State University and renamed as Corey Marsh Ecological Research Center (CMERC), has been left to the effects of nature since the Muck Farm's closing in 2012. Little is known about the impacts of this long-term agricultural history on current hydrological characteristics. CMERC's history plays an important role in its future; understanding the hydrology's current state will allow for more informed decision making for the goal of ecological restoration. To do this, baseline hydrological characteristics must be established. This research study aims to characterize the water balance, water quality, and soil quality at sites across the CMERC property and at neighboring Michigan DNR land. Evaluation of 8 groundwater wells and 5 surface water locations indicated increased conductivity levels in areas where agricultural practices took place. High levels of ammonium, magnesium, calcium were also found,

furthering our evidence that agricultural chemicals are still presently impacting the marsh. Future students will be able to use this baseline data to ask more in-depth questions regarding hydrology and wetl

HOW DO FLUCTUATIONS IN DEMAND AFFECT COCOA SUSTAINABILITY?
Presenter(s): Abby Bailey, Alexa Lewis
Environmental Science & Natural Resources
Mentor(s): Michael Adetayo Olabisi (College of Agriculture & Natural Resources)

Over time, the chocolate industry has experienced exponential growth due to increasing demand world wide, and parallel to it, cocoa demand. However, this increased demand has led to unsustainable harvesting practices to become commonplace in the cocoa industry. Previous research has examined the nature of the industry, detailing working conditions, wages, and environmental costs. Building on this data, this paper explores the correlation between unsustainable practices and the increase in seasonal and regional demand for cocoa. Further, to show how consumers are directly contributing to cocoa production practices and, within this system, analyze the ongoing sustainability efforts. Research has shown that the exponential growth in demand for cocoa is associated with the increase in child labor, wage reductions, and towering carbon emissions.

EVALUATION OF A WEBSITE DESIGNED TO ENCOURAGE PRO-ENVIRONMENTAL BEHAVIORS
Presenter(s): Alaina Bennett, Bailey McFadden, Cora Garling, Ginger Kempf, Lea Saputo
Environmental Science & Natural Resources
Mentor(s): Dantona Judith Leger (Residential & Hospitality Services), Katherine Alaimo (College of Agriculture & Natural Resources), Samyuktha Iyer (College of Social Science)

Earth Is My Home, an MSU and community initiative, aims to be a leading source for environmental education, organizing, and community. The initiative uses evidence-based strategies to seed new social norms by fostering communities and building programs that promote discussions about and adoption of pro-environmental behaviors. One component of the initiative is a website, www.earthismyhome.org, that will host checklists of eco-friendly actions, community-based educational programs, and support for environmental advocacy. The purpose of this study was to gain an understanding of perceptions of the website's look and feel, user experience, and effectiveness for encouraging pro-environmental behaviors. Focus groups with up to three participants were conducted with university students recruited through student organizations and flyers. Participants were invited to interact with the website, engage in a conversation to share their thoughts and ideas with the research team and other participants, and take a short survey. Focus group topics included website first impressions, visual appeal, clarity, and usability. The survey questions focused on participants' attitudes and perceptions of the initiative as a whole. Focus groups were recorded and transcribed verbatim and transcripts were analyzed by content and theme analy

HIDDEN LIFE BELOW: INVESTIGATING DEEP SOIL MICROBIAL IDENTITIES
Presenter(s): Faith Nhkum, Krishen Patel
Environmental Science & Natural Resources
Mentor(s): James Tiedje (College of Agriculture & Natural Resources)

The Loess Hills in Western Iowa have been a target of scientific interest due to their unique soil formation resulting from sequential wind deposits over the last 75,000 years. The undisturbed layers offer the opportunity to sample depths spanning glacial periods. During warmer periods 50,000 and

30,000 years ago, vegetation returned which was later covered by further aeolian deposits. Our hypothesis is that microbes living in these deep soils are unique as they have been selected to survive under very resource poor conditions. Our goal is to determine conditions which favor their growth so that we can explore their adaptations to this environment. Collaborating with the Iowa Geological Survey, we were able to obtain 22-meter-deep soil cores from two sites: the Loess Hills State Forest and Hitchcock Nature Center. From previous work in the lab, high levels of the novel phylum GAL15 was identified from 16S rRNA and genome sequencing. We are using genomic and habitat information to attempt to enrich and eventually isolate member(s) of this community. These include high temperature, minimal carbon, vitamin B12, and long-term incubations. Enrichments were done to amplify the presence of less abundant taxa found in the preliminary long term enrichment experiments. We anticipate that 16S rRNA gene sequencing of the current enrichments will reveal the presence of taxa such as Thermoproteota, Acidobacteriota, and SAR3

PFAS, PATTERNS, AND THE PUBLIC: COMMUNITY HEALTH AND SOCIETAL RESPONSE IN THE MIDWEST
Presenter(s): Calisto Kohn
Environmental Science & Natural Resources
Mentor(s): Jennifer Lee Johnson (College of Agriculture & Natural Resources)

The intersection of health burdens and environmental injustice is particularly pronounced in Rust Belt communities like Otsego, a small town in Allegan County, Michigan. Focusing on factors such as industrial pollution, improper disposal and repurposing of toxic waste, and loss of trust in municipal authorities, this project explores the intricate relationships between Otsego residents and the paper mill industry dominating their local economy for the past 150 years. With the creation of the community's environmental justice group "Justice for Otsego" in 2017, residents have become increasingly aware of and concerned with the role of environmental contamination in the extreme rise in cancer deaths and other negative health outcomes such as autoimmune disorders and reproductive harms present in their community. PFAS chemicals, cancer-causing industrial agents that have seen very little research or policies restricting their use, have been widely used in paper production since the 1960s and are one factor of this web that I measure using quantitative environmental testing and analysis. This works alongside and in combination with qualitative approaches such as interviews with residents, collaboration with community partners, and analysis of archival materials. These methods serve to investigate local knowledge and health outcomes, the goal of this project is to shed light on the dark and unknown area that is PFA

RELATIONAL ORGANIZING TO ENCOURAGE PRO-ENVIRONMENTAL BEHAVIORS
Presenter(s): Bailey McFadden, Claire Hardie, Erykah Boynton, Kelsey Adamczak, Nala Blair, Olivia Szarowicz
Environmental Science & Natural Resources
Mentor(s): Dantona Judith Leger (Residential & Hospitality Services), Katherine Alaimo (College of Agriculture & Natural Resources), Samyuktha Iyer (College of Social Science)

Introduction: Earth Is My Home is an MSU and community-based initiative aimed at educating and inspiring individuals to integrate sustainable practices into daily life. The initiative integrates key behavior change strategies including social norms, relational organizing, social support, education, and principles of persuasion. This study evaluated the effectiveness of two key components of the initiative in promoting behavior change: meaningful personal conversations and expert-developed checklists. Methods : A standardized script was developed to recruit participants through meaningful conversations that included asking participants about their appreciation for the environment, their current sustainability practices, and discussing potential future actions listed on one or more checklists (Nature, Home Energy, Food, Waste and Water, and Transportation). Research staff were trained to conduct the conversations, and the script was iteratively improved through pilot conversations, feedback from participants, and team discussions. The finalized scripts were used to recruit participants at libra

LANDSCAPE ANALYSIS OF BOBCAT OCCUPANCY IN SOUTH-CENTRAL MICHIGAN

Presenter(s): Cooper Krueger
Environmental Science & Natural Resources
Mentor(s): Michael Shaw (College of Agriculture & Natural Resources), Olivia Spagnuolo (College of Agriculture & Natural Resources), Sonja Christensen (College of Agriculture & Natural Resources)

Bobcats (Lynx rufus), have a large range that covers most of North America. Bobcat occupancy patterns vary by location, and few studies examine these traits in Michigan. This gap in research has become a concern for managers, particularly in the Lower Peninsula. Using non-baited camera traps, we surveyed eight townships within Newaygo, Kent, Mecosta, Montcalm, and Ionia County between July 15-September 15 in 2022. We use a single season occupancy model to assess the impact of forest cover and crop type on the presence of bobcats. We predict occupancy will be positively associated with forest cover, and increased crop cover in a detection area will decrease the probability of occupancy. We asses the impact of temperature and moon phase on detection probability. We predict warmer temperatures will be associated with reduced detections, and a fuller moon will increase detection. By identifying landcover affects their presence, managers will be able to better understand possible negative effects of agricultural development on bobcat populations.

MODELING OF SOIL WATER DISTRIBUTION UNDER DIFFERENT IRRIGATION TYPES AND TECHNIQUES FOR IMPROVING BLUEBERRY IRRIGATION MANAGEMENT

Presenter(s): Stewart Tucker
Environmental Science & Natural Resources
Mentor(s): Younsuk Dong (College of Agriculture & Natural Resources)

Blueberry production is Michigan's second largest fruit crop, comprising nearly 25% of the state's fruit economy. Recently, erratic rainfall and temperatures brought on by climate change is making irrigation management more challenging for farmers, with 83% of Michigan blueberry acres being irrigated. With blueberry's shallow roots and preference for sandy soil, blueberries can face water stress that could lead to a decrease in yield causing economic losses in the millions. Climate change has complicated farmers' choosing the optimal irrigation system and operation methods to increase fruit quality and yield. The objective of this project is to analyze the distribution of water using common irrigation types in blueberry production, including single-drip, double-drip, and overhead sprinkler systems. Moreover, irrigation techniques, like pulse application, were evaluated to understand their effects on retaining optimal soil moisture content in the root zone. The HYDRUS modeling software was utilized in this study to understand the soil water flows. Field data, including soil texture, bulk density, soil moisture sensors, infiltration rate, and weather, were collected from two blueberry orchards. These data were used to calibrate and validate the model. The HYDRUS performance was evaluated by modeling efficiency, root mean squared error, and coefficient of determination, with the acceptable valu

LEVERAGING STREAM FLOW TO REVEAL COMPLEX FLOWPATHS OF GROUNDWATER TO STREAMS IN SOUTHWESTERN MICHIGAN
Presenter(s): Jack Garrison
Environmental Science & Natural Resources
Mentor(s): Jay Zarnetske (College of Natural Science)

This project will use streamflow data to paint a clearer picture of the Augusta Creek watershed in southwest Michigan and its hydrologic properties, specifically water sources. In the Augusta Creek watershed, preliminary data suggests more groundwater flows into the stream in the lower region of the watershed. However, it is unclear where the groundwater originates due to hydrogeologic heterogeneity in the region. This project looks to determine and understand additive groundwater flows into the watershed, the importance this has for the scientific and hydrologic communities to understand the groundwater "plumbing," and develop and analyze discharge data more in depth of low relief landscapes with subsurface hydrologic complexity like in lower Michigan forests. These kinds of groundwater-surface water interactions are not fully understood, and with more data and research, we can help fill in the gaps to provide better insight and data into this less studied facet of hydrogeology. Augusta Creek, located in the southern half of the lower peninsula of Michigan, acts as a perfect candidate to research these complex low-relief surface-groundwater interactions, as the area is a mostly flat, rural wetland-dominated watershed with a well-defined stream system flowing through it.

EVALUATING POST-CHEMICAL TREATMENT POPULATION REBOUND AND ITS POTENTIAL CAUSES IN THE MANAGEMENT OF INVASIVE PROCAMBARUS CLARKII
Presenter(s): Jon Dittenbir
Environmental Science & Natural Resources
Mentor(s): Brian Roth (College of Agriculture & Natural Resources), Mackenzie Thompson (College of Agriculture & Natural Resources), Sarah Walker (College of Agriculture & Natural Resources), William Ota (College of Agriculture & Natural Resources)

Population rebound presents a major challenge to the eradication of invasive red swamp crayfish (Procambarus clarkii) in southern Michigan. We observed rebounds of varying severity in eight ponds treated with ExciteR pyrethrin-based chemicals. These ponds belong to a larger interconnected system of thirteen waterbodies linked by an untreated creek with a potential source population. Additionally, P. clarkii are burrowing crayfish which may shelter them from exposure to ExciteR. We regularly collected trap count data from modified Gee Minnow Traps from 2021-2024 in all treated ponds. We used this data to calculate the monthly CPUE (catch per unit effort) in each pond, as well as the maximum CPUE from before and between each round of treatment. To calculate rebound, we evaluated the maximum CPUE after all rounds of treatment as a percentage of the maximum CPUE before any treatments. Waterbodies located closer to the creek did not have significantly higher rebounds than their more distant counterparts, nor did ponds with a higher burrow density (avg. number of burrows per 5m2 surrounding a waterbody). These results suggest that while initially effective, chemical trea

ANALYSIS OF LUNAR REGOLITH LMS-1-2 FOR POTENTIAL NUTRIENTS ATTRIBUTED TO PLANT GROWTH
Presenter(s): Haylie Beers
Environmental Science & Natural Resources
Mentor(s): Michael Velbel (College of Natural Science)

A regolith is a loose layer of broken rock and dust that covers solid rock on airless bodies such as Mars, the Moon, and asteroids. Lunar regolith may provide an important element in the infrastructure of regenerative life support systems (RLSS). RLSS will be required to generate water, air, waste, and to produce food during long missions to the Moon. An analog simulant is a specially crafted mixture that mimics the surface of the Moon. They are created to replicate the physical and chemical characteristics of extraterrestrial surfaces as close as possible. Planetary scientists need regolith analogs to fully understand the regolith on the Moon. Lunar soil is very different from soil on Earth. Lunar regolith is used to identify chemical characterization and minerals that are high in N, P, and K. Samples must be analyzed for potential elements in the regolith that could potentially be used to develop agricultural soil. The purpose is to identify ways scientists use to identify and compare regolith simulants to potentially learn the properties of lunar soil. Two image types from the same sample will be used to compare observable attributes of the sand samples. Images of grain samples from the Moon will be compared to SEM regolith simulants to distinguish the properties of each sample that are similar and can be used for further analysis of potential nutrients in the lunar soil. Data acquired from these images can be used to identify potential parti

DIFFERENCES IN MICROBIAL COMMUNITY COMPOSITION WITHIN THE SAGINAW AQUIFER, THE PREDOMINANT SOURCE OF DRINKING WATER FOR MID-MICHIGAN.

Presenter(s): Carol Hogan

Environmental Science & Natural Resources

Mentor(s): Katie Quinlan (College of Natural Science), Matthew Schrenk (College of Natural Science)

The Saginaw aquifer provides access to clean drinking water to Michigan residents from the Lansing area to Saginaw Bay. However, the biogeochemistry of this critical resource is poorly understood. The Saginaw aquifer is primarily composed of sandstone which allows groundwater to flow through the pores while transporting dissolved chemicals and bacterial cells. Additionally, groundwater in the lower peninsula flows from mid-Michigan to Lake Huron towards Saginaw Bay, displaying different ages of water, young to old. Groundwater age was determined using Tritium and Carbon-14 dating. Groundwater samples were collected from mid-Michigan towards Saginaw Bay to better understand the relationship between biogeochemistry, groundwater age, and microbial communities. The samples have been filtered for microscopy and DNA extraction. From 16S rRNA Amplicon sequencing, each well's microbial composition has been revealed. The microbial data and the environmental parameters are used to analyze the relationship by statistical approaches. All the data is mapped using ArcGIS Online and QGIS to further analyze microbial and geospatial relationships. Documenting changes in groundwater along its flow path helps identify interactions between microbial composition, groundwater age, and biogeochemistry in the Saginaw aquifer improving understanding of drinking water in Michig

PROBING THE MAGMATIC SOURCE OF TURKANA'S PLIOCENE SHIELDS USING ISOTOPIC TECHNIQUES

Presenter(s): Libby Ashby

Environmental Science & Natural Resources

Mentor(s): Andrew Bollinger (College of Natural Science), Tyrone Rooney (College of Natural Science)

The Turkana Depression is an ideal location to study the mantle source of magmatism in the East African Rift due to its prolonged history of magmatism and its thin crust. Currently, there is very little existing isotopic data on the Turkana Pliocene shield volcanoes, causing the shields to be poorly characterized with respect to their mantle source(s). One proposed hypothesis attributes a metasomatic contribution to some of these lavas based on existing trace element data, but the age and origin of this metasomatic event is unknown. To address the variations in mantle source contributions of Turkana's Pliocene shield volcanoes, isotopic analysis of Sr, Nd, and Pb will be conducted to allow for a more complete interpretation of the magma sources that produced these rocks. Furthermore, isotopic analysis of Turkana's Pliocene shield volcanoes can be compared to other volcanic eruptions to contribute to the broad scientific knowledge of heterogeneous mantle sources during the evolution of the East African Rift system. Initial sample results will be plotted with previously measured major and trace element data and compared with the geochemical data for similar volcanic events in literature, which will broaden the current understanding of the mantle sources and magmatic evolution contributing to the formation of Turkana's Pliocene shield volcanoes.

EFFECTS OF REGOLITH TO CREW HEALTH ON MARS

Presenter(s): Jessie Schalkhauser

Environmental Science & Natural Resources

Mentor(s): Michael Velbel (College of Natural Science)

Regolith is a layer of an unconsolidated heterogeneous mixture of dirt and rocky material that sits on top of a rock surface. Mars regolith is important because it can provide answers about Mars's past and reveal traces of past life or water. Planetary scientists can also use it to assess planet surface conditions. A regolith analog simulant is material that is designed to mimic the properties and qualities of a foreign regolith. More knowledge of Mars regolith is needed to improve scientific understanding of the risks to crew health that they will face on Mars. Grains <1µm are most impactful to human health because they can enter the lungs and bloodstream. Jagged edges, rugged profiles, complex surface texture glass mounds, and submicron vesicles are required for an accurate simulant (Liu 08). The purpose is to use a Mars regolith analog to help assess risks to crew health for potential trips to Mars, by analyzing a Keyence color image and a low-mag SEM image of MGS-1-#3 (Mars regolith analog) for grain size and shape. Using the data, we can predict the effect of regolith to create protective measures for a crew. The attributes of regolith simulant observed in this study are grain angularity and size. The quality-of-match between simulant and natural regolith is of moderate quality. Well matched attributes are jagged edges, rugged profiles, grains <1µm. The simulant regolith is useful for assessing the

ASSESSING THE RELATIONSHIP BETWEEN AMERICAN DOG TICK (DERMACENTOR VARIABILIS) RELATIVE DENSITY AND GRASSLAND VEGETATION COVER IN MICHIGAN FROM YEARS (TBD).

Presenter(s): Holly Merritt

Environmental Science & Natural Resources

Mentor(s): Jean Tsao (College of Agriculture & Natural Resources)

The American Dog Tick (Dermacentor variabilis) is a widely distributed species found across central and eastern North America, with isolated populations in the Pacific Northwest. In Michigan, D. variabilis comprises around 70% of the tick population, however, there has been a distinct lack of analysis of their distribution. Primarily within the southern part of D. variabilis range, this species is the main vector for pathogens that can infect both human and companion animal hosts. Our aim was to assess the relationship between the relative density of D. variabilis and grassland vegetation cover at sampled sites in Michigan from years (TBD). Additionally, we plan to develop an updated spatial distribution map by county for D. variabilis in Michigan from 2004 to 2024. While data analysis is ongoing, we anticipate finding either a correlation between D. variabilis density and grassland vegetation cover or no significant difference in tick density across sites with varying grassland vegetation cover. The results of this study will contribute to a better understanding of D. variabilis habitat preferences and site selection in Michigan, while contrib

EFFECTS OF WEATHER ON CAVITY NESTING BIRD BREEDING PHENOLOGY
Presenter(s): Gray Longcore
Environmental Science & Natural Resources
Mentor(s): Jen Owen (College of Agriculture & Natural Resources)

Climate change can cause a mismatch between the timings of animal populations and their food sources. This has been observed in avian populations which use weather conditions to initiate breeding. Insect life cycles are controlled by photo period rather than weather which can cause mismatches between birds and their food source. These mismatches can lead to decreased food availability and population decline. I examined this interaction using data collected from a long-term cavity nesting bird study. Nesting data combined with weather data collected from the same site provided the opportunity to examine the effects of spring temperature and precipitation on nest initiation and egg laying. I was able to assess differences across 4 years (2021-2024) and between the two species studied at the Corey Marsh Ecological Research Center. I compared the dates that nests were completed, and the first eggs were laid for Tree Swallows (Tachycineta bicolor) and Eastern Bluebirds (Sialia sialis). I predicted that warmer, drier conditions in April and May will lead to earlier first egg dates. Tree Swallows will be more affected by weather conditions because they are obligate migrants whereas Eastern Bluebirds are facultative migrants. These results can be used to inform management strategies for cavity nesting birds as temperature and precipitation patterns change.

EXPLORATION OF DUCKWEED CONTROL OF HARMFUL ALGAE
Presenter(s): Clara Ives
Environmental Science & Natural Resources
Mentor(s): Dawn Dechand (College of Agriculture & Natural Resources), Katherine McCullen (College of Agriculture & Natural Resources)

Harmful algal blooms (HAB) are a global threat to water quality and aquatic ecosystems. Eutrophic conditions and quiescent water promote the occurrence of HAB. Duckweeds, which grow on or near the surface of quiescent fresh water, are globally distributed and possess many qualities that allow them to outcompete other aquatic plants and form dense floating mats, including rapid vegetative propagation, high adaptability, and efficient nutrient absorption. Studies have indicated potential for duckweeds to be used to control HAB through multiple mechanisms: blocking light for growth, decreasing aqueous nutrient concentrations, producing exudates, and uptaking HAB toxins. Our research intends to determine the ideal nutrient conditions for duckweed plants to outcompete HAB. In the first trial, Lemna minor, an axenic species of duckweed, will be co-cultured with a HAB community collected in Lansing, MI in nutrient medias with varying phosphorus concentrations. HAB biomass and duckweed growth will be monitored and compared with control groups of only duckweed and only the collected HAB. In the second trial, duckweed will be inoculated with microbiome collected from

USING AN ULTRASONIC MICROPHONE TO DETERMINE BAT DIVERSITY ON MSU'S CAMPUS
Presenter(s): Gabby Dryden, Isabella Leksche Rosales, Quinn Sloma
Environmental Science & Natural Resources
Mentor(s): Brian Keas (Office of Undergraduate Education)

Urbanization is a growing threat to native biodiversity, putting conservation pressures on many organisms, including North American bats, which play important roles in the ecosystem as consumers of vast numbers of insects. In Michigan, there are nine native bat species, most of which are in decline due to disease and habitat loss. Because they fly at night, monitoring bat populations can be difficult, and we have little data to understand baselines and changes in populations over time. We conducted bat surveys on the campus of Michigan State University over 14 nights in September and October 2024, using an ultrasonic microphone that records bat calls to determine its effectiveness in an increasingly urbanized setting. Of 1341 recordings, 49% (657) were initially auto-labeled as unidentified and the remaining as possible bat calls. Upon further manual examination of calls, only 2% (27) were confirmed as the Big Brown Bat (Eptesicus fuscus). Additional possible species included the Hoary Bat (Lasiurus cinereus), and the Silver-Haired Bat (Lasionycteris noctivagans). The areas with the most bat detections were natural areas including Beal Gardens, River Trail, Sanford Natural Area, and Lewis Landscape Arboretum. Our results suggest that ultrasonic microphones are useful in detecting bats on MSU's campus though there are many false recordings. We suggest that further studies be conducted at other times of the year to determine if other bat species are present and w

NON-TARGET WILDLIFE SPECIES INTERFERENCE OF AN ANTI-TICK DRUG DELIVERY SYSTEM TARGETED AT WHITE-TAILED DEER IN SOUTHERN MICHIGAN

Presenter(s): Lawton Prince
Environmental Science & Natural Resources
Mentor(s): Henry Campa (Graduate School Dean), Jean Tsao (College of Agriculture & Natural Resources), Matthew Buchholz (College of Agriculture & Natural Resources)

White-tailed deer (Odocoileus virginianus) are an important host for adult stage blacklegged ticks (Ixodes scapularis). Developing a protocol to administer anti-tick medication to deer could significantly reduce black-legged tick populations. Blacklegged ticks are a vector of Lyme disease causing Borrelia spp. bacteria, so reducing their abundance lowers the human transmission risk. However, the deployment of such a protocol may be affected by consumption of drug delivery units composed of food products for deer by non-target species such as rabbits (Sylvilagus floridanus), raccoons (Procyon lotor), and turkey (Meleagris gallopavo). We describe the early stages of developing, deploying, and evaluating such a protocol and describe the non-target species activity at sites in Meridian Township, MI. The protocol entails deploying test drug delivery units in grids in multiple locations and vegetation types throughout the study area. Trail camera pictures and videos were used to assess the relative numbers, time of visitation, and activities of white-tailed deer and non-target species at grid sites in fall and winter. Non-target species were observed consuming individual drug delivery units. These results demonstrate some of the challenges of non-target species consuming drug delivery units making fewer available for white-tailed deer, over estimating deer consumption rates, and having less impact on controllin

DEVELOPMENT OF A PRO-ENVIRONMENTAL BEHAVIORS MENTOR TRAINING PROGRAM

Presenter(s): Cora Garling, Lea Saputo, Olivia Bisson
Environmental Science & Natural Resources
Mentor(s): Dantona Judith Leger (Residential & Hospitality Services), Katherine Alaimo (College of Agriculture & Natural Resources), Samyuktha Iyer (College of Social Science)

Earth Is My Home, an MSU and community initiative, aims to be a leading source for environmental education, organizing, community, gratitude, and joy. The initative uses evidence-based strategies to seed new social norms by fostering communities and building programs that promote discussions of eco-friendly actions to love, protect, and heal the Earth. One component of the initiative is to promote sustainable behaviors through participant workshops and a mentorship program. The Bee the Change workshops will educate and connect Earth is My Home participants in a supportive and interactive environment. The Enviro-mentor program will train workshop leaders and volunteers for the initiative.

Both programs are designed to encourage participants to form small encouraging communities, stimulate impactful learning, and encourage the development of new social norms. Examples of materials developed for each program will be presented including workshop manual outlines,

MAPPING THE DISTRIBUTION OF CHARACEAE IN MICHIGAN'S INLAND LAKES.
Presenter(s): Braydon Sprik
Environmental Science & Natural Resources
Mentor(s): Jeremy Hartsock (College of Agriculture & Natural Resources)

Fresh water macro-algae in the family Characeae 1) provide critical habitat for many game fish species, 2) they oxygenate the water column and 3) they stabilize lake sediments. They are often the dominant group of photosynthetic organisms occupying the littoral zones of Michigan's inland lakes. However, despite their importance for the proper functioning of lakes, they are often underappreciated and considered nuisance weeds by lake users. From surveying aquatic macrophyte communities in 92 lakes throughout Michigan, we detected members of the Characeae family being present in ~90% of the lakes sampled. In total, we found 5, 3, and 2 species of Chara , Nitella , and Tolypella , respectively. Many of these detections are new County occurrences. Of note, we detected the aquatic invasive species Starry stonewort (Nitellopsis obtusa) in 31 lakes, thereby highlighting the emerging threat of this species spreading to new areas.

A GEOCHEMICAL SIGNATURE ANALYSIS OF GRANITOIDS FROM ANGOLA
Presenter(s): Danielle KIllingback
Environmental Science & Natural Resources
Mentor(s): Tyrone Rooney (College of Natural Science)

Granitoid rocks provide crucial information about tectonic evolution, as they are the dominant rock type in Earth's upper continental crust. Major mountain-building tectonic events, such as the Pan-African orogeny and the assembly and breakup of the supercontinent Gondwana, are closely linked to granitoids. We are studying a suite of granitoid rocks located along the Angolan ocean margin, which represent fragments of continental crust that ruptured during the opening of the South Atlantic. By examining the processes that formed these rocks, we aim to better understand how the crust along this margin developed and evolved prior to continental breakup. Through elemental composition analysis of granitoid samples from the area, we will assess the tectonic activity that contributed to their formation. Additionally, using petrographic methods such as modal mineralogy, this research will provide deeper insight into the tectonic processes associated with Gondwana and the Pan-African orogeny, refining our understanding of crustal evolution along rifted continental margins.

MODELLING MAGMA EVOLUTION WITHIN THE ETENDEKA LARGE IGNEOUS PROVINCE
Presenter(s): Thomas Libecco
Environmental Science & Natural Resources
Mentor(s): Tyrone Rooney (College of Natural Science)

This project will investigate the magmatic evolution of the Etendeka Large Igneous Province (LIP). LIPs are defined as areas with massive volcanic eruptions that occur across large areas. Etendeka is unique among LIPs because its magmas have experienced a high degree of magmatic processing within the crust. This process, termed magmatic evolution, changes the geochemistry of the magmas from primitive to evolved over time. This unique magmatic evolution within Etendeka raises the question: how did the Etendeka magmas become so evolved? I will use dike data obtained from the GEOROC database to model magmatic evolution, which will help us understand which REAFC (Recharge, Evacuation, Assimilation, Fractional Crystallization) processes have impacted the magma. Dikes are conduits through which magma moves from the mantle to the crust, preserving a record of magmas that have experienced little processing within the crust. By modeling the evolution of magma chambers fed by these dikes, this project seeks to determine the magmatic differentiation processes that occur within the continental crust in LIPs. Using evolved data from the Bero Volcanic Complex (Angola), the project aims to establish a connection between less-evolved magma within dike systems in neighboring regions to understand the parental magma of the Bero Volcanic Complex and the depth of the mag

INFLUENCING ANGLERS TO DECREASE POST MORTALITY RATES OF SHARKS
Presenter(s): Mia Pepevnik, Rainah Spohn
Environmental Science & Natural Resources
Mentor(s): Amber Peters (College of Agriculture & Natural Resources)

Despite its seemingly harmless nature, "shark posing"-the act of taking a photo with a shark after it has been caught-can have significant negative impacts on the shark's post-release survival. While there are safe and effective ways to pose with a shark, improper handling can lead to increased post-release mortality rates. Our presentation aims to highlight the best practices for shark handling, emphasizing what not to do, and demonstrating how outreach through social media can educate anglers on responsible catch-and-release techniques to minimize harm to shark populations.

THE CHOCOLATE INDUSTRIES CONTRIBUTION TO GLOBAL DEFORESTATION
Presenter(s): Charlie Conrad
Environmental Science & Natural Resources
Mentor(s): Michael Adetayo Olabisi (College of Agriculture & Natural Resources)

About 30% of the deforestation in Ghana and Cote-d'Ivoire, two countries responsible for about 60% of the world's cocoa supply, is tied to producing the essential ingredient for chocolate. This report explores how the growing demand for cocoa contributes to deforestation by analyzing global data, farming practices, and economic pressures. Additionally, the report discusses the socioeconomic challenges cocoa farmers face, including poverty, child labor, and gender disparities, which further drive unsustainable agricultural practices. Government regulations have been introduced to address deforestation and labor exploitation. However, enforcement remains a significant challenge. The report highlights potential solutions, including sustainable farming techniques like agroforestry and company specific implementations like supply chain transparency. Using data from Global Forest Watch and FAOSTAT, this study presents visual analyses of deforestation trends in Ghana and Cote-d'Ivoire and their correlation with cocoa production. The findings indicate that while cocoa farming is a vital economic driver in these countries, its environmental toll is severe. Consumers and regulators should know more about the complex supply chains that link the chocolate on store shelves to the health of tropical forests, and by extension, global sustainability.

ORGANIZED OPPOSITION AND SUPPORT FOR RENEWABLE ENERGY IN THE UNITED STATES
Presenter(s): Daniel Horowitz
Environmental Science & Natural Resources
Mentor(s): Douglas Bessette (College of Agriculture & Natural Resources)

As the size of renewable energy projects and the speed of development increase with our state and federal decarbonization targets, the role and influence of organized groups in supporting or opposing those projects continues to grow. This study utilizes data from the Sabin Center for Climate Change Law, Robert Bryce Report, and Daily Energy News Digests, as a starting point to build a first-of-its-kind database of organized online support and opposition groups. The database includes group names, states, townships and counties, group and member counts, project and developer names, dates of events, and finally a number of hyperlinks including local ordinances and local news articles for further analysis. The dataset includes over 450 entries delineating organized opposition and support in the US Midwest and Northeast. The database provides an opportunity to improve our understanding of how developers and officials can improve development processes and community outcomes, as well as provide community-acceptance researchers access to a growing body of opposition and support group data. The database currently focuses on wind and solar projects in the US Midwest and Northeast, but work has begun to expand its reach across the US. Additionally, we are currently using the database to explore the relationship between project size and opposition, the types and locations of projects that receive the most opposition, and

EPIDEMIOLOGY & PUBLIC HEALTH

INVESTIGATING TELOMERE LENGTH AND CARDIOVASCULAR HEALTH IN SOUTH ASIANS: ADDRESSING HEALTH DISPARITIES THROUGH MASALA DATA

Presenter(s): Jasnoor Kaur
Epidemiology & Public Health
Mentor(s): Emily Anderson (Northwestern University)

South Asians have a significantly higher risk of cardiovascular disease (CVD) compared to other racial and ethnic groups. Despite representing a quarter of the world's population, limited research exists on factors contributing to this phenomenon. Telomere length (TL), a biomarker for cellular aging, has been linked to atherosclerosis cardiovascular disease (ASCVD) in populations of European descent, but there are no current studies that have examined this relationship in South Asians individuals. Therefore, the primary purpose of the present study is to examine the association between TL and subclinical atherosclerosis. This study will inform whether TL could be used as a biomarker in this patient population for individuals who may be more likely to develop clinical ASCVD in the future. Data from the MASALA (Mediators of Atherosclerosis in South Asians Living in America) study were used to analyze the hypothesized association of TL with baseline CAC examination scores, common carotid IMT, and incident CAC. We categorized TL into 3 tertiles based on distribution, and statistical analyses included linear and logistic regression models adjusted for demographic, clinical, and behavioral risk factors. Participants with shorter TL (T1) had significantly higher unadjusted median CAC scores and mean cIMT. However, after adjusting for covariates

READING BETWEEN THE SPECIALTIES: VARIATIONS IN MEDICAL LITERATURE CONSUMPTION ACROSS DISCIPLINES

Presenter(s): Paige Spitz, Rachel Roberts, Sonia Hadar
Epidemiology & Public Health
Mentor(s): Destiny Kanning (College of Nursing)

Continuous learning is crucial for physicians, but the vast volume of medical literature makes staying updated challenging. While research has examined general physician reading habits, little is known about how engagement varies across specialties. This study explores the frequency, preferred sources, and digital engagement strategies of medical professionals in fields like surgery, internal medicine, podiatry, and nursing. Surgeons may rely more on visual tools and intraoperative experiences, while internal medicine physicians engage more with peer-reviewed literature and clinical guidelines. Factors such as time constraints, institutional access, and digital versus print preferences shape reading behaviors, but their specialty-specific impact is unclear. By identifying trends and barriers in literature consumption, this study aims to inform tailored continuing medical education strategies, improve journal accessibility, and refine medical education approaches to better meet the needs of different healthcare professionals.

THE ASSOCIATION BETWEEN B-SIT AND OLFACTION STATUS
Presenter(s): Pritika Manna
Epidemiology & Public Health
Mentor(s): Honglei Chen (College of Human Medicine), Yaqun Yuan (College of Human Medicine)

Poor olfaction is common in older adults and may indicate underlying health conditions. This study assessed olfactory function in 2,545 older farmers from North Carolina and Iowa between 2020 and 2021 using the 12-item Brief Smell Identification Test (B-SIT). We analyzed their B-SIT scores alongside perceived testing experience and examined factors associated with olfaction while accounting for study design, participation, and covariates. Among participants, 37.8% demonstrated good olfaction (B-SIT score 11-12), 34.2% had moderate olfaction (9-10), and 28.0% exhibited poor olfaction (0-8). Higher B-SIT scores correlated with perceiving more identified odors (Spearman's p=0.65) and stronger odor intensity (Spearman's p=0.54). Poor olfaction was associated with older age, single marital status, North Carolina residence, and a history of asthma, recurrent sinus infections, or nasal/brain surgery. Seasonality influenced B-SIT results, with the highest scores in summer (June-August) and the lowest in spring (March-May), averaging a 0.48-point difference. Acute allergic or cold symptoms (e.g., runny nose, sore throat, sinus pain) and recent farming activities (e.g., working in animal confinement areas or exposure to wood/metal dust) showed no clear link to poor olfaction. Though not statistically significant, lower B-SIT scores were observed in those who handled pesticides or used gasoline. These findings suggest that various demographic and environmental factors may i

CAREGIVER-BASED DETERMINANTS OF ALZHEIMER'S DISEASE (AD) MORTALITY
Presenter(s): Emma Nicolaysen
Epidemiology & Public Health
Mentor(s): Bevertone Anyonga (College of Social Science), Matthew Grossmann (College of Social Science)

This study examines the impact of caregiver-related variables on Alzheimer's disease (AD) mortality at both the state and national levels. Given the increasing prevalence of AD in the U.S., particularly among women, African Americans, and Hispanics/Latinos, understanding factors that influence AD-related deaths is critical for healthcare policy. The study explores two key caregiver-related determinants: the number of caregivers and care aides and the health conditions of caregivers. Data were sourced from the Alzheimer's Association and the Alzheimer's Impact Movement, covering 50 U.S. states from 2020 to 2021. Using multiple regression analysis, the first model revealed a significant positive correlation between the number of caregivers and AD-related deaths per state ($p<0.05$), with caregiver prevalence accounting for 93.64% of the variance in AD mortality. In contrast, the second model exploring the health of caregivers found only depression to be significantly related to AD mortality ($p<0.05$), though it explained a minimal 9.54% of the variance.

EMPOWERING MSU GREEK LIFE TO RECOGNIZE AND TREAT AN OPIOID OVERDOSE
Presenter(s): Alexis Maloof, Jack Burke, Matthew Hendrick
Epidemiology & Public Health
Mentor(s): Bret Bielawski (College of Osteopathic Medicine), Carolina Restini (College of Osteopathic Medicine)

There has been an increase in opioid related overdoses in college-aged populations (18-21) over the past decade. The lack of education on recognizing and reversing an opioid overdose poses significant safety concerns for college students nationwide. To our knowledge, there is no training on the use of naloxone specifically within the Greek Life community at Michigan State University. We sought to train Greek Life members on awareness, recognition and reversal of an opioid overdose. To assess the efficacy of our training intervention, a total of 249 Greek Life members were surveyed using pre and post-training questionnaires. This cross sectional study hypothesized that our training intervention: 1) Would increase awareness among a peer demographic at risk of an opioid overdose. 2) Would enable members to recognize the signs and symptoms of an opioid overdose. 3) Would increase the comfort level of using naloxone in the case of an opioid overdose. Our results revealed the following differences between pre and post training sessions: 1) Recognition that Greek Life members are an at-risk demographic increased by 7% ($p<0.01$). 2) Ability to recognize an opioid overdose increased by 72% ($p<0.01$). 3) Confidence in administering naloxone increased by 82%

US PATENT REVIEW: IDENTIFYING CHEMICALS USED IN THE MANUFACTURE OF TAMPONS
Presenter(s): Dieny Diallo, Jon Bank, Lenora Say, Maren Williams
Epidemiology & Public Health
Mentor(s): Kristen Upson (College of Human Medicine)

Tampons are commonly used by 52-86% of US menstruators as they absorb/retain menstrual fluid within the vagina. However, vaginal tissue is highly permeable; chemicals in tampons could be absorbed vaginally and affect health. As several chemicals have been detected in tampons, we searched the US Patent and Trademark Office database to understand chemical use in tampon manufacturing. We identified patents filed before September 1, 2024, describing menstrual tampon inventions using metals - zinc, cadmium, and arsenic. Our patent review of other metals, phenols, phthalates, and perfluoroalkyl substances is ongoing. Using a standardized protocol, we abstracted patent data. For zinc, our search yielded 89 documents; 47 met our review criteria (62% issued patents, 38% patent applications). Patents described zinc use in the tampon absorbent core, fibers, and applicator as an antimicrobial, lubricating, pigment, and absorptive agent. Major US tampon companies comprised 50% of patent assignees. The most recent patent was filed in 2024. For cadmium, we identified 41 documents; 23 met our review criteria (78% issued patents and 22% patent applications). Patents described cadmium use for its antimicrobial, pigment, and absorptive properties in absorbent tampon fibers. A major US tampon company assignee was listed on 50% of patents. The most recent patent was filed in 2021. We identified 23 tampon patents describing arsenic; 10 met our review criteria (100% issued patents). Arsenic was

THE EFFECT OF SOCIAL DETERMINANTS OF HEALTH ON USE OF DIABETES-RELATED TECHNOLOGY IN OLDER ADULTS WITH TYPE 2 DIABETES.

Presenter(s): Damilola Adissa

Epidemiology & Public Health

Mentor(s): Evan Reynolds (College of Human Medicine)

Objective: We aim to determine associations between social determinants of health (SDOH) and use of diabetes-related mobile applications in older individuals with type 2 diabetes (T2D). Research Design and Methods: We used data from the National Poll on Health Aging, a nationally representative survey of older adults in the United States. We identified persons that self-reported having T2D. Co-primary outcomes were use of mobile applications to (1) track diabetes medications and (2) track blood glucose levels. SDOH factors included income, education, insurance, lack of companionship or social isolation, and housing status. We fit logistic regression models to determine associations between SDOH factors and use of each mobile health application, adjusting for demographic information and access to technology. Results: There were 348 persons with T2D that completed the survey (mean (SD) age: 65.4 (7.9), 44.0% female, 69.5% White, 13.2% Black, 13.5% Hispanic). We found 12.4% used mobile applications to track blood glucose and 5.5% used applications to track diabetes medications. Regression models revealed higher income associated with an increased odds of using mobile applications to track blood glucose levels (OR:52.02, 95%CI: 6.27-716.88). Additionally, older age associated with decreased odd

CREATION OF A NANO-BIOSENSOR PROBE FOR THE RAPID DETECTION OF SALMONELLA UTILIZING THE FLJ GENE MARKER

Presenter(s): Katherine Heinecke

Epidemiology & Public Health

Mentor(s): Anthony James Franco (College of Agriculture & Natural Resources), Evangelyn Alocilja (College of Agriculture & Natural Resources)

The detection of Salmonella in poultry critical for ensuring food safety and public health. Traditional methods for Salmonella detection, while effective, are time-consuming and labor-intensive, often taking several days to yield results. To address this challenge, a biosensor probe targeting the flj gene, a gene associated with Salmonella flagella, was developed for the rapid detection of Salmonella in poultry meat samples. This study evaluated the performance of the biosensor probe in laboratory conditions, based on its sensitivity and selectivity, and compared its analysis results with conventional detection methods. Additionally, the system provided fast results within 4 hours, significantly reducing detection time compared to traditional methods. The successful integration of this biosensor probe into poultry processing plants could facilitate quicker responses to contamination, reducing the risk of pathogen outbreaks and enhancing food safety protocols in the industry.

STERILIZATION REVOLUTION: CAN AUTOCLAVES REDUCE MEDICAL WASTE IN HEALTHCARE?

Presenter(s): Elizabeth Verhoef, Emma Movahedi, Rachel Roberts

Epidemiology & Public Health

Mentor(s): Destiny Kanning (College of Nursing)

The expansion of healthcare has led to a sharp increase in medical waste, much of which consists of single-use plastics, disposable equipment, and pharmaceutical byproducts. The reliance on disposable materials, including gloves, syringes, and packaging, poses significant environmental challenges. A large portion of this waste is non-biodegradable, necessitating incineration, which releases harmful chemicals into the environment. Identifying sustainable alternatives to current disposal methods is critical to reducing healthcare's ecological impact. This literature review examines the potential role of autoclaves in reducing medical waste and mitigating environmental harm. By systematically analyzing peer-reviewed research from 2010-2025, we assess the effectiveness of autoclaving in sterilizing and repurposing medical materials, its feasibility as a large-scale waste management solution, and its environmental impact compared to incineration. Our findings highlight key takeaways regarding the performance of autoclaves, barriers to implementation, and proposed solutions for integrating sustainable waste processing into healthcare systems. Understanding the role of autoclaves in waste reduction can inform policy changes, improve hospital protocols, and support innovations in sustainable medical waste management. This review provides insight into how healthcare institutions can adopt autoclaving as a viable alternative to incineration, ultimately contributing to a more environ

MATERNAL EXPOSURES TO SULFUR DIOXIDE AIRBORNE CONCENTRATIONS AND ADVERSE BIRTH OUTCOMES: DETROIT METROPOLITAN AREA, 2009-2015

Presenter(s): Alaina Pabbathi
Epidemiology & Public Health
Mentor(s): Sue Grady (College of Social Science)

Sulfur dioxide (SO2) is a gaseous air pollutant emitted by industry during fossil fuel combustion and other industrial processes. High concentrations of SO2 are harmful to human health and the environment. The Environmental Protection Agency (EPA) regulatory 1-hour SO2 standard is 75 parts per billion (ppb). Short-term exposure to SO2 (range, 5 minutes to 24 hours) can irritate the human respiratory system causing bronchoconstriction. There is also evidence that exposure to SO2 during pregnancy is associated with adverse birth outcomes, including low-birth weight and preterm birth. This study utilizes AERMOD the EPA's advance plume modeling program to measure airborne SO2 in the Detroit Metropolitan Area (DMA). Maternal exposures to annual average concentrations are assigned to women giving birth 2009-2015. The DMA is also highly segregated by race and household income; thus the moderating effects of concentrated poverty in the SO2 exposure and birth outcome relationship is examined. The results further explain the large racial disparities in adverse birth outcomes in this metropolitan area of Michigan.

THE LONGITUDINAL ASSOCIATION OF POLYUNSATURATED FATTY ACIDS AND EXECUTIVE FUNCTION OF ADOLESCENTS WITH PERINATAL HIV IN KAMPALA, UGANDA

Presenter(s): Eshika Avidi
Epidemiology & Public Health
Mentor(s): Alla Sikorskii (College of Osteopathic Medicine), Amara Ezeamama (College of Osteopathic Medicine), Jenifer Fenton (College of Agriculture & Natural Resources), Vanessa Cardino (Graduate School Dean)

Polyunsaturated fatty acid (PUFA) levels are vital for adolescent cognitive development. The role of PUFAs in executive function (EF) is understudied, especially in populations with perinatal HIV exposure/infection, who experience malnutrition and neuroinflammation. The objectives of this study were to quantify associations between serum PUFA levels and EF in Ugandan adolescents over 12 months and evaluate modification by perinatal HIV status. It was hypothesized that polyunsaturated fatty acid (PUFA) levels were associated with decreased executive dysfunction (ED), especially in those with perinatal HIV exposure/infection. Adolescents with perinatal HIV infection (APHIV, n=159), adolescents HIV exposed uninfected (AHEU, n=155), and adolescents HIV unexposed uninfected (AHUU, n=153) were recruited. Questionnaire- and performance-based measures of EF (analyzed as z-scores) were assessed at baseline, 6-, and 12-months. Linear mixed-effects models were used to analyze associations between baseline serum PUFA tertiles and longitudinal ED measures. Among all adolescents, moderate v. low total ω-3 PUFA (mean difference [95% confidence interval]: -0.51 [-0.87,-0.15]), Om

THE ATTEMPT TO CUT DOWN OR STOP THE USE OF ALCOHOL AMONG MARGINALIZED DEPENDENT POPULATIONS
Presenter(s): Alexandra Beck
Epidemiology & Public Health
Mentor(s): James (Jim) Anthony (College of Human Medicine)

Alcohol dependence (DSM-V) is a problem that impacts individuals regardless of age, race, gender, or other identities. In a meta-analysis examining 6,631 studies, the association of alcohol outcomes and social disadvantage (poverty, racial stigma, etc.) revealed that individuals experiencing extreme disadvantage were associated with 2-6 times greater experience of alcohol issues (Mulia et al., 2016). Alcohol withdrawal syndrome affects a large portion of the US, and while most cases are mild, symptoms, such as anxiety and gastrointestinal pain can worsen and lead to fatal complications (Canver et al., 2024). The purpose of this research is to bring attention to under-studied groups in an effort to better protect them from the negative ramifications of alcohol dependence syndrome and withdrawal. The data used to determine estimates is from the National Survey on Drug Use and Health modules that pertain to alcohol use.

ENGAGING COLLEGE STUDENTS IN DEVELOPING A TAILORED VIDEO INTERVENTION FOR UNIVERSITY CAMPUSES
Presenter(s): Alison Frommeyer, Dibakar Roy, Eleazar Asase, Grace Caldwell, Mandy Marsili, Matthew Mwemba, Olivia Miars, Umniah Moshi
Epidemiology & Public Health
Mentor(s): Angela Chia-Chen Chen (College of Nursing), ChengChing Liu (College of Nursing)

Purpose/Background: Human papillomavirus (HPV) is the most common sexually transmitted infection in the U.S., particularly among college students, and can lead to cancers in males and females. The HPV vaccination addresses this public health concern, yet many college students have not received it. This presentation describes the engagement of college students in developing a tailored, video intervention for their peers. Method: A diverse group of 8 college students serve on a student advisory board (SAB), co-developing a tailored video intervention to promote HPV vaccination. The SAB meets with faculty researchers monthly for two hours. Light refreshments are provided; each member will receive a completion certificate and gift card. Two student assistants, experienced in filming and video editing, are involved to improve quality. Meeting discussions are digitally recorded and transcribed. Results: The SAB consists of 5 female and 3 male students with majors in human health disciplines, bioscience disciplines, engineering, and performing arts. Members represent different race/ethnicity (50% White, 25% Black, 25% Asian), year in the program (Sophomore to Senior) and research experience (0-18 months of prior experience). Four videos (each 2-3

SUPPORTING PREGNANT WORKERS: RECOGNIZING RISKS, AND KNOWING YOUR LEGAL RIGHTS
Presenter(s): Darielle Moore
Epidemiology & Public Health
Mentor(s): Dawn Misra (College of Human Medicine)

The 2024 U.S. Pregnant Fair Workers Act requires that employers provide accommodations for workers during pregnancy. We do not yet know how this legal protection will improve maternal and infant outcomes. Women may not be aware of the accommodations available to them or how to negotiate with employers to be granted accommodations. This presentation will first review information about the relationship between occupational heavy lifting and the risk of miscarriage and preeclampsia. We will focus on heavy lifting as an example of a risky workplace exposure. Then we will provide information about pregnant worker's rights so that pregnant workers and their support network can take action to reduce their risk. Finally, we will show an example of messaging that can be used to advocate for accommodations related to heavy lifting by pregnant workers.

NEWLY INCIDENT CANNABIS AND INHALANT USE: POSSIBLE EXCESS RISK FOR INDIGENOUS YOUNG PEOPLE IN THE UNITED STATES SINCE 2004
Presenter(s): Isaac Maki
Epidemiology & Public Health
Mentor(s): James (Jim) Anthony (College of Human Medicine)

Prior research in the field of epidemiology has shown that Indigenous young people of the United States have higher rates of starting to extra-medically use prescription pain killer drugs. So, my project seeks to see if there is a similar risk among Indigenous populations in the United States to use cannabis recreationally compared to non-Indigenous populations. I utilized survey data from the US National Surveys on Drug Use and Health (NSDUH) to produce specific year-pair estimates of cannabis usage proportions along with standard errors. Then, I summarized these estimates with both Frequentist and Bayesian inference approaches in R-scripts. For both inference approaches, I saw that all of the intervals comparing Indigenous and non-Indigenous people overlapped. Thus, the NSDUH data did not support that Indigenous populations had a higher rate of recreational cannabis use than that of non-Indigenous populations. For this UURAF presentation, I used the same methods to determine if there were any excess risks among Indigenous populations with the use of inhalants.

ANTIMICROBIAL RESISTANCE IN THE GUT MICROBIOMES OF INFANTS IN THE PEDIATRIC INTENSIVE CARE UNIT
Presenter(s): Kennedy Zarembski
Epidemiology & Public Health
Mentor(s): Mara Leimanis (College of Human Medicine), Sarah Comstock (College of Agriculture & Natural Resources)

In the body there is a mutualistic relationship between the bacteria in the gut and an individual's health. In children, the first two years of life are important to establish healthy bacteria. There is also a gut lung axis where the bacteria in the gut can be affected if there is lung inflammation or disease. In adults, it is understood that healthy bacteria can be lost while in the intensive care unit whereas there is little understanding for children in intensive care. The goal of this study is to determine if there is a correlation between bacteria type and sample type and to describe the antibiotic resistance present. There are two types of samples: samples from infants with respiratory syncytial virus (RSV) or healthy infants. The RSV samples are from children in the PICU for RSV associated bronchiolitis and the healthy controls were from children in the hospital for other reasons who were age matched to the RSV children. Samples were either perianal swabs or fecal samples. DNA was extracted from the samples and underwent whole metagenome sequencing via AVITI Sequencer. Resulting sequences will be analyzed and antibiotic resistance load will be described and compared by sample type. Understanding the impact of critical care on the antibiotic reservoir in young children may enable us to combat antibiotic resistance in later life.

COMPARATIVE ANALYSIS OF PRIMARY HEALTH CARE SYSTEMS: INSIGHTS FROM A COLLABORATIVE ONLINE INTERNATIONAL LEARNING (COIL) PROGRAM BETWEEN THE UNITED STATES AND NIGERIA

Presenter(s): Alexis Litts

Epidemiology & Public Health

Mentor(s): Andrea Freidus Turner (College of Osteopathic Medicine), Rebecca Malouin (College of Osteopathic Medicine)

Collaborative Online International Learning (COIL) programs provide students with international learning experiences through online engagement in coursework. This method of international collaboration has become an increasingly popular form of global learning, as it is cost-effective and does not require international travel. In global health, COIL can be used to form partnerships between countries and promote the equal exchange of information through collaborative experiences. In a pilot COIL program between the Michigan State University Global Health Studies Program and the University of Nigeria, Nsukka Department of Human Kinetics and Health Education, a group of students worked together to examine aspects of primary care and primary health care between Nigeria and the United States. Over four weeks, students conducted small group interviews focused on their personal experiences with the medical system in their respective countries. The interview questions were focused around key themes in primary care and primary health care, including quality of care, accessibility, and delivery of care. A comparative analysis between the two countries' systems was then performed to identify key themes in primary health care and primary care and to make policy recommendations. Between Nigeria and the United States, students' perceptions of the quality of car

BEST PRACTICES FOR COMMUNICATING WITH PARTICIPANTS OF PFAS BIOMONITORING STUDIES

Presenter(s): Grace VanderMolen

Epidemiology & Public Health

Mentor(s): Courtney Carignan (College of Agriculture & Natural Resources)

Measurement of contaminants such as per- and polyfluoroalkyl substances (PFAS) in blood, urine, breast milk, and serum has become more common as analytical methods have improved over the past two decades. This practice is called 'biomonitoring' and is used to inform scientific understanding of exposure and health effects. While there is great interest among study participants and the public in learning about these results there has also been considerable debate about whether and how to approach these communications. Therefore, we conducted a literature review to investigate evolving views on communication of biomonitoring results. We searched PubMed using key terms including "PFAS", "Biomonitoring", "Public", "Communication" and "Contaminants" to help identify relevant studies. Studies were retained in the literature review if they had investigated communication of biomonitoring results and were in a credible source (e.g., peer reviewed journals). While some studies cautioned against sharing results citing the possibility of creating fear, most recommended sharing of results by including

OCCURRENCE OF HEART CONDITIONS AND DIABETES ACROSS STATES WITH AND WITHOUT A HISTORY OF JIM CROW RACIAL SEGREGATION IN POPULATION AGED 50+

Presenter(s): Aaron Mallamad
Epidemiology & Public Health
Mentor(s): James (Jim) Anthony (College of Human Medicine)

My work is stimulated by published research on mortality rates in the United States and the observation that age- and sex-adjusted mortality rates show interesting patterns of premature deaths in populations of states classified as "Jim Crow" states on the basis of post-Civil War policies. I can describe my approach to studying morbidity and health experiences in relation to "Jim Crow" status, which shifts the focus of study from death to health and wellness experiences during life. My estimates for the US are based on rigorous multi-stage area probability samples of civilian community residents age 12 years and older, sampled and assessed with computer-assisted self interviews, with sampling frame coverage of al 50 states and D.C. Each year's sample size exceeds 50,000 persons, generally with participation levels exceeding 70%. My estimates require complex sample survey approaches that include analysis weights and Taylor series linearization for variance estimation.

EPIDEMIOLOGY OF INTERNATIONALLY REGULATED DRUG USE: DIVERSITY SUBGROUP VARIATION IN THE UNITED STATES SINCE 2002

Presenter(s): Landon Stallmann
Epidemiology & Public Health
Mentor(s): James (Jim) Anthony (College of Human Medicine)

I will describe my progress in a line of epidemiology research on diversity subgroup variations in the epidemiology of internationally regulated drugs. My estimates for the US are based on rigorous multi-stage area probability samples of civilian community residents age 12 years and older, sampled and assessed with computer-assisted self interviews, with sampling frame coverage of al 50 states and D.C. Each year's sample size exceeds 50,000 persons, generally with participation levels exceeding 70%. My estimates require complex sample survey approaches that include analysis weights and Taylor series linearization for variance estimation.

ASSESSING DIGITAL SKILLS AND ELECTRONIC VISIT VERIFICATION AMONG MICHIGAN'S DIRECT CARE WORKERS

Presenter(s): Vaishnavi Rayannavar
Epidemiology & Public Health
Mentor(s): Andrea Freidus Turner (College of Osteopathic Medicine), Clare Luz (College of Osteopathic Medicine), Sharmila Suresh (College of Osteopathic Medicine)

Direct Care Workers (DCW) provide long-term care and personal assistance services to older adults and those living with disabilities or chronic conditions to ensure a high quality of life and independence. Current data suggests there is a dearth of DCWs both in the state and nationally, due to high turnover rates, lack of benefits, low wages, racism, lack of respect, and inadequate training. This research project reports on a small piece of a large-scale survey of DCWs conducted by IMPART (Integrated Model for Personal Assistant Research and Training) Alliance at Michigan State University. IMPART Alliance is an organization dedicated to strengthening the DCW workforce through training, advocacy, research, and community engagement. This presentation will focus on one emerging issue DCWs face: the use of digital technology, particularly electronic visit verification (EVV) systems. EVVs are a method of documenting DCWs work practices, including dates and times services were rendered, types of services provided, locations, caregivers providing services, and care receivers. It has recently become a federally mandated requirement for all Medicaid personal care services (PCS) and home health services (HHCS) that involve in-home care to use EVVs. This is largely because EVVs have become a way to verify services billed. Using surveys and interviews with DCWs, we explore DCW comfort levels with EVVs as well as c

A CLEAR LOOK INTO EYE HEALTH
Presenter(s): Katherine Engbers
Epidemiology & Public Health
Mentor(s): Carl Boehlert (College of Engineering), Per Askeland (College of Engineering)

Depending on comfort and health, glasses and contact lenses have been two of the largest prescribed treatments for correcting refractive errors within the eye. But is there truly a difference between the two, and if so, which is better? This study investigates the differences in chemical composition between glass lenses and contact lenses using a scanning electron microscope (SEM). By using this technique, high imaging resolution, composition, and microstructure are examined. Sanning Electron Microscopy and Energy Dispersive X-Ray Spectroscopy (EDS) allow for detailed comparison of morphology and elemental composition of the lenses. The results of this study will be evaluated with respect to previous literature to enhance the understanding of the differences between the lenses and how they might impact health and comfort for patients that utilize them.

A MULTI-FACTOR ANALYSIS OF PARITY, BMI, AND SPATIOTEMPORAL TUMOR DYNAMICS IN OVARIAN CANCER ONSET
Presenter(s): Nidhi Kundargi
Epidemiology & Public Health
Mentor(s): Sachi Horibata (College of Human Medicine)

Ovarian cancer is the deadliest gynecologic cancer in women, responsible for approximately 14,000 deaths annually. Due to the present lack of adequate screening methodologies for detection, its incidence is commonly diagnosed at extremely late stages. Tumor biomarkers play a critical role in detecting incidence, yet there is a research gap in examining the severity of the diagnoses and probability of fatality through the spatiotemporal lens-especially so when examining Body Mass Index (BMI) and parity status. Understanding the contribution of BMI and parity status in ovarian cancer is vital in the advancement of effective ovarian cancer screening because ovarian tumors are surrounded by dense fat tissue, leading to difficulty in detection. Here, we examine the dynamics of tumor feature correlations, parity (live births), and patients' survival outcomes across BMI classifications by leveraging data from the Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trials published by the National Cancer Institute. Our findings reveal significant shifts in correlating spatiotemporal tumor features after controlling for fatality status and demographic factors, including a 12% increase in the inverse correlation between CA-125 levels-a known biomarker-, parity status, and screening severity. Additionally, CA-125 levels appear to be more

THE DISTRIBUTION OF ENVIRONMENTAL JUSTICE ACROSS MICHIGAN
Presenter(s): Yashveer Singh
Epidemiology & Public Health
Mentor(s): Alicynne Glazier-Essalmi (College of Human Medicine)

Michigan is home to a plethora of diverse ethnic and racial communities across multiple rural, urban, and suburban geographies, contributing to the lived exposome of those throughout the state. The EPA's

Environmental Justice Screening Tool is a relatively novel geospatial index providing crucial data on the distribution of environmental exposures and vulnerability of neighborhoods within the US. The effect of detrimental environmental factors is contextualized by demographic and socioeconomic factors at the ecological level, characterized by external health stressors disproportionally affecting marginalized populations. This presentation seeks to illustrate the latest distribution of key harmful environmental exposures, including various toxic air and metal pollutants, in tandem with sociodemographic variables across Michigan. In examining potential patterns in environmental justice within the vast state of Michigan, etiologies of disease and areas of intervention can be identified.

UTILIZING AYA PREFERENCES FOR TRUSTED SRH INFORMATION IN STUDY RESULT DISSEMINATIONS

Presenter(s): Eliana Hollis
Epidemiology & Public Health
Mentor(s): Emma Schlegel (College of Nursing)

Adolescent young adults (AYAs) endure high rates of sexually transmitted infections and unintended pregnancy, and oftentimes do not have a usual source of care to refer to for reliable sexual-reproductive health (SRH) information. With the advent of technology, including resources such as online forums and social media postings, it can be difficult to discriminate valid information from misinformation. Therefore, it is essential that we understand how AYAs interact with health information online to positively influence health outcomes for future generations. To investigate AYAs trusted sources of information, a literature (narrative) review was conducted using resources such as PubMed and Google Scholar. Results cited the internet as the main source of SRH information among AYAs, with participants determining credibility by checking: internet domain, credentials/expertise of author(s), citations, evidence of recent updates, verifications, and the presence of statistics/graphs. Utilizing this data, a project case study was conducted in conjunction with Dr. Emma Schlegel's "Promoting Health 4 Her" study. An infographic was formulated to return results to the "Promoting Health 4 Her" AYA participants, incorporating mentioned markers of credibility from the previous literature review. Results of the "Promoting Health 4 Her" study mirrored results of the

THE IMPACT OF RACE AND ETHNICITY ON THE CONTENT OF PRENATAL AND POSTPARTUM HEALTHCARE VISITS

Presenter(s): Nadia Blake
Epidemiology & Public Health
Mentor(s): Claire Margerison (College of Human Medicine)

Prenatal and postpartum healthcare visits are critical for ensuring maternal and infant health. These visits allow physicians to educate and counsel expecting and new mothers on various topics, such as nutrition, intimate partner violence (IPV), gestational diabetes, and cardiovascular health. However, disparities exist in the content of these visits, with some racial and ethnic groups receiving different levels of counseling. Using 2022 data from the Pregnancy Risk Assessment Monitoring System (PRAMS), this study examines these disparities, focusing on underrepresented groups such as American Indian/Alaskan Native (AI/AN) and Asian mothers. Understanding these disparities is essential for addressing maternal health inequities, particularly given that AI/AN women experience 1.8 times higher maternal mortality rates than White women, while Asian women face unique barriers to care, such as language and cultural differences. Descriptive statistics and bivariate analyses were conducted to assess differences in counseling topics by race and ethnicity, and Chi-square tests were used to determine the statistical significance of these disparities. Findings indicate that IPV screenings were more commonly reported among Black and AI/AN mothers, while discussions on HIV testing were more frequent among Black mothers compared to White and Asian mothers. These va

PSYCHOLOGICAL DISTRESS PROFILES OF PERSONS LIVING WITH HIV/AIDS, MALE-FEMALE VARIATIONS STRATIFIED BY ETHNIC SELF-IDENTIFICATION SUBGROUPS
Presenter(s): Sophia Zuber
Epidemiology & Public Health
Mentor(s): James (Jim) Anthony (College of Human Medicine)

The National Survey on Drug Use and Health (NSDUH) provides estimations regarding the health experiences of individuals across many categories. The K6 psychological distress profiles of individuals can be used to better understand the mental health of those surveyed. Utilizing these profiles along with HIV/AIDS population estimates, better methods for addressing the psychological needs of patients with HIV/AIDS diagnoses. I hope to address all 6 facets of distress across sex and race/ethnicity subgroup variations. In doing so I also intend to adjust for age in these groups to gain more information about the needs of each age group along with the other aforementioned groups.

FIREFIGHTER PFAS EXPOSURE STUDY: A COMMUNITY ENGAGED EXPOSURE BIOMONITORING STUDY
Presenter(s): Lydia Mathews
Epidemiology & Public Health
Mentor(s): Courtney Carignan (College of Agriculture & Natural Resources)

Background: Per- and polyfluoroalkyl substances (PFASs) have been used widely in many products to impart resistance to water, heat and grease. This includes products used by firefighters such as aqueous film forming foams (AFFF) used to fight fuel fires and protective gear. However, few studies have investigated firefighter exposure via these pathways. Therefore, we conducted a biomonitoring study of firefighters (n=80) who provided a blood sample and completed a brief exposure questionnaire. A panel of 51 PFAS analytes were investigated in participant serum using LC-HRMS. A total of 24 PFAS were identified in one or more sample. The median concentration of PFHxS was twice that of the general U.S. population. This finding is consistent with other studies of firefighters and may reflect past exposure to PFAS in AFFF.

PROMOTING MENSTRUAL EQUITY AT MSU: IMPACT OF PROVISION OF FREE MENSTRUAL PRODUCTS ON CAMPUS
Presenter(s): Khushi Chhabra
Epidemiology & Public Health
Mentor(s): Kristen Upson (College of Human Medicine)

As access to menstrual products is vital for menstrual equity, Michigan State University (MSU) introduced free menstrual products in select women's and gender-neutral bathrooms in February 2023. To examine the impact of this initiative, we conducted an online survey of current MSU students and employees ages ≥18 years. We developed survey questions (37 multiple choice and 3 open-text) covering experiences obtaining menstrual products on the university campus. Between November 2024 and March 2025, the survey was completed by 2,274 individuals. The analyses were restricted to those who experienced a menstrual period in the past 12 months on the East Lansing campus (n=1,927). The study population had a median age of 24 years (interquartile range 20-34 years); 65% reported not having any menstrual products with them to manage their menstrual period. Of these 1,246 individuals, 74% used the free menstrual products provided on campus. Additionally, only 20% reported ever struggling to obtain menstrual products while a campus member and 78% of participants strongly agreed that having access to free menstrual products on campus made them feel supported. However, 43% reported needing menstrual products but none were available in the campus bathroom. Among individuals on campus before February 2023 (n=1,178), 68% agreed that free menstrual product availability has helped with menstrual management; 44% agreed that free product availability has helped wi

FILM STUDIES & DIGITAL MEDIA

HOW I TOLD THE STORY OF MY GRANDPARENTS
Presenter(s): Mia Burghardt
Film Studies & Digital Media
Mentor(s): JeanaDee Allen (College of Communication Arts Sciences)

A demonstration of creative challenges and process of producing a documentary of my Grandparent's life that showcases who they are and uncovers what they went through to immigrate to the United States in the 80's.

GLOBAL & AREA STUDIES

BOBA TEA AS A CONNECTION TO ASIAN AMERICAN CULTURE
Presenter(s): Madyson Banyas
Global & Area Studies
Mentor(s): Xuefei Hao (College of Arts & Letters)

Boba tea shops in Los Angeles act as hubs for Asian American culture. The origins of boba tea reveal an ongoing act of cultural exchange that has evolved into a distinct tea culture for the new generation. This presentation examines the modern boba tea scene and its connection to Asian American culture and identity. Boba tea shops began as an Asian American alternative to the Caucasian-dominated youth culture in Los Angeles. Asian Americans utilized boba tea shops to connect to both Asian and American culture. The rising popularity of boba tea in the past fifteen years has broadened the appeal to Americans of all races and ethnicities. Far from the days of chop suey restaurants created by necessity, modern boba tea shops pioneer a new industry and culture. Boba tea represents a unique blend of cultures and has become a symbol of Asian American identity through merchandise, aesthetics, and politics. For many Americans, boba tea is an entry point to tea culture. This presentation outlines the journey of boba tea from an unknown innovation to a global phenomenon, concluding that boba tea is more than just tea - it is a representation of Asian American culture and cultural exchange.

HORMONES IN HAVOC
Presenter(s): Laile Zadran
Global & Area Studies
Mentor(s): Camelia Suleiman (College of Arts & Letters)

This study investigates the health effects of prolonged conflict on the endocrine systems of Syrian women and children, two of the most vulnerable populations in crisis settings. Years of war have led to chronic stress, malnutrition, and restricted access to healthcare, creating a cascade of hormonal disruptions with profound implications for growth, reproductive health, and metabolic processes. Women and children are particularly susceptible to these disruptions due to their unique developmental and physiological needs. Chronic stress associated with conflict elevates cortisol levels, impairing immune function, stunting growth, and contributing to long-term health risks. Additionally, widespread malnutrition inhibits essential hormone production, increasing the prevalence of conditions such as insulin resistance, delayed puberty, and gestational diabetes among affected populations. This research also emphasizes the crucial role of female healthcare workers in addressing these health challenges, particularly in regions where cultural and logistical barriers limit healthcare access. Through specialized approaches, these professionals serve as essential advocates for improving hormonal health outcomes in Syrian women and children. By examining these endocrine disruptions within the broader context of the Syrian healthcare crisis, my research highlights

CHALLENGING OF THE AMERICAN EDUCATION SYSTEM FOR SYRIAN REFUGEE CHILDREN IN LANSING, MICHIGAN
Presenter(s): Adela Escojido
Global & Area Studies
Mentor(s): Camelia Suleiman (College of Arts & Letters)

I will be discussing how the American education system lacks to offer the support so many refugee students need. This presentation brings awareness to the topic people don't know much about. I chose specifically Lansing, Michigan to demonstrate that these problems are not just happening all around the world, but in our own communities and that we can make a difference in so many people's lives if we took the time to challenge ourselves to broaden our own perspectives and comfortability of our lifestyles to help those in need from all different diversities. I investigated data on refugees, opportunities or lack of, as well as the social, emotional, and physical effects on refugee students. I will also make a point to remark on the struggles the average student goes through like learning to develop a routine and relationships with others can be difficult among other factors, but for a refugee student there are these difficulties and even more barriers that make it difficult for them to be successful in their lives when these pressures make them feel like they are constantly being put down. Barriers such as language, social standing or their family's economic standing, etc. could all influence a child's development, and even silence children for fear of being wrong or not fe

JUVENILE INVOLVEMENT IN ISIS TERRORISM - FOCUSING ON RETRIBUTION
Presenter(s): Maci Menard
Global & Area Studies
Mentor(s): Camelia Suleiman (College of Arts & Letters)

This presentation explores the complex issue of juvenile involvement in ISIS terrorism with a particular focus on the concept of retribution. It examines the systemic recruitment and radicalization of children within ISIS-controlled territories, detailing the psychological manipulation employed by the group. The presentation highlights specific cases of juvenile terrorism, illustrating how adolescents are exploited for violent acts by ISIS, and it discusses the challenges of rehabilitating these children post-conflict. It also considers the injustices faced by children wrongfully detained for alleged ISIS affiliation, as well as the shortcomings of current legal and humanitarian responses. The need for effective international intervention, including rehabilitation and deradicalization efforts, is underscored to prevent further victimization and offer these young individuals a chance for recovery and reintegration into society.

THE STRUGGLE FOR SURVIVAL: WATER SCARCITY AND THE SANITATION CRISIS IN SYRIA
Presenter(s): Fatima Rais
Global & Area Studies
Mentor(s): Ayman Mohamed (College of Arts & Letters)

This research explores the severe sanitation crisis and water scarcity affecting millions of Syrians. Decades of conflict, infrastructure destruction, and governmental neglect have forced many to rely on contaminated water, leading to outbreaks of diseases such as cholera. Over 14.6 million Syrians lack regular access to safe water, a direct consequence of the Syrian Civil War, which has devastated the country's water and sanitation infrastructure. Without proper hygiene and sanitation, living conditions deteriorate, exacerbating the humanitarian crisis. This study utilizes scholarly articles and personal testimonies from within Syria to analyze the ongoing impacts of the crisis and argue for urgent action. Rebuilding Syria's water infrastructure and implementing clean water distribution systems are critical first steps toward improving public health and restoring quality of life. Without immediate and coordinated efforts, the ripple effects of Syria's water crisis may result in further loss of life and deepen the suffering of its people for generations to come. The presentation discusses potential avenues to remedy the situation including governmental commitment to implement reforms that will be vital for Syria's recovery and long-term stability.

THE ECONOMIC STATUS OF SYRIA, BEFORE AND DURING THE CIVIL WAR
Presenter(s): Saleh Bhatti
Global & Area Studies
Mentor(s): Camelia Suleiman (College of Arts & Letters)

The civil war in Syria has destroyed its economy. Turning what was once a stable and diverse system into one that struggles to survive. Before the civil war, Syria's economy was growing, supported mainly by farming and oil. But since the conflict began in 2011, the fighting has damaged and destroyed much of the country's infrastructure, like roads, hospitals, schools, and power plants. Without these, businesses can't operate properly, making it nearly impossible for the economy to function well. Most of the government's money is spent on the military, leaving little for rebuilding or supporting the economy. Overall the civil war has crushed Syria's economy by destroying buildings and infrastructure, driving people away, damaging key industries, and causing high prices. Rebuilding the economy will take a long time, along with peace, aid, and major reconstruction efforts. In this presentation I will bring to light the drastic changes in the economy pre and during the war, and the current economic reconstruction efforts.

SKIN UNDER SIEGE; THE DERMATOLOGICAL IMPACT OF WAR AND REFUGEE CONDITIONS: MALNUTRITION, STRESS, AND INFECTIOUS DISEASES AMONG SYRIAN REFUGEES IN LEBANON
Presenter(s): Ayat Alsoofi
Global & Area Studies
Mentor(s): Camelia Suleiman (College of Arts & Letters)

This project examines the dermatological health impacts among Syrian refugees, exploring how conflict-driven displacement has exacerbated health vulnerabilities. Syria was chosen as the focus due to its ongoing humanitarian crisis - one of the largest and most unresolved in the world - which has left millions displaced and facing severe hardships. Additionally, the portrayal of Middle Eastern communities through Orientalist narratives has often overlooked the region's complex realities, making it crucial to shed light on the human cost of this crisis. With a focus on skin, hair, and nails, this project investigates how prolonged food insecurity and poor living conditions impact dermatological health in refugee camps.Analyzing these conditions highlights dermatology's role in crisis healthcare, with data drawn from recent studies on Syrian refugee populations. The findings emphasize that dermatological health serves as both a visible indicator of refugee well-being and a critical component of comprehensive care, suggesting that healthcare interventions in conflict zones should incorporate dermatology to improve health outcomes and dignity. By addressing these overlooked aspects, this project advocates for more targeted health responses in humanitarian settings. Despite the ongoing challenges, the resilience of the Syrian people offers hope for recovery and a stronger future.

HEALTH SCIENCES

HOW CAN TRPA1 ACTIVATION AFFECT THE VAGUS NERVE RESPONSE TO EFFECTOR ORGANS?
Presenter(s): Arya Juvekar, Michal Rut, Zhina Zabihian
Health Sciences
Mentor(s): Chunqi Qian (College of Osteopathic Medicine)

The vagus nerve is the tenth cranial nerve in the human body. As a primary link to the parasympathetic nervous system it restores homeostasis after exposure to stressful event - for instance, by reducing inflammation. Cardiovascular and neurological emergencies such as heart attacks and CVAs (strokes) are one of the most common causes of death worldwide1, therefore comprehending the process behind them allows creating more preventive solutions. Our group is focused on the part of the process that can take a traumatic event from minor pain symptoms to potential death. TRPA1 is a cation channel that, when exposed to chemical irritants, contributes to pain and inflammation. After encountering a traumatic event (i.e., stroke or heart attack) TRPA1 receptors may become overreactive due to cellular damage, leading to increased inflammation and potential neuronal injury2. Modulating TRPA1 activity through a vagus nerve may help limit the damage caused by inflammation3, with the goal of improving recovery and offering therapeutic benefits.

UNDERGRADUATE RESEARCH TEAM COLLABORATION ON AN EXEMPLAR CAREGIVER BEREAVEMENT STUDY FOR TRAINING AND MENTORSHIP IN NURSING SCIENCE
Presenter(s): Myah Leuenberger
Health Sciences
Mentor(s): Arienne Patano (College of Nursing), Gwen Wyatt (College of Nursing), Rebecca Lehto (College of Nursing)

There is an urgent need to increase the number of nurse scientists to address public health needs. However, pre-licensure nursing students often lack exposure to nursing research. Therefore, the purpose is for research-interested undergraduates (UGs) to actively participate in various aspects of the study, fostering teamwork and co-learning. To accomplish this, UGs will engage in a National Cancer Institute study designed to evaluate a nature-based meditation program for bereaved family caregivers at risk for poor emotional health and protracted grief. Through weekly meetings and assignments, students gain hands-on research experience, learning about IRB approval, research fidelity, protocol manual development, recruitment, intervention development, and data collection tools like Qualtrics. Under expert mentorship from nurse scientists and a PhD student, each of the five UG team members contribute to different components to the research project. Student's report improved critical thinking, a deeper understanding of the research process, and increased confidence. Their enthusiasm has led to abstract submissions for research conferences, and one student has applied to the PhD program. Early exposure to research is crucial, as the number of nurse scientists remains insufficient. Providing UGs with research training enhances the pipeline of PhD-prepared nurses who will advance nursing science. This experience fosters meaningful collaboration and may inspire more

WHAT'S IN YOUR HAIR?
Presenter(s): Kevin Ramirez-Cholula
Health Sciences
Mentor(s): Per Askeland (College of Engineering)

In this research project I look at the differences between hair products on hair. The reason for this is to figure out how safe hair products are and to see how different hair types react with the same product.

EMOTIONAL SUPPORT AND WELLBEING FOR CANCER PATIENTS AND THEIR CAREGIVERS: STATE OF THE SCIENCE ON THE USE OF NATURE-BASED VIRTUAL REALITY
Presenter(s): Lily McGowan
Health Sciences
Mentor(s): Rebecca Lehto (College of Nursing)

Both cancer patients and their informal caregivers experience emotional strain across the cancer trajectory, from diagnosis and curative treatment to supportive palliative care. Thus, there is a need for therapies that can support caregiver emotional health and well-being. Recently, virtual reality (VR) with nature-based content is being studied for effectiveness in improving emotional well-being. To contribute to this research, the study purpose was to identify gaps in the state-of-the-science by examining the literature on nature-based VR for its use as emotional support among both cancer patients and informal caregivers. The literature search drew upon CINAHL, PubMed, Web of Science and Embase databases with key terms: caregiver, cancer and VR. Articles were further screened for nature, well-being and emotional outcomes. Eligible articles included cancer patients, cancer caregivers, used nature-based VR interventions, provided empirical data, and were in English. Following screening, 27 articles were included in the review: 26 implementing nature VR interventions with cancer patients and 1 article with cancer caregivers, 7 used pediatric populations and 19 were adult based. Most studies were conducted during clinic procedures as a distraction for the patient, often with the informal caregiver present. Improvement in emotional health and overall well-being were reported outcomes for patients and informal caregivers in the one study. Nature-bas

MICHIGAN LAWS THAT INFLUENCE THE DELIVERY IN CARE FOR THOSE WITH SUBSTANCE USE DISORDER
Presenter(s): Emily Pickett
Health Sciences
Mentor(s): Ann Annis (College of Nursing)

Between 2020 and 2021, Michigan saw a 13% increase in opioid overdose deaths, followed by a 7% decrease in 2021-2022 due to policy interventions. We aimed to assess the impact of specific Michigan laws on the delivery of care for individuals with substance use disorder (SUD). We conducted a policy analysis focusing on laws enacted in Michigan since March 2020 that regulate SUD services. We collected data from state and federal sites on SUD treatment facilities to evaluate the services they provide, including SUD treatment medications, admissions for detoxification or post-overdose care, and naloxone distribution in the community. The data was synthesized to provide context to Michigan's management of the opioid crisis. Two pieces of legislation-Public Acts 98 and 176 of 2022-were identified as key to Michigan's response. These laws ensure coverage for medically necessary detoxification at inpatient SUD facilities and support increased naloxone distribution by community organizations and pharmacies. In November 2022, Michigan reported 2,633 overdose deaths, with projections estimating a total of 2,887 overdose deaths by end of 2022. Michigan has 395 substance use treatm

PARENTAL EDUCATIONAL DIFFERENCES IN EVALUATIONS OF PARENT-ADOLESCENT MEETINGS TO PROMOTE ADOLESCENTS' PHYSICAL ACTIVITY AND HEALTHY EATING

Presenter(s): Cami Prina, Hannah Jackson
Health Sciences
Mentor(s): Ezgi Ulusoy (College of Communication Arts Sciences), Hesam Varpaei (College of Nursing), Lorraine Robbins (College of Nursing)

The purpose of this secondary data analysis of baseline data from a NIH-funded randomized controlled trial was to examine the dimensions of parent-adolescent meeting evaluations and the role of parental education in predicting differences across these dimensions. Data from 599 participants (85.8% female; Mage = 39.56, SD = 7.74) were analyzed. Using exploratory factor analysis (EFA) with a minimum residual extraction method and varimax rotation, three dimensions were identified: increased engagement in and enjoyment for healthy eating, provided practical skills related to healthy eating, and offered informational support, collectively explaining 73% of the variance. Subsequent one-way ANOVAs assessed the impact of educational level (high school or less, some college/technical training, bachelor's degree or higher) on these dimensions. Significant results were observed for engagement/enjoyment ($F(2, 561) = 7.21$, $p = 0.001$) and practical skills ($F(2, 561) = 3.94$, $p = 0.023$). Post-hoc analyses revealed that parents with some college/technical training reported significantly higher engagement/enjoyment and practical skills than those with a bachelor's degree or higher. No significant parent educational differences were found for the informational support dimension.

BLOOD PRESSURE RESPONSES DURING EXERCISE TESTING IN FEMALES USING ORAL CONTRACEPTION

Presenter(s): Dalton Goodwin
Health Sciences
Mentor(s): Amy Boettcher (College of Education), Katharine Currie (College of Education)

BACKGROUND: A systolic blood pressure (BP) ≥190 mmHg during exercise testing is an exaggerated response in females. This observation provides insight into cardiovascular health, including future risk of hypertension. BP fluctuations throughout a female's menstrual cycle may complicate hypertension diagnosis. Further, 25% of menstruating females use oral contraceptive pills (OCP), which warrants examination of how OCP may affect BP responses during exercise. PURPOSE: To examine BP responses during exercise testing throughout an OCP cycle in females. We hypothesize that there would be no effect of cycle time point on exercise BP values. METHODS: Fifteen females (23±2 years) completed a modified Bruce treadmill test during the placebo, early pill, and late pill phase of their OCP cycle. Brachial BP was measured pre-exercise (standing on treadmill) and at submaximal and peak efforts. Data were checked for normality and compared using repeated-measures ANOVA or Friedman tests depending on normality. RESULTS: Data are presented as mean±SD for placebo, early pill and late pill time points. There was no difference in pre-exercise (121±11, 122±16, 125±14 mmHg; P =0.683), submaximal (169±23, 174±30, 162±22 mmHg, P =0.106), or peak (186±21, 191±29, 185±20, mmHg; P =0.434) systolic BP between time points. Within t

PEDIATRIC ONCOLOGY QUALITY MEASURE USE, MONITORING PRACTICES AND OPPORTUNITIES FOR SYSTEM REDESIGN IN RESOURCE-DIVERSE COUNTRIES
Presenter(s): Ana Ludwig
Health Sciences
Mentor(s): Courtney Sullivan (College of Nursing), Maura Philippone (College of Communication Arts Sciences)

While pediatric cancer survival is approximately 30% in low- and middle-income countries compared to 80% in high-income countries, nursing-sensitive quality indicators (NSIs) can be leveraged to assess and improve patient outcomes across resource-diverse settings. A recently established core set of pediatric cancer NSIs will be pilot tested on pediatric cancer units in three resource-diverse hospitals (Malawi [low-income], Philippines [lower-middle-income], Singapore [high-income]). NSIs include: Total nursing hours per patient day; pain assessment, intervention, reassessment rates; hand hygiene rates; patient and family discharge education rates; chemo/biotherapy administration "double check" process adherence rates; Pediatric Early Warning Score nursing assessment adherence rates; vascular access device maintenance care bundle adherence rates; intravenous infiltration and extravasations rates; central line-associated bloodstream infection rates; and health professional and hospital characteristics. In preparation for pilot testing, we aim to understand hospitals' existing NSI use, monitoring practices, and opportunities for system redesign (i.e., documentation) to improve the reliability and usability of the NSIs. A paper-based, semi-structured survey followed by key informant interviews and a review of source documentation will be performed with pilot site nurse leaders. Descriptive qualitative and quantitative analyses will be conducted. Findings will inform strengths

GUIDED NATURE-BASED AUDITORY MEDITATION FOR BEREAVED CANCER CAREGIVERS
Presenter(s): Alissa Thompson
Health Sciences
Mentor(s): Arienne Patano (College of Nursing), Gwen Wyatt (College of Nursing), Rebecca Lehto (College of Nursing)

Bereavement is the period of grief and mourning following the death of a loved one. Informal cancer caregivers (CGs) endure emotional distress, physical tension, and social isolation during bereavement but often have limited access to supportive interventions. Additionally, limited research has addressed bereavement for cancer CGs despite the increased risk of prolonged grief disorder recognized in the DSM-5. The study aims to develop a nature-based healing meditation (NBHM) intervention to support home-based cancer CGs during early bereavement, who are facing symptoms such as grief, focus and concentration loss, anxiety, depression, as well as lowered quality of life (QOL). A single-group, longitudinal, pre-post mixed methods study will test the feasibility/acceptability of the NBHM intervention. Adult CGs (>18 years) who have experienced the loss of a loved one to cancer will follow guided audio meditations featuring nature imagery to promote mental relaxation, cognitive restoration, and emotional release. For example, during the solar system module, participants will engage in focused and controlled breathing while completing a soothing head-to-toe body scan. The imagery provided will allow participants to visualize the vastness of the solar system, symbolizing the weight of bereavement lifting as they float

COMPARING THE SCAT6 SYMPTOM CHECKLIST AND CP-SCREEN FOR CONCUSSION IDENTIFICATION IN COLLEGE-AGED INDIVIDUALS
Presenter(s): Lia Baudon, Teya Coyle
Health Sciences
Mentor(s): Lili Klein (College of Education)

The purpose of this study was to assess the discriminant ability of the Sport Concussion Assessment Tool6 (SCAT6) Symptom Checklist and the Clinical Profiles Screen (CP-Screen) to identify college-aged individuals with concussion from controls. Participants were enrolled in our prospective study ≤5 days post-injury and completed the demographics, injury information, the SCAT6, and the CP-Screen. The SCAT6 symptoms were analyzed as total number, severity, and clusters (affective, cognitive-ocular, migraine-fatigue). The CP-Screen was analyzed by total score and symptom profiles (anxiety/mood, migraine, cognitive/fatigue, vestibular, ocular) and modifiers (sleep, neck). Logistic regression (LR) and receiver operating characteristic (ROC) analyses determined discriminant ability through area-under-the-curve (AUC) ($p=.05$). We enrolled 53 participants (31 concussions; 22 controls; µage=20.1±1.35 years, 56.6% female).The CP-Screen total score (AUC=0.93, 95%CI=0.85-1.00, $p<0.001$), SCAT6 symptom number (AUC=0.84, 95%CI=0.74-0.95, $p<0.001$), and SCAT6 symptom severity (AUC=0.84, 95%CI=0.73-0.95, $p<0.001$) significantly predicted concussion. While a forward stepwise LR did not retain any of the SCAT6 symptom clusters ($p>0.05$), symptom profiles/modifiers including an

INCOME DIFFERENCES AND PERCEIVED EFFECTIVENESS OF PARENTAL WEBSITE TO ASSIST ADOLESCENTS WITH HEALTHY EATING
Presenter(s): Alexi Wallace, Mingjia Ma
Health Sciences
Mentor(s): Ezgi Ulusoy (College of Communication Arts Sciences), Lorraine Robbins (College of Nursing)

The purpose of this secondary data analysis of baseline data from a NIH-funded randomized controlled trial was to explore the relationship between parental income and the perceived effectiveness of an experimental website designed to support parents in fostering their child's healthy eating habits. The analysis utilized data from 599 participants, predominantly female (85.8%), with an average age of 39.56 years (SD = 7.74). Parental income, the main independent variable, was categorized into three levels: low income (<$29,999), middle income ($30,000-$59,999), and high income (≥$60,000). Five one-way ANOVAs were conducted to assess the effect of income on various parental support variables that the website was focused on improving 5 areas: increased parents' confidence and motivation; helped parents see how they can help their child enjoy healthy eating; provided important information and strategies; and helped to increase healthy eating behaviors in their children. Post-hoc analyses using Tukey's honestly significant difference (HSD) revealed that middle-income families consistently reported higher levels of improvement in all 5 areas, as compared to high-income families. No differences o

EFFECTS OF GUT MICROBIOTA AND SLEEP QUALITY ON COGNITIVE IMPAIRMENT
Presenter(s): Elizabeth Klein, Olivia Rossi
Health Sciences
Mentor(s): Hesam Varpaei (College of Nursing), Lorraine Robbins (College of Nursing)

Background: Increasing evidence on the gut-brain axis shows that poor sleep quality and gut microbiota have been shown to be related to cognitive impairment. However, the relationship between variations in gut microbiota composition, sleep quality, and cognitive impairment remains inconsistent across preexisting literature. This study investigates how gut microbiota and sleep quality contribute to cognitive impairment. Method: This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Five different online databases (PubMed, CINAHL, Scopus, WOS, and EMBASE) were searched using appropriate keywords. Original articles in the English language that assessed sleep quality, gut microbiota, and cognitive impairment were included and screened. Animal and in vivo studies were excluded. The results were narratively synthesized. Results: Fourteen studies were selected, with sample sizes ranging from 22 to 735 participants. Among all studies, direct correlations were found between sleep quality, cognitive function, and gut microbiota. Improvements in sleep quality, as well as anxiety states, mental states, and depression were greater in groups who took probiotics than placebo groups. In addition, alterations in gut microbiota, including increases in Actinobacteria and Proteobacteria, were found to be associated with sleep-deprivation-induced cognitiv

POSITIVE CHANGES IN HOME EATING ENVIRONMENT ARE RELATED TO FOOD ACCESSIBILITY
Presenter(s): Elizabeth George, Paula Mireku
Health Sciences
Mentor(s): Jiying Ling (College of Nursing)

This study aimed to examine the relationship between food accessibility and home eating environment. It is a secondary data analysis using data from a clinical trial involving 200 children aged 3-5 and their parents from rural areas. The children's mean age was 47.16 months and parents' mean age was 32.68 years. Most participants were non-Hispanic and White. About one third of parents were single and had an annual family income below $20,000. Approximately 44.2% were unemployed, and more than half had a high school education or less. Geographic Information System was used to assess food accessibility by matching families' reported zip codes to the corresponding Zip Code Tabulation Areas from the U.S. Census Bureau's TIGER/Line database. Increased parental food resource management behaviors were linked to greater access to grocery stores/supermarkets ($B=0.12$, $p=.043$) and higher perceived weight was associated with greater access to convenience stores ($B=0.03$, $p=.027$). Although not statistically significant, lower access to limited-service restaurants was related to improvements in food resource management behaviors ($B=-0.04$ $p=.092$) and a better home eating environment ($B=-0.28$, $p=.092$). Furthermore, reduced acc

PARENTS' INCOME AND PERCEIVED EFFECTIVENESS OF A WEBSITE TO ASSIST THEM IN SUPPORTING THEIR ADOLESCENT'S PHYSICAL ACTIVITY
Presenter(s): Emily Altman, Jaelyn Andrick
Health Sciences
Mentor(s): Lorraine Robbins (College of Nursing)

The purpose of this secondary data analysis of baseline data from a NIH-funded randomized controlled trial was to investigate the relationship between parental income and perceived effectiveness of a researcher-designed website designed to support parents in promoting their young adolescent child's physical activity. Data were analyzed from 599 participants, primarily female (85.8%), with an average age of 39.56 years ($SD = 7.74$). Five one-way ANOVAs were conducted to examine how different annual family income levels (low, middle, and high) influenced parental perceptions. Perception items included measures of the extent to which the website" (1) helped parents to assist their children to attain physical activity; increased their (2) confidence and (3) motivation for helping their children; (4) increased parents' actual direct involvement to help their children increase physical activity; and (5) resulted in observed increases in their children's physical activity. Results showed that parents with a middle-range income were consistently the most positively influenced by the intervention, as evidenced by significantly higher mean scores in all 5 areas, compared to those having higher incomes. No differences in the outcomes emerged between parents having a low income and those in the other two groups in most areas; however, parents with low incomes were more directly involved in helping their child to engage in physical activity than the high-income families.

TARGETED MAGNETIC PARTICLE IMAGING: MMP-2 ACTIVATED NANOCOMPOSITES FOR NON-INVASIVE TUMOR DETECTION AND BIOMARKER QUANTIFICATION
Presenter(s): Andrew Laesch
Health Sciences
Mentor(s): Bryan Smith (College of Engineering)

Current limitations of cancer imaging include moderate sensitivity of MRIs, PET ionizing radiation, and MRI signal decay with depth. Magnetic Particle Imaging (MPI) is a new imaging technique that provides high sensitivity, low background noise, and deep tissue penetration without signal loss from biological tissue. These advantages facilitate the precise detection of superparamagnetic nanoparticles in the complex cancer tumor microenvironment. Under an applied oscillating field in MPI's field-free zone, Superparamagnetic Iron Oxide Nanoparticles (SPIONs) larger than 20 nm undergo magnetization and exhibit Brownian relaxation. This relaxation phenomenon allows SPIONs to act as MPI's real-time quantitative signal tracer with high spatial resolution. In the tumor microenvironment, Matrix Metalloproteinases such as MMP-2s are over-expressed proteases that degrade type IV collagen, necessary for metastasis. Cancer imaging strategies may target this biomarker for metastasis detection, MMP-2 quantification, and characterization of tumors. We synthesized MMP-2-cleavable peptide nanocomposites encapsulating iron oxides. Enzymatic cleavage facilitates controlled degradation of the nanocomposites, releasing SPIONs and enhancing the MPI signal. These signal tracers may no longer be restricted by the polymer and signal intensity is increased. This approach allows for tumor progression imaging based on SPION accumulation and characterizing tumors through biomarker quantifications. Comb

HEALTHY EATING & PHYSICAL ACTIVITY
Presenter(s): Mel Suwal, Yu Bin Cho
Health Sciences
Mentor(s): Ezgi Ulusoy (College of Communication Arts Sciences), Hesam Varpaei (College of Nursing), Lorraine Robbins (College of Nursing)

The purpose of this secondary data analysis of baseline data from a NIH-funded randomized controlled trial was to examine the dimensions of the intervention evaluation items and their relationship with participant satisfaction in two domains: healthy eating and physical activity. The full sample included 559 participants, evenly split by gender (50% female, 48.5% male, 1.4% not reported), with an average age of 12.69 years (SD = 0.93; range: 10.07-14.81 years). The racial composition was predominantly Black or African American (53.7%). An exploratory factor analysis (EFA) identified four dimensions: (1) healthy eating engagement and enjoyment and learning of strategies, (2) physical activity empowerment and skill-building, (3) support from, value of, and connection through coaching, and (4) physical activity engagement and enjoyment. These dimensions explained 63% of the total variance and were used as predictors in linear regression models. For satisfaction with the healthy eating intervention, "healthy eating engagement and enjoyment and learning strategies" was a significant predictor of participant satisfaction ($\beta = 0.649$, $p < .001$), while " support from, value of, and connection through coaching" showed a marginal effect ($\beta = 0.271$, $p = .051$). BMI exhibited a slight negative effect ($\beta = -0.013$, $p = .078$) on satisfaction with the healthy eating intervention. For satisfaction with the phys

CARDIOVASCULAR RESPONSES DURING BLOOD FLOW-RESTRICTED RESISTANCE EXERCISE: A META-ANALYSIS AND SYSTEMATIC REVIEW
Presenter(s): Leslie Avila, Yashveer Singh
Health Sciences
Mentor(s): Marty Spranger (College of Natural Science)

Blood flow-restricted resistance exercise (BFR-RE) is a widely-expanding exercise modality employed by athletes and clinical practitioners. Low-intensity resistance exercise coupled with blood flow restriction (LI-BFR) increases muscle mass and strength similar to that achieved from high-intensity, free-flow resistance exercise (HI-RE). This fact is promising, especially for clinical populations where exercise intolerance may preclude engagement in HI-RE. As restriction of blood flow to exercising muscle elicits the exercise pressor reflex (EPR), which in turn augments cardiovascular responses to exercise, concerns have been raised about the safety of BFR-RE, particularly in clinical populations with cardiovascular disease. Therefore, a clear understanding of the cardiovascular responses during BFR-RE is prerequisite for widespread application of this exercise modality. Accordingly, we summarized and quantified the current evidence of the acute cardiovascular responses during low-intensity, free-flow resistance exercise (LI-RE), HI-RE, and LI-BFR. Five databases were searched for randomized controlled clinical trials comparing hemodynamic outcomes of systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR) during LI-BFR with LI-RE and/or HI-RE. Six studies with 96 participants were eligible for meta-analysis. Results showed that SBP, DBP, and HR are significantly increased during LI-BFR when compared to LI-RE, but not HI-RE. No significant differe

EPIDIDYMAL ADENOMATOUS HYPERPLASIA: IS THERE A RELATIONSHIP WITH TESTICULAR DISEASE
Presenter(s): Bonnie Keating
Health Sciences
Mentor(s): Dalen Agnew (College of Veterinary Medicine)

Epididymal lesions can form in canines as a result of inflammation or less commonly due to degeneration or proliferation. Hyperplastic lesions are largely benign, but in humans it has been suggested that they may have a correlation with testicular disease. While hyperplasia may not be directly harmful, it may signal an increased risk to testicular inflammation, cancer, or degeneration. Such a correlation may help understand both testicular and epididymal diseases. Thus, this study aims to identify a correlation between epididymal hyperplasia and testicular disease. Data will be collected from a minimum of 100 canine testicles from the MSU Veterinary Diagnostic Laboratory archive and will be examined, including the type and severity of epididymal and testicular lesions. This data will be analyzed using a chi-square test. This data will enrich our understanding of infertility in canines and provide valuable comparative information for other mammalian species.

EROSION IN EVERY SIP: HOW SODA DAMAGES TEETH ENAMEL
Presenter(s): Neha Vizzeswarapu
Health Sciences
Mentor(s): Carl Boehlert (College of Engineering), Per Askeland (College of Engineering)

Soda consumption in the United States is a major problem. According to the CDC, nationally 63% of adults aged 18 or older report drinking sugar-sweetened sodas one or more times daily. Soda can be bad for your health for many reasons such as poor blood sugar, and kidney problems, and it even has been linked to obesity, type 2 diabetes, and cancer. It is also bad for your teeth as they are exposed to the sugar and acid in soda which damage the tooth enamel and wear it down over time. Using the Scanning Electron Microscope (SDS), four teeth were examined before and after being soaked in four different sodas (Dr. Pepper, Cherry Coke, Coke, and Mountain Dew) to see how the teeth changed. The SEM used a focused beam of electrons over the teeth's surface to produce detailed, magnified sample images. Those images were used to compare the teeth and see the change. The composition of the teeth using energy-dispersive X-ray spectroscopy (EDS) was used to see how the composition on the surface of the teeth changed. It was found that the acids in the sodas eroded and softened the tooth enamel. There was also visible discoloration and staining involved. Due to the ongoing acid attacks, the acid wears away the teeth and causes tooth surface loss.

CHOLESTEROL AND HEMATOLOGICAL PROFILES OF UNDERGRADUATE PRE-HEALTH STUDENTS: A COMPARISON TO NATIONAL BENCHMARKS

Presenter(s): Janna Shehadeh
Health Sciences
Mentor(s): John Zubek (College of Natural Science)

In preparation for a future in healthcare, students at Michigan State University are offered an opportunity to practice clinical skills in a quasi-clinical laboratory course PSL 311L - Physiology Laboratory for Pre-Health Professional Students. As part of our preparatory course activities, students collect small blood samples in our Hematology (blood) unit while learning to analyze clinical data, develop patient-provider communication skills, and build technical expertise necessary for a successful healthcare career. Blood lab values collected in this session include hematocrit, ABO blood type, total lipid panel (e.g. LDL, HDL, and Triglycerides), prothrombin time PT-INR (international normalized ratio), and hemoglobin. However, this project focuses on blood lipid values. Since the inception of this course in 2016, our students recognized the lack of clear hematological parameters for college age individuals. Therefore, our students initiated a longitudinal project that quantifies hematological data with the intention of building a referent database for college age, healthcare intent students. While our student population generally fell within acceptable ranges for Total Cholesterol, LDL, and HDL according to the Centers for Disease Control (CDC) guidelines for adults, there is a paucity of data limiting the value of these guidelines for the colle

COMPARISON OF CUSTOM AND STORE-BOUGHT ORTHOTICS

Presenter(s): Julia Luebbe
Health Sciences
Mentor(s): Carl Boehlert (College of Engineering), Per Askeland (College of Engineering)

Orthotics are tools used for aligning and supporting the foot and ankle. They are available in two main options: off-the-shelf options found at retail stores and custom-made orthotics, which come at a significantly higher cost. This project aims to compare the effectiveness of these two types. Key evaluations used include the "bend test," aimed to assess an orthotic's sturdiness, and Scanning Electron Microscopy (SEM) to analyze their microstructure. The results of these tests, combined with insights from prior research, are discussed to determine which option offers superior performance.

BROWN ADIPOSE TISSUE AS A NOVEL TRANSPLANTATION SITE FOR RESTORING OVARIAN FOLLICULAR FUNCTION
Presenter(s): Mankirat Singh, Medha Manepalli
Health Sciences
Mentor(s): Ping Wang (College of Human Medicine), Saumya Nigam (College of Human Medicine)

Infertility issues, especially in younger women, are ubiquitous across the world caused by conditions such as premature ovarian insufficiency (POI), ovarian cancer, etc. Current treatments, such as ovarian cryopreservation allow for the tissue to be transplanted after course of treatment or to solve POI. Orthotopic Ovarian tissue transplantation has been shown to be effective in restoring hormonal cycles and ovarian function, however challenges like poor vascularization, inflammatory responses, and immune rejection lead to follicular loss. This study proposes BAT as a novel site for ovarian tissue engraftment as the environment containing high vascular density and anti-inflammatory properties will preserve the ovarian follicles, and cause less damage to the grafts reducing chances of hypoxia. 6-8 week old female NOD/SCID mice will be anesthetized, undergo bilateral ovariectomy, one of ovary graft will be transplanted into the BAT of the mice. The blood hormone levels of vital hormones which aid in follicular development (Serum Estradiol (E2), follicle-stimulating hormone (FSH) and anti-Mullerian Hormone (AMH) levels will be measured using ELISA assays prior to and post- surgery. Furthemore, the subcutaneous transplantation site of White Adipose Tissue (WAT) will b

MOLECULAR ANALYSIS OF SARS-COV2 ORF8 PROTEIN-HOST INTERACTIONS: CONSTRUCTION OF RECOMBINANT HOST PROTEIN LIGANDS
Presenter(s): Lillian Stupar, Mansi Paradkar, Natalie Mulheron
Health Sciences
Mentor(s): Cristiane Pereira Hicks (Research & Innovation), Michael Bachmann (College of Human Medicine), Xuan Xie (College of Natural Science)

The COVID-19-associated blood clotting disorder (CAC) is a major cause of morbidity and mortality in severely ill Acute and Long COVID patients. In these patients, one of the elevated clotting factors is the von Willebrand factor (VWF), whose antagonist, the protease ADAMTS13, is reduced. The currently favored "Thromboinflammation" hypothesis explains CAC as an indirect effect of hyperinflammation in some patients. In contrast, we hypothesize that CAC is directly driven by one of the protein products of the SARS-CoV2 virus, the ORF8 protein. It was seen that this protein interacted with over 40 host proteins; amongst them, the interleukin 17 receptor A (IL17RA) and the host proteases ADAM9 and ADAMTS1. In support of our idea, co-precipitation experiments show a direct molecular interaction between the viral ORF8 protein and the host ADAMTS13 protein. Here, we are cloning and expressing 1) additional members of of the ADAM/ADAMTS family

CHILDREN'S SCHOOL-BASED ASTHMA MANAGEMENT PROGRAMS: A LITERATURE REVIEW
Presenter(s): Jane Thomas
Health Sciences
Mentor(s): Kimberly Arcoleo (College of Nursing)

School nurses play a crucial role in facilitating optimal childhood asthma management, yet barriers and limited research for effective school-based interventions remain. This literature review examines the implementation and impact of programs like the School-Based Asthma Therapy (SBAT) program, emphasizing its role in improving asthma management among children. Even with this research deficit on school-based asthma research implementation, programs like SBAT have highlighted many benefits, including enhanced symptom recognition, improved medication adherence, increased understanding of inhaler use, streamlined communication, and reduced caregiver burden. Additionally, these programs can provide educational advantages for children, caregivers, school nurses, and administrators. However, these studies are limited, and more thorough research is required to identify each program's specific benefits and barriers. In addition, continuing to address implementation challenges could further optimize programs like SBAT, enhancing health outcomes for children with asthma. These findings emphasize the critical role of developing and analyzing more school-based intervention programs like the ones included in the literature review, and have potential to significantly enhance asthma control, reduce health disparities, and improve the overall well-being of children with asthma.

HEART RATE AND BLOOD PRESSURE RESPONSES TO EXERCISE IN POSTMENOPAUSAL FEMALES WITH HYPERTENSION

Presenter(s): Dora Lei, Maya Abbou, Nicole Schmitt
Health Sciences
Mentor(s): Jill McMahon (College of Osteopathic Medicine), Katharine Currie (College of Education)

Background: Cardiovascular disease (CVD) is the leading cause of death in postmenopausal females. The leading modifiable risk factor of CVD is hypertension and 75% of postmenopausal females have hypertension. Even with pharmacologic treatment, >50% of females with hypertension are not meeting blood pressure (BP) goals. Exercise training lowers BP and improves fitness in postmenopausal females. Purpose: To evaluate the influence of a 6-week exercise intervention on heart rate (HR) and BP at rest and during exercise in postmenopausal females with hypertension. Hypothesis: We hypothesize that 6 weeks of exercise training would decrease HR and systolic BP (SBP) at rest and during exercise. Methods: The exercise training intervention included treadmill walking (40-minutes) and isometric handgrip (4 x 2-minute sets) for 24 sessions in 17 females (age:67 ±8 yrs, BMI:34±7 kg/m2)

THERAPEUTIC BRIGHT LIGHT IN IMPROVING OVERALL SLEEP QUALITY IN CANCER PATIENTS: A SYSTEMATIC REVIEW

Presenter(s): Meghana Atmakur
Health Sciences
Mentor(s): Horng-Shiuann Wu (College of Nursing)

Sleep is often disrupted in cancer patients due to dysregulated circadian rhythm. The circadian rhythm regulates the body's alertness and sleepiness cycle based on light and dark environments. Bright light therapy (BLT) mimics ambient light and helps reset the body's circadian rhythm. Various studies have reported that BLT improves sleep quality in cancer patients, but the control, dim light (DL), has also been shown to improve symptoms. This systematic review aims to determine if BLT effectively improves sleep quality in cancer patients. A literature search using keywords, cancer, sleep disturbances, and light therapies, was conducted in PubMed, CINAHL (EBSCO), Embase, and Web of Science Core, in addition to a grey literature search. A total of 1,196 articles were identified. Eight articles were included in this review as they assessed overall sleep quality using the Pittsburgh Sleep Quality Index (PSQI) global scores. The findings were conflicting. Most (?) of the studies showed that neither BLT nor DL significantly improved overall sleep quality. Among the remaining (?) studies, the results were inconsistent as some showed that BLT significantly improved overall sleep quality ($p=0.010$ and $p<0.001$), while others showed that DL significantly improved sleep quality ($p=0.001$ and $p=0.037$). The findings across the studies show that BLT is not more eff

TRANSLATION PROTOCOL FOR 50K4LIFE EDUCATIONAL MODULES FROM ENGLISH TO SPANISH
Presenter(s): Michelle Gallegos
Health Sciences
Mentor(s): Susan Buchholz (College of Nursing)

Mexican Americans, the largest minority group in the United States, face barriers related to physical activity. The50K4Life study at the University of Texas El Paso examines interventions (including group-level) to increase physical activity in bilingual (English and Spanish) high school employees working in the southwestern United States. Research team members created a 50K4Life Educational Modules (in English). With these modules, high school employees will complete an action plan and implement strategies on the school campus to improve walkability and walking behavior. The purpose of the project being presented is to outline the process used in translating these educational modules from English to Spanish. Working with other bilingual team members, the Michigan State University student (who is bilingual) embarked on translating the modules.Translation of materials requires accuracy, clarity, and linguistic nuances. The translation process involves three main steps: preparation, translation, and assurance. Background information is required before the translation process to provide context for the project purposes, methods, interventions, outcomes, potential challenges, and alternative approaches. The next step is translating materials while maintaining the original meaning and tone. Health literacy is also considered. The final step is assurance, which involves proofreading the text. The changes in

INVESTIGATING THE DISABILITY TRAINING EXPERIENCES OF PEDIATRIC RESIDENTS IN MICHIGAN
Presenter(s): Alekya Vudathu, Haley Doss, Joseph Kesto
Health Sciences
Mentor(s): Emily Jensen (College of Social Science)

This study utilized a mixed-method, multi-phase design to address the following research questions; (a) What are the training experiences of pediatric residents in Michigan in regard to working with children with disabilities and children with medical complexities?; (b) How do pediatric residents perceive their self-efficacy in working with these populations? (c) What suggestions for training improvement do pediatric residents have? This work utilizes a social justice framework, centering disability as an aspect of diversity that practitioners must be trained on in order to provide effective care for children with disabilities and their families. In addition, high quality training has been shown to improve practice, which can thus improve health outcomes and health equity for children with disabilities and their families (Huth et al., 2020; Shah et al., 2018; Bogetz et al., 2015). The goal of this line of work is to create inclusive and healing spaces for all children.

CAFFEINE, SLEEP AND CARDIOVASCULAR OUTCOMES AND MORTALITY
Presenter(s): Alyssa Hein, Choaye Zi
Health Sciences
Mentor(s): Hesam Varpaei (College of Nursing), Lorraine Robbins (College of Nursing)

According to the CDC, cardiovascular diseases are the leading cause of death in the United States. These conditions result from unhealthy lifestyle factors, such as poor sleep quality and excessive caffeine intake. However, a few studies have examined the combined effect of these two factors on cardiovascular disease outcomes. This study investigates the relationship between caffeine, sleep quality, and cardiovascular disease. This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Five online databases (PubMed, CINAHL, Scopus, Web of Science, and EMBASE) were searched using appropriate keywords. Original articles published in English that assessed sleep quality, caffeine intake (in any form), and cardiovascular outcomes were included. Animal and in vivo studies were excluded. Additionally, the included articles were screened for any potentially missing studies. The results were narratively synthesized. A total of 19 articles were included (n=4 cross-sectional, n=10 cohort, and n=5 randomized controlled trials). Most studies focused on healthy adults (>18 years old). Polysomnography and self-reported questionnaires were used to measure sleep. Food frequency questionnaires were used to assess caffeine intake. Cardiovascular outcomes were determined using patients' self-reported data or medical records. Sleep architecture was measured by self-reported data and polysomnography. The common cardiovascular ou

THE IMPACT OF LIVE CLASSICAL MUSIC INTERVENTION ON SYMPTOM MANAGEMENT IN HOSPICE CARE

Presenter(s): Leslie Avila, Maxwell Ondras, Pierse Meyers, Yashveer Singh
Health Sciences
Mentor(s): Marty Spranger (College of Natural Science)

This research proposes a novel intervention assessing the impact of live classical music on symptom management among hospice patients. Conducted by musicians from the Harmony Healers Society, the study aims to examine whether live classical music sessions can effectively alleviate symptoms such as pain, anxiety, depression, and overall distress in a hospice care setting. Utilizing the Edmonton Symptom Assessment System-Revised (ESAS-R), symptom severity will be quantitatively assessed pre- and post-intervention, with additional qualitative data obtained through primary care coordinators' observations. Secondary analyses will explore correlations between specific musical elements, such as tempo and instrumentation, and symptom improvement, as well as differential impacts on emotional versus physical symptoms. This intervention addresses critical gaps in current literature regarding non-pharmacological approaches in palliative care, potentially offering a complementary therapeutic method for enhancing patient comfort and well-being. Ethical considerations, including informed consent and participant autonomy, are prioritized, ensuring minimal risk and confidentiality. Findings from this study will inform best practices in hospice care and contribute valuable insights to the fields of integrative medicine and music therapy.

REPRODUCTIVE DISORDERS IN DAUGHTERS FROM PREECLAMPTIC-LIKE BPH/5 PREGNANCIES

Presenter(s): Kendall Ball
Health Sciences
Mentor(s): Viviane Cristine Leite Gomes (College of Veterinary Medicine)

Preeclampsia, a hypertensive disorder of pregnancy characterized by hypertension and end-organ damage, is a global leading cause of maternal and fetal mortality. This disorder is known to cause long-term adverse effects on the offspring including neurodevelopmental, metabolic, and reproductive disorders. Yet, the underlying mechanisms remain poorly understood. Our primary objective is to characterize estrous cyclicity in female offspring from preeclamptic pregnancies. Herein, we utilized Blood Pressure High Subline 5 (BPH/5) mouse, a spontaneous model of superimposed preeclampsia, in comparison to Blood Pressure Normal Subline 3 (BPN/3). Previous findings in BPH/5 mice have exhibited precocious puberty, hyperandrogenism, and ovarian abnormalities. We hypothesize BPH/5 female offspring will have altered estrous cyclicity, with prolonged average cycle length and duration in each cycle stage. To test this hypothesis, we performed daily vaginal cytologies on BPN/3 (n=9) and BPH/5 (n=11) females beginning at 8 weeks of age and continuing for 14 days. To compare duration of cycle

and number of days in each stage between strains, Student's t-tests were performed. Over fourteen days, BPH/5 females had longer average cycle length (p ≤ 0.01) than BPN/3 females. There was no difference in average number of days in proestrus or estrus between strains. When assessing average days in metestrus/diestrus, BPH/5 females spent more days (4.82 ± 0.90, $p \le 0.05$) in these cycle sta

CHARACTERIZATION OF SUPPORTIVE TELEHEALTH INTERVENTIONS FOR FAMILY CAREGIVERS OF HEAD AND NECK CANCER PATIENTS: A SCOPING REVIEW
Presenter(s): Malia Rogers
Health Sciences
Mentor(s): Veronica Bernacchi (College of Nursing)

Head and neck cancer (HNC) patients often require assistance from family caregivers to manage post-treatment symptoms and medical equipment. Technology-based interventions are critical resources for HNC family caregivers, but there is limited understanding of intervention characteristics that are most effective in supporting family caregivers to manage HNC care. Therefore, the purpose of this scoping review is to characterize existing, technology-based interventions available for HNC family caregivers. Our methodological approach followed Arksey and O'Malley's framework and PRISMA-ScR guidelines. We developed tailored search strategies for PubMed, Scopus, Web of Science, PyschInfo and CINAHL databases between Oct 2023-Jan 2024. Studies were eligible for inclusion if they were peer-reviewed, original research available in English, and had a technology-based intervention being used by HNC family caregivers. 791 studies were yielded from the search strategies, with 7 studies meeting eligibility criteria. Caregiver samples were predominantly women (63%), Caucasian (88%), and the patient's spouse/partner (51%). N=3 interventions combined technology and in-person interventions. Intervention content included medical simulation exercises (n=4), virtual yoga (n =1), and educational videos/modules (n =4). Intervention outcomes included patient and caregiver quality of life (n =3) and caregiver distress (n =4). Intervention timing included 24/7 availability (n =4) and scheduled visit

REPRODUCTIVE FACTORS SHOW CONNECTION TO EARLY-ONSET BREAST CANCER
Presenter(s): Eli Creedon, Kyra Makie
Health Sciences
Mentor(s): Horng-Shiuann Wu (College of Nursing)

The incidence of breast cancer among younger female populations (18-45 years) is rising: 7-10% of new diagnoses being early-onset. Early onset breast cancer (EOBC) is a serious concern with negative prognosis, higher recurrence, and mortality (1.46-fold increased risk of dying). While these findings are alarming, effective preventative strategies are lacking. This systematic review aimed to determine lifestyle risk factors associated with EOBC among females aged 45 or younger. Three databases were searched: PubMed, CINAHL, and Web of Science. Keywords included early-onset/early incidence, risk factors, and breast cancer. The initial search resulted in 2,075 articles for screening. Inclusion criteria involved: EOBC female cases, age ≤ 45, and assessment of lifestyle factors. Exclusion criteria encompassed: articles > 10 years, genetic risk factors, data including males, secondary diagnoses of breast cancer, review articles, and case studies. Full-text review was conducted for the remaining 69 articles. Seven articles were included in this review. Four of the seven studies revealed that oral contraceptive use, particularly < age 20 and/or for extended periods (≥ 30 years) were associated with EOBC. Conflicting findings were identified. Several studies showed earlier pregnancy (< age 20) while others suggested later pr

FEASIBILITY OF USING IMMERSIVE VIRTUAL REALITY FOR A 6-MINUTE WALK TEST IN YOUNG ADULTS
Presenter(s): Joseph Belanger
Health Sciences
Mentor(s): Pallav Deka (College of Nursing)

Although the maximal oxygen uptake test (VO2 max) test is the gold standard for evaluating cardiovascular fitness, the traditional submaximal 6-minute walk test (6MWT) is often used as a practical and effective surrogate for evaluating effectiveness of clinical interventions. There may be barriers to conducting the traditional 6MWT. Immersive Virtual Reality (VR) for gaming purposes has become popular. However, the use of immersive VR to conduct the 6MWT has not been tested. The objective of our study is to evaluate the validity and reliability of using immersive VR for the 6MWT (VR-6MsWT; using Holofit application) compared to the traditional 6MWT. While wearing the VR headset, the Holofit application allows participants to walk on the spot and explore an environment virtually. Using a matched pair design, each participant completed two sets of 6MWT and two sets of VR-6MsWT. Distance walked in 6 minutes in meters was recorded. Heart rate was monitored using the Polar H10 sensor, and step count was measured using the Fitbit Charge 5. At the end of each test, participants reported their perceived exertion using the Borg 6-20 Rating of Perceived Exertion (RPE) scale. For analysis, the best score of the two walks was used. 31 participants (22 female and 9 male) with a mean age of 20.9±0.9 years completed the study. On average participants walked 273±192 meters more in the VR-6MsWT. A weak Pearson's Cor

COUNTY AND INCOME DIFFERENCES IN ADOLESCENT DIET QUALITY
Presenter(s): Aalia Arshed, Alyssa Hein, Haidy Zhang
Health Sciences
Mentor(s): Hesam Varpaei (College of Nursing), Lorraine Robbins (College of Nursing), Natalia Fraczek (College of Education)

Limited research exists on adolescents' diet quality at the county level. This secondary analysis of baseline data from a randomized controlled trial aimed to identify differences in 10- to 14-year-olds' diet quality across seven Michigan counties (Calhoun, Genesee, Ingham, Jackson, Kent, Washtenaw, Wayne) and income levels. Diet quality was assessed using two 24-hour dietary recalls via phone with each adolescent, with Healthy Eating Index (HEI) scores calculated (range: 0 to 100; higher scores reflect better diet quality). One-way ANOVA and Tukey's Range Test were conducted. Participants' mean age was 12.08 years; 447 were male, and 465 were female. Racial/ethnic distribution included 362 (39%) identifying as Black, 339 (36%) as White, 22 (2%) as Asian, 132 (14%) as >one race, 42 (5%) as other, and 121 (13%) as Hispanic.Annual household incomes were: ≤$29,999 (31%), $30,000-$69,999 (38%), and ≥$70,000 (31%). Adolescents' HEI scores and caloric intake varied among the seven counties (p=.0019 and .0149, respectively). Adolescents in Kent had significantly higher HEI scores than those in Wayne, Genesee, Calhoun, and Jackson. Caloric intake varied as well(p-value = 0.0149) with Genesee having significantly higher caloric intake than Kent (p≤.05). Higher caloric intake and lower HEI in Genesee suggest poorer overall diet quality. Annu

TECHNOLOGY-MEDIATED INTERVENTIONS FOR PROMOTING WELLBEING AND QUALITY OF LIFE IN INFORMAL CANCER CAREGIVERS: A SCOPING REVIEW

Presenter(s): Lauren Bottini

Health Sciences

Mentor(s): Arienne Patano (College of Nursing), Gwen Wyatt (College of Nursing), Rebecca Lehto (College of Nursing)

Informal cancer caregivers play a critical role in the home delivery of care of patients, yet they often experience emotional, physical, and social burdens that can have a profound impact on their well-being and quality of life (QOL). As cancer care becomes more complex, caregivers may experience increased distress and health challenges. Recent technological innovations have improved access, management of care logistics, communication, and patient and family engagement. However, there are few studies that have capitalized on these novel technologies to enhance informal cancer caregivers' emotional health and well-being. Thus, the purpose of this review is to evaluate the state of the science on the use of technology-mediated interventions, such as wearables or smart apps, for improving the psychosocial wellbeing and QOL of informal cancer caregivers. Utilizing Arksey & O'Malley's scoping review framework, included studies were those evaluating technological interventions for informal cancer caregivers mental health/QOL. Out of 230 studies, a total of 20 peer reviewed studies met inclusion criteria. Studies featured interventions such as virtual reality/augmented reality (VR/AR), smartwatches, Fitbit sensors, and mobile apps to monitor or support mental health and QOL. Findings suggest that technology tools, including both VR/AR and m-health, were found to be effective by promoting healthy behaviors, emotion symptom monitoring, and well-being. While these interventions

DOES GENETIC DELETION OF AUTOIMMUNE REGULATOR INFLUENCE MOUSE MATING BEHAVIOR?

Presenter(s): Katrina Halgren

Health Sciences

Mentor(s): Alexandra Yaw (College of Agriculture & Natural Resources), Margaret Petroff (College of Veterinary Medicine), Soo Hyun Ahn (College of Veterinary Medicine)

Autoimmune regulator (Aire) is a transcription factor expressed in the thymus responsible for generating immune self-tolerance. Deletion of Aire causes autoimmune disease and can result in infertility. The vomeronasal organ (VNO) is necessary for pheromone sensing in rodents, which drives mouse mating behavior. The VNO and surrounding glands are targeted by autoreactive immune cells in Aire- deficient (Aire-/-) mice. Further, Aire-/- males are severely sub-fertile compared to their wild-type counter parts. Based on these results, we hypothesized that Aire-/- males may be infertile due to their inability to sense female pheromones, resulting in a lack of copulatory behavior. To determine if the mating behavior of male Aire-/-

UNDERSTANDING THE EFFECTIVENESS AND IMPLEMENTATION OF OBESITY PREVENTION PROGRAMS AMONG NATIVE AMERICANS: AN INTEGRATIVE LITERATURE REVIEW

Presenter(s): Sarah Auger

Health Sciences

Mentor(s): Tsui-Sui Kao (College of Nursing)

Significance: Native Americans (NA) face higher obesity-related comorbidities than the general population, a disparity rooted in the lasting impacts of colonization, creating significant economic, educational, and health barriers. Purpose/Aim: Guided by the Whittemore and Knafl framework, this integrative literature review examined the effectiveness and implementation of obesity prevention programs designed to mitigate Native Americans' obesity risks. Methods: Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guideline, 5 databases (CINAHL Plus with Full Text, PubMed, Sociological Abstracts and Web of Science Complete Collection) were searched. Risk bias assessments were performed using the Alberta Heritage Foundation for Medical Research Assessment tool. Results: Of 378 articles screened, 40 studies (intervention, n= 17, implementation, n=23) were included/analyzed with sample sizes ranged from 7 to 1637. The interventions target eating behaviors (n=16), physical activity (PA, n=10), food security (n=4), environmental barriers (n=6), and NA traditional enculturation emphasis (n=10) with significant effects noted on

ENGINEERING GLYCYL RADICAL ENZYMES FOR SELECTIVE HYDROCARBON FUNCTIONALIZATION
Presenter(s): Jimyung Ryu, Sara Mann
Health Sciences
Mentor(s): Anshika LNU (College of Natural Science), Jian Liu (College of Natural Science), Mary Andorfer (College of Natural Science), Shukurah Anas (College of Natural Science)

X-succinate synthases (XSSs), which are members of the glycyl radical enzyme (GRE) superfamily, play a critical role in the anaerobic degradation of hydrocarbons, allowing microbes to metabolize hydrocarbons without the need for oxygen. These enzymes utilize radical chemistry to carry out challenging C-H bond activations, making them powerful tools for biocatalysis and environmental remediation. Understanding and engineering GREs like benzylsuccinate synthase (BSS) and methylalkyl-succinate synthase (MASS) expand the potential for selective functionalization of hydrocarbons under anaerobic conditions. We aim to explore the substrate scope of BSS and lay the groundwork for directed evolution. To this end, we have anaerobically purified BSS and characterized activity in vitro on several non-native substrates. SDS-PAGE was used to assess enzyme purity and LCMS was used to follow in vitro assays to evaluate enzyme activity. Saturation mutagenesis and site-directed mutagenesis were used to determine whether substrate scope and yield can be increased. Mutagenesis studies have identified key residues that expand the substrate scope, allowing functionalization of previously unreactive substrates. This work expands the substrate scope and improves catalytic efficiency of BSS, thus highlighting the versatility and potential of BSS for selec

WELLBEING IN NURSING SCHOOL: LEVERAGING PHONE-BASED SUPPORT SERVICES
Presenter(s): Kendall Perry
Health Sciences
Mentor(s): Jackeline Iseler (College of Nursing)

Nursing students experience significant academic, clinical, and emotional demands, often leading to high stress levels, burnout, and mental health challenges. While mindfulness-based interventions (MBIs) have shown promise in mitigating these issues, their structured nature and additional time requirements pose barriers to student engagement. This study explores the effectiveness of "Happy," a proactive phone-based support service designed to improve emotional and mental well-being of individuals, and in this case, nursing students', by offering regular check-ins through calls or text messages. Unlike traditional interventions that require students to seek out support, "Happy" provides a low-effort, accessible approach that integrates seamlessly into daily routines. Utilizing a longitudinal, observational design, the study recruited undergraduate nursing students in their third semester at Michigan State University. Participants were enrolled in the "Happy" program for six months, receiving monthly outreach. Student engagement with the intervention was tracked as the primary outcome measure. While the original study design included self-reported stress assessments and focus group interviews, only baseline data were collected, and no students participated in follow-up assessments or focus groups. Despite these limitations, engagement with the "Happy" program provided insights into the feasibility of phone-based

ASSESSING HEALTH RISKS OF MARS REGOLITH TO CREW
Presenter(s): Megan Van Brunt
Health Sciences
Mentor(s): Michael Velbel (College of Natural Science)

Regolith is loose unconsolidated rock and dust that sits on top of the layer of bedrock. Planetary scientists need to know about regolith on Mars because it provides them important information of the potential for past life/ geological history, as well as important factors for planning future missions. More specifically understanding the regolith allows scientists to examine the potential health hazards for astronauts. A(n) analog (simulant) is a material designed to mimic the chemical and physical properties of regolith found on Mars. Planetary scientists need regolith analogs because it allows them to test and examine processes that would be used on Mars regolith samples without having to acquire them. This is important because obtaining those samples can be difficult and there is only a small amount to utilize. To plan and simulate the analysis of Martian regolith, simulants must accurately mimic the chemical, physical, and mechanical properties of actual Martian regolith. This knowledge is crucial for assessing the risks regarding pulmonary, cardiovascular, ocular and dermal toxicity for crew. To address the health risks posed by Martian regolith, natural regolith samples must be analyzed for particle size distribution and chemical composition, especially toxic elements that could affect human health. By comparing optical color images of the assigned regolith simulant using Keyence technology with

INNOVATIVE STRATEGIES TO COMBAT THE NURSING SHORTAGE IN THE UNITED STATES
Presenter(s): Leah Alfred
Health Sciences
Mentor(s): Linda Keilman (College of Nursing)

The nursing shortage in the United States (US) is a persistent issue that significantly impacts quality patient care. Projections indicate a national shortage of 78,610 full-time registered nurses (RNs) by 2025, with a continued deficit of 63,720 in 2030. The COVID-19 pandemic exacerbated this crisis, as approximately 195,292 RNs (5.0% of the workforce) left the profession. High job turnover rates also contributed to the shortage, with approximate RN replacement costs of $65,000 per individual. New RN graduates often enter the workforce underprepared, requiring extensive orientation. The shortage disproportionately affects racial-ethnic minorities, medically underserved areas and populations (MUA/P), health professional shortage areas (HPSA), and rural communities. This study employed a systematic literature review to explore evidence-based (EB) strategies for mitigating the root of the RN shortage. One EB approach is the implementation of competency-based nursing curriculums to ensure graduates at all levels are adequately prepared for clinical practice. Nursing accreditation organizations oversee the adherence of nursing programs to established quality standards. State Boards of Nursing (SBON) regulate clinical hour requirements for licensure, ensuring uniform educational standards across the US. US academic nursing and nursing organizations have been developing other strategies to increase the number of nursing students admitted, graduated, and passing the RN licensure

ASSESSING THE FEASIBILITY OF ALLIED PROFESSIONALS DELIVERING CBT FOR PEDIATRIC PAIN: A SYSTEMATIC REVIEW
Presenter(s): Manasi Kulkarni
Health Sciences
Mentor(s): Natoshia Cunningham (College of Human Medicine)

Pediatric chronic pain affects 11-38% of children, leading to profound consequences such as mental health challenges, impaired academic performance, and heightened risk of opioid misuse. While Cognitive Behavioral Therapy (CBT) is a proven, non-pharmacological treatment, access remains limited, particularly in underserved communities, due to geographic, financial, and systemic barriers. This study investigates whether allied health professionals can feasibly deliver CBT after structured training. A scoping literature review highlights the potential for allied professionals to enhance accessibility to CBT through evidence-based training programs. The findings emphasize that training improves provider confidence and patient outcomes, including reduced anxiety and increased coping strategies among children. Family feedback highlights the importance of culturally tailored approaches to improve treatment adherence and equity. This work underscores the potential to reduce healthcare disparities by empowering allied professionals to provide equitable, non-pharmacological pain management solutions in underserved areas.

REFRAMING POST-ACUTE LONG-TERM CARE FOR LGBTQ+ OLDER ADULTS
Presenter(s): Alexis Karpenko
Health Sciences
Mentor(s): Linda Keilman (College of Nursing)

The LGBTQ+ older adult (OA) population in long-term care (LTC) is rapidly growing. Due to the unique complexities of this population's care, competency requires health care professionals (HCPs) and direct care workers (DTWs) to have appropriate and accurate information. In our 2019 descriptive cross-sectional study, we used an online survey to collect data from MI facilities (n = 429). Survey items included facility characteristics, diversity training history, perceived need for LGBTQ+ training, interest in additional training on LGBTQ+ OA in LTC, and training preferences. Results were obtained from 71 facilities (14%). There was good support for diversity training, with 74% stating it was "very important". A majority (63%) had some diversity training in the past year. Most (72%) endorsed the need and desire for more training on LGBTQ+ aging. More content on transgender OA and concerns such as room assignments, dementia, and use of pronouns were identified. Barriers to training included: cost, availability of trainers with the appropriate expertise, ability to reach large numbers of employees, staff turnover, bias among staff and residents, and the need to provide rationale for this type of training. LTC has changed since the COVID-19 pandemic such as stricter infection control policies, LTC staff shortages, and increased rates of resident isolation, anxiety, and depression. Our new study will look at the effects of COVID-19 on LGBTQ+ residents. Diversity training is criti

DEPRESCRIBING IN PRIMARY CARE: A CONCEPT ANALYSIS AND PRELIMINARY FINDINGS
Presenter(s): Tae Eun Kim
Health Sciences
Mentor(s): Jay Gottschalk (College of Nursing)

Deprescribing is a systematic, patient-centered process aimed at reducing or discontinuing medications that may no longer be beneficial or could cause harm. In a primary care setting, deprescribing involves collaboration between healthcare providers and patients to assess medication regimens, identify potentially inappropriate medications (PIMs), and implement tapering or discontinuation strategies when appropriate. The process includes several key steps: medication review, shared decision-making, risk-benefit analysis, and monitoring for withdrawal effects or symptom recurrence. Primary care clinicians play a critical role in deprescribing by integrating it into routine care, utilizing clinical guidelines, and addressing barriers such as patient resistance, polypharmacy complexities, and time constraints. Successful deprescribing relies on patient education, caregiver involvement, and interprofessional coordination to ensure safe and effective medication management. This approach is particularly important for older adults and individuals with multimorbidity, where polypharmacy is prevalent and associated with increased risks of adverse drug reactions, cognitive decline, and reduced quality of life. As deprescribing gains recognition as an essential component of comprehensive medication management, further research and policy efforts are needed to optimize its implementation in primary care practice.

USE OF ARTIFICIAL INTELLIGENCE IN MENTAL HEALTH ASSESSMENT AND INTERVENTIONS FOR PATIENTS WITH CANCER: A SCOPING REVIEW

Presenter(s): Christine O'Donnell
Health Sciences
Mentor(s): Gwen Wyatt (College of Nursing), Rebecca Lehto (College of Nursing)

Patients with cancer face many barriers to mental health care, especially in marginalized and underserved communities. Vulnerable populations such as racial minorities and LGBTQ + individuals experience both high rates of cancer and poor mental health outcomes. To promote health equity for this population, artificial intelligence (AI) may improve mental health in cancer patients by enabling peer connections and information access; however, such technologies also present unique risks and challenges. To address this need, a scoping review explored what is known about using AI to detect and address mental health (anxiety and depressive symptoms) among cancer patients. Arksey and O'Malley's five-stage methodology for scoping reviews guided the literature review. After screening for relevant articles and articles' references across five databases, eleven studies were identified. These studies met criteria regarding AI-based assessments and interventions for cancer patients with mental health issues. Two randomized controlled trials showed that text messaging and chatbots reduced distress and improved well-being. Another chatbot study demonstrated positive findings for assessment of depression and anxiety. Other AI studies showed that voice analysis, facial expression recognition, and mobile applications could assess and intervene related to mental health symptomology. Gaps were identified related to comorbidities and data quality. Overall, AI shows promise to support mental hea

CAN LIGHT INTENSITY AFFECT FERTILITY? A STUDY ON HOW BRIGHTNESS INFLUENCES REPRODUCTIVE HEALTH

Presenter(s): Krystal Jang
Health Sciences
Mentor(s): Alexandra Yaw (College of Agriculture & Natural Resources), Hanne Hoffmann (College of Agriculture & Natural Resources)

Seasonal variations in light quality, including duration and intensity, influence physiological processes in mammals. Light intensity is significantly higher in the summer than in winter in continental climate regions, benefiting diurnal humans by promoting overall health. Reduced light exposure has been linked to fertility deficits, with lower in-vitro fertilization success rates observed in the winter. Infertility rates are increasing, and modern women are spending more time indoors where lighting is dimmer than natural sunlight. However, the impact of this on fertility remains unclear. Light plays a crucial role in regulating reproductive hormones. When light enters the eye, photic signals are transmitted to the brain to influence the reproductive axis, driving hormone release and reproductive function. To investigate how light intensity modulates reproductive axis function, I will use a mouse model exposed to different light intensity conditions. Given that mice are nocturnal, I hypothesize that increased light intensity will disrupt reproductive hormone release and estrous cycle regularity. Female mice will be housed under standard light conditions (300 lux) before transitioning to bright (1000lux) or dim light (50 lux) under a 12:12 light-dark cycle. Estrous cyclicity will be monitored via daily vaginal cytology. Additionally, luteinizing hormone and follicle-stimulating hormone levels-critical f

EXAMINING SEX DIFFERENCES IN POST-CONCUSSION SYMPTOMS AND PSYCHOLOGICAL HEALTH-RELATED QUALITY OF LIFE (PHRQOL) USING ECOLOGICAL MOMENTARY ASSESSMENT (EMA)
Presenter(s): Kate Ryan, Katie Koch
Health Sciences
Mentor(s): Allie Tracey (College of Education)

The purpose of this study was to examine differences in the variance of post-concussion symptoms and PHRQoL throughout recovery between individuals with concussions and controls using the EMA platform, ReCoUPS, and examine potential sex differences in symptom reporting. Thirty-six college-aged athletes with a concussion (female=23, Age=20.36<u>+</u>1.25 years) and 34 healthy matched controls (female=21, Age=20.35<u>+</u>1.37 years) were enrolled in a longitudinal repeated measures study. Participants completed demographics, injury information, and enrollment in the ReCoUPS platform with their cellphone number ≤3 days post-concussion. The Sport Concussion Assessment Tool-6 (SCAT6) symptom checklist (including clusters: affective, migraine, cognitive-ocular), and PROMIS Depression and Anxiety surveys were administered daily throughout recovery via ReCoUPS text messages. Surveys were terminated ≤2 days after full medical clearance (FMC). Multilevel mixed-effects linear regression models estimated within- and between-individual variance in symptom clusters and PHRQoL with intraclass correlation coefficients (ICCs) to determine

BLOOD PRESSURE CIRCADIAN RHYTHM AND PREGNANCY OUTCOMES IN HIGH-FAT DIET-FED DAHL SALT-SENSITIVE RAT
Presenter(s): Lauren Kim
Health Sciences
Mentor(s): Viviane Cristine Leite Gomes (College of Veterinary Medicine)

Maternal obesity is a major risk factor for hypertensive disorders of pregnancy (HDP), a leading cause of maternal and fetal mortality. Disrupted blood pressure (BP) circadian rhythm may occur with obesity and HDP. The interplay between maternal adiposity and BP rhythm disturbances remains unclear. The high-fat-diet-fed (HFD) Dahl Salt-Sensitive rat (DSS) is established as a model of adiposity-induced hypertension. We hypothesized hypertension would be exacerbated in HFD DSS during pregnancy, with loss of BP circadian rhythm. Virgin DSS females from Charles River Laboratories were assigned to control diet (CD, 10% kcal fat) or HFD (60% kcal fat) at 3 weeks old (Research Diets, Inc). At 11 weeks old, radiotelemetry transmitters were implanted (PhysioTel TM HD-S10, Data Sciences International). Mean arterial pressure (MAP) was recorded every 10 min (n=5/group). Chi2 periodograms were used to assess MAP circadian rhythms (ClockLab 6). Gestaional Day (GD)0-18, 24h average MAP was higher in HFD vs CD ($p<0.05$), (GD)19-21 MAP was lower in HFD ($p<0.05$), and not different from GD22 to PD1 ($p>0.05$). HFD and CD maintained 24h MAP rhythm (GD0-14) ($p<0.05$). However, during (GD14-21), 4/5 HFD lost MAP circadian rhythmicity compared to 1/5 CD (Chi2 periodogram; $p< 0.05$). All animals recovered circadian MAP rhythm at PD0. In conclusion, DSS rats fe

ONE ORGAN, THREE GENOTYPES, ONE CLOCK: UNDERSTANDING CIRCADIAN RHYTHMS IN THE PLACENTA
Presenter(s): Kierra Jursch
Health Sciences
Mentor(s): Alexandra Yaw (College of Agriculture & Natural Resources), Hanne Hoffmann (College of Agriculture & Natural Resources)

Close to 4 million women are diagnosed with preeclampsia (PE) a year, a hypertensive condition that is a leading cause of maternal and fetal mortality. Placental dysfunction is a central factor in PE, and delivery of the placenta is currently the only treatment for PE. PE is associated with disrupted placental circadian rhythms, biological processes that follow a roughly 24-hour clock. To explore whether placental circadian rhythms can be manipulated outside the body, we assessed the effects of PF670462, a drug that is known to lengthen circadian rhythms. Early results from PF670462 treatment show elongated circadian rhythms, confirming that placental clocks can be pharmacologically manipulated ex vivo. Using this model, we hypothesized that epidermal growth factor (EGF), a chemical central to PE and placenta function, could modulate placenta circadian rhythms. Using circadian Per2::Luciferase reporter mice we prepared placenta explants representing the maternal decidua, the maternal-fetal combined junctional zone and the fetal labyrinth in mid pregnancy (gestation day (GD) 11), late pregnancy (GD14) and close to term pregnancy (GD18). Preliminary results showed no significant effects of EGF treatment in across layers or gestational ages. This work establishes a foundation for studying placental circadian function and the susceptibility to pharmacological intervention, with implications for unders

SERIAL SYMPTOM MONITORING WITH ECOLOGICAL MOMENTARY ASSESSMENT IMPROVES PREDICTION OF CONCUSSION RECOVERY OUTCOMES
Presenter(s): Giulia Castiglioni, Morgan Schmidt
Health Sciences
Mentor(s): Allie Tracey (College of Education), Lili Klein (College of Education)

Objective: This study aimed to determine if a mobile ecological momentary assessment (EMA) platform, ReCoUPS, improves the prediction of concussion recovery outcomes compared to traditional in-person symptom reports. Methods: We enrolled 36 college-aged athletes with a concussion (µage=20.36±1.25 years; female n=23, 63.89%) in our exploratory longitudinal study. Athletes completed demographic and injury information, the Sport Concussion Assessment Tool6 (SCAT6) symptom checklist (0-6 Likert scale), and enrolled in ReCoUPS within 3 days post-injury. SCAT6 total symptom severity scores (possible score range=0-132), as well as the affective (range=0-24), cognitive-ocular (range=0-24), and migraine-fatigue (range=0-30) symptom clusters were reported daily throughout recovery via ReCoUPS text messages. Surveys were terminated <48 hours post-full authorized medical clearance. Time to authorized clearance (date of authorized clearance - date of injury) was calculated. Symptom cluster (affective, cognitive-ocular, migraine-fatigue) and total symptom severity scores were calculated at three time points: initial visit (i.e., Initial), average of the first 7 days enrolled in ReCoUPS (i.e., Week 1), and average of entire EMA period (i.e, Full ReCoUPS). Univariate robust standard error linear regressions examined associations between symptom scores and recovery outcomes ($p<0.05$). Results: Average time to authorized clearance was 26.68±14.33 days. Initial symptoms were not significantly a

EFFECTS OF RAW AND ROASTED HIGH OLEIC SOYBEANS ON NUTRIENT INTAKE AND DIGESTIBILITY OF HIGH-PRODUCING DAIRY COWS
Presenter(s): Kathleen Doneth
Health Sciences
Mentor(s): Adam Lock (College of Agriculture & Natural Resources)

We determined the effect of feeding raw and roasted, ground high oleic acid soybeans (HOSB) on nutrient intake and digestibility of dairy cows. Thirty-six multiparous Holstein cows (45.6 ? 6.22 kg/d of milk; 110 ? 61 DIM) were randomly assigned to treatment sequences in a 4x2 Truncated Latin square design with 35-d periods. Treatments were: control (CON), 16% roasted HOSB (ST), 16% raw HOSB (RAW-D), and 16% raw HOSB + by-pass protein (RAW-U). HOSB replaced conventional soybean meal and hulls in HOSB diets and by-pass protein replaced soybean meal in RAW-U to maintain diet composition (% DM) of 21% forage NDF, 28% starch, and 17% CP. Total dietary fatty acid (FA) content was 2.8, 4.9, 5.1, and 5.1% DM, respectively. The statistical model included the random effect cow within square and fixed effects of square, treatment, and period. Pre-planned contrasts were the overall effect of SOY {CON vs. HOSB [1/3 (RST + RAW-D + RAW-U)]}, effect of roasting {RST vs. RAW [1/2 (RAW-D + RAW-U)]}, and effect of protein (RAW-D vs RAW-U). Overall, inclusion of 16% DM HOB increased nutrient intake and FA absorption. Roasting HOSB increased digestion and absorption of dietary FA compared to raw HOSB.

DESIGNING CHATBOT SUPPORT TOOL TO HELP ADOLESCENTS WHO EXPERIENCE CYBERBULLYING
Presenter(s): Yevgenia Minchuk
Health Sciences
Mentor(s): Celeste Campos-Castillo (College of Communication Arts Sciences)

We conducted 12 focus groups with a group of 41 adolescents who are diverse with respect to gender, race, and sexual identity. We asked them what they would like to see in a chatbot support tool that combats cyberbullying.

HISTORY, POLITICAL SCIENCE, & ECONOMICS

WINNERS AND LOSERS IN THE POST-9/11 STOCK MARKET
Presenter(s): Bosen Shen, Eric Cui, Ian Schoenl, Kevin Lamas-Perez, Khadija Hozefa Bilaspurwala, Rachel Seol, Thomas Trotter
History, Political Science, & Economics
Mentor(s): Xuefeng Jiang (Eli Broad College of Business)

Although several industries, such as the travel industry, were negatively affected in the stock market due to the attacks on September 11th, 2001, some stock prices saw an increase in performance shortly after the stock market reopened on September 17th. Examples include pharmaceutical companies, tech companies, energy companies, and military bond prices. Due to the significant shifts in investor sentiment toward certain industries after the attack, our study seeks to answer the following questions: which sectors/companies in the S&P 500 benefited the most and least in the short term, and how much did they or did they not improve in the stock market? The state of the markets will be addressed using stock market data from Wharton Research Data Services (WRDS), and both statistical and graphical analysis will be used to present the trends found in the stock market shortly after the events of September 11th.

UKRAINE'S SUSTAINABLE DEVELOPMENT AND THE IMPACT OF WAR OF ITS FUTURE
Presenter(s): Lyra Opalikhin
History, Political Science, & Economics
Mentor(s): Siddharth Chandra (International Studies & Programs)

This project examines the current Ukraine-Russia War and how the conflict has affected Ukraine's Sustainable Development Goals (SDGs). The SDGs are 17 goals set by the United Nations to achieve mutual prosperity and peace that pays attention to sustainable practices. The goals range from eliminating poverty, eliminating hunger, reducing inequality, increasing access to education, and more. These goals are directly impacted by wartime, as war is understood to set back these goals and hamper quality of life. By examining the Ukraine-Russia War, I hope to understand not just the impact each SDG faced due to the ongoing conflict, but whether there are trends between which SDGs are most or least impacted, alongside what steps should be taken by the international community to assist Ukraine's redevelopment once the war concludes. The project compares Ukraine's progress regarding the SDGs before the conflict to their progress during it, determining what SDGs are the most and least impacted by the conflict. The project also lends insight into explanations behind the results of the SDGs alongside how the broader international community will act once the war concludes.

POLITICS,RELIGION AND JAPAN
Presenter(s): Keiara Dixon
History, Political Science, & Economics
Mentor(s): David Humphrey (College of Arts & Letters)

The purpose of this research study is to examine the intersections of religion, politics, and society in contemporary Japan. By analyzing responses from individuals who have lived in Japan for seven or more years, alongside their personal experiences and photographic evidence, this research seeks to uncover the influence of religion on Japanese politics and its broader societal impact. The study explores whether religion plays a significant role in shaping political decisions, policies, and public perceptions and expectations, or if its influence is minimal in a predominantly homogeneous (maybe secular?) society. Furthermore, this study investigates how Japanese citizens perceive and engage with political and religious institutions while identifying relationships between these forces. The research aims to provide an understanding of how religious beliefs, traditions, and institutions intersect with governance and societal expectations in Japan today. The central question guiding this study is: Does religion influence politics in contemporary Japan, and, if so, to what extent? By addressing this question through qualitative analysis, this study contributes to a deeper comprehension of Japan's socio-political fabric and the evolving role of religion within it.

THE ROLE OF FIELD OF SPECIALIZATION IN THE ACADEMIC LABOR MARKET
Presenter(s): Knick Laux
History, Political Science, & Economics
Mentor(s): Hanzhe Zhang (College of Social Science)

The academic labor market for PhD economists has been studied in detail over the last few decades to shine light on the efficiency of the market's placements and the predictors of success in the market. The literature covers the expectations and satisfaction of placed graduates and identifies first-year graduate grades and program rank as predictors of higher placement. This project includes the field of specialization of graduates as a significant predictor of academic placement, and samples from the placements of the top 100 graduate programs over the last fifteen years to create one of the largest placement datasets to date. Data from placement lists, job-market-candidate pages, CVs, LinkedIn, JEL dissertation lists, and internet archives are combined to collect covariates and each graduate's field in three forms: their self-reported field, their JEL-listed field, and their job-market-paper field as classified by a support vector machine trained on NBER working papers. Placement rank as ranked by U.S. News and World Report is regressed separately on each form of field of specialization, with controls informed by the literature, to identify the fields of economics which are predictors of strong placements, as well as which signal of a graduate's field takes the most weight in placement decisions. The findings will improve models of the academic labor market for econ

BIKINIS AND BOMBSHELLS: COMMERCIALIZING AND SEXUALIZING NUCLEAR MILITARIZATION AFTER WWII
Presenter(s): Delaney Cram
History, Political Science, & Economics
Mentor(s): Kimberly Priest (College of Arts & Letters)

On the first of July 1946, just months after the conclusion of the second World War, the United States oversaw the testing of another atomic bomb that was exploded on a collection of islands in the Pacific known as Bikini Atoll. This bomb was the fourth atomic bomb ever to be detonated in human history and the first of a series of nuclear testing that would occur over Bikini Atoll and in the Marshall Islands. On the fifth of July 1946, French designer Louis Réard released the bikini swimsuit, a garb named to profit off of the bombing at Bikini Atoll and normalize US use of this weaponry. The swimsuit met with immediate controversy for its lack of modesty while also tying nuclear bombs to women's sexuality. The bikini swimsuit was not the only product marketed to women during this time that profited off of and normalized the dawning nuclear age. Make-up products such as atomic red lipstick also signaled acceptance of atomic warfare with rhetoric and advertising meant to spur consumerism and sexualize militarization. And while the word "bikini" came to be associated with skimpy two-piece beachwear and the word "bombshell" came to describe overt female seduction, the activities of the United States military in Bikini Atoll that inspired these terms faded from the public eye. This project seeks to examine the history that inspired these products as well as the way female fetishization served to distract t

MLB ARBITRATION: WHAT MAKES A PLAYER WIN?
Presenter(s): Harrison Kubicki
History, Political Science, & Economics
Mentor(s): Hanzhe Zhang (College of Social Science)

In this dataset we analyze 2000+ datapoints, aggregating statistics and characteristics of MLB players from 2010-2025. We aim to see what characteristics correlate with a player going into contract arbitration, or whether they win or lose arbitration.

BEYOND THE ACA: THE ROLE OF GENDER COMPOSITION IN STATE LEGISLATURES ON GENDER-SPECIFIC HEALTHCARE COVERAGE
Presenter(s): Emma Huizenga, Lola Browne
History, Political Science, & Economics
Mentor(s): Matthew Grossmann (College of Social Science)

The Affordable Care Act (ACA), signed into law in 2010 and fully implemented in 2014, requires both public and private insurers to cover a minimum of ten essential health benefits for their policyholders, including ambulatory patient services, emergency services, hospitalization, maternal & newborn care, mental health & substance disorder services, prescription drugs, rehabilitative & habilitative services & devices, laboratory services, preventive & wellness services & chronic disease management, and pediatric services for oral and vision care. Additionally, the benefits of contraceptives and breastfeeding coverage must be provided, though anomalies to this rule exist. While these requirements cover an extensive range of care, some gender-specific health benefits are exempt from obligatory coverage, leaving the issue of mandated coverage to the states. Given that women's and transgender healthcare has been historically overlooked and highly politicized, it is crucial to examine whether the representation of marginalized identities in state legislatures influences the adoption of mandatory insurance coverage laws for gender-specific healthcare. Studying the effects of representation can help foster a more inclusive and fair policy system by promoting accountability and equity to address the systemic neglect of these issues. To answer this question, state-level insurance mandates for contraceptives, abortion, fertility treatments, vasectomies, erecti

SELEUCID COINS, PRESENTABILITY, AND ACCESSIBILITY
Presenter(s): Yousef De Vries
History, Political Science, & Economics
Mentor(s): Noah Kaye (College of Social Science)

I've been working with my professor Noah Kaye in his work with Seleucid Coinage. I hope to be able to present about my work in making these coins both legible and captivating to view both online and, perhaps hopefully, in more physical mediums. Our work involves the application of numismatic sites and the accessibility of linked open data, and in particular Seleucid Coins Online. For this project, I am hoping to finalize an arrangement wherein we will be adding coins made available to us to such a resource, and perhaps digitizing them in the form of 3D models.

THE ACCURACY OF BAYEUX TAPESTRY'S DEPICTION OF THE ARMS AND ARMOR AT HASTINGS
Presenter(s): Tyler Richards
History, Political Science, & Economics
Mentor(s): Emily Tabuteau (College of Social Science)

The Bayeux Tapestry provides an invaluable visual source on the Battle of Hastings. Its wide ranging depiction of combat helps us to gain an understanding of how the battle was fought and what weapons and armor was used. Or can it? How much of the Bayeux Tapestry's depictions of the tools of war can be trusted, and if they can be trusted, what exactly do they depict? In this presentation I will show contemporary evidence, as well as artifacts to show what may have been worn and wielded at the Battle of Hastings.

RACE & THE POLITICS OF EXECUTIVE APPOINTMENTS
Presenter(s): Alexander Hubbs, Tomas Feldmann Tonelli
History, Political Science, & Economics
Mentor(s): Ian Ostrander (College of Social Science)

High-level executive appointments to bureaucratic posts are increasingly politicized and serve as a metric for a successful presidency. The role of race in American bureaucracies, however, is understudied relative to the importance of these high-level appointees in providing for representative policymaking. During his campaign for office in 2020, President Biden promised to prioritize filling the federal bureaucracy with diverse appointees. Was he successful? This project examines high-level appointment politics in the 117th & 118th Congresses in order to evaluate President Biden's efforts.

The Biden administration did move quickly on diversifying nominations while the Democratic Senate prioritized these confirmations by taking advantage of new Senate rules. However, slim majorities kept some nominees from reaching a vote. There is strong evidence in support for President Biden's claims that he has provided an historic slate of diverse nominees for federal agencies.

PRECAUTIONARY PRINCIPLE IN INDIAN ENVIRONMENTAL LAW
Presenter(s): Kate Kling
History, Political Science, & Economics
Mentor(s): Mark Axelrod (James Madison College)

I am researching the influence of Customary International Law (CIL) on the implementation of the precautionary principle in Indian environmental law and policy. CIL was developed to regulate interactions between states; it has been suggested as an alternative to legal constraint when states cannot agree on treaties. CIL does not require global legislative implementation, so it provides a way for judges to sidestep unwilling political actors. States then internalize norms from CIL into domestic law, which occurred with Precautionary Principle in India. Precautionary Principle requires that scientific uncertainty cannot be used to avoid environmental regulation, calling upon the State Government to anticipate, prevent, and attack the causes of environmental degradation. It also instructs industrialists to prove their actions are ecologically benign before they begin work. The 1987 United Nations Brundtland Report was instrumental for the Precautionary Principle to become a part of Indian law, as evidenced by the landmark 1996 Vellore Citizens Welfare Forum Case. I show that, since then, judicial decisions have predominantly cited the Vellore decision or the National Green Tribunal (NGT) Act, which requires private actors to use precaution in decision-making, rather than drawing back to CIL to justify precautionary measures. I analyze a random selection of Supreme Court Cases which discuss the precautionary principl

MUSIC, GENDER, AND TAYLOR SWIFT: CAN POPULAR CULTURE AND ASSOCIATED PERCEPTIONS OF GENDER IDENTITY SWAY ELECTIONS?
Presenter(s): Lowell Monis
History, Political Science, & Economics
Mentor(s): Ana Bracic (College of Social Science)

This study explores the role of cultural symbols, particularly Taylor Swift's favorability, in shaping political preferences, focusing on gender identity, ideology, and party identification as key factors. Using survey data collected in an exit poll for the 2024 United States elections, the research examines whether celebrity endorsements influence support for political candidates, hypothesizing that ideological beliefs would override cultural influences. The findings reveal that Swift's favorability initially predicted political support. Still, its effect diminished when controlling for ideology and party identification, with significance retained to a reduced level among Harris voters, highlighting her ability to mobilize the Democratic base. The endorsement, however, showed no effect among independents and Trump voters when controlled for ideology. Furthermore, the study explores the perceived correlation between traditional notions of masculinity and conservative ideologies, and femininity and liberal values, revealing the complex ways gender identity shapes political attitudes. Ideology emerged as the strongest predictor of political preferences, aligning with previous studies on the centrality of ideology in voter behavior, and suggesting limited practical impact for celebrity endorsements in ideologically polarized contexts. There is also a focus on music genres, their political history, and ideological connotations in the United States.

RUSSIAN CIVIL-MILITARY RELATIONS AND THE FSB
Presenter(s): Marija Sagan
History, Political Science, & Economics
Mentor(s): Kirstin Hasler Brathwaite (James Madison College)

Traditionally, the Russian military shows little interest in being part of the political power and issues. The civilian leaders make the decisions and the military follows their directions. The primary organizational culture in the late 1990s for the Russian military institutions remained committed to the norm of civilian supremacy under Putin's control. The civil relations with the Federal Security Service (FSB) changed as the organization became more powerful. Current literature on civil-military relations neglects the relationship between civil relations with the FSB and how it contributes to the civil relations with the military. With these considerations, my focused research question is: How does an evolving FSB influence civil-military relations in Russia? Previous civil-military relations theory has mainly focused on democracies with only a few theorists examining authoritarian regimes. Other scholars have explained the evolution of the FSB from its predecessor security organizations to today looking at its change in responsibilities and roles performed in the federal government. However, existing academia does not completely explain the relationship between the two Russian organizations in the context of civil-military relations. Using case studies of the Second Chechen War and the Annexation of Crimea will give insight

THE IMPACT OF POLITICAL AFFILIATIONS ON STOCK MARKET PERFORMANCE IN BANGLADESH
Presenter(s): Sharif Hossain
History, Political Science, & Economics
Mentor(s): Prabhat Barnwal (College of Social Science)

Political shifts significantly impact financial markets, particularly in economies where businesses rely on government connections. This study examines the effect of Sheikh Hasina's resignation on August 5, 2024, on the Bangladeshi stock market, focusing on firms affiliated with the Awami League. Using daily stock data from 100 companies listed on the Dhaka Stock Exchange, a Difference-in-Differences (DiD) approach was applied to assess performance differences between politically connected and non-connected firms. Results indicate that prior to the event, both groups exhibited negative returns. However, post-event, non-affiliated firms recovered with positive returns, whereas politically connected firms continued to experience losses and heightened volatility. Regression analysis confirms that affiliated firms were disproportionately affected, with the impact becoming statistically significant when controlling for trading volume and value. These findings align with global research on political connections, highlighting the risks of dependency on political ties. The study underscores the importance of political stability for market confidence and suggests that investors should consider political affiliations as a risk factor when evaluating firms in emerging markets.

HISTORY EDUCATION AND DOMESTIC POLITICS: KOREA
Presenter(s): Kara Hwang
History, Political Science, & Economics
Mentor(s): Laura MacDonald (Residential College in Arts & Humanities)

State governments have historically used education to shape ideal citizens with perspectives amicable to the ruling party and breathe in ideologies supporting their political agenda into compulsory education curriculums. One way in which this has been done is through altering the narratives of past events in history education curriculums, whether it be textbooks or standards. A government's international and domestic political intent is oftentimes well reflected in the top-down reformation of history education curriculums. In the wake of today's heightened political tensions in both global and internal politics for many countries, I seek to explore how a government's political intentions are reflected in the history education curriculums of the time, starting with Korea as an example. The Republic of Korea, for its short existence from 1948, has experienced several political turbulences until today. Education curriculums have also been through a number of changes, making the current 2022 Education Curriculum the 7th edition. The changes made by each revision in history education, with the focus on its narrative from events in 1945 to the 2000, will be compared with both domestic and international political developments in Korea. Focus will be placed on the educational purpose and standard goals for each curriculum, in identifying the correlation betwee

DOWRIES: THE CATALYSTS OF CHANGE IN RURAL CHINA
Presenter(s): Domenic Cedillo
History, Political Science, & Economics
Mentor(s): Yulian Wu (College of Social Science)

Dowries have been a practice in rural China since the Spring and Autumn Period until their attempted ban under the 1950 Marriage Law of the People's Republic of China when they came under a fundamental rework while being covertly practiced. This paper examines the significant changes made to dowries and how they impacted the social, political, and financial relationships among women, the state, and social hierarchies. Current literature treats dowries as marginal examples of inequality within marriages and are often viewed as a bargaining chip, but seldom considered when discussing broader themes of gender. Dowries are significant because they have helped women challenge patriarchal structures, the government, and formed a level of social mobility and hierarchy. Dowries as a custom provide an insight into an individualized realm outside of the typical notion that the Chinese government is an all powerful entity. This paper was written utilizing secondary literature that details gender relations in marriages in addition to providing statistics when it comes to the development of dowries. Primary sources detail what dowries contained and how dowries relate to individuals, families, social groups, the media, and the government. The key takeaway is that dowries hold immense power more than ever before to change the positionality of women in China. With an increasingly commodified dowry, the Chinese Co

ECONOMIC AND SOCIAL IMPACT OF RENEWABLE ENERGIES FOR MICHIGANDERS
Presenter(s): Elizabeth Hudson
History, Political Science, & Economics
Mentor(s): Michael Adetayo Olabisi (College of Agriculture & Natural Resources)

Do our environmental obligations outweight our environmental or do they more intertwined than people realize. What is best for Michiganders, and will turning green really be for the best. What is the the dollar amount that renewable energies save or cost Michiganders and how does adoption of renewable energy impact their daily lives. This presentation explores the economic costs and opportunities associated with renewables, with a focus on the opportunities and limitations tied to Michigan's geography and history. With social pressures to move towards renewbale and green energy is it in Michigan best interest economically to invest in renewable energy.

FAIR INCOME FOR WEST AFRICAN COCOA FARMERS
Presenter(s): Max Gripton
History, Political Science, & Economics
Mentor(s): Michael Adetayo Olabisi (College of Agriculture & Natural Resources)

This paper examines the persistent issue of low annual incomes among cocoa farmers in West Africa, despite the region's dominance in global cocoa production, contributing over 70% of the world's supply. While cocoa is a critical commodity, many farmers still earn incomes below the global poverty threshold. This paper attributes the causes of this problem to a number of factors including, but not limited to: volatility within the cocoa market, unpredictable cocoa growth patterns, cocoa price ceilings set by governments, and inefficient cocoa farming practices. These findings suggest that there are many ways to boost cocoa producers' income through West African countries' government actions. A boost in West African cocoa farmers income could result in an increase in chocolate price, however, it is found that a 50% increase in cocoa producers income would only result in a marginal increase in chocolate price ("Low Cocoa Prices and Income for Cocoa Farmers"). Additionally, there are ways to increase cocoa producers' income without affecting the cost of chocolate, such as implementing producer groups in West Africa to increase efficiency at cocoa farms, and boost yields.

PARTISAN CUES IN LOCAL ELECTIONS: VOTER AWARENESS AND ALIGNMENT IN SCHOOL BOARD RACES
Presenter(s): Oscar Joldersma
History, Political Science, & Economics
Mentor(s): Rebecca Jacobsen (College of Education)

This study explores the growing influence of partisanship on local school board elections by analyzing voter awareness and partisan alignment. In Rhode Island (RI), where school board candidates run with party labels, 62 percent of respondents recognized candidate partisanship. In Michigan (MI), where school board elections are officially nonpartisan, 36 percent of voters still identified candidate affiliations based on endorsements from unions, county political parties, or advocacy organizations. Additionally, 83 percent of RI voters supported school board candidates who aligned with their presidential choice, highlighting strong partisan voting patterns. To build on this analysis, we will determine the partisanship of MI school board candidates using state voter registration data and examine the characteristics of voters who split their ballots. These findings show the increasing role of partisanship in down-ballot elections and the implications on voter behavior.

POLITICAL POLARIZATION AND MISINFORMATION THROUGH MEDIA
Presenter(s): Julia Park
History, Political Science, & Economics
Mentor(s): Ani Sarkissian (College of Social Science)

The current polarization of American politics between the Left and Right have drastically increased in the past three decades. Media domination of political discussions have led to mass spread of misinformation. Fact checking platforms, unbiased social media postings, and even legacy media reports are viewed increasingly with suspicion by a public that gets its news from partisan outlets. Partisanship is driving voting behavior even when research has proven that people who identify as democrat or republican do hold policy views that seem to contradict their party label (Ellis & Stimson, 2005). My project ReKive proposes a solution to the problems of polarization and misinformation that focuses on making the American public more informed about the work being done on Capitol Hill. ReKive is a platform where crucial government information can be accessed quickly and conveniently using AI technology. Bills that are introduced and passed by the House are concisely summarized to become more digestible for the everyday voter. Budget bills are appropriately outlined to increase transparency of where tax-dollars are being distributed. State representatives will be on clear display alongside their supporting policies and clear directions on how to reach them for inquiries. ReKive uses information directly from the government source which allows minimal opportunity for bias and aims to bridge a gap between the government and its citizens so that elections can become an opportunit

FILLING THE FEDERAL BENCH WITH BIDEN JUDGES
Presenter(s): Meera Kanade
History, Political Science, & Economics
Mentor(s): Ian Ostrander (College of Social Science)

Judicial Appointments are increasingly politicised and serve as a metric for a successful presidency. After the Trump administration's historically successful spate of judicial appointments, President Biden promised to prioritize filling the federal bench with diverse nominees. Was he successful? This project examines judicial appointment politics in the 117th & 118th Congresses in order to evaluate President Biden's efforts. The Biden administration did move quickly on judicial nominations while the Democratic Senate prioritized these confirmations by taking advantage of new Senate rules. However, slim majorities and the continued honoring of blue slips blocked some nominees from reaching a vote. There is strong evidence in support for President Biden's claims that he has provided an historic slate of diverse nominees for the federal courts.

EVERYBODY LOSES: WHY THE WORLD SHOULD CARE ABOUT AFRICA'S SUSTAINABLE ECONOMY TRANSITION
Presenter(s): Idia Obayagbona
History, Political Science, & Economics
Mentor(s): Michael Adetayo Olabisi (College of Agriculture & Natural Resources)

If the world does not aid Africa in their sustainable economic transition, there will be no winners in the fight against climate change. This presentation will investigate the effects of climate change on agricultural production, trade, transportation and other features of African economies. This presentation will also investigate how current systems prohibit global climate initiatives/goals (climate agreements, sustainable development goals, and advancements in clean energy technology). The main highlights include the disadvantages faced by African countries in the fight against climate change, and opportunities to move toward more sustainable practices, with an emphasis on the external costs other countries around the world will have imposed upon them, if they do not aid in Africa's sustainable economy transition.

ASSESSING CONSUMPTION EXPENDITURE IN INDIA
Presenter(s): Dhimaan Bhattacharya
History, Political Science, & Economics
Mentor(s): Prabhat Barnwal (College of Social Science)

To evaluate key determinants shaping spending patterns across households in India. Imported, cleaned, and categorized microdata from the National Sample Survey of 2022-23 by developing a Stata do-file. Looked at different years' data to compare expenditure through time. Look at factors that affect/shape household expenditure.

VISIBLE AND VOCAL: THE INTERSECTION OF GENDERED ISLAMOPHOBIA AND MUSLIM WOMEN'S POLITICAL PRIORITIES

Presenter(s): Elaina Rankin

History, Political Science, & Economics

Mentor(s): Nura Sediqe (College of Social Science)

This study examines the intersectional impacts of Islamophobia and gender on American Muslim women, with a focus on their perceptions, political behavior choices, and policy priorities. Building on Beydoun and Sediqe's (2023) theory of gendered Islamophobia, which highlights the uniquely gendered tropes that characterize Islamophobia, this article explores how these dynamics influence Muslim women's perception of discrimination and political participation. Using data from surveys fielded in 2019, 2020, and 2023, three key findings emerge. First, Muslim women perceive discrimination as a more significant issue compared to Muslim men. Second, Muslim women are more likely to participate in women-specific protests, explaining the increased visibility of Muslim women in women's social movements. Perceptions of discrimination were positively associated with an increased likelihood to participate. Third, Muslim women prioritize reproductive justice as a policy concern at higher rates than Muslim men. These findings contribute to the growing empirical literature on American Muslim women, situating their experiences within broader conversations on intersectionality, racialization, and women's political engagement. The analysis underscores the vital role Muslim women play navigating the intersections of Islamophobia and gender, demonstrating how women's rights issues remain important for Muslim women.

GREEDFLATION IN THE HEADLINES: MEDIA REPORTING ON INFLATION

Presenter(s): Gavin Boom

History, Political Science, & Economics

Mentor(s): David Ortega (College of Agriculture & Natural Resources)

Public discourse in the U.S. has increasingly focused on inflation, economic instability, and "Greedflation"-the notion that corporations inflate prices beyond necessary cost adjustments to maximize profits. While this theory has gained traction in media and politics, its role as a primary driver of inflation remains debated. This study examines the relationship between media coverage of price gouging and changes in consumer prices. Using a regression-based quantitative approach, this study analyzes Factiva's news archives (1999-2024) to track mentions of 'greedflation', 'profiteering', and 'price gouging' across economic cycles. It explores correlations between media coverage, industry-specific trends, and economic fluctuations while assessing biases in reporting. Historical inflation via the Consumer Price Index(CPI) data is incorporated to evaluate whether corporate-driven inflation narratives align with economic realities or are potentially amplified by outside factors such as the 24/7 news cycle and political polarization. Regression analysis suggests that for a 1 unit increase in CPI, the predicted increase in news articles containing one of the search terms increases by 46 (p-value<0.01, r-squared 0.13). This analysis controls for seasonality via monthly dummy variables as well as recessionary periods. These results suggest a strong link be

HUMAN DEVELOPMENT & RELATIONSHIPS

EFFECTS OF THE SYRIAN WAR ON CHILDHOOD DEVELOPMENT
Presenter(s): Maya Rice, Peyton McLaughlin
Human Development & Relationships
Mentor(s): Camelia Suleiman (College of Arts & Letters)

The Syrian war has profoundly impacted child development in Syria, for both the children who remain and the ones who were forced to relocate. This presentation covers the psychological effects of forced displacement, exposure to violence, loss of family members, and disruption of education. The effects are all things that negatively harm children's mental well-being and their overall cognitive development; both short-term and long-term issues can arise. We divided the presentation into three different sections, highlighting what harms development the most. The challenges emphasized are education, or lack of it, social and emotional development, and effects on cultural identity. Education in Syria has been severely disrupted; children in Syria either can't get an education due to the conflict in the surrounding areas, or they still go to schools even with the conflict, putting themselves at risk. This lack of education causes children to fall behind academically and socially. It's easier for them to develop mental disorders and have long-term issues with relationships. Their relationships with their family, friends, and culture are weakened by the conflict, and they aren't a stable support pillar in their lives. At the end of the presentation, several organizations that offer aid to children in Syria are brought up. Supporting these organizations and spreading their information can help the children and their overall development, volunteering is

SURVIVORS TO LEADERS: CO-PRODUCED MODELS FOR COMBATING HUMAN TRAFFICKING
Presenter(s): Sumaiya Imad
Human Development & Relationships
Mentor(s): John Waller (College of Social Science)

Human trafficking remains a critical global issue, affecting an estimated 50 million individuals annually, with women and children disproportionately impacted. This presentation explores innovative, survivor-centered approaches to combating human trafficking through co-produced models that integrate the lived experiences of survivors into intervention design. Building on personal experiences and the success of the non-profit organization 'Sincerely, Her,' the research demonstrates how co-production empowers survivors to transition into leaders and advocates within their communities. This study, conducted in collaboration with Michigan State University and supported by the Schoenl Family Grant for Dire Needs Overseas, investigates how scalable, participatory intervention models can enhance economic independence, psychological well-being, and social reintegration. Methods include in-depth interviews, thematic analysis, and quantitative surveys to evaluate intervention outcomes and establish best practices. Key findings highlight the transformative potential of co-production in addressing systemic issues, fostering survivor leadership, and creating sustainable interventions. By focusing on measurable indicators such as reduced re-trafficking rates and increased community acceptance, this project offers a replicable framework for global application. The presentation aims to inspire a reimagined approach to policy and non-profit efforts, emphasizing survivor agency and equity i

PERINATAL EXPERIENCES OF LATINX BIRTHING PEOPLE: A QUALITATIVE ANALYSIS
Presenter(s): Alexa Baker
Human Development & Relationships
Mentor(s): Erica Mitchell (College of Social Science), Francesca Pratt (College of Social Science)

Disparities present within the U.S. healthcare system disproportionately impact Latinx birthing people during the perinatal phase. Understanding the prenatal and postnatal experiences of Latinx birthing people through qualitative narrative reports is essential for addressing disparities, informing prenatal programs and highlighting interventions while maintaining cultural relevance. This qualitative study explores the perinatal experiences of 10 self-identified Spanish speaking Hispanic birthing people who had given birth within the past 2 years in the southeast region of the U.S. Data was collected across 2 focus groups in 2023 facilitated by a native Spanish speaker and responses were transcribed in Spanish then translated to English. Participants were recruited through a trusted community partner and were compensated $100 each for their participation. Thematic analysis was used to inductively analyze data related to experiences with pregnancy, childbirth, and postpartum. The goal of this study is to understand Latinx birthing people's perinatal experiences in the U.S. with varying amounts

HOW DOES THE PARENT-CHILD RELATIONSHIP MEDIATE THE RELATIONSHIP BETWEEN PARENT MENTAL WELL-BEING AND CHILD BEHAVIORAL HEALTH?
Presenter(s): Amalia Kouzy, Dylan Distelrath
Human Development & Relationships
Mentor(s): Jiying Ling (College of Nursing)

Understanding parental mental well-being and child behavioral health dynamics is crucial for developing effective family-centered interventions. This study examined how aspects of parent mental well-being-stress, anxiety, and depression-influence child behavioral problems, focusing on the mediating effects of parent-child relationship quality, specifically conflict and closeness. Using data from 154 parent-child dyads, structural equation modeling revealed significant pathways. The caregivers had a mean age of 31.4 years, with 41.6% unemployed and 40.3% earning under $20,000 annually. The preschoolers, with a mean age of 47 months, were predominantly White (72%) and male (49.4%). Higher parent stress was associated with a poorer parent-child relationship, marked by increased conflict ($\beta=0.53$, $p<.001$) and decreased closeness ($\beta=-0.22$, $p=.010$). Child behavioral problems were negatively associated with closeness ($\beta=-0.12$, $p=.024$) and positively associated with conflict ($\beta=0.69$, $p<.001$). Additionally, child social skills were negatively related to conflict ($\beta=-0.348$, $p<.001$) but not significantly correlated with closeness ($\beta=0.29$, $p=.089$). Importantly, conflict emerged as a mediator in the relationship between parental mental well-being and both child behavioral problems ($\beta=0.37$, $p<.001$) and so

RELATIONSHIP BETWEEN PARENTAL HEALTH AND CHILD EMOTIONAL WELL-BEING
Presenter(s): Addison Kamminga, Megan Steeby
Human Development & Relationships
Mentor(s): Jiying Ling (College of Nursing)

Aims: Parental mental health plays a critical role in shaping children's emotional well-being, yet this relationship remains underexplored in families facing socioeconomic adversity. This study examined the association between parental mental health and preschoolers' emotional well-being in families enrolled in Head Start. Methods: Preschoolers (ages 3-5 years old) and their parents were recruited non-randomly from 16 Head Start centers in the Midwestern U.S. Parents completed an online Qualtrics survey assessing sociodemographic characteristics, parents' mental health (perceived stress, anxiety and depression), and preschoolers' emotional wellbeing (positive and negative affect). Data were analyzed using IBM SPSS Statistics 27. Results: The sample was predominantly White, with most parents being mothers. Families showed diversity in income and employment status, with 59% of parents experiencing financial insecurity. Only half had education beyond high school. Correlational analysis revealed positive correlations between parents' perceived stress and their preschoolers' sadness ($r = .38$, $p < .001$), fear ($r = .36$, $p < .001$), and anger ($r = .46$, $p < .001$). Similarly, parents' anxiety and depression were positively correlated with preschoolers' sadness

POLICY SOLUTIONS TO SUPPORT WOMEN IN SKILLED TRADES IN MICHIGAN

Presenter(s): Delaney Cram, Prachurjo Das
Human Development & Relationships
Mentor(s): Heather McCauley (College of Social Science)

In 2024, the Michigan Women's Commission released the Women in the Michigan Workforce Report which emphasized the differences in men and women's participation in various aspects of the Michigan workforce. One of the greatest disparities in workforce participation that this report revealed was in skilled trades. According to the report, only 10 percent of registered apprentices for skilled trades in Michigan are women and the women who are employed in skilled trades are most represented in traditionally pink-collar professions such as healthcare and educational services. This project aims to examine the primary barriers to women in Michigan entering and succeeding in the skilled trades and identify effective policy solutions. These barriers and potential solutions were identified through interviews with women who have experience in registered apprenticeships and participate in the Michigan workforce in skilled trades or as entrepreneurs and business owners. In this project, we identify the main obstacles for Michigan women in the workforce to be a need for reliable childcare, a lack of support and communication, particularly during and after apprenticeships, and the failure of legislation to effectively differentiate the resources available to small businesses compared to large corporations. We rely on the interviews along with our research on the policies implemented by other states to determine policy solutions that will best support women in the Michigan workforce, espec

BIRTH TO AGE 5 INTERNAL STATES' SCOPING REVIEW

Presenter(s): Prisha Patel
Human Development & Relationships
Mentor(s): Claire Vallotton (College of Social Science)

Internal states are thoughts, feelings, and desires we experience in everyday life that shape our behaviors. Children's understanding of their own and others' internal states is the beginning of self-understanding and empathy, and it is socialized starting in early development by the way we talk to children about internal states. However, there is no clear summary of the research on children's own use of internal state talk between birth and age 5, as they develop language skills. Learning about young children's internal state talk will allow researchers to gain an understanding of methods to advance early social, emotional, cognitive, and language development toward more self-compassion and empathy for others. Our project uses a scoping review methodology to identify and compile current scientific studies to understand how and how much young children's internal state talk has been studied. Scoping reviews are a "review of what we already know " (Munn et al., 2022). We worked with a research librarian to develop the scoping review protocol - including key words and phrases, databases, and inclusion criteria - based on a set of vanguard articles that we knew should be part of the review. Our final search strategy identified > 6,100 titles and abstracts; we are currently reviewing them using our inclusion criteria to exclude papers that are unrelated to our study. After excluding irrelevant abstracts, we will review the full text of included articles, then code them to de

DIGITAL INTERVENTION TO SUPPORT SLPS AND FAMILIES IN ENHANCING COMMUNICATION FOR CHILDREN USING AAC
Presenter(s): Casey Reed, Latrell Massey
Human Development & Relationships
Mentor(s): Sarah Douglas (College of Social Science), Sarah Dunkel-Jackson (College of Social Science)

The Family Telepractice Augmentative and Alternative Communication Modeling (FamTAM) project aims to improve communication outcomes by helping SLPs and caregivers with effective modeling strategies for augmentative and alternative communication (AAC) devices. This will be done through remote telepractice sessions, SLPs and caregivers receive training on how to integrate AAC into daily interactions, increasing functional communication skills in children. This project evaluates the effectiveness of the FamTAM approach by analyzing video recordings of SLP-caregiver and caregiver-child interactions before and after structured training interventions. Coding these interactions allows for an assessment of SLP-caregiver and caregiver-child communication.

PAWS AND PRONOUNS: GENDERIZATION OF GENDER-NEUTRAL BOOK CHARACTERS
Presenter(s): Margaret Roney
Human Development & Relationships
Mentor(s): Claire Vallotton (College of Social Science), Holly Brophy-Herb (College of Social Science)

Book-sharing is a common way early childhood educators engage children in the classroom to support development and teach knowledge about the world. Thus, it is important for educators to be aware of implicit messages to children during book-sharing, including gender representations and stereotypes that may be harmful. However, there is little research on gender-neutral book characters, including animals, which are commonly featured in young children's books. This study investigates gender socialization processes in book-sharing with young children by examining the pronouns educators use when referring to gender-neutral characters. We will present study background, methods, results, and discussion. We videotaped and transcribed 100 infant/toddler educators sharing two wordless storybooks featuring gender-neutral animal characters. We coded teachers' references to animals as male, female, neutral, or switching between these - various pronouns used for one character in one sharing. We found that male pronouns were used a total of 250 times across observations, while female pronouns were used 3 times. Male pronouns were predominantly used when educators referred to story protagonists. Educators usually used gender-neutral ways to refer to supporting characters, followed by male pronouns. This study expands awareness of potential biases early childhood educators may have in regard to gender representations

HUMANTIES

MICHIGAN QUILT PROJECT AND THE QUILT INDEX: NEW DIRECTIONS
Presenter(s): Erin Vollertsen
Humanities
Mentor(s): Marsha Macdowell (College of Arts & Letters)

The Quilt Index (QI), www.quiltindex.org, provides a digital space for access to images and data on a physical textile art form. Launched in 2003, QI includes data on nearly 100,000 quilts and quilt-related resources from individuals, guilds, and museums around the world. The QI also includes stories about the individual or individuals who made the quilt as well as the social history of the object. Originally initiated to preserve and make accessible the tens of thousands of records resulting from largely female community scholars/volunteers, the Quilt Index has become a major resource for a variety of trans-national and inter-disciplinary research and educational uses. The Michigan Quilt Project, an ongoing research activity of the Michigan Traditional Arts Program, was one of four pilot projects included in the Quilt Index and over 10,000 Michigan quilts have been documented and included in the Index. Today, new efforts are being made to increase the participation of individuals and institutions in adding their Michigan quilt collections to the Index, thus ensuring that information on this part of the state's material culture history is preserved for future generations.

THE IMPACT OF ADULTIFICATION BIAS ON SELF-IMAGE AND ACADEMIC SUCCESS
Presenter(s): Keyoncee Washington
Humanities
Mentor(s): Margaret McGladrey (University of Kentucky)

Adultification, a societal norm that causes Black children to be perceived and treated as more mature than their peers, can have profound outcomes on the academic success and self-image of Black women in higher education. Black women are often expected to embody strength, resilience, and maturity "beyond their years," resulting in heightened pressure, stress, and feelings of isolation. These expectations may also influence the support afforded to them by their peers, staff, and faculty, thereby negatively impacting their overall success. Although existing research highlights the consequences of adultification for Black women, there remains gaps in research that address how they navigate, counteract or leverage these effects. This study uses data from an online biographical questionnaire of 48 Black women attending or working at the University of Kentucky, with 15 of these participants subsequently participating in four virtual focus groups. Preliminary findings suggest that Black women find supportive relationships with peers, staff, and faculty to be important coping strategies for managing adultification bias in their academic experiences. Although participants shared negative effects of adultification bias, other participants shared positive perceptions of how adultification bias affected their educational trajectories. Future research could involve designing and evaluating mentoring structures that support Black women in intersecting roles a

ASIAN-AMERICAN YOUTH CO-DESIGNING HERITAGE LANGUAGE WORKSHOPS FOR IMMIGRANT FAMILIES: A COMMUNITY-BASED PARTICIPATORY RESEARCH STUDY
Presenter(s): Rachel Zhai
Humanities
Mentor(s): Jungmin Kwon (College of Education)

This paper is part of a larger community-based participatory research (CBPR) project in which three teacher educators and educational researchers collaborated with four Asian American youth to co-design and co-lead workshops aimed at fostering heritage language (HL) learning and maintenance among immigrant children and families. We focus on the perspectives and experiences of the youth participants who grew up maintaining Korean or Chinese as their HL. Specifically, we examine how they view HL learning, reflect on their own HL learning journeys, and draw on their HL knowledge and experiences in co-designing and co-leading the HL workshops. The key findings of this paper include: 1) shared belief and diverse paths in maintaining HL, 2) the HL workshops as spaces to leverage knowledge and expertise, and 3) building a community of HL support to sustain HLs in a predominantly monolingual society.

HUMANITIES MAKE THE WORLD GO ROUND
Presenter(s): Cyteriell Harmon
Humanities
Mentor(s): Michael Ristich (College of Arts & Letters)

As an English major I can honestly say that I have had my fair share of hearing "What are you going to do with that degree?" Whenever I tell someone that I am an English major who is not looking into being an educator, I get weird stares, and I can tell that they think my major is useless. This scenario is something that many people whose majors are based in the arts and humanities face all the time. We are constantly made to feel like our majors aren't as important, and that we cannot find a good, well-paying job following our passions in humanities. This sentiment is not true at all considering that there are many successful people that have majored in humanities and enjoy what they do while making good money. This common misunderstanding is one that continuously makes people who want to pursue majors in the humanities decide against it and in some cases, they end up pursuing a major and career they do not enjoy. Ultimately, I want to help incoming MSU students (and college students in general) who are considering majoring in the humanities be more confident in their choices and know that they can have a successful career while also doing what they aspire to do. I want them to feel like they can make changes and ultimately make the world a better place while pursuing their passions.

THE HARLEM RENAISSANCE AND THE MADWOMAN IN THE ATTIC
Presenter(s): Natalie Liliensiek
Humanities
Mentor(s): Joshua Lam (College of Arts & Letters)

Containing both the sirenic external beauty and internal cunning of Biblical Eve, mental instability and madness in women have been influential in female writing since the Victorian Era. The madwoman-stemming first from male perceptions of female characters-is both evil and angelic, pure and monstrous; However, traditionally the overarching literary narrative has focused on white women and their barriers of gender and sexuality. Within the literary canon, smaller, location based literary movements-for example the Mahjar writers in New York in the early 20th Century, or the Harlem Renaissance in Harlem post World War I-are often highlighted for the unique contexts and ideas that those movements produced. However, they were still inevitably impacted by and responding to broader literary movements and trends. Nella Larsen's 1929 novel Passing particularly exemplifies the influences of these prior literary movements. Within Passing, the characters of Irene and Clare reflect the "angel" and "monster" sub-archetypes of female characters, founded from the "madwoman in the attic" stereotype of the prior century, expanding on Victorian writings around womanhood and agency within the queer and highly racialized environment of Harlem. Their narrative arches and subsequent portrayals frame ideas of agency in women and madness in relation to gender, race, and sexuality as a form of feminist resistance to the white male opp

VOTING BEHAVIOR AND RACIAL AFFINITY: UNRAVELING THE INFLUENCE OF INTERRACIAL RELATIONSHIPS ON ELECTORAL PREFERENCES
Presenter(s): Nel Robinson
Humanities
Mentor(s): John Kuk (College of Social Science), John Waller (College of Social Science)

This research study examines how racial affinity affects voting behavior. Specifically, it looks at how interracial relationships can increase empathy and understanding for people of color, therefore influencing voting decisions. My research expands the discussion into the political sphere by taking inspiration from the seminal study by Jordan, Lajevardi, and Waller (2022), which examined the impact of interpersonal relationships with women of color on racial and gender convictions among Americans. I address the crucial question of whether interracial contact causes more progressive voting habits or if people with progressive ideas are more likely to connect with diverse people in general. I take on the challenge of "reverse causation" head-on. This methodological dilemma highlights the difficulties in claiming that exposure to racial diversity may directly lessen prejudices and improve political unity across racial lines. It is crucial for both academic investigation and real-world understanding. My analytical approach is to define causality in order to shed light on the complex relationship that exists between interracial relationships and political outcomes. By doing this, I intend to further the academic discussion regarding the transformative potential of this relationship and provide insight into how interracial contact affects voting behavior. The project's ultimate goals are twofold: first, to produce a paper that can be submitted to a scholarly publication, thereb

PROTEST FICTION: UNDERSTANDING THE POWER OF LITERATURE IN COMBATTING CLIMATE CHANGE AND ENVIRONMENTAL INJUSTICE
Presenter(s): Sydney Logsdon
Humanities
Mentor(s): Ellen McCallum (College of Arts & Letters)

Too frequently, issues like climate change, ecological degradation, and environmental injustice are characterized in the US by political polarization and apathy. As a result, there is a growing need for alternative forms of scientific communication that convey the urgency and reality of environmental crises to audiences in highly developed Western nations, who have the greatest ecological impacts. This project proposes narratives as the platform to do so by comparing representations of the environment and rebellion in Renee Gladman's The Activist and Italo Calvino's The Baron in the Trees. In doing so, I argue that literature and other forms of cultural media offer a platform for developing and disseminating non-dominant environmental perspectives. This is especially so in speculative fiction, which permits readers to imagine the long-term impacts of (and potential solutions to) social and ecological crises. Environmental fiction becomes a tool for shifting the broader cultural narrative around climate change away from loss and apathy and towards adaptability and agency. This project is a poster adaptation of a senior honors thesis that draws from literature and environmental studies to demonstrate the need for interdisciplinary thinking when addressing large-scale crises.

CREATIVE CRISIS RESPONSES: AN EXAMINATION OF CROSS-TEMPORAL PANDEMIC ART
Presenter(s): Esther Bienek, Kaitlyn Sluder, Natalie Liliensiek
Humanities
Mentor(s): Natalie Phillips (College of Arts & Letters)

This project investigates the relationships between art created during different pandemics across time. Our lab, the Digital Humanities and Literary Cognition Lab (DHLC), has worked to collect 2,000 works of art created during the Covid-19 pandemic, and has been subsequently creating both in-person exhibitions across the country and an accessible online archive to showcase these works. The future of the project looks to compare themes from the art created during the Covid-19 pandemic to other pandemics and epidemics going back centuries: historical art created from the Bubonic plague and the Spanish flu, as well as artifacts like the AIDS quilt and musical responses to the Ebola epidemic. Pandemics create social practices and challenges that recur, with ever-shifting historical tools for management, communication, and recording. Those in the Bubonic plagues of the Middle ages and seventeenth century, along with the Spanish flu, used physical mediums to document pandemics; however, it has proved harder to preserve those experiences. Contemporary technology allows alternate methods to record this information and provides better access to these creative experiences. This project has aimed to historicize creative artifacts from the Covid-19 pandemic by providing crucial information about the conditions that shaped community and social cha

MISGENDERING AND PASSING IN RELATION TO GENDER AND RACE FOR TRANSGENDER AND NONBINARY PEOPLE
Presenter(s): Jameson Prahler
Humanities
Mentor(s): Jae Puckett (College of Social Science), Kye Campbell-Fox (College of Social Science)

Gender norms are inherently tied to eurocentric standards and, as such, people of color can be held to gender norms that do not align with their own cultures. We examined how experiences of misgendering and perceptions of passing may differ across intersections of race and gender for transgender and nonbinary (TNB) people ($N = 854$ TNB adults, average age = 35, 60.9% white). According to an ANOVA, there were significant differences between the groups in relation to misgendering, $F(7, 790) = 22.80$, $p < .001$, and perceptions of passing $F(7, 788) = 6.59$, $p < .001$. Post hoc analyses showed that nonbinary people, regardless of their race or sex assigned at birth, tended to report higher levels of misgendering than transgender men and women who were white and those who were people of color. In addition, transgender women (white and people of color) were less likely to perceive themselves as passing compared to white transgender men. White transgender women were less likely to perceive themselves as passing compared to transgender men of color. These findings are possibly due to the general populace having a largely binary understanding of gender. As such, people who do not identify in a binary way, such as nonbinary people, likely experienc

INVESTIGATING PROSECUTORIAL MISCONDUCT: EXAMINING SYSTEMIC FAILURES AND ACCOUNTABILITY MEASURES
Presenter(s): Alex Guo
Humanities
Mentor(s): Michael Ristich (College of Arts & Letters)

Prosecutorial misconduct undermines the integrity of the judicial system, leading to wrongful convictions, diminished public trust, and systemic inequities. This poster explores the various forms of prosecutorial misconduct, including withholding exculpatory evidence, coercing false testimony, and engaging in prejudicial courtroom behavior. By analyzing court cases, statistical trends, and institutional barriers to accountability, this study highlights the structural deficiencies that enable prosecutorial misconduct to persist. Furthermore, it examines the effectiveness of current oversight mechanisms, such as judicial sanctions, bar disciplinary actions, and conviction integrity units. The poster argues for stronger regulatory frameworks, increased transparency, and policy reforms to ensure prosecutorial accountability and safeguard defendants' rights.

IRAQI PORTRAYAL OF SUFFERING: HISTORY AS TOLD THROUGH THE ARTS
Presenter(s): Fatimah Alkashwani
Humanities
Mentor(s): Ayman Mohamed (College of Arts & Letters)

Once a civilization known for its advancements in the sciences and arts, Iraq is now known by the world as a war-torn nation. Starting from the time Saddam Hussein presided as leader until now, Iraq has been involved in countless wars, the deadliest of which has an estimated range of just over 100,000 to around 1,000,000 casualties (Iraq War, 2003-2011). Naturally, many have suffered and experienced unexplainable traumas as a result. Among the coping mechanisms used by those who are traumatized, art is one of them. With this in mind, I will be looking at how Iraqis and the Iraqi diaspora portray their experiences through written and audiovisual media, namely Dreaming of Baghdad by Haifa Zangana and Mission of Destruction by Dia Al-Azzawi. Along with examining the historical context of each piece, I will analyze how Zangana and Azzawi decided to portray their suffering and how that translates into the story being told. Ultimately, the aim of this project is to bring light to the aspects of Iraqi suffering that may have been overlooked due to orientalist/stereotypical media and to determine how successful art is as a method of recording and preserving history.

CRASHING THE CAPITAL: EDUCATING ABOUT THE HISTORY OF PUNK CULTURE IN LANSING
Presenter(s): Brayden Chrisman
Humanities
Mentor(s): David McCarthy (Residential College in Arts & Humanities)

Starting in the late 1970s, Lansing, Michigan and the surrounding capital area fostered a vibrant underground punk scene. However, despite achieving nationally recognized heights in the early 80s, this key piece of the community's cultural past and present is scarcely included in modern conversations about local history. To close this gap in collective memory, I created a project, "Crashing the Capital: The History of Punk Rock in Lansing", which sought to educate the local public on how DIY punk expression reshaped our community's identity. Crashing the Capital's flagship product was an event hosted at The Fledge in collaboration with CADL Local History, MSU Special Collections, the MSU ALLC, and the MSU Honors College on February 28th of this year. It featured an open gallery walk to see archives of fliers, zines, and concert footage from the time; a panel discussion with musicians, zine makers, and venue owners from the 80s and 90s; and modern-day punk bands recreating a show one could have seen at the height of the 80s scene. Through our work, we sought to create a space for multigenerational connection between past and present members of the Lansing punk subculture, and to enable the preservation of oral history from a scene that was in many ways ephemeral. My presentation will reflect on the importance of multigenerational contact and knowledge exchange for DIY art movements as demonstrated by Crashing the Capital, and consider what lessons Crashing the Capital provi

A CHRONOLOGY OF CONTROVERSIAL COMICS: REPRESENTATIONS OF QUEER DESIRE AMIDST AMERICAN COMIC CENSORSHIP IN THE TWENTIETH CENTURY
Presenter(s): Carter Brown, Lorraine Inman, Sydney Logsdon
Humanities
Mentor(s): Julian Chambliss (College of Arts & Letters)

This presentation discusses a new project from the Digital Humanities and Literary Cognition Lab that explores Michigan State University's comic book collection, the largest public collection of its kind in the world. Through the metadata listed in this database, we analyze the historical context of the creation of the Comics Code Authority (CCA), and its effects on the content and reach of taboo comics. In particular, we explore representations of queer desire in American comics over time and how they were affected by the CCA and shifting sexual politics of the twentieth century. Initially, we chart the trends in content preceding the implementation of the code, then, we observe the effectiveness of the code across the country, with state by state breakdowns of data trends and enforcement of the CCA. Finally, we look to the dissolution of the code, and the effects it had on queer identity and expression in comics. The implementation and effects of the CCA can be compared to the targeted suppression of queer art, expression, and identity throughout history. By bringing this data to light, we observe historical persecution of marginalized sexual identities in a mass medium reflective of the cultural zeitgeist. Pop culture is reflective of general cultural ideas, and censorship of pop culture may be reflective of mass cultural persecution. Through the interdisciplinary analysis of this data, incorporating both digital humanities methods of visualization and sociopolitical ex

ALL EYES ON YOU SPELL
Presenter(s): Aidan Morris, Eveline Wells, Ha Anh Do, Niki Yang, Xzandria Lambert
Humanities
Mentor(s): David Watson (College of Arts & Letters)

Since pre-Christian times, meanings have been imbued into symbols, pictures, and seemingly frivolous actions in order to serve a specific purpose for a culture, community, or individual. In an effort to understand and preserve old European systems of magic (the redirection of the world's energy), we created our very own magic spell with the goal to garner attention to the subject. Dubbed "All eyes on you", our charm incorporates knowledge on various areas of magic in order to amplify the subject's presence and centralize all the surrounding beings' focus onto them, and thus all eyes in the premises will be cast upon them. The main methodology behind our spellwork is celestial magic-the idea that certain planetary bodies have associations with different attributes which can be harnessed to accomplish a variety of goals. The celestial and ceremonial elements incorporated into our spell include a focus on specific stars and their subsequent meanings, ritualistic practices with the intent of fostering connection, and upholding traditions of magic. This includes the ideas of numerology, sigils, and oral invocations, which are all specially adapted to fit into the ceremonial context of our spell. These components all intertwine to create our contemporary and innovative spell that carries out both our intentionality and that of the subject. The enchantment is meant to be an overall lighthearted experience for everyon

INTEGRATIVE & ORGANISMAL BIOLOGY

EFFECT OF A DISTURBED ENVIRONMENT ON PERCH HEIGHT AND HABITAT CHARACTERISTICS OF D. MICROCEPHALUS
Presenter(s): Mallory Bergmann
Integrative & Organismal Biology
Mentor(s): J.P. Lawrence (Lyman Briggs College)

Dendropsophus microcephalus, commonly known as the Small-headed Treefrog, is a small amphibian species characterized by its size (27-32 mm), round short snout, and flat head shape (Bolívar-G et al., 2009). The frog displays nocturnal colors of light yellow with brown or tan markings, shifting to tan-yellow or light brown with darker markings during daylight hours (Fonseca-Pérez et al., 2017). Male D. microcephalus are primarily vocal on vegetation up to 30 cm above shallow water, particularly active during the rainy season and following heavy rains (Tárano, 2011). Global literature identifies habitat alteration as a major driver of amphibian population declines (Gardner et al., 2007). Despite its resilience, D. microcephalus is known to inhabit disturbed areas (Bolívar-G et al., 2009). This study focuses on D. microcephalus in Gamboa, Panamá, examining human impact on habitat (proximity to roads), perch height, and leaf size. Results indicate a negative correlation between perch height and distance from roads, suggesting lower perching vegetation as proximity to roads increases. Conversely, there is a positive correlation between leaf size and distance from roads, indicating increased vegetation availability away from roads, potentially beneficial for mating and habitat purposes.

COMPARATIVE ANALYSIS OF ROUND GOBY (NEOGOBIUS MELANOSTOMUS) SIZE DISTRIBUTION INFREQUENCY IN NATIVE PREDATOR STOMACHS ACROSS LAKE MICHIGAN AND LAKE HURON, 2017-2023
Presenter(s): Rachel Baja
Integrative & Organismal Biology
Mentor(s): Brian Roth (College of Agriculture & Natural Resources), Elvita Eglite (College of Agriculture & Natural Resources), Makenzie Smith (College of Agriculture & Natural Resources)

Over recent decades, Lakes Michigan and Huron have undergone significant alterations in predator-prey dynamics, including the introduction of Round Goby. These changes resulted in reduced lake productivity and preyfish availability for predatory fishes. One of the most striking changes was the Alewife (Alosa pseudoharengus) collapse in Lake Huron in 2003, which forced predators to switch to alternative prey. While previous studies have largely focused on Alewife to determine the sustainability of predator populations, new shifts in predator-prey systems highlight the need to examine the size distribution of emerging preyfish to asses predator foraging conditions. Here, we analyzed fisheries-independent surveys and angler tournament fish stomach samples in collaboration with state, federal, and tribal agencies, focusing on Round Goby size distribution in the stomachs of 3,034 Lake Trout (Salvelinus namaycush) and 294 Walleye (Sander vitreus) from 2017-2023. Our data revealed that prey fish size varied across: (1) lakes, (2) regions, and (3) years. Despite some annual variation, Round Goby consumed by both species were on average 30 mm larger in Lake Michigan compared to Lake Huron, with more pronounced regional size differences in Lake Michigan. Cross-lake differences in Round Goby sizes may be associated

EXPLORING SEASONAL VARIATION IN GENETIC POPULATION STRUCTURE OF LAKE TROUT IN LAKE SUPERIOR
Presenter(s): Lucille Wilson
Integrative & Organismal Biology
Mentor(s): Emily Bardwell-Patino (College of Natural Science)

Lake trout (Salvelinus namaycush) are one of only 2 trout species native to Lake Superior. After their population dropped to an extreme low in the mid-1900s, collaborative recovery efforts have restored self-sustaining populations throughout most of the lake. Although lake trout population abundance has increased, more insight is needed into the population structure and genetic diversity of this species. Further, it is not well understood how lake trout genetic population structure changes throughout spawning and non-spawning seasons. Individuals are presumed to return to their native spawning reefs during the fall spawning season due to spawning site fidelity. They may be more dispersed outside of the spawning season, but genetic insight is needed to explore these patterns. This study aims to investigate how lake trout dynamics vary by season by comparing genetic population structure during and outside of spawning season. We will conduct restriction-site associated DNA sequencing on around 2500 wild lake trout individuals caught in the fall and spring. With this data, we will perform population structure analyses to explore if the population structure of lake trout changes based on the season. We may gain insight into how populations disperse among spawning reefs, and how this impacts genetic population structure. The critical genetic information gathered in this study will in

SURVIVAL AND GROWTH OF EDN2A AND EDN2B MUTANTS
Presenter(s): Jacob Gray
Integrative & Organismal Biology
Mentor(s): Julia Ganz (College of Natural Science)

The endothelin system is important for regulatory processes in the cardiovascular and pulmonary system and development of the vertebrate-specific neural crest cell population. In most vertebrates there are three different Endothelin (Edn) ligands, Edn1, Edn2, and Edn3. Zebrafish, as teleost fish, have undergone a whole-genome duplication, the teleost genome duplication. Thus, in zebrafish there are for example two edn2 genes, edn2a and edn2b. In mouse and human, EDN2 is expressed in different tissues, including ovarian and intestinal epithelial cells. Edn2 mouse mutants show growth defects. Yet, the role of edn2 has not been tested in zebrafish and it remains unclear if edn2a and edn2b have the same or different functions during zebrafish development. In this project, I am testing the working hypothesis that edn2a and edn2b affect growth and survival of zebrafish larvae. Using established edn2a and edn2b mutants, I am currently measuring growth and survival in 5 day and 14 day-old zebrafish. By modeling this gene in zebrafish, we can better understand the function this gene has during development.

A TEST OF THE RISK ALLOCATION HYPOTHESIS IN CENTRAL AMERICAN AGOUTIS IN GAMBOA, PANAMA
Presenter(s): Kayla Mizell
Integrative & Organismal Biology
Mentor(s): J.P. Lawrence (Lyman Briggs College)

The Central American agouti is a large neotropical rodent that spends much of its time foraging, grooming, resting, or vigilant (Smythe, 1978). Although these behaviors are common, precisely when they are performed throughout the day may be influenced by factors such as predation (Suselbeek et al., 2014). Agoutis are commonly preyed upon by carnivores such as ocelots and jaguars, who are most active from dusk to dawn (Suselbeek et al., 2014). According to the risk allocation hypothesis, such temporal variation in predation risk can influence how animals allocate common behaviors throughout the day (Van Buskirk et al., 2002). This study aims to determine if agoutis in Gamboa, Panama, allocate certain common behaviors to the morning, afternoon, or evening in response to temporal variation in predation risk. The risk allocation hypothesis predicts that agoutis will be more vigilant in the morning and evening when the predation risk is higher. Similarly, it predicts that agoutis will forage, groom, and rest more in the afternoon when the predation risk is lower. Agoutis in Gamboa, Panama, were observed in the morning, afternoon, and evening, and the duration of time individuals spent displaying the four behaviors of interest was recorded. ANOVA testing revealed that the amount of time agoutis spent displaying each behavior did not differ significantly throughout the day. Although inconsistent with previous studies

ASSESSING THE INFLUENCE OF BENTHIC MACROINVERTEBRATE DIVERSITY ON INVASIVE PROCAMBARUS CLARKII HOME RANGE SELECTION

Presenter(s): Evan Wahmhoff
Integrative & Organismal Biology
Mentor(s): Brian Roth (College of Agriculture & Natural Resources), Mackenzie Thompson (College of Agriculture & Natural Resources), Sarah Walker (College of Agriculture & Natural Resources)

The red swamp crayfish (Procambarus clarkii) is a pervasive invasive species that drastically alters aquatic ecosystems. In this study, we investigate the relationship between red swamp crayfish home ranges and the diversity of benthic macroinvertebrates, a crucial food source for many aquatic organisms. Red swamp crayfish are voracious predators and burrowers, and directly affect benthic macroinvertebrate populations through predation and habitat disruption. We hypothesized that red swamp crayfish home ranges would center near areas of high benthic macroinvertebrate density due to increased food availability. We conducted radio telemetry and collected benthic invertebrates from four Southeast Michigan retention ponds with established red swamp crayfish populations from June-August 2022. At each pond, we used radio telemetry to track crayfish locations daily. We also collected monthly macroinvertebrate samples at five randomized locations per pond using ponar grabs and dipnets. From this data, we calculated Shannon's diversity and richness for each macroinvertebrate sample point. We then determined crayfish home range centers in ArcGIS, and calculated the distance between each of these centers and each macroinvertebrate sample location. Contrary to our hypothesis, our results demonstrated a significant positive relationship between the distance from crayfish home range centers

CERRO PUNTA'S MULTI-SPECIES HUMMINGBIRD POPULATION'S ARTIFICIAL FEEDER-ASSOCIATED BEHAVIOR

Presenter(s): Marieke Anderson
Integrative & Organismal Biology
Mentor(s): J.P. Lawrence (Lyman Briggs College)

Bird feeders are a well-known global staple, but, despite their prevalence, there are many issues surrounding bird feeders: this is especially true of hummingbird feeders. Given the difficulties of feeder upkeep and the potential for altering behavior, it is important to question if hummingbird feeders are worth the risks and resources. Through ethogram-based observational assessment of the behaviors of five hummingbird species in Cerro Punta, Panama; interspecies interactions and feeder-proximity behavior can be accessed. By researching behavior at artificial feeders, a stronger argument can be

posed based on species-level behavioral patterns. Through better knowing hummingbird feeding behaviors, researchers could go on to better assess the viability of hummingbird feeder use as it pertains to hummingbird and local ecosystem health. Furthermore, some species of hummingbird are territorial, which is another behavioral aspect to consider at sites that promote interspecies interactions. Key environmental factors on behavior considered include elevation of hummingbird feeders (first-floor versus second-floor), quantity of nearby feeders (one versus three), prevalence of humans (moderate, reduced, consistent, or fluctuating), as well as sex (male, female, unknown), quantity, and species (lesser violetear, talamanca, violet sabrewing, white-tailed emerald, white-throated mountain-gem) of the present individuals.

CAN HIGHLY INVASIVE MUSSELS ACT AS VECTORS OR BIOINDICATORS OF THE MYXOZOAN PARASITE T. BRYOSALMONAE IN MICHIGAN?
Presenter(s): Suhaylah Ahmad Ali
Integrative & Organismal Biology
Mentor(s): Bartolomeo Gorgoglione (College of Veterinary Medicine), Cahya Fusianto (College of Veterinary Medicine)

The Great Lakes basin has been invaded by Zebra Mussels (Dreissena polymorpha) and Quagga Mussels (Dreissena bugensis). They reproduce fast, becoming widespread across large and small lakes and rivers in North America, and are known to be bio accumulators of potentially harmful pathogens to people and animals. Another harmful organism, the myxozoan parasite Tetracapsuloides bryosalmonae (Malacosporea), acts a two-host life cycle, in which under suitable temperature, environmental, and host susceptibility conditions, may induce Proliferative Kidney Disease (PKD) in salmonids. They infect freshwater bryozoan species, moss filter-feeding organisms widespread in freshwater ecosystems, before releasing waterborne malacospores that can be infectious to susceptible fishes. With the confirmed presence of T. bryosalmonae in several salmonid species and bryozoans across the Great Lakes region, it is concerning that invasive mussels were often found sharing the same substrates with bryozoans. Zebra and Quagga mussels were collected from rivers and lakes around Michigan, to investigate if they can act as vectors or hosts for T. bryosalmonae . Tissue samples are screened for T. bryosalmonae by PCR, followed by histological

USING TRAINABLE WEKA SEGMENTATION IN FIJI TO ANALYZE THE EFFECTS OF DOSE-DEPENDENT DISRUPTION OF SIGNAL TRANSDUCTION PATHWAYS ON NEURITE ELONGATION.
Presenter(s): Lorenzo Thrasher, Maya Viers
Integrative & Organismal Biology
Mentor(s): Kyle Miller (College of Natural Science)

Understanding the mechanisms by which neurons grow is essential to the development of treatments to repair damage to the human nervous system. A common technique to understand such mechanisms is measuring in vitro neurite outgrowth following the manipulation of signal transduction pathways that affect neurite elongation. Although effective, past methods of neurite measurement have primarily been performed manually, which can be impractical when considering large data sets. This paper introduces an semi-automated strategy to measure the length of neurites. This process is executed using machine learning via Trainable WEKA Segmentation (TWS) in FIJI. To assess the utility of this strategy, still images were taken of cultured chick forebrain neurons that were experimentally treated with the Rac/cdc42-inhibitor MBQ-167, which inhibits signaling pathways essential to axonal elongation. A ground truth of total neurite outgrowth within each condition was established through the manual measurement of neurites. Through regression and Dunnett's 1-way ANOVA, the reliability of this machine learning-based technique was affirmed. The advantages of this method lie in its efficiency and repeatability relative to the manual tracing of neurites to produce quantitative results pertaining to neurite outgrowth across a dataset. This approach is also simple to use compared to other aut

ASSESSING SPATIAL AND TEMPORAL VARIATION IN MORPHOLOGY OF A SALAMANDER (PLETHODON CINEREUS)

Presenter(s): Lucas Badiner
Integrative & Organismal Biology
Mentor(s): Louise Mead (College of Natural Science)

Global climate change and increasing mean annual temperatures are expected to disrupt current ecosystems, and species in turn, need to respond effectively to these changing environmental conditions. Amphibians are especially vulnerable to these environmental changes due to their reliance on moisture levels and water availability. Studies such as Caruso et al. (2014), have indicated that increased mean temperatures are associated with reductions in body size of adult salamanders. Hantak et al. (2021) observed reductions in body size of the Eastern Red-Backed Salamander Plethodon cinereus in response to increasing mean annual temperatures. However, body size reduction in Plethodon cinereus has not been measured in western populations of the species. Plethodon cinereus , is a small, terrestrial, lungless salamander belonging to the family Plethodontidae,that is native to much of the eastern seaboard and eastern deciduous forests of North America. Plethodon cinereus inhabits a wide variety of forest types and are often the most abundant salamander found throughout their range. Plethodon cinereus is a critical species for nutrient cyc

NR3C1 GENE FOUND BY PCR LINKS STRESS RESPONSE TO TRIER STRESS TEST IN HUMANS AND AUDIO PLAYBACK IN CANADIAN GEESE

Presenter(s): Jessica Rowe
Integrative & Organismal Biology
Mentor(s): Douglas Luckie (Lyman Briggs College)

The purpose of this study was to examine homologous behaviors and genes evolutionarily shared between avians and humans. Humans (Homo sapiens) and Canadian geese (Branta canadensis) were selected for the evaluation of stress responses, and the glucocorticoid receptor gene (NR3C1) was tested via PCR. The study explored whether avians and humans share conserved stress behaviors and NR3C1 alleles by using PCR to identify conserved DNA sequences. Canadian geese' stress responses were observed using playback as done by Deecke et al. in their 2002 Nature paper. A homologous study of human subjects was done using the Trier Social Stress Test from Pereria et al., 2020, to observe stress response, focusing on behavioral for geese and cardiovascular for humans. Several control studies were conducted, including playback of mallard duck vocalizations (negative control) and fireworks sound (positive control) for geese and monitoring of resting heart rate (negative control) and forest ambiance playback (positive control) for humans. For PCR, DNA oligonucleotide primers found by El-Refaey et al. in 2021 were used to confirm the presence of the NRC31 gene in human genomic samples, and the human primers are planned to be applied to purified goose DNA to seek out homologous alleles of NR3C1. Geese displayed behavioral responses to stressors, and humans exhibited cardiovascular changes, supporting the hypothesis that stress responses correlate with NR3C1 activity. However, further investigat

USING SPOTTED GAR AND GENE MANIPULATION IN ZEBRAFISH TO UNDERSTAND NERVOUS SYSTEM EVOLUTION IN TELEOST FISHES

Presenter(s): Grace Urban

Integrative & Organismal Biology

Mentor(s): Ingo Braasch (College of Natural Science), Jamily Ramos De Lima (College of Natural Science), Julia Ganz (College of Natural Science)

A whole-genome duplication (WGD) event leads to a full duplication or polyploidization of an organism's genome. Throughout evolution, the bony vertebrate lineage has undergone two WGDs. Additionally, lineage-specific WGDs are also observed such as in the ancestor of the teleost fishes (Teleost Genome Duplication, TGD), the most species-rich group of vertebrates. WGD-derived extra copies of genetic elements have been proposed to provide the raw material that can seed evolutionary and developmental innovations, adaptation, and speciation, for example in the vertebrate nervous and sensory systems. Genome-wide, around 80% of the extra gene copies from the TGD have been lost (non-functionalization) in teleosts during their rediploidization process. However, for those genes that have been retained as duplicates, regulatory changes or coding mutations may generate complementary expression patterns and/or protein functions among duplicates (sub-functionalization); and/or gene duplicates may acquire new expression patterns and/or protein functions (neo-functionalization). Yet, the extent of sub- and neofunctionalization following the TGD remains poorly understood. Therefore, my research training aims to use the closest living outgroup of the teleosts, the non-teleost fish spotted gar (Lepisosteus oculatus) as an outgroup for comparative analysis of gene expression to the teleost model o

DETERMINING THE CONSPICUOUSNESS OF LEG FLAGS IN MATADOR BUGS (ANISOSCELIS ALIPES)

Presenter(s): Larkin Dulaney

Integrative & Organismal Biology

Mentor(s): J.P. Lawrence (Lyman Briggs College)

Many animals utilize color in a variety of ways, yet how these colors are perceived by predators is not entirely understood in some notably conspicuous species. One such species is the Matador Bug, Anisoscelis alipes , of Central and South America, which has enlarged colorful femoral flags whose purpose is not currently known. By analyzing in situ photographs of Matador Bugs with Quantitative Color and Pattern Analysis (QCPA), we assessed the conspicuousness of Matador Bug leg flags when viewed by potential predators, thus testing the hypothesis that these flags serve as a signal to predators. We utilized QCPA to view the insects and their surroundings through the simulated vision of the Eurasian Blue Tit, Cyanistes caeruleus , and Fringed Jumping Spider, Portia fimbriata , to mimic that of their related natural predators. By comparing the long, medium, and short wavelength sensitivities of these predators to the insects' leg flags and bodies within their environments, we examined whether predators could perceive these insects.

NITROGEN AND CARBON STABLE ISOTOPE ANALYSIS OF BLACK BEAR HAIRS

Presenter(s): Collin Sauter

Integrative & Organismal Biology

Mentor(s): Hasand Gandhi (College of Natural Science), James Moran (College of Natural Science)

Stable isotope ratios of $\delta 13C$ and $\delta 15N$ have been widely used for estimating an organism's dietary consumption. This project seeks to develop a method for laser ablation isotope ratio mass spectrometry (LA-IRMS) that can perform simultaneous $\delta 13C$ and $\delta 15N$ measurements on samples of black bear hairs and tooth cross sections. These spatially resolved measurements can then be used to track the change in a bear's diet over the course of time (hair tracking short term changes and teeth representing yearly changes). δ13C measurements, have already been successfully performed on both hair and tooth samples, with a maximum spatial resolution of 25um; however, δ15N measurements have not achieved an adequate signal to background ratio. The hair samples were collected from captive black bears who were fed a controlled diet which alternated between corn, trail mix, and meat. These food samples were measured for δ13C using elemental analyzer IRMS, and as expected, the isotopic composition of the hair samples changed significantly along their lengths, approaching -- but never reaching -- the isotopic values of the food samples. This demonstrates the potential for LA-IRMS in tracking changes of an organism's dietary consumption; however, more work is n

RELIABILITY OF VISITOR COLLECTED DATA IN ZOO SETTINGS
Presenter(s): Aaron Guggenheimer
Integrative & Organismal Biology
Mentor(s): Eila Roberts (College of Natural Science)

Zookeepers want to have a full picture of the behaviors of the animals in their care to ensure positive welfare. Similarly, zoo goers frequently want to know when animals tend to perform their behaviors so that they can plan their visits accordingly. In a perfect world there would be an abundance of time and trained researchers to track and share this information with interested parties. However, these are often in short supply. Here, we set out to see if engaging zoo visitors themselves in observations towards these goals will yield reliable and useful data. To accomplish this, we gathered dense observational data on North American river otters and cotton-top tamarins at Potter Park Zoo to determine their patterns of activity and space use. We simultaneously provided visitor surveys on these same measures to test the reliability of visitor-collected data on these patterns. With this information, we sought to answer the following questions: 1) When are these animals visible? 2) When they are visible, where are they? 3) When they are visible, what behaviors are observed? 4) Do the observations of visitors match ours? By answering these questions, we hope to help zookeepers improve the welfare of the animals in their care and determine if visitor observations are reliable enough to use as information for promoting animal welfare.

CHARACTERIZATION OF ENTERIC NERVOUS SYSTEM DEVELOPMENT IN SPOTTED GAR (LEPISOSTEUS OCULATUS)
Presenter(s): Isabella Rinaldi
Integrative & Organismal Biology
Mentor(s): Brooke Jeffery (College of Natural Science), Ingo Braasch (College of Natural Science), Julia Ganz (College of Natural Science)

The enteric nervous system (ENS) provides the intrinsic innervation to the gastrointestinal tract. Because of its central role in controlling gut function, identifying the genetic basis of ENS development is important for understanding its role in gastrointestinal diseases. The zebrafish (Danio rerio) model system has been crucial in understanding the genetic basis underlying ENS development, as gene regulatory networks governing developmental processes are often shared across the vertebrate lineage. Recent work has identified the spotted gar (Lepisosteus oculatus), a non-teleost fish, as a bridge between the teleost zebrafish and humans if genetic elements cannot be linked between zebrafish and humans. To use gar as a bridge species, we aimed to characterize ENS development in spotted gar. I first performed whole-mount immunohistochemistry between stages 25 and 34 of gar development using the pan-neuronal markers Elavl and acetylated-α-Tubulin (α-Tub) to determine when ENS neurons differentiate. Elavl and α-Tub were detected in enteric neuronal cell bodies and nerve fibers respectively at stages 32-33 and 33-34 but not at stages 25-30. This suggests that ENS neurons differentiate at the beginning of stage stages 31-32. To identify neuronal subtypes, I am currently performin

EXAMINING THE GENETIC EFFECTS OF HYBRIDIZATION: IMPLICATIONS OF SPLAKE (SALVELINUS FONTINALIS X SALVELINUS NAMAYCUSH) INTROGRESSION INTO NATIVE TROUT POPULATIONS

Presenter(s): Grant Bruninga
Integrative & Organismal Biology
Mentor(s): Ben Kline (College of Natural Science), Mariah Meek (College of Natural Science)

Many Great Lakes fish species, such as brook trout (Salvelinus fontinalis) and lake trout (Salvelinus namaycush), have experienced declines in population abundance in response to climate change and the introduction of non-native species. While lake trout have recently been designated as recovered, brook trout continue to decline across the Great Lakes region and face threats to population persistence. One of these threats is the stocking of splake, an anthropogenic hybrid of brook trout and lake trout (Salvelinus fontinalis x Salvelinus namaycush). Splake have been stocked into Lake Superior since the 1970s to provide recreational fishing opportunities amidst declining native trout populations. However, through interbreeding, splake can diminish genetic advantages of wild trout through the introduction of maladaptive genetic variation. Therefore, introgression of splake alleles into wild trout populations could reduce their resilience, especially in an era of environmental change. Previous hatchery crosses of brook trout, lake trout, and splake suggest differential offspring survival depending on the maternal parent species. However, the genomic contribution of these three parent species to th

PLANTING FOR POLLINATORS: USING NATIVE SPECIES TO ENHANCE THE POLLINATOR GARDEN

Presenter(s): Loren Campbell
Integrative & Organismal Biology
Mentor(s): Alan Prather (University Arts & Collections), Carolyn Miller (University Arts & Collections)

Native pollinators have been dealing with a decline from habitat loss, pesticides, climate change and many other problems. To help native pollinators combat these issues, we added a pollinator garden to Beal Botanical Garden in 2022, with the goal of attracting a large and diverse population of native pollinators using native plants. To optimize the native pollinators that visit our garden, we surveyed the pollinators that visited each species of plant. We have collected data for two years. During our second season of collecting data we were able to see data from new plants, optimise our survey taking and get better results for the future. New plants include Monarda fistulosa and Helianthus giganteus. Plants like Erigeron pulchellus and Symphyotrichum novae-angliae saw an increase in pollinators from the first season. Some plants have consistently attracted a low number of pollinators, for the past two years, like Phlox pilosa and Sisyrinchium angustifolium. Along with data collected in the Pollinator Garden, we are also using plants we have observed in other parts of Beal Botanical Garden to improve the Pollinator Garden in years to come. The data collected will be used to see what we have attracted and how we can expand our pollinator attraction. Outside of the pollinator garden, plants like Claytonia virginica and Amorpha canescens have been observed attracting numerous native pollinators.. There is a planned expansion happening to the Pollinator Garden where Claytonia

NORTH AMERICAN AVIAN RESPONSES TO GLOBAL CHANGE: EFFECTS OF NEGATIVE INTERSPECIES INTERACTIONS ON POPULATION TRENDS
Presenter(s): India Hirschowitz
Integrative & Organismal Biology
Mentor(s): Phoebe Zarnetske (College of Natural Science)

Global changes, including climate change, land use change, and invasive species, have been identified as driving forces for shifts in avian species' ranges and migration patterns. However, the impact of changing ranges on interspecies interactions remains understudied. Key to filling this gap is creating comprehensive data on species interaction networks, across large geographic regions and multiple species. We created the Avian Interaction Database for bird-bird interactions across North America, which contains over 26,000 pairwise interactions. With these data, we identify pairs of native and non-native species that interact in different ways (e.g., competition, predation, mutualism). For these pairs, we use regression to quantify the relationships between their range shifts, and between their population trends, using additional data from the North American Breeding Birds Survey and eBird. We identify species whose populations are declining, species who may benefit from global changes, as well as the types of interactions that align with these changes. Preliminary results suggest that range expansion has led to an increase in negative interspecific interactions (e.g., competition, predation). This study emphasizes the importance of open-access data for research and conservation, and provides insights about how species interactions affect species' distributions. The results will help identify species

WARMING SPRINGS PRODUCE SMALLER DRAGONFLIES
Presenter(s): Abigail Cattermole
Integrative & Organismal Biology
Mentor(s): Alisha Shah (College of Natural Science)

In the past century, global temperatures have been increasing at alarming rates. One effect of warming temperatures can be the decrease in body size of ectotherms. Smaller body sizes may reduce overall fitness, affecting the persistence of populations and species. While temperature is expected to reduce body sizes at maturity, all ectotherms do not respond to warming in this way. Here, we examined museum specimens collected over the past century in Michigan to determine if the body size of Plathemis lydia, the common white-tail dragonfly, has been impacted by warming temperatures. We scanned 246 individuals and measured their head, thorax and abdomen length to calculate the total body size of each specimen. We then used historic climate data to determine if temperature had an impact on the body size of Plathemis lydia. First, we found that increases in average Michigan temperatures were strongly correlated with decreasing body length of male and female dragonflies. We then looked separately at effects of spring and fall temperatures on body size and found that males and females both decrease in body size as average spring temperatures increase. On the other hand, the fall prior to emergence had no effect on the body size of dragonflies. Further research across multiple dragonfly species is needed to fully understand the extent of this relationship and how many species are impacted.

ANGIOTENSIN-II MODULATES ADIPONECTIN SECRETION IN THE DIFFERENT ANATOMICAL LOCATIONS OF THORACIC PERIVASCULAR ADIPOSE TISSUE.

Presenter(s): Alyssa Shadowens
Integrative & Organismal Biology
Mentor(s): Andres Contreras (College of Veterinary Medicine), Javier Rendon Mora (College of Veterinary Medicine), Miguel Chirivi Gonzalez (College of Veterinary Medicine)

Hypertension (HTN) is the most common cardiovascular disease and a major global cause of death. HTN alters the vessel structure, including perivascular adipose tissue (PVAT), resulting in a loss of its vasoactive properties. However, the mechanisms remain unclear. Aortic PVAT (aPVAT) is distributed in three regions: anterior (aaPVAT) and two laterals (laPVAT). PVAT is primarily composed of adipocytes, with laPVAT accumulating more of these cells than aaPVAT. The populations of these cells are maintained by adipogenesis of Adipocyte progenitor cells (APCs). APCs in aPVAT regions have distinct embryonic origins, but their functional differences are unknown. A healthy population of PVAT adipocytes is required as these cells secrete adiponectin, a vasorelaxant hormone. This study examined the effect of angiotensin-II (Ang-II), a HTN inducer agent, on aPVAT-resident APCs adiponectin secretion. We hypothesized that adiponectin levels would be higher in the lateral sites. APCs from aaPVAT and laPVAT of SD rats (n=9) were isolated using explant outgrowth. During adipogenic induction, APCs were exposed to Ang-II, or Yoda1, a PIEZO1 agonist that mimics mechanosignaling and suppresses adipogenesis. Adipogenesis was assessed with a lipid stain, Bodipy, and nuclei stain. Triglycerides and adiponectin secretion were quantified. Upon exposure to Ang-II, adiponectin secretion was significantly higher in laPVAT compare

HYPERTENSION MODULATES COLLAGEN DEPOSITION BY ADIPOCYTE PROGENITOR CELLS IN THE PERIVASCULAR ADIPOSE TISSUE IN COARCTED MICE

Presenter(s): Becca Lefkowitz
Integrative & Organismal Biology
Mentor(s): Andres Contreras (College of Veterinary Medicine), Cristian Rendon Mora (College of Veterinary Medicine)

Hypertension (HTN), classified as chronically elevated blood pressure, is a major contributor to cardiovascular diseases (CVDs), promoting vascular remodeling through extracellular matrix deposition, inflammation, and elastin degradation. Perivascular adipose tissue (PVAT) plays a key role in vascular homeostasis by secreting vasoactive molecules that regulate vascular tone and contribute to hypertension-induced remodeling. PVAT also contains multipotent adipocyte progenitor cells (APCs), which maintain adipocyte populations through differentiation and may contribute to extracellular matrix remodeling within PVAT. We hypothesized that HTN alters APC function in PVAT, leading to enhanced collagen deposition. To test this, six-week-old PDGFRa-CreERT2/R26-LSL-tdTomato mice underwent thoracic aorta coarctation to induce a gradient in blood pressure. After 8 weeks, tissue samples were collected, stained with immunofluorescence, imaged with 2-photon microscopy and second harmonic generation (SHG) to visualize collagen, and analyzed with QuPath. APCs were identified as tdTomato (tdT+), and results are the % of APCs co-localized with collagen from total cells (mean±SD). One-tailed T-tests revealed no significant difference in APC co-localization with collagen between PVAT upstream (4.64 ± 3.36) vs. downstream (10.64 ± 3.36) ($P=0.27$), suggesting HTN does not significantly alter APC-driven collagen remodeling. However, APCs co-localized with SHG+ collagen were lower downstream (93.6

HOW DOES HUMAN FOOTPRINT IMPACT NORTH AMERICAN AVIAN SPECIES INTERACTIONS?
Presenter(s): Ann Joseph, Caroline Roche, Giovanni DePasquale, Maddie Andreatta
Integrative & Organismal Biology
Mentor(s): Phoebe Zarnetske (College of Natural Science)

Urbanization and other human-induced land use changes are at an all time high. As little as 3% of Earth's land area remains largely untouched by human influence. This human footprint has a large effect on species' habitat and biodiversity, and can impact how species interact with each other. For example, some research shows that avian species with nests closer in proximity to urban and developed areas have a lower risk of nest takeover and brood parasitism by other avian species, whereas other research shows that these interactions increase with urbanization. However, current studies focus on local scales and only a few species, making it difficult to understand how human footprint affects the frequency of these interactions across large areas and multiple species. Until now, there has not been a comprehensive database of avian interspecific interactions across a large geographic area. Now, using the Avian Interaction Database (currently being compiled by student and faculty researchers at Michigan State University, with over 26,000 pairwise interactions to date), along with the North American Breeding Bird Survey (BBS), we have the capacity to quantify the spatial and temporal changes in nest-related interactions among avian species across North America. Here, we use this database, along with the BBS and Human Footprint Index (HFI), to quantify the effects of human footprint on avian species' inte

ASSOCIATION OF MIDGUT PROTEASES WITH TOXICITY OF CRY1F TOXIN IN CABBAGE LOOPERS (TRICHOPLUSIA NI)
Presenter(s): Jackson Bird
Integrative & Organismal Biology
Mentor(s): Ping Wang (Cornell University)

In 1915, scientists discovered that the soil-dwelling bacterium Bacillus thuringiensis (Bt) had insecticidal properties. This toxicity was later found to originate in parasporal crystals produced by the bacterium; the major proteins present within these crystals are called Cry toxins. Over time, growers began using Bt in insecticidal sprays. Additionally, for the past 30 years, farmers worldwide have been growing ever-expanding varieties of genetically modified crops that express Bt proteins to confer resistance to insect feeding. In the insect digestive tract, Cry toxins are proteolytically activated, followed by a cascade of damage to the midgut cells that leads to the death of the target organisms. Many Bt crops have been approved for use worldwide, including cotton, soybeans, eggplant, potato, tobacco, and, most commonly, sweet corn. However, with continuing planting of Bt crop varieties and application of Bt sprays, pest resistance to Bt is also increasing. Resistance to Bt toxins is often conferred by mutations in the Bt receptors in insects, preventing them from killing the organism. It may also be due to changes in digestive proteases in the insect midgut, as Bt toxins are proteinaceous in nature and thus can be degraded by proteolytic enzymes. This project aims to examine the association of digestive proteases with the resistance of cabbage looper (Trichoplusia ni) larvae to the Bt toxin Cry1F.

KINESIOLOGY

OBSERVATIONAL LEARNING VS. MOTOR-EXPLORATION: WHICH IS MOST EFFECTIVE IN IMPROVING PERFORMANCE ON A NOVEL COLLABORATIVE MOTOR TASK?

Presenter(s): Anna Elmquest, Morgan Waggoner
Kinesiology
Mentor(s): Rajiv Ranganathan (College of Education)

There are multiple approaches to learning new skills. It has been debated whether observational learning or motor-exploration is more beneficial in facilitating the learning of a new motor task. Observational learning allows individuals to observe successful task performance before attempting it themselves, while motor-exploration enables individuals to use movements that work best for their own capabilities. This distinction is particularly relevant for individuals learning to operate robotic prosthetics or assistive devices. Our study examines whether observational learning or motor-exploration is more efficient when applied to learning a novel collaborative motor task. The participants were asked to use upper body movements to control a cursor on a screen to various targets located around the screen. Two groups were tested: the observational group that was able to see their partner during the task, and the motor-exploration group that was not able to see their partner during the task. Training conditions were completed collaboratively and consisted of 20 reaches to the targets, while testing conditions were completed independently and consisted of 24 reaches to the targets. Our findings indicate that participants in the observational learning group, who had full visibility of their expert partner, acquired the task at a faster rate than those in the motor-exploration group. Given that the ultimate objective for individuals learning to use assistive devices is

STRENGTH AND KNEE VALGUS: EVALUATING INJURY RISK WITH MARKERLESS MOTION CAPTURE AND A NOVEL STRENGTH COMPOSITE SCORE

Presenter(s): Jagger Wraalstad
Kinesiology
Mentor(s): Arjun Parmar (College of Education), Matthew Harkey (College of Education)

INTRODUCTION: Knee valgus is a key injury risk factor, yet its assessment is often restricted to labs. Markerless motion capture (MMC) provides a more accessible method by estimating valgus through the knee-ankle separation ratio (K:A), which quantifies knee positioning relative to the ankles. Strength influences valgus control, but single-variable assessments may overlook its multidimensional nature. A composite strength score better captures the interplay of extensor and flexor strength in relation to valgus mechanics. PURPOSE: Examine the relationship between K:A and knee extensor and flexor strength in Division I female athletes. METHODS: Twenty-seven female athletes (age 20.3±1.1 years; BMI 24.8±2.4) completed isokinetic dynamometer testing for quadriceps and hamstring peak torque on both dominant and non-dominant limbs. Two linear regression models examined the relationship between K:Aexcursion-calculated from three drop vertical jump trials via MMC-and strength. The raw strength model included four independent variables: peak knee extensor and flexor torque for each limb. The composite model used principal component analysis to derive four strength composite scores (SC1-SC4), reducing collinearity. RESULTS: The raw strength model was significant (p=0.014, r2=0.68), however none of the raw strength measures were significant in this model. The composite strength model was significant (p=0.014, r2=0.68). SC1-descri

ASSOCIATIONS OF SLEEP DIFFICULTY WITH STRESS AND RECOVERY IN COLLEGIATE FEMALE ATHLETES
Presenter(s): Natalie Blake
Kinesiology
Mentor(s): Corey Grozier (College of Education), Matthew Harkey (College of Education)

Collegiate athletes face unique stressors related to the demands of their sport, academics, and social pressures compared to non-athletes. Adequate sleep is essential for the regulation of stress and recovery in athletes; however, the impact of sleep difficulty on these factors, particularly in female collegiate athletes, remains unexplored. Therefore, this study examined the association between sleep difficulty and stress and recovery within this population. Seventy-three Division I female athletes completed surveys to assess sleep difficulty, stress, and recovery. Sleep difficulty was evaluated using the Athlete Sleep Screening Questionnaire (ASSQ) and scored with the Sleep Difficulty Score (ASSQ-SDS) to assess factors such as sleep duration, quality and satisfaction, sleep latency, sleep maintenance, and medication use. Participants were categorized as having no sleep difficulty (score=0-4) or experiencing sleep difficulty (score≥5). Within these two groups, stress and recovery were assessed using the Acute Recovery and Stress Scale (ARSS). A Mann-Whitney U test evaluated differences in stress between groups, while an independent t-test compared recovery, as it met the assumption of normality. Statistical significance was set at $p<0.05$. There were forty-two athletes with sleep difficulty and thirty-one without. No differences were found between groups for stress (with (31.5±16.7); without (26.6±13.5);U=536, p=0.199) or recovery (with (63.4±13.4); without (65.6±

COMPARING TSK-11 AND ACL-RSI SCORES IN INDIVIDUALS WITH AND WITHOUT EFFUSION-SYNOVITIS FOLLOWING ACL RECONSTRUCTION
Presenter(s): Faith Persyn
Kinesiology
Mentor(s): Corey Grozier (College of Education), Matthew Harkey (College of Education)

Following ACL reconstruction (ACLR), knee inflammation may affect psychological outcomes, potentially reducing readiness to return to sport and increasing fear of movement. However, no direct link between inflammatory markers and psychological outcomes has been established. This study examined the association between effusion-synovitis and psychological outcomes, specifically readiness to return-to-sport and kinesiophobia, in patients post-ACLR. Fifty-two participants, who were four to six months post-ACLR, were included in this cross-sectional study. Effusion-synovitis in the involved limb was assessed using ultrasound imaging along the longitudinal plane at the suprapatellar recess. The severity of effusion-synovitis was graded using a previously established semi-quantitative scale ranging from 0 to 3. Participants were then categorized into two groups: absent/mild (grades 0-1) and moderate/severe (grades 2-3). Psychological readiness and kinesiophobia were evaluated using the ACL Return-to-Sport after Injury Scale (ACL-RSI) and the Tampa Scale of Kinesiophobia-11 (TSK-11), respectively. Independent t-tests were conducted to compare psychological readiness and kinesiophobia between those with and without effusion-synovitis. The significance level was set at 0.05 a priori . The groups were evenly divided, with 26 participants experiencing effu

DIFFERENCES IN FEAR OF MOVEMENT ON RECTUS FEMORIS MUSCLE QUALITY BETWEEN ADOLESCENTS AND ADULTS AFTER ACL RECONSTRUCTION
Presenter(s): Kate Mumford
Kinesiology
Mentor(s): Jessica Tolzman (College of Education), Matthew Harkey (College of Education)

Introduction: Kinesiophobia is a fear of movement commonly occurring during the recovery process from anterior cruciate ligament reconstruction (ACLR). Muscle quality is captured from echo intensity (EI) via ultrasound images. Evaluating kinesiophobia and muscle quality after ACLR is important because age-related differences in physical and psychological response could affect outcomes in both groups. This study aims to evaluate differences in the relationship between muscle quality and kinesiophobia between adults and adolescents following ACLR. Methods: We enrolled adolescents (age=14-17.9 years) and adults (age=18-35 years). The Tampa Scale for Kinesiophobia (TSK) is a self-reported questionnaire that assesses fear of movement and re-injury, with higher scores indicating greater fear of movement. Echo intensity evaluates muscle quality where a higher EI value indicates non-contractile fibers and a lower EI indicates contractile fibers. We completed a Pearson correlation to assess the relationship between EI and TSK values. We then compare if the two correlations were significantly different with a Fisher's r-to-z transformation. Results: Adolescents (Height: 172.06±8.76cm; weight: 70.8

MOTOR SKILL SEQUENCING IN REAL-WORLD CONTEXTS
Presenter(s): Jaini Gandhi
Kinesiology
Mentor(s): Rajiv Ranganathan (College of Education)

Motor skill sequencing plays a crucial role in real-world tasks such as sewing, where efficiency depends on how seamlessly individuals transition between different motor actions. Tasks that require precision and coordination, like sewing, demand well-structured motor sequences to optimize speed and accuracy. This study investigates the sequencing strategies employed by individuals performing two sewing tasks: a straight stitch and a curved stitch. Using video-based analysis and behavioral coding in BORIS, an open-source software for observational research, we categorized participants' actions into distinct motor behaviors, such as fabric alignment, guiding, and reinforcement stitching. A time budget analysis was conducted to compare the sequencing strategies of faster versus slower participants. Preliminary findings suggest that efficient sequencing is characterized by minimizing repeated preparatory actions and prioritizing continuous guiding movements. We anticipate that our final analysis will confirm that slower participants engage in more frequent realignments and guiding adjustments, while faster participants optimize movement sequencing to reduce task duration. These insights have potential applications in training methodologies, workplace skill optimization, and the development of automated systems for motor-based tasks. Further analysis will provide a deeper u

THE ACUTE EFFECTS OF A VIBRATION-BASED THERAPY DEVICE ON INHIBITORY CONTROL IN CHILDREN WITH ADHD
Presenter(s): Clayton Monge, Kishan Patel
Kinesiology
Mentor(s): Colt Coffman (College of Education), Lauren Bullard (College of Education), Matthew Pontifex (College of Education)

Vibrational therapy has been proposed to enhance autonomic nervous system (ANS) regulation, influencing state-dependent control of attention and interrelated cognitive processes. Wearable devices using vibration-based techniques, such as the Apollo System, may therefore offer therapeutic benefits for populations with both autonomic and executive dysfunction, including children with Attention-Deficit/Hyperactivity Disorder (ADHD). While our preliminary data suggest that the Apollo System does not improve long-term symptomology in children with ADHD, its potential effects on inhibitory control during acute use (i.e., a single session) has not been investigated. Therefore, our study aimed to examine the acute effects of the Apollo System on inhibitory control task performance in children with ADHD as part of a double-blind, sham controlled clinical trial. Eighty-one children with ADHD were recruited from Mid-Michigan communities and randomly assigned to either an active device group (n = 42) or a sham control group (n = 39). Each group completed a Go/No-go task and Flanker task before and during Apollo System use, which index the response inhibition and interference control subdomains of inhibitory control, respectively. The Apollo device did not significantly improve reaction time or response accuracy (p's > 0.05) on either the Go/No-go task or the Flanker task compared to the sham device. These findings suggest that acute use of the Apollo system is ineffective in impr

PHYSICAL THERAPY AND FUNCTIONAL SYMMETRY: EXPLORING THE IMPACT OF PT DURATION ON ACL RECONSTRUCTION OUTCOMES
Presenter(s): Colleen Kubisiak, Isabela Griwatsch
Kinesiology
Mentor(s): Jessica Tolzman (College of Education), Matthew Harkey (College of Education)

Introduction: Duration of physical therapy (PT) post-ACL reconstruction (ACLR) plays a crucial role in determining an individual's return to full function. Vertical ground reaction force (vGRF), single leg hops, isokinetic strength, and limb symmetry index (LSI) are often used to determine an individual's readiness to return to sport. Extended PT could be beneficial for recovery outcomes, providing evidence to support increased PT visits should be covered by insurance to improve patient care and long-term recovery following ACLR. Therefore, the purpose of this study was to identify correlations between PT duration and performance outcomes post-ACLR. Methods: 69 participants (46% female) from a longitudinal study at Michigan State University following unilateral ACLR were assessed. Peak vGRF was recorded from five drop-vertical jump trials. Participants performed five single-leg hops per limb, aiming for maximum distance, and five isokinetic knee flexion and extension trials from a BioDex machine, peak strength was utilized. Averages were calculated for each task, and LSI was determined: LSI = (ACLR/Contralateral) * 100. PT duration was self-reported at the visit's start. Spearman's correlation assessed the relationship between PT duration and physical outcomes. Results: Spearman correlation analyses showed no significant relationships between participants (T

THE EFFECT OF HIGH-INTENSITY INTERVAL TRAINING ON SOLEUS MUSCLE IN POSTNATAL GROWTH-RESTRICTED MICE

Presenter(s): Julian Ananyev
Kinesiology
Mentor(s): David Ferguson (College of Education)

Postnatal growth restriction (PNGR), often resulting from early-life undernutrition, is associated with increased risk of chronic diseases and impaired skeletal muscle function. While physical activity generally enhances oxidative capacity and muscle health, PNGR mice have been shown to exhibit poor responsiveness to voluntary exercise. High-intensity interval training (HIIT) has been effective in increasing oxidative capacity in non-restricted populations, but its impact on PNGR skeletal muscle remains unclear. PURPOSE: This study investigated whether HIIT could improve skeletal muscle oxidative characteristics in female PNGR mice. METHODS: Female PNGR and control (CON) mice were assigned to either HIIT (5 days/week for 4 weeks) or sedentary (SED) groups starting on postnatal day 44. Soleus muscles were collected on postnatal day 73 and analyzed for muscle fiber type distribution and cross-sectional area (CSA). RESULTS: CON mice had a greater percentage of Type IIb fibers (31.2±8.7%) compared to PNGR (23.7±4.3%, p=0.044) and larger CSA (2298±410µm2 vs. 1780±448µm2, p=0.030). HIIT did not significantly alter CSA in either group but trended toward increasing Type IIa fiber percentage in PNGR mice (+8.2±5.1%, p=0.404). CONCLUSION: These findings suggest that while PNGR mice exhibit reduced muscle size and a more oxidative fiber profile at baseline, HIIT may stimulate favorable fiber-type shifts not seen with

CHARACTERIZATION OF INFANT-MOTHER JOINT ENGAGEMENT DURING THE ACQUISITION OF WALKING

Presenter(s): Sumedha Dondapati, Talia Wallis
Kinesiology
Mentor(s): Mei Hua Lee (College of Education), Promise Robinson (Graduate School Dean)

The acquisition of locomotor skills, such as walking, allows infants the opportunity to further engage and navigate the world around them. Prior to the onset of independent walking, infants learn about their environment through joint engagement, defined as the mother and infant interacting physically or focusing on the same object simultaneously. However, the opportunities and the type of joint engagement change dramatically with the infant's ability to walk. The purpose of this research was to characterize infant-mother joint engagement in the acquisition of walking. We conducted a longitudinal study with biweekly home visits starting from the time that infants could stand for 10 s until they could walk independently. The video data was then coded to examine infant-mother interactions. Datavyu, an open-source behavior coding software, was used to code the infant's engagement with either the mother, an object, or both, and to determine who initiated the engagement. We hypothesize that the dynamics of joint engagement changes as infant learns to walk independently - specifically, the earlier the onset of independent walking, the greater the level of joint engagement. We expect that our study will aid in the early identification of infants with motor developmental delays and provide information for future interventions.

AN EXAMINATION OF SPORT-RELATED PERFORMANCE AND ANXIETY IN COLLEGIATE ATHLETES
Presenter(s): Kaitlyn Wilcox, Tristan Janisse
Kinesiology
Mentor(s): Kenan Sayers (College of Social Science)

Sport-related performance anxiety (SRPA) is a common challenge among collegiate athletes, often impacting their ability to perform under pressure. It is influenced by various factors including psychological traits, past experiences, and physiological conditions. Given the high stakes involved with collegiate sports, understanding the link between concussions and other forms of anxiety (i.e., SRPA) can be beneficial to creating helpful interventions. However, SRPA's relationship between concussion history and anxiety sensitivity remains unclear. The purpose of this study was to investigate whether athletes with a history of concussions report higher levels of sports-related anxiety than those without a history of concussions and whether the specific number of concussions further impacts sports-related anxiety. Varsity collegiate athletes (N=86) completed a survey battery that included the Anxiety Sensitivity Index (ASI-3), concussion history, and Sport Anxiety Scale (SAS-2). Correlational analyses were conducted to examine the relationships between these variables. Results showed a weak-to-moderate positive correlation between concussion history and SRPA ($r=0.285$, $p=0.008$), but no significant association between concussion history and anxiety sensitivity ($r=0.011$, $p=0.917$). A moderate positive correlation was found between anxiety sensitivity and SRPA

SOCIAL NORMS AND NEGATIVE PARENTAL BEHAVIORS IN YOUTH SPORT - ZACHARY MAZZUCHI, DR. JEEMIN KIM, DEPARTMENT OF KINESIOLOGY, College of Education
Presenter(s): Zachary Mazzuchi
Kinesiology
Mentor(s): Jeemin Kim (College of Education)

Though parents can facilitate their children's sport participation, youth sport parents have also been reported to engage in negative sideline behaviors (e.g., yelling at opposing teams/coaches, encouraging unnecessary aggression). More research is warranted to examine these parental behaviors because they may contribute to aggression and hostility among youth athletes and spectators, and could ultimately undermine the integrity of youth sports. One potential antecedent of negative sideline behaviors is social norms. That is, parents may be more likely to engage in negative behaviors if they believe that such behaviors are socially acceptable (i.e., normative) within the sport context. The goal of this study was to examine the extent to which parents engage in negative sideline behaviors and assess the relationship between parents' own self-reported engagement in negative sideline behaviors and their perceptions of other parents' behaviors (i.e., social norms). Youth sport parents (N=164; 121 females and 52 males; Mage = 46.8 years, SD = 6.24) completed an electronic survey to repor

SUBCHONDRAL BONE ECHO INTENSITY IN INDIVIDUALS WITH AND WITHOUT EALY KNEE OA SYMPTOMS FOUR MONTHS POST-ACLR
Presenter(s): Katie Carothers, Natalie Blake
Kinesiology
Mentor(s): Corey Grozier (College of Education), Matthew Harkey (College of Education)

Individuals who undergo anterior cruciate ligament reconstruction (ACLR) have an increased risk for early-onset osteoarthritis (OA). Ultrasound imaging non-invasively assesses subchondral bone via echo intensity, reflecting density and microstructural changes, yet remains underutilized post-ACLR. This study examined differences in ultrasound-assessed subchondral bone echo intensity between individuals with and without early knee OA symptoms four-months following ACLR. Ten participants, four months post-ACLR, underwent ultrasound imaging to assess subchondral bone. Images of the affected femoral condyle were captured with participants supine and the knee in maximal flexion. A 25×25-pixel region of interest, placed midway between the sulcus angle and medial condyle, was divided into five subsections for analysis. Mean echo intensity was measured for the overall region and each subsection. Early knee OA symptoms were classified using the Luyten criteria based on KOOS scores, with participants scoring ≤85% in at least two of four categories identified as symptomatic. Group differences in medial subchondral bone echo intensity were analyzed using independent t-tests ($p < 0.05$). Seven participants met the criteria for early knee OA symptoms; however, no significant differences in subchondral bone echo intensity were observed between groups at any subsection ($p > 0.05$) or overall ($t = -0.312$; $p = 0.763$). These f

IDENTIFYING A KEY FACTOR IN INTRODUCING A NEW SPORT: A CONSUMER EXPERIENCE-CENTRIC APPROACH
Presenter(s): Megan Blake, Namika Page
Kinesiology
Mentor(s): Jennifer Roth (College of Education), Keonyoung Chung (College of Education), Sanghoon Kim (Facility for Rare Isotope Beams)

The introduction of new sports is often driven by the goal of expanding recreational opportunities and promoting physical activity. However, a key challenge is identifying the experiential factors that sustain long-term participation in newly introduced sports. Thus, this study examines how participants' competence, enjoyment, and socialization influence their continuous behavioral intentions through the mediating role of satisfaction. This study used the RedBall Tennis, which was recently introduced by the USTA to promote physical activity among diverse populations, as a research context. 615 participants (M=40.7) participated in the Redball Tennis program and subsequently completed an online survey. The survey assessed participants' experiences related to perceived competence, enjoyment, socialization, satisfaction, and behavioral intentions. Structural equation modeling was employed to test the proposed mediation model, with competence, enjoyment, and socialization as predictors, satisfaction as a mediator, and behavioral intention as the outcome. The results showed that, among the three predictors, only enjoyment had a direct effect on behavioral intention. Furthermore, satisfaction mediated this relationship, while competence and socialization did not. The findings emphasize the importance of enjoyment in shaping participants' experiences with new sports. Specifically, creating an enjoyable environment and experience can enhance participant satisfaction, which in turn

CHARACTERIZING INFANT-MOTHER COMMUNICATION DURING THE ACQUISITION OF WALKING
Presenter(s): Georgia Berger, Konner Roche
Kinesiology
Mentor(s): Jennifer Burns (College of Education), Mei Hua Lee (College of Education)

As infants begin to explore their environment, they are able to interact with varying objects, physically, and are able to interact more with others, verbally. Previous literature indicates that the interaction between the mother and infant can have an impact on the language development of the infant. However, the interplay between an infant's locomotor ability and verbal communication requires further research. The purpose of this study is to examine the relationship between locomotor activity and verbal communication in infants learning how to walk. Each infant-mother dyad was video recorded in their home, with data collections beginning when infants could stand independently (10 consecutive seconds), and ending when infants were able to walk independently (10 consecutive steps). Infant's locomotor activity and verbal communication were coded using Datavyu, an open-source behavior coding software. Locomotion was coded for different behaviors the infant engaged in (e.g., walking, crawling, sitting) and verbal communication was coded for whether the infant was initiating, responding to, or engaging in solo vocalization. Data was analyzed to determine whether infant vocalization increased with active (e.g., walking, crawling) or passive (e.g., sitting, kneeling) locomotor behaviors, and whether different locomotor behaviors correspond to specific types

A SYSTEMIC REVIEW OF PHYSICAL ACTIVITY ASSESSMENT METHODS DEVELOPED FOR/IN TODDLERS
Presenter(s): Sam Tauriainen
Kinesiology
Mentor(s): Karin Pfeiffer (College of Education)

Adequate physical activity (PA) has been associated with positive physical and mental health in toddlers. Few methods of assessing PA in toddlers have been developed, and no literature evaluating potential methods exists for toddlers. Objective: The purpose of this review is to identify existing methods of assessing PA developed for use with toddlers. Methods: This systematic review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) framework. The databases PubMed, Web of Science, SCOPUS, and EBSCO were searched for articles published before October 2023. Articles were included if they 1) Included human subjects, 2) 50% of age-range included 12 - 36 months, 3) Included development, validation, or cross-validation, 4) Published by October 2023, 5) Available in English and full-text. Information was extracted using a standardized form. Quality and risk of bias was assessed using the Checklist for Analytical Cross-Section Studies: Critical Appraisal tools for use in JBI Systematic Reviews. Results: Sixteen studies were reviewed. Participants were healthy in fifteen studies and only 30% of studies included commonly marginalized groups. 40% of participants were con

ASSESSING THE RELATIONSHIP BETWEEN STRENGTH ASYMMETRY AND KNEE FLEXION AND VALGUS EXCURSION ASYMMETRY DURING A DROP VERTICAL JUMP
Presenter(s): Jack Logsdon
Kinesiology
Mentor(s): Arjun Parmar (College of Education), Matthew Harkey (College of Education)

Introduction: Asymmetries of Knee Flexion Angle (KFA) and Knee Valgus Angle (KVA) in an individual are knee injury risk factors. Knee extensor and flexor strength asymmetries may influence asymmetries in KFA and KVA. Identifying this relationship may be crucial to understanding knee injury risk. Purpose: Examine the relationship between asymmetries in knee extensor and flexor strength and asymmetries in KVA and KFA in Division I athletes. Methods: Twenty-four female athletes (age 20.3 ± 1.1 years; BMI 24.6 ± 2.3) completed isokinetic dynamometer testing for knee extensor and flexor peak torque on both limbs. Using markerless multi-camera motion capture (150Hz) KFA and KVA excursion was calculated as the difference between the angle at initial and peak angle during a drop vertical jump. Knee extensor and flexor strength was averaged over five trials. KVA and KFA excursion were averaged over three trials. Asymmetry was calculated as the relative difference between the dominant and non-dominant limbs. Two linear models were fit between the two extensor and flexor strength asymmetries and excursion asymmetries. Results: Strength asymmetries did not significantly predict KVA excursion ($p = 0.32$, $r2 = 0.41$). However, strength asymmetries significantly predicted KFA excursion ($p = 0.04$

PERSPECTIVES OF YOUTH WITH AUTISM SPECTRUM DISORDER WHO PARTICIPATED IN AN EXERCISE AND NUTRITION PROGRAM

Presenter(s): Lydia Miller, Morgan Adelini, Sarah Segarra
Kinesiology
Mentor(s): Darice Brooks (College of Education), Janet Hauck (College of Education)

Autism Spectrum Disorder (ASD) is characterized by deficits in social communication and integration accompanied by repetitive behaviors, interests, and activities, which negatively impact life domains (i.e., social and occupational). Paired with motor deficiencies, youth with ASD experience lower levels of physical activity (PA), placing them at a 40% greater risk of being overweight and 20% greater risk of obesity compared to their neurotypical (NT) peers. Creating an accessible, inclusive, and cost-friendly exercise environment may help to combat the risk of overweight and obesity while also increasing the chance of social interaction for this population. The A-ONE program is designed to improve the physical health of middle school and high-school-aged youth with ASD by offering exercise and nutrition sessions in an online and in-person format. 12 participants (mean age) participated in either the online or in-person sessions of AONE. Each participant completed up to 10 sessions of exercise and nutrition guided by Kinesiology students. Once the 10 sessions were completed, participants completed an interview in which they discussed their time spent in the program. Results : participants reported X, Y, Z

AGREEMENT OF COMMERCIALLY- AVAILABLE PULSE OXIMETRY AND ARTERIAL BLOOD GAS SAMPLING IN NORMOXIA, MODERATE, AND SEVERE HYPOXIA

Presenter(s): Tavleen Kaur
Kinesiology
Mentor(s): Chad Wiggins (College of Education), Sophie Miller (College of Education), Wesley Blumenburg (College of Education)

Arterial blood gas (ABG) analysis is the current gold standard for assessing blood oxygenation, but it is invasive and resource-intensive. Pulse oximetry provides a non-invasive alternative, however its accuracy during acute, moderate and severe hypoxic exposures remains unclear. This study evaluates the agreement of pulse oximetry compared to direct ABG sampling during acute graded hypoxic exposures. Commercially available pulse oximetry (SpO?) and arterial oxygen saturation (SaO?) measurements were collected from healthy volunteers undergoing controlled hypoxic exposures at three graded levels of inspired oxygen (FiO2). Data were collected for ~12 minutes at each incremental FiO2: normoxia (FiO?= 21%), moderate hypoxia (FiO?= 15%) and severe hypoxia (FiO?= 10%). Separate Bland-Altman analyses were performed for each inspirate to assess agreement between the two methods. Bias, limits of agreement, and variability across different levels of hypoxia were identified. Preliminary findings indicate a mean bias of -0.3 to 1.8% (SpO? - SaO?) with limits of agreement spanning -8.0% to 5.7%. The accuracy of pulse oximetry stayed consistent with increasing levels of hypoxia, and the delays in signal acquisition were minimal. Pulse oximetry remains a non-invasive technique for detecting changes in blood oxygenation. The present study suggests that pulse oximetry may precisely detect changes in blood oxygenation during acute hypoxic exposure. These findings suggest that the use of pu

INVESTIGATING THE ROLE OF A PHYSICAL ACTIVITY-BASED POSITIVE YOUTH DEVELOPMENT PROGRAM ON GOAL SETTING AND LEADERSHIP SKILLS IN YOUTH

Presenter(s): Noel Mann
Kinesiology
Mentor(s): Chelsi Ricketts (University of Toronto), Emily Hayashi (College of Education), Leapetswe Malete (College of Education)

Physical activity (PA) is beneficial for development of youths' life skills in personal and social areas. However, studies show that perceived development of skills differs based on age and sex. This study examined differences in the perceived development of goal setting and leadership through sport in 184 students (male = 58.10%; M age = 14.41, $SD = 1.60$) who participated in an after-school PA-based program. Participants completed cross-sectional measures of perceived development through PA. A two-way MANOVA was conducted, comparing results based on age group (i.e., emerging and early adolescence [ages 8-13 years] vs. older adolescence [ages 14-18 years]) and sex (i.e., males vs. females). Results showed no significant difference in the perceived development of goal setting between emerging/early adolescents ($M = 3.48$, $SD = 0.846$) and older adolescents ($M = 3.64$ $SD = 0.874$) or between males (M<

ASSOCIATION BETWEEN CONCUSSION AND SUICIDAL BEHAVIORS IN MICHIGAN HIGH SCHOOL STUDENTS

Presenter(s): Ashley Jones, Kosette Bartels
Kinesiology
Mentor(s): Colt Coffman (College of Education), Lauren Bullard (College of Education), Matthew Pontifex (College of Education)

Prior research in nationally representative samples suggests that the odds of depressive symptoms and suicidal behaviors increase when an adolescent has sustained ≥ 1 concussion(s) in the past 12 months. However, it remains unclear whether these trends have remained stable over time or differ when accounting for demographic and sociocultural factors specific to Michigan. The present study sought to examine the association between concussion history and suicidal behaviors in high school students, using data from the 2017, 2019, 2021, and 2023 Michigan Youth Risk Behavior Survey (YRBS). Weighted multivariate logistic regressions, adjusted for relevant covariates, were used to estimate odds ratios and 95% confidence intervals for suicidal behaviors and feelings of sadness or hopelessness in the past 12 months. Our findings indicated that concussion history was not associated with an increased odds of reporting feelings of sadness/hopelessness, suicidal ideation, or planning in Michigan high school students within the past 12 months (p 's > 0.05). Greater odds of reporting suicide attempts were observed in those with a history of concussion (AOR = 1.68; 95% CI = 1.26, 2.25), whereby those with two or more concussions in the past 12 months had the highest odds of attempting suicide (AOR = 2.14; 95% CI = 1.33, 3.43). Interestingly, these results remained consistent even after adjusting for coll

INVESTIGATING AGE AND SEX DIFFERENCES IN YOUTH'S PERCEIVED LEVEL OF SOCIAL AND EMOTIONAL SKILLS THROUGH PHYSICAL ACTIVITY INTERVENTION

Presenter(s): Aarushi Lokhande
Kinesiology
Mentor(s): Chelsi Ricketts (University of Toronto), Emily Hayashi (College of Education), Leapetswe Malete (College of Education)

Studies show that physical activity (PA)-based social-emotional learning (SEL) can vary by age and sex. This study examined age and sex differences in the perceived development of social and emotional skills in 184 students (male = 58.10%; M age = 14.41, SD = 1.60) who participated in an after-school PA-based program. Participants completed cross-sectional measures of perceived development of SEL skills. A two-way MANOVA compared results based on age group (emerging/early adolescence [8-13 years] vs. older adolescence [14-18 years) and sex (males vs. females). Results showed no significant difference in perceived development of social skills between emerging/early adolescents (M= 3.27, SD= 0.999) and older adolescents (M = 3.36, SD = 1.035). Likewise, there were no significant differences in perceived development of emotional skills between early adolescents (M = 3.44, SD = 0.854) and older adolescents (M = 3.42, SD = 0.923, Wilks λ = .984, F (2, 142) = 1.143, p = .322). A significant difference in perceived development of social skills was found between sexes, with males (M = 3.50, SD = 0.837) reporting

ON THE RELATIONSHIP BETWEEN HAND DOMINANCE AND GAZE PATTERNS

Presenter(s): Anita Kompalli, Bhuvana Bhamidipati, Meagan Rockafellow
Kinesiology
Mentor(s): Florian Kagerer (College of Education)

Our study explores how gaze patterns and hand kinematics are influenced by handedness while performing bimanual tasks. Twelve right-handed and twelve left-handed participants were tasked with moving two cursors to two targets as swiftly and accurately as possible. Each cursor was controlled by a table-mounted joystick with a cover blocking the participant's hands. Participants' heads were stabilized using a chin rest, and their eye movement was measured using a screen-mounted eye tracker. This experiment consisted of three experimental conditions. The first condition had participants move their cursor from a home position to two targets straight ahead at 90 degrees. The second condition had the cursors move from the home position to targets located at either 30 or 150 degrees in the same direction. The last condition had the same target locations but required the cursors to move in mirror-fashion, either laterally or medially. We then analyzed the sum of fixation dwell time in the region of interest around each target and the root mean square error (RMSE) to indicate the hands' movement straightness. We found that participants preferentially looked at their dominant hand. Additionally, in the isodirectional and anisodirectional conditions, right-handed participants tende

HEALTH BEHAVIOR DISPARITIES IN CHILDREN WITH ADHD: PHYSICAL ACTIVITY, SLEEP, AND SEDENTARY BEHAVIORS

Presenter(s): Clay Moscovic, Harris Barnes, Kayla Amin
Kinesiology
Mentor(s): Colt Coffman (College of Education), Lauren Bullard (College of Education), Matthew Pontifex (College of Education)

Attention Deficit Hyperactivity Disorder (ADHD) is associated with differences in health behavior engagement in children and adolescents; specifically, they tend to be less physically active, report worse quality sleep, and may be more sedentary than their typically developing peers. As health behaviors such as sleep and physical activity (PA) have been shown to improve cognitive functioning and may alleviate some ADHD symptoms, it is important to understand how symptom severity impacts health behavior patterns. Therefore, the purpose of this stud y was to examine the relationship between ADHD symptomatology and health behavior engagement, specifically achievement of the Canadian 24-Hour Movement Guidelines for Children and Youth (sleep, step, PA, sedentary behavior), in a sample of children and adolescents with ADHD. 81 participants aged 8-17 years old (64% male; 37% on ADHD medication) completed the ADHD Rating Scale 5 (ADHD RS-5), which evaluates the frequency and severity of ADHD symptoms, the Pittsburgh Sleep Quality Index, which evaluates different aspects of sleep, and were also asked to report on their total daily PA, sleep, sedentary behavior, and screen time. Parents/guardians completed the aforementioned surveys as well as the Godin Leisure Time PA Questionnaire and specific questions about their

LINGUISTICS, LANGUAGES, & SPEECHES

AUTOMATIC EXTRACTION OF DEVELOPMENTAL TRAJECTORIES IN CHILD LANGUAGE ACQUISITION
Presenter(s): Molly Thornber
Linguistics, Languages, & Speech
Mentor(s): Hezao Ke (College of Arts & Letters)

This study develops a computational model to explore how children learn the syntax of their first language by analyzing the structure of speech from caregivers. The model processes raw sentences, applies natural language processing to add structural annotations, and uses learning algorithms to simulate how children acquire syntax over time. In particular, the model takes raw linguistic data as input and uses a Universal Dependencies parser to extract syntactic information. A gold standard of manually parsed sentences from children's and their caregiver's production is used to detect systematic errors in the UD parsing, and the code is iteratively refined to correct these errors to improve the parsing quality. Then, the improved model is applied to raw longitudinal data of individual children from the CHILDES corpora. The required subject parameter, whether a sentence requires a subject to be grammatical, and a subparameter applying to finite sentences only, are used to demonstrate the results of the model's analysis, modeling how the child narrows down to a subset of data where a linguistic rule holds. This result shows how the model advances the understanding of the developmental trajectories as the linguistic input from caregivers and output from the child are analyzed and compared. The study thus sheds light on how children extract syntactic knowledge from language exposure and what learning mechanisms may be involved in child language acquisition.

ADDRESSING COMMUNICATIVE PARTICIPATION IN STUTTERING THERAPY.
Presenter(s): Amber Tetreau
Linguistics, Languages, & Speech
Mentor(s): J Scott Yaruss (College of Communication Arts Sciences)

This study examines communicative participation perspectives in adults who stutter and have received speech therapy throughout their lifespan. Communcative participation is a vital aspect of social communication as it defines the level of engagement and success someone has in their daily conversations. An aspect of communication beyond the structure of a conversation but rather what an individual can receive and give from it. Aiming to understand ideas of measuring and properly addressing communicative participation needs in therapy, this study covers a reflection of how communicative participation was covered in previous speech therapy and future goals participants may hope to have covered. This was done through open answer interviews with participants to find personal measures and goals, as well as derive the urgency participants feel in coverage of communicative participation in therapy. This is done in hopes of bringing light to more aspects of stuttering needs beyond fluency. Leading to the larger picture of addressing the social needs and communicative quality that the individual experiences, as well as embracing a multifactoral approach in speech therapy goals and success.

UNDERSTANDING RETENTION: MSU STUDENTS IN LANGUAGE CLASSES
Presenter(s): Alexandra Edwards
Linguistics, Languages, & Speech
Mentor(s): Kathryn McEwen (College of Arts & Letters)

This poster presents research on student enrollment trends in world language courses, specifically German, over multiple years, focusing on attrition and retention patterns. The primary objective is to gain a deeper understanding of how to better support students throughout their language-learning journey. This research analyzed historical class lists from German courses to track students' progression from their initial class to their final one. The data offer insights into student trajectories within the German program through the College of Arts & Letters. Various independent variables, including college major, initial course level, and AP scores, were taken into account in the analysis.

VERB AGREEMENT WITH NON-DP SUBJECTS
Presenter(s): Ezekiel Brown
Linguistics, Languages, & Speech
Mentor(s): Alan Munn (College of Arts & Letters), Louis Konkoly (College of Arts & Letters)

In English, verbs must agree in plurality with their subjects. For example, 'The dog is running' is grammatical, while 'The dogs is running' is not. Conjoined subjects like 'the dog and the cat' behave just like plurals: we can say 'The dog and the cat are running' despite the fact that neither 'dog' nor 'cat' are plural by themselves. By conjoining them, the whole phrase is semantically plural. A similar pattern occurs with conjoined prepositional phrase (PP) subjects: 'Under the bed and in the closet are good places to hide'. However, singular is also possible with these sentences: 'On the couch and by the window is a comfy place to sit'. Previous literature attributed this kind of singular/plural alternation to the semantics of the conjoined phrases. Conjoined PPs interpreted as a single location trigger singular agreement while those interpreted as multiple trigger plural. However, we argue that the verb doesn't agree with the PPs at all. Instead, we analyze it as agreeing "downward" with 'places'/'spot'. Downward agreement, as in sentences like 'There is a dog and a cat in the room', doesn't respect semantic plurality. We predict the PPs' semantic plurality to have minimal impact on agreement. To test our hypothesis, we ask participants to rate the acceptability sentences they read. By presenting them with mismatches between the PPs' semantic pl

INVESTIGATING TEMPORAL INTERPRETATIONS OF COORDINATED EVENTS IN CHILDREN
Presenter(s): Ankith Ram Mohan, Guilherme Eckert Roda, Sophie Motawi
Linguistics, Languages, & Speech
Mentor(s): Alan Munn (College of Arts & Letters), Cristina Schmitt (College of Arts & Letters), John Ryan (College of Arts & Letters), Yaxuan Wang (College of Arts & Letters)

This study explores how people understand the word 'and' in sentences. 'and' has been considered as a simple boolean connector: saying 'The bird has blue feathers and yellow feet' and saying 'The bird has yellow feet and blue feathers' are the same as long as the bird has both properties. But when 'and' connects actions, like 'Alice broke her arm and went to the hospital', it implies the events happened in that order. Saying 'Alice went to the hospital and broke her arm' sounds strange because it reverses the expected sequence. Adults usually prefer sentences where the order of events matches reality. The question arises whether children also care about the order of events when using 'and', or if they treat it just as a boolean connector, ignoring event sequence. While some researchers think children don't focus on such details until later, this idea hasn't been fully tested. The present experiment explores whether kids share adults' preferences or have a different understanding of 'and'. To address this question, children were tested using an acceptability judgement task where they hear a brief story before hearing test sentences containing events conjoined by 'and.'

ATTRITION AND RETENTION OF STUDENT ENROLLMENT IN LESS COMMONLY TAUGHT LANGUAGE COURSES
Presenter(s): Tyler Lindquist
Linguistics, Languages, & Speech
Mentor(s): Emily Uebel (College of Arts & Letters)

This poster highlights research conducted on student enrollments in world language courses across multiple years to examine attrition/retention, with the ultimate goal of better understanding how to better support students throughout their language studies. Researchers examined class lists of Less Commonly Taught Language (LCTL) courses from prior years to track students from their first class to their last. These data give us a picture of student trajectories through LCTL programs. Several independent variables, such as college major, starting course level when enrolled, and any AP/IB/CLEP scores were considered.

STRUCTURAL AMBIGUITY IN L2 SPEAKERS
Presenter(s): Raymond Deng
Linguistics, Languages, & Speech
Mentor(s): Cristina Schmitt (College of Arts & Letters)

Ambiguity is pervasive in natural language. For example, the string "the chicken is ready to eat" has two interpretations: it can be interpreted as "the chicken can start eating" or "the chicken is ready to be eaten". Interestingly not all the same strings are ambiguous across languages and sometimes a string has two interpretations but the preferences change depending on the language. This project examines how L2 speakers interpret ambiguous sentences in English as compared to native speakers of English. We report results from an acceptability judgement task in which participants rate on a Likert scale whether they find an interpretation to an structurally or lexically ambiguous sentence more or less acceptable. Results are analyzed and correlations are calculated to determine effects of age of acquisition, length of time in an English-speaking environment, L1. and how long they have been English-speakers. The project also explores how people from different regions can or cannot accept various interpretations of ambiguous language. This project also explores possible reasons for the rejection of certain interpretations based on how participants' native languages are structured.

EMOJI & AGE: EXPLORING AGE-BASED VARIATIONS IN EXPRESSING EMOTIONS VIA EMOJIS
Presenter(s): Sara Kirkman
Linguistics, Languages, & Speech
Mentor(s): Betsy Sneller (College of Arts & Letters)

In today's digital age, emojis have become a fundamental aspect of online communication, serving to express a variety of nonverbal cues. This study takes a closer look at the emojis used to express laughter, irony, empathy, and cuteness, and examines generational-based differences on emoji selection. Data was collected through a survey distributed to participants across various age groups, asking them to select emojis they would use in prewritten messages using a fill-in-the-blank paradigm. Results show a preference of older individuals towards more literal emoji usage, rather than more subjective interpretations preferred by younger individuals. Results also show that older users are more static in their emoji usage and younger users are more comfortable using the same emoji in multiple contexts.

RELATIONSHIP BETWEEN MUSICALITY, WORKING MEMORY, AND SPEECH AUDITORY-MOTOR SYNCHRONIZATION: A COMPARISON OF ADULTS WHO DO AND DO NOT STUTTER
Presenter(s): Brianna Petersen, Cormac Avila, Shrinidhi Pola
Linguistics, Languages, & Speech
Mentor(s): Bailey Rann (College of Social Science), J McAuley (College of Social Science)

Developmental stuttering is a neurodevelopmental disorder affecting speech motor control, resulting in sound prolongations, speech repetition, and silent blocks (World Health Organization, 2010). Recent research by Zhu, Chen, Chen, and Zhang (2024) compared speech auditory-motor synchronization, working memory, and musical sophistication in adults who stutter (AWS) and adults who do not stutter (AWNS). AWS showed poorer speech auditory-motor synchronization and poorer working memory compared to AWNS but no differences in musical sophistication. Working memory was positively correlated with speech auditory-motor synchronization. The current study replicates and extends the findings of Zhu et al. (2024) using a similar set of methods. Contrary to Zhu et al. (2024), we observed no difference between AWS and AWNS in speech auditory-motor synchronization and working memory. Similar to Zhu et al. (2024) we found no group difference in musical sophistication. We will discuss possible reasons why there are discrepancies between studies.

BUSINESS CERTIFICATE IN MULTILINGUALISM & MULTICULTURALISM
Presenter(s): Jo Warnke
Linguistics, Languages, & Speech
Mentor(s): Meagan Driver (College of Arts & Letters)

Now more than ever, it is important to uphold the value of multilingualism and multiculturalism, and one of the spaces where languages and cultures most commonly meet and interact is in business settings. To promote awareness of multilingual and multicultural communities, I created a certificate program for businesses. This program, in the form of a short and engaging course, equips businesses with strategies and tools to create a more welcoming and accessible environment for people of various linguistic and cultural backgrounds. After successfully completing the course, businesses become certified in Multilingual and Multicultural Awareness. This certificate acts as a message to people of all languages and cultures that they will be welcomed and that all languages and cultures are valued, appreciated, and understood.

LINGUISTIC AND VISUAL EFFECTS ON JUDGING EVENT COMPLETION
Presenter(s): Jaina Kittle, William McLaren
Linguistics, Languages, & Speech
Mentor(s): Jingying Xu (College of Arts & Letters)

Language plays a crucial role in how we represent and describe events. When there is a set of three cookies and I eat all of them, I can say 'I ate three cookies/those cookies'. When not all cookies are eaten or are partially eaten, will the sentences still be true? Previous studies show that judgements are affected by the degree of incompleteness of the visual stimuli and the direct object's determiner type ('those'/'three'). When 2 _ cookies are eaten, participants reject the numeral sentences, but accept the demonstrative sentences because 'those cookies' can be interpreted to refer to a subset of two fully eaten cookies. When each cookie is partially eaten, participants equally accept the sentences of both determiner types due to imprecise readings (as one bite is sufficient to be considered "eating a cookie"). In this experiment, we investigate whether having 'each' in the sentence, 'I ate each of those cookies', would make participants keep the same interpretation strategies in each visual context or make them inspect the completeness status of each object more carefully and trigger more rejections. We find that 'each' affects the judgments in the two visual stimuli differently. Participants reject sentences when 2 _ cookies are eaten, showing that 'each' leads participants to consider the whole set of 3 cookies. However, participants still accept the sentence when each cookie is partially eaten, s

RETENTION OF UNDERGRADUATE FRENCH STUDENTS
Presenter(s): Sarah Regan
Linguistics, Languages, & Speech
Mentor(s): Matthew Kanefsky (College of Arts & Letters)

This Research was conducted on student enrollment in French language courses across multiple years to examine attrition/retention, with the ultimate goal of better understanding how to better support students throughout their language studies. Researchers examined class lists of world language courses from prior years to track students from their first class to their last. These data give us a picture of student trajectories through the French language program. Several independent variables, such as college major, starting course level when enrolled, and any AP/IB/CLEP scores were considered.

INTERPRETING THE SIMPLE PAST AS THE PRESENT PERFECT
Presenter(s): Hannah Choi, Jaina Kittle, Kay Humpert, Mason Dellot
Linguistics, Languages, & Speech
Mentor(s): Alan Munn (College of Arts & Letters), Cristina Schmitt (College of Arts & Letters)

In English, both the simple past ("Did you visit Chicago?") and present perfect ("Have you visited Chicago?") convey event completion, but their uses differ. The past can be used when a specific time in the past is being referred to while the present perfect can be used in contexts where the speaker has an experience of having done something. This is called the experiential perfect and can be indicated by the use of the adverb "ever", for example. Previous research in the MSU Language Acquisition Lab has shown that many speakers allow the past tense in these experiential contexts, and accept sentences such as "Did you ever visit Chicago?". In this study we test this idea further by comparing two discourse contexts, "restricted" and "unrestricted". In a restricted scenario, Person A meets with Person B a week after they told them about their plans to visit Chicago; B now expects A to have gone to Chicago in the past week. In an unrestricted scenario, A simply tells B about their love of travel since they were a child. We would expect both "Did you visit Chicago?" and "Have you visited Chicago?" to be accepted in the restricted context, but only "Have you gone to Chicago?" to work in the unrestricted context. Speakers who accept the past tense in experiential contexts should accept the past tense in unrestricted contexts as well as restricted contexts. Our study will shed more light on the factors that aff

MOST LIKELY TO USE THE SUPERLATIVE: ACQUISITION OF COMPARATIVE AND SUPERLATIVE CONSTRUCTIONS
Presenter(s): Jo Warnke
Linguistics, Languages, & Speech
Mentor(s): Cristina Schmitt (College of Arts & Letters)

Comparative and superlative constructions, especially the ones formed with the morphological affixes "-er" and "-est", respectively, are understudied in acquisition, and are acquired quite late-between 4 to 6 years of age. Transcripts of child speech in the CHILDES database(CITE) and previous elicitation tasks have shown that young children use varying and often inconsistent adjectival morphology for both comparative and superlative constructions even though they perform well in comprehension tasks, so they are conscious of the syntax and semantics of these structures. This data also shows that children begin producing the comparative construction and the absolute forms of adjectives at a much higher rate than the superlative, suggesting that young children are underusing the superlative construction. However, some contexts have a superlative interpretation but speakers use the comparative construction. So in a set of two objects where one is bigger than the other, it makes sense to talk about "the bigger one", meaning the object that is biggest in the set. When the number of objects in the set increases, it becomes odd to discuss the bigger one, and there is a preference for the superlative construction, which in this case is "the biggest one". We designed an elicitation task to determine the extent to which adults and children consistently use the

TESTING GENDER AND ANIMACY WITH ARTIFICIAL LANGUAGE
Presenter(s): Kamryn Jenkins, Ocean Angelo
Linguistics, Languages, & Speech
Mentor(s): Cristina Schmitt (College of Arts & Letters)

Pronoun systems vary in terms of what kinds of features they encode. In English, for example, pronouns carry person, number and gender features. One way to study whether some of these features are more basic than others is to examine these properties in a controlled environment by creating an artificial language that mimics these features. This study uses an artificial language to investigate how learners perform in a task where they must implicitly learn a pronoun system. Inspired by contact between Paraguayan and Argentine Spanish, the artificial language includes a determiner system which agrees with gender features on nouns (±Masc) and a pronoun system which agrees with either animacy (±Anim) or gender (±Masc) of that noun that it refers to. The goal is to determine whether learners are more sensitive to animacy or gender when learning the artificial system and whether they can extend that system to new noun stimuli. Results from this study will contribute to understanding of how learners attend to morphosyntactic features in language learning. By testing learner sensitivity to animacy and gender features across lexical categories, this work provides insight into which grammatical features are most informative or more basic. We predict the results will reveal that either a) participants model explicit grammatical cues related to gender or b) rely on cognitively salient categories like animacy which is not explicitly encoded on determiners.

WHO'S AFRAID OF THE BIG BAD C*NT?: CHANGES IN OFFENSIVENESS ACROSS GENERATIONS
Presenter(s): Sabrina Ruiz
Linguistics, Languages, & Speech
Mentor(s): Betsy Sneller (College of Arts & Letters)

Oppressed and marginalized communities often reclaim words used as slurs against them. The word "queer," once a slur for homosexuals, was chosen and reclaimed by activists, "to disarm their vocabulary and throw it back in their faces." (Stewart & Hamer, 1995, p. 206) Today, "cunt" is widely interpreted as an offensive term in Standard American English. It is hurled as an insult, or to reduce a woman's worth down to her genitals. There are dialects of English, and certain communities, where it strongly contrasts. Instead, it is so casual it is commonplace. In a queer femme environment, such as a Detroit Ballroom, to be called "cunt" is a compliment towards someone's embodiment of femininity. "Is anycunt decent going to be there?" with "-cunt" standing in as a pronoun, like "-body," or "-one," is nonderogatory and inoffensive in Scottish English. In this study, I examine how different derogatory words may have changed in their level of offensiveness across generations. Data was collected through a survey distributed to participants across different age groups, asking them to rate a set of slurs as to how offensive each one is. Data will be analyzed in R.

THE IMPERFECTIVE IN BRAZILIAN AND EUROPEAN PORTUGUESE THROUGHOUT THE CENTURIES
Presenter(s): Guilherme Eckert Roda
Linguistics, Languages, & Speech
Mentor(s): Cristina Schmitt (College of Arts & Letters), Jingying Xu (College of Arts & Letters), John Ryan (College of Arts & Letters), Yaxuan Wang (College of Arts & Letters)

In European Portuguese (EP) there is a preference for the Past Imperfective to be used in contexts where Brazilian Portuguese (BP) uses the conditional. While EP speakers can use the imperfective in sentences such as (1), from Hricsina (2017), BP speakers find the usage odd; (1) 'Se houvesse condições financeiras, do meu ponto de vista, não dava prémios por resultados mas dava-os proporcionalmente às receitas.' (Miguel Galvão Telles); The sentence illustrates the fact that the imperfective has a greater variety of modal uses in EP than it does in BP. Previous works claim that the conditional uses of the imperfective are, to some extent, an innovation, as the uses seem to be more frequent in the last centuries. In this project, we aim to study the new limits of the boundaries of the imperfective, which were expanded because of other changes in the language. In particular, we examine the use of two progressives and the conditional across time using the Corpus Tycho Brahe of historical Portuguese.

IMPLEMENTING USER EXPERIENCE, INCLUSIVITY, AND ACCESSIBILITY IDEAS INTO VIRTUAL REALITY CURRICULUM FOR TRACHEOSTOMY AND LARYNGECTOMY
Presenter(s): Jewell Tyler
Linguistics, Languages, & Speech
Mentor(s): Busra Ensar (College of Communication Arts Sciences), Jeffrey Searl (College of Communication Arts Sciences)

Virtual Reality (VR) technology is quickly becoming a practical tool for students in medical fields to learn procedures in a low-stakes environment. The focus of this study is Tracheostomy and Laryngectomy Care: Virtual Reality Curriculum (TLC-VRC), a curriculum currently in development to provide training to future speech-language pathologists (SLPs), as well as professions from a broader range of healthcare disciplines. This study aimed to gather feedback on user experience , specifically focusing on the inclusivity and accessibility of the TLC-VRC. Inclusivity and accessibility are too often overlooked aspects of the VR user experience; this project aimed to address this gap to make the program functional for all. Ensuring all future practitioners can participate in the valuable education and training the curriculum provides is imperative. Thirteen SLP graduate students participated in the study by completing both pre- and post-play surveys evaluating the experience. The users provided valuable insight into improvements concerning representation and modifications to improve accessibility. The post-user data was largely positive, with many reporting engagement,

MICROBIOLOGY, IMMUNOLOGY, & INFECTIOUS DISEASE

INVERSE CORRELATION OF NK CELLS AND VIRAL LEVELS IN VAGINAL TISSUE 48HRS AFTER INTRAVAGINAL CHALLENGE WITH SHIV-SF162P3 IN RHESUS MACAQUES WITH SUBOPTIMAL PGT121 DELIVERY
Presenter(s): Evan Madden
Microbiology, Immunology, & Infectious Disease
Mentor(s): Jeffery Schneider (Rush University)

Background: Rhesus macaques(RM) that get an intravenous (IV) infusion of the broadly neutralizing antibody (bNAb) PGT121, 24hrs prior to intravaginal challenge with SHIV-SF162P3, are not protected from challenge 1-3 days later. We have shown that it takes 7 days to achieve full antibody occupancy in the vaginal epithelium following IV injection, therefore we set out to understand if timing of antibody injection could alter viral kinetics following challenge. Methods: Utilizing Cy5-labeled PGT121 and sham DEN3, we compared -7 days(n=5) and -1 days(n=5) IV infusion prior to intra-vaginal challenge with SHIV-SF162P3 in RM and measured virus 48hrs later. Tissue and plasma levels of viral RNA and DNA were detected using gag qPCR and antibody levels were measured through Cy5 fluorescence. We used RNA-Seq to probe for transcriptomic differences. We used NKG2A to measure NK cell levels in vaginal tissue. Results: We found less viral RNA and DNA present at the site of challenge 48hrs after challenge in the -7 day group(2/5 RM) compared to the -1 day group(5/5), which correlated with less PGT121 vaginal occupancy. There was an increase in response to virus genes in the -1 day group. In -7 day group, we found increased expression of PP14, a known regulator of NK cell responses. When measuring NK cells we found an inverse correlation with virus in vaginal tissue of the -1 day group. Conclusion: We found that

THE ROLE OF MIGRATORY BIRDS IN THE SPREAD OF LYME DISEASE THROUGH THE DISPERSAL OF INFECTED TICKS
Presenter(s): Alexis Litts
Microbiology, Immunology, & Infectious Disease
Mentor(s): Jen Owen (College of Agriculture & Natural Resources)

The black-legged tick (Ixodes scapularis) is the vector of Borrelia burgdorferi , the bacteria that causes Lyme disease. Lyme disease is the most common tick-borne infection in the United States. While mammals are the primary hosts of this tick, birds can also serve as hosts. Migrating birds have the potential to transport ticks long distances, and this dispersal mechanism has contributed to the rapid expansion of I. scapularis ticks and the pathogens they carry throughout the eastern United States in recent years. Although we know that migrating birds can transport I. scapularis , we still do not fully understand their role in the spread of B. burgdorferi . In this study, we collected ticks from birds captured at the Burke Lake Banding Station, Michigan, USA, during fall migrations from 2018 to 2023, identified the species of ticks collected, and tested I. scapularis for the presence of B. burgdorferi . The prevalence of B. burgdorferi -infected I. scapularis on birds increased from 2.3% to 17.3% between 2018 and 2023. The most commonly infested birds were members of the

ANTAGONISTIC ACTIVITY OF METARHIZIUM ANISOPLIAE AGAINST PHYTOPATHOGENS
Presenter(s): Myah Frazier
Microbiology, Immunology, & Infectious Disease
Mentor(s): Soumya Moonjely (College of Agriculture & Natural Resources)

Metarhizium anisopliae is an entomopathogenic fungal endophyte and symbiont of plants and is used as a biocontrol agent in some agricultural systems. It colonizes plants, infecting harmful insects and returning nitrogen to the host plant. Previous research has demonstrated anti-fungal properties of M. anisopliae against phytopathogens such as Fusarium graminearum , the causal agent of Head Blight in wheat. The objective of this research is to assess the potential antagonistic properties of M. anisopliae against other phytopathogens: F. virguliforme, Colletotrichum fiorinae, Magnaporthe oryzae, C. spaethianum, Alternaria alternata, Cercospora beticola , and Cochliobolus heterostrophus . Antagonistic potential of M. anisopliae against phytopathogens was evaluated by quantifying reductions in mycelial growth, conidial germination, and symptom mitigation in diseased plants. To observe mycelial growth inhibition, dual-culture Petri dish as

USING ENVIRONMENTAL DNA TO STUDY MICROBIAL DIVERSITY IN GREAT LAKES SEDIMENTS
Presenter(s): Maggie Dobry
Microbiology, Immunology, & Infectious Disease
Mentor(s): Nicole Smith (College of Natural Science)

Sediment cores were collected from 3 of the Great Lakes (Erie, Huron, and Superior) aboard the RV Blue Heron in Summer 2024. A major focus of the study was to understand how biological communities in the Great Lakes Basin have varied over time (the last 12,000 years) using ancient DNA from deep (several meters) sediment cores. In addition to the deep cores, shallow (0-40 cm) cores were also collected from each site to study how modern microbial communities may impact sediment chemistry and biomolecular preservation. The shallow cores were sub-sampled in 4 cm increments and environmental DNA was extracted. After extraction, DNA was quantified using fluorometry, PCR-amplified, and submitted for sequencing. By comparing microbiological results with sediment characteristics, we can better understand how biodiversity changes with depth and how it may influence geochemical profiles. Additionally, by studying modern systems in Great Lakes sediments, and their relationship to the water column, we can relate the sedimentary record to the environmental health of this ecosystem. When these profiles are compared, we can begin to piece together a larger picture of how biodiversity in the Great Lakes Basin has changed spatially and temporally which may help us to predict future changes.

CHARACTERIZATION OF GLUTEN-INDUCED AUTOANTIBODY RESPONSE IN A MOUSE MODEL.
Presenter(s): Chris Van Antwerp
Microbiology, Immunology, & Infectious Disease
Mentor(s): Tamil Selvan Arul Arasan (College of Agriculture & Natural Resources), Venugopal Gangur (College of Agriculture & Natural Resources)

During the previous year, we discovered that mice produce autoantibodies upon exposure to gluten in the absence of an adjuvant. Here, I will characterize the autoantibody response in this mouse model. There are 2 aims: 1) to characterize the autoantibody response in common bread wheat gluten exposed mice; and 2) to characterize the autoantibody response in durum wheat gluten exposed mice. I expect to determine the relative capacity of 2 types of wheat glutens to elicit autoimmunity in this model.

TCBS SELECTS FOR QUINOLONE RESISTANCE IN V. CHOLERAE DNA REPAIR MUTANTS
Presenter(s): Drew Johnson
Microbiology, Immunology, & Infectious Disease
Mentor(s): Alex Wessel (College of Natural Science), Christopher Waters (College of Osteopathic Medicine)

Thiosulfate Citrate Bile-Salts Sucrose (TCBS) agar is commonly used as both a selective and differential medium for isolating marine Vibrios , including the aquatic human pathogen Vibrio cholerae . While it is valuable as a rapid and inexpensive diagnostic tool, we have observed that certain V. cholerae mutant strains grow poorly when cultured on TCBS agar. In particular, certain strains of DNA repair mutant V. cholerae are strongly attenuated for growth on TCBS agar. However, after evolving these mutants on TCBS, we identified suppressor mutations in DNA gyrase which result in not only restored growth on TCBS, but resistance to quinolone antibiotics. Our results indicate that the selectivity of TCBS regarding these DNA-repair mutants works in a similar fashion to quinolone antibiotics.

FUSOBACTERIUM AND STREPTOCOCCUS INTERACTION IN ANAEROBIC BIOFILMS
Presenter(s): Jane Schell
Microbiology, Immunology, & Infectious Disease
Mentor(s): Jonathan Hardy (College of Human Medicine)

We have found that Streptococcus mutans ATCC strain 25175 has two colony morphologies. One is larger and slimy, and one is small and dry. These two types are genetically stable. The large colony only gives large colonies when struck out and the small one only gives small colonies. We first thought one must be a contaminant, but both were identified as S. mutans by the MSU Veterinary Diagnostic Lab with high confidence. The two types interact differently with Fusobacterium in anaerobic biofilms, which are a model of the gingival space microbiome. The small colony type inhibits Fusobacterium , while the large colony type does not. We are investigating why these two types are different, and why only the small type inhibits Fusobacterium .

EVOLUTION OF VGLL3 IN EUBLEPHARIS MACULARIUS
Presenter(s): Sofya Mishina
Microbiology, Immunology, & Infectious Disease
Mentor(s): Yun Liang (College of Osteopathic Medicine)

Lupus, or systemic lupus erythematosus (SLE), is a chronic autoimmune disease that occurs when the body's immune system attacks its own healthy tissues and organs. Symptoms can be treated with steroid drugs but not the condition. An estimated 204,000 people have SLE in the United States, according to the most recent data available. (As stated by CDC) Dr. Yun Liang's research identified the role of transcription factor of VGLL3 and its role in sex-biased autoimmune diseases, like lupus, by activating inflammation pathways. Moreover, it suggested that female-biased VGLL3 overexpression is due to metabolic stress, a key factor in placental mammals when carrying and giving birth to offspring. (Liang Y., 2016) Dr. Yun Liang's lab studies the role of VGLL3 in placental mammals (mice and humans). The proposed research focuses on looking at the role of VGLL3 in non-mammalian systems and comparing it with its function in mammals. The chosen model of study is Eublepharis macularius (Leopard gecko), due to there being documented cases of reptilian systems expressing symptoms of SLE (Fredric L., 1978). It is a less studied area of research that allows to test the idea of VGLL3 overexpression's linkage to metabolic stress during pregnancy in a non-placental system by performing qPCR, West

INVESTIGATING THE ROLE OF EIPA DURING BRUCELLA OVIS INFECTION OF MACROPHAGE-LIKE CELLS
Presenter(s): Mckenna Goike
Microbiology, Immunology, & Infectious Disease
Mentor(s): Melene Alakavuklar (College of Natural Science)

Brucella ovis is an intracellular pathogen that is the main cause of Brucellosis in sheep. In this research project, we studied the role of the envelope integrity protein A (EipA) in B. ovis. eipA is an essential gene in B. ovis therefore it cannot be deleted from the genome. To study the function of EipA we used a conditional EipA depletion strain. EipA is a periplasmic protein with a domain of unknown function (DUF 1134) and it is conserved throughout Alphaproteobacteria. When depleted of EipA, Brucella cells appear in chains and rounded as opposed to the wild-type singular coccobacilli form. A driving piece of investigation is to recognize the size and shape differences of cells with and without EipA when within host cells following infection. To model infection, we infected d

PRESTO-TANGO SCREENING OF CONDITIONED MEDIA FROM HPV+ HEAD AND NECK CANCER CELLS
Presenter(s): Chinmay Chouthai
Microbiology, Immunology, & Infectious Disease
Mentor(s): Johnathon Garber (College of Human Medicine)

The tumor microenvironment is increasingly recognized as crucial to carcinogenesis and the development of therapeutics for cancer. Human papillomavirus (HPV)-positive head and neck squamous cell carcinoma (HNSCC) is characterized by a tumor microenvironment (TME) that is extensively infiltrated with immune cells, despite successful escape of the tumor cells from the immune response. To better understand the role of the microenvironment and chemokine-dependent cell recruitment in HPV+ HNSCC, we employed PRESTO-Tango screening to investigate G protein-coupled receptor (GPCR) chemokine receptor activation by ligands in conditioned media from HPV+ HNSCC cell lines vs. normal control cells. Using this approach, we measured GPCR activation events via luciferase activity to determine which chemokine receptors may be key contributors to immune cell recruitment in HNSCC tumors.

INVESTIGATING THE ROLE OF INTERFERON MODULATORS ON ISRE SIGNALING
Presenter(s): Alekya Vudathu
Microbiology, Immunology, & Infectious Disease
Mentor(s): Aubree Muethel (College of Osteopathic Medicine), Yun Liang (College of Osteopathic Medicine)

The JAK/STAT signaling pathway plays a critical role in immune regulation, particularly through Type I interferon signaling. Type I interferons (IFNa) activate the JAK/STAT pathway, which induces the Interferon Stimulated Response Element (ISRE), a key DNA element that initiates the expression of interferon-stimulated genes (ISGs). These ISGs are essential for mounting an effective immune response. Dysregulation of Type I interferons has been implicated in the pathogenesis of autoimmune diseases, including Systemic Lupus Erythematosus (SLE), making it a promising target for therapeutic intervention. In this study, we hypothesize that targeting ISRE with immune modulators, such as the JAK/STAT inhibitor FLLL32, could disrupt immune signaling and induce distinct downstream effects on cellular function, offering insights into lupus pathogenesis. To test this hypothesis, HEK293T cells expressing an ISRE-eGFP reporter were treated with FLLL32. ISRE activation was monitored via GFP fluorescence, and the effects of JAK/STAT inhibition on immune signaling were assessed by changes in the number of GFP-positive cells and mean fluorescence intensity. Additionally, qPCR was used to quantify ISG expression. Our findings will provide valuable insights into how specific modulation of the JAK/STAT pathway influences immune function and may inform potential therapeut

THE EFFECT OF EXOSOMES ON PAIN SENSITIVITY
Presenter(s): Dashiell Jones
Microbiology, Immunology, & Infectious Disease
Mentor(s): Aaryn Edwards (College of Natural Science), Geoffroy Laumet (College of Natural Science)

Chronic pain affects approximately 50 million Americans and represents a significant financial burden on society, with costs exceeding $600 billion annually in medical expenses and lost productivity. Various cell types, including neurons, keratinocytes (skin cells), and immune cells, play crucial roles in pain. However, the mechanisms by which these cells communicate within tissues to modulate pain remain poorly understood. Extracellular vesicles are released by all cells within the human body and play a vital role in intercellular communication. Small extracellular vesicles (sEVs), primarily exosomes, house a large variety of cellular contents, such as DNA, RNA, lipids, metabolites, and membrane proteins. I hypothesize that exosomes are involved in intercellular communication that modulate pain sensitivity. The goal of this project is to understand whether the presence of exosomes affects pain sensation. Distinct groups of mice were injected with Manumycin-A and GW4869. Manumycin-A and GW4869 inhibit sEV biogenesis. Mechanical and thermal pain were measured using von Frey and Hargreaves' methods, respectively, two established techniques used in pain research. Mice injected with GW4869 were found to be more sensitive to pain than the control group, while mice injected with Manumycin-A exhibited no significant difference in pain sensitivity from mice injected with the vehicle. Size exclusion chromatography was used

QUANTIFYING STAPHYLOCOCCUS AUREUS INTERACTIONS WITH THE GLYCOLYSIS BY-PRODUCT METHYLGLOYOXAL

Presenter(s): Mckenna Major

Microbiology, Immunology, & Infectious Disease

Mentor(s): Neal Hammer (College of Natural Science)

Methylglyoxal (MGO) is a toxic byproduct of glycolysis that is produced by bacterial and mammalian cells. The MGO detoxification pathway in the bacterial pathogen Listeria monocytogenes is glutathione (GSH)-dependent, while Escherichia coli encodes both GSH-dependent and GSH-independent MGO detoxification pathways. To investigate whether GSH is involved in the detoxification of MGO in Staphylococcus aureus, Kirby Bauer disk diffusion assays using tryptic soy agar (TSA) with or without GSH and disks impregnated with MGO were performed. This analysis revealed that addition of GSH to TSA does not reduce the zone of inhibition of S. aureus when treated with MGO. S. aureus encodes genes with greater than 25% homology to the E.coli GSH-dependent and GSH-independent MGO detoxification systems. To determine whether these genes encode MGO protective enzymes, inactivating mutations were generated in S. aureus and a series of minimum inhibitory concentration (MIC) assays were performed using increasing concentrations of MGO. MICs were calculated when S. aureus was cultured in both rich tryptic soy broth (TSB) or chemical defined media (CDM) supplemented with either GSH or cystine (CSSC) as the sulfur source. Contradictory to the Kirby Bauer assay, the more sensitive MIC assay showed that GSH provides S. aureus with moderate protection against MGO. Additionally, of the seven mutants tested, three exhibited decreased MIC, indicating a potential MGO detoxification function. Further inve

EGGSHELL MICROSTRUCTURE AND QUALITY

Presenter(s): Coner Kouza

Microbiology, Immunology, & Infectious Disease

Mentor(s): Carl Boehlert (College of Engineering), Per Askeland (College of Engineering)

The safety and marketability of eggs depend a lot on the quality of their shells, but there isn't much information about how different egg production methods affect shell strength and porosity. To find out if production systems make different kinds of eggshells, I used a scanning electron microscope to study the shells of free-range and caged system eggs. I looked at shell strength by testing how much force the shells can take before they break. We also did some 2D and 3D image analysis using the SEM data and a special 3D micro-CT program. I saw differences between the two groups in how the shell crystals are arranged, the size of the pores, and the strength of the shells. I think that the microstructure of the eggshells is different, which could influence how the eggs resist microbial contamination (if at all).

IDENTIFIYING SURROGATE SPECIES FOR FOODBORNE PATHOGEN RESEARCH

Presenter(s): Jocelyn Dooley

Microbiology, Immunology, & Infectious Disease

Mentor(s): Teresa Bergholz (College of Agriculture & Natural Resources)

Wheat grain is an emerging source of foodborne pathogens. Contamination of grain can occur during a variety of steps during food processing, including growth, harvest, transport, and storage (Chen et al., 2021). Emerging pathogens for wheat grain particularly involve cases of Escherichia coli and Salmonella. These outbreaks are persisting despite initial assumptions that low moisture foods have low risk of transmitting foodborne pathogens (Lauer et al., 2021). Therefore, the need exists to further investigate wheat grain as a source of foodborne pathogens. Tempering is used as a mechanism to strengthen the grain and lessen the amount of endospores prior to milling through the addition of water. This step is susceptible to microbial contamination due to the humidity and temperature in which tempering occurs, which allows for the proliferation of microbes (Chen et al., 2021). Through investigating the microbes present on natural wheat grain, the susceptibility of these strains to the tempering process can be investigated. Surrogate species contributing to the contamination of wheat grain with foodborne pathogens can be identified through utilizing methods of<span sty

KNOCK-OUT MUTATIONS OF ACEE AND NAGA IN E. COLI NISSLE 1917 IMPEDE CLEAVAGE OF PROTECTIVE MUCIN LAYER IN THE GUT WALL

Presenter(s): Rowan Litts
Microbiology, Immunology, & Infectious Disease
Mentor(s): Rhiannon LeVeque (College of Natural Science), Ritam Sinha (College of Natural Science), Victor DiRita (College of Veterinary Medicine)

The role of the degradation of mucin, a protective carbohydrate layer within the crypts of the gut wall, has been extensively studied for its role in gut colonization of both commensal and pathogenic gastrointestinal (GI) bacteria. Many of the sugar components of mucin can be catabolized by GI bacteria as an energy source, resulting in the degradation of the mucin layer and the exposure of the gut wall, which is vulnerable to colonization by pathogenic bacteria. To study the role of these metabolic pathways in gut colonization, I constructed knock-out mutants of essential genes for the catabolism of mucin sugar components in E. coli Nissle 1917, a probiotic bacterial strain frequently used in the treatment of gastrointestinal GI disorders. First, I knocked out the aceE gene, an essential in the pyruvate dehydrogenase complex (PDHc) that degrades the pyruvate product of glycolysis to initiate the citric acid cycle. Second was the nagA gene, which is responsible for the de-acetylation of N -acetylglucosamine (GlcNAc) that allows for the molecule to enter glycolysis. Both of these genes are essential for mucin degradation, as glucose and GlcNAc are abundant sugar components of mucin. Further studies of thes

PURIFICATION OF THE BACTERIAL MICROCOMPARTMENT H-PROTEIN BY USING A NOVEL HEAT-TREATMENT PROCEDURE

Presenter(s): Abigail Thompson
Microbiology, Immunology, & Infectious Disease
Mentor(s): Robert Hausinger (College of Natural Science), Yali Wang (College of Natural Science)

Bacterial microcompartments (BMCs) are protein-based organelles composed of hexameric shell proteins (BMC-H) that may also incorporate trimeric (BMC-T) and/or pentameric (BMC-P) proteins to form a selectively permeable scaffold which encapsulates specific enzyme cargo. The synthesis of BMC-H from Haliangium ochraceum (HO) in Escherichia coli leads to sheet or tube-like assemblies, with undefined conditions governing the outcome, and denaturing agents are typically required to solubilize these inclusion bodies for further use. In this study, we developed a rapid method for purifying soluble BMC-H. By partially diluting cleared cell lysate and applying heat treatment at 90-100°C, we obtained highly pure and soluble hexamers in the supernatant. Additionally, we demonstrated that the purified hexamer assembles with trimeric shell proteins (BMC-T) to form HT shells in vitro. This simplified purification method can be easily scaled and applied to other BMC-H proteins, overcoming challenges related to solubility and structural variability. This approach provides an efficient strategy for BMC-H purification, facilitating its future use in cargo loading and functional studies, including biocatalysis and nanomaterial applications.

SEX DIFFERENCES WITHIN THE INFLAMMATORY RESPONSE FROM SLE123 AND C57BL/6 MICE
Presenter(s): Sarah Raspanti
Microbiology, Immunology, & Infectious Disease
Mentor(s): James Pestka (College of Agriculture & Natural Resources), Vanessa Estrada (College of Natural Science)

Autoimmune disease, where the immune system attacks the host tissue, is a significant financial and health burden. It affects ~50 million Americans, and the overall cost is $50-70 billion annually. There are over 80 kinds of autoimmune diseases, and they are often hard to diagnose due to their overlapping symptoms. Factors such as genetics and environmental triggers, like toxicants, can contribute to the development of autoimmune disease. Silica is one of the most abundant minerals on earth, and respiratory exposure has been epidemiologically linked to the autoimmune disease systemic lupus erythematosus. This disease is 9 times more likely to occur in women, and results in unresolved inflammation and symptoms in various body parts. It is important to study what kind of responses these triggers may cause in patients with lupus. Our lab utilizes the SLE123 mouse model, which is a lupus-prone model that has the background of a C57BL/6 mouse. Using the SLE lupus mouse model, it is possible to derive fetal liver-derived alveolar macrophages (FLAMs) that recapitulate the alveolar macrophage phenotype, which would otherwise interact with inhaled silica in the lung. I will employ both female and male FLAMS respectively from SLE123 and C57BL/6 mice to determine if there are sex differences within the inflammatory response. To prime the cell's inflammas

DEFINING GLYCEROL BINDING TO THE MYCOBACTERIUM TUBERCULOSIS PROTEIN PPE51
Presenter(s): Madison Enviya
Microbiology, Immunology, & Infectious Disease
Mentor(s): Robert Abramovitch (College of Veterinary Medicine)

Mycobacterium tuberculosis (Mtb) has evolved to adapt its physiology to various environmental cues, including changes in pH. A key stage of infection for Mtb is adapting to survive in the acidic environment of the phagosome. When cultured on non-permissive carbon sources (e.g. glycerol) at a pH of 5.7, Mtb restricts its growth in a phenomenon known as acid growth arrest. Previously, a genetic selection was conducted to discover mutants that can grow on glycerol at acidic pH, isolating mutants of ppe51 . These mutants exhibit a phenotype called enhanced acid growth (EAG). The ppe51 gene encodes for the protein PPE51; three mutant variants of ppe51 (S211R, A228D, and E215K) were identified with the EAG phenotype. Additional studies have raised the hypothesis that PPE51 functions to promote glycerol uptake across the impermeable mycomembrane. The goal of this study was to determine the biochemical interactions of PPE51 with glycerol at an acidic pH and the impacts of mutations on these interactions. These findings will allow us to better understand the mechanism of PPE51 and glycerol uptake in Mtb. We hypothesize that the wild-type and mutant variants have differential biochemical interactions with glycerol, leading to the different growth phenotypes. To achieve this goal, I

METHOD DEVELOPMENT FOR SCENEDESMUS OBLIQUUS QUANTIFICATION USING THE COULTER COUNTER.
Presenter(s): Anthony Paivarinta
Microbiology, Immunology, & Infectious Disease
Mentor(s): Lindsey Thompson (College of Natural Science), Nina Wale (College of Natural Science)

Method development for Scenedesmus Obliquus using the coulter counter to increase efficiency and accuracy in feeding Daphnia colonies.

PHAGE ENCODED TRANSCRIPTION FACTORS AND THEIR ROLES IN VIRULENCE
Presenter(s): Brooke Ognian
Microbiology, Immunology, & Infectious Disease
Mentor(s): Daniel Maddock (College of Agriculture & Natural Resources)

Motility is the ability of an organism to move on its own by expending energy. In bacteria motility is crucial for key characteristics such as pathogenicity. Bacteria move in several ways, including swimming and swarming, which are controlled by flagella, and twitching, which relies on pili. Pseudomonas syringae , a plant pathogen that causes bacterial canker in cherry trees, depends on motility for successful invasion and colonization of host plants. Previous research has shown that within the genome of Pseudomonas syringae , a prophage is present, and its deletion reduces both motility, and thus, pathogenicity. This suggests that the prophage plays a role in regulating these phenotypes. The goal of this study is to determine whether introducing specific transcription factors back into the prophage deletion mutant can restore motility to wild-type levels. The prophage deletion mutant will be compared to the wild type, and each new tested mutant will contain one of five transcription factors reintroduced into its genome. We will test the impact of these transcription factors on bacterial motility through swimming, swarming, and twitching motility assays and growth curve assays. The results of this study will identify the role of these transcription factors in moti

ASSESSING ANTIBIOTIC RESISTANCE IN E. COLI, K. PNEUMONIAE, AND E. CLOACAE USING ZETA POTENTIAL
Presenter(s): Josie Cayen
Microbiology, Immunology, & Infectious Disease
Mentor(s): Evangelyn Alocilja (College of Agriculture & Natural Resources)

Antimicrobial Resistance (AMR) is a developing issue in public health where infectious bacteria, viruses, parasites, and fungi no longer respond to certain antimicrobials [1]. This has created a problem where microbial infections can become difficult to treat, which increases disease spread and death rates. In 2019 alone, AMR contributed to 4.95 million deaths [1]. The rapid determination of a bacterium's antibiotic resistance profile is critical in reducing the clinical and agricultural overuse of last-resort carbapenem antibiotics which select for Carbapenem Resistant Enterobacterales (CRE). One of the areas lacking in the current development of rapid diagnostics for AMR bacteria is the difference in cell surface potentials between AMR and drug-susceptible bacteria [2]. Thus, the aim of this work is to develop a database of zeta potential measurements to support a phenotypic rapid diagnostic method in determining drug susceptibility. The zeta potential of bacterial samples was measured to differentiate Carbapenem-susceptible Escherichia coli (E. coli) from Carbapenem-resistant E. col

THE EFFECT OF ZINC ON PHOSPHODIESTERASES IN VIBRIO CHOLERAE
Presenter(s): Marissa Malleck
Microbiology, Immunology, & Infectious Disease
Mentor(s): Aathmaja Anandhi Rangarajan (College of Osteopathic Medicine), Christopher Waters (College of Osteopathic Medicine)

Cyclic di-GMP is a signaling molecule that regulates biofilm formation and motility and contributes to bacterial infection in Vibrio cholerae. Cyclic di-GMP is regulated by many enzymes, including diguanylate cyclases (DGCs), which synthesize cyclic di-GMP, and phosphodiesterases (PDEs) which degrade intracellular levels of c-di-GMP. We have previously found that zinc binds ZpdA (vc0515) PDEs in the EAL domain. Several EAL phosphodiesterases are present in V. cholerae, which collectively regulate intracellular zinc levels. We are currently investigating the roles of 11 other EAL phosphodiesterases and the impact of zinc on influencing cyclic di-GMP levels. We are determining the effect of zinc on EALs by measuring the levels of cyclic di-GMP upon overexpression of EALs. In our assay, we are measuring cyclic di-GMP with a mNeonGreen fluorescent biosensor, which contains a riboswitch fused to the mNeonGreen protein that fluoresces in the presence of cyclic di-GMP. We plan to conduct biofilm and motility assays to determine the effect of EALs in the presence and absence of zinc. Our results highlight

INVESTIGATING THE SPATIAL METABOLOME OF MOUSE GUT-LUMEN USING MALDI-TOF MASS SPECTROMETRY

Presenter(s): Gillian Robbins
Microbiology, Immunology, & Infectious Disease
Mentor(s): Jacob Haffner (College of Natural Science), Tian (Autumn) Qiu (College of Natural Science)

Metabolomic investigations reveal information about host-microbe interactions and their associated chemical processes through studying the presence and interactions of small molecules within the gut. Investigation of metabolomics profiles in gut-lumen samples will help to reveal the molecular features potentially associated with gut-microbiome interactions. This project investigates spatial distributions and localizations of metabolites in Balb/c mouse gut-lumen samples and compares the ionic signals to those found in C-57 mice to investigate strain differences. For this experiment, we collected proximal and mid-colon samples from Balb/c mice and embedded them in a 5% carboxymethylcellulose (CMC) solution. We then cryosectioned the samples, oriented as cross sections with a thickness of 16 µm, and thaw-mounted the sections onto indium tin oxide (ITO) coated slides. We sprayed the slides with a 2,5-dihydroxybenzoic acid (DHB) matrix and analyzed them using matrix-assisted laser desorption/ionization mass spectrometry imaging (MALDI-MSI) on a Bruker timsTOF fleX mass spectrometer. Using the SCiLS software for data analysis, we were able to identify ion signals that belonged only to the gut wall (m/z 86.0965, m/z 71.073) and the lumen (m/z 331.0383, m/z 101.0598). Some ions localized to both the tissue and interface as a gradient-type pattern; however, we did not find any signals localized only to the epithelium-lumen interface. Our findings demonstrate the efficacy of using MA

BIOMETRIC MONITORING AND EARLY DETECTION FOR BOVINE LEUKEMIA VIRUS IN DAIRY ANIMALS

Presenter(s): Delaney Dixon
Microbiology, Immunology, & Infectious Disease
Mentor(s): Scott Sherrill-Mix (College of Veterinary Medicine)

Bovine leukemia virus infections cause significant challenges in the cattle industry, including decreased animal health, welfare, and longevity and reduced production and profit margins. Studies estimate that BLV infects over 40% of US dairy cows and costs the industry over $525 million annually. Despite this large burden, little is known about when and how the virus transmits between animals. This study aims to identify the timing and vectors of BLV infection among dairy animals using SmaxTec biometric sensors. These sensors were deployed in the rumen of young dairy cows to track temperature, rumination, and locomotion in real time. Blood is sampled from cows showing biometric signs of potential infection, and molecular assays for recent BLV infection are used to flag transmission events in these cattle. Once BLV infections are identified molecularly, biometric signatures specific to BLV will be determined and used to separate out nonspecific clinical signs. Here, I will develop a software library to interface with the data output from the tag provider, process the data, flag potential illnesses, and compare animals and time points. Once completed, this study aims to contribute to developing sustainable disease control strategies within the cattle industry to enhance animal welfare and economic resilience.

REGULATION OF BIOFILM AND MOTILITY WITH ZNUABC DELETION IN VIBRIO CHOLERAE
Presenter(s): Preethika Lakshminarayanan
Microbiology, Immunology, & Infectious Disease
Mentor(s): Aathmaja Anandhi Rangarajan (College of Osteopathic Medicine), Christopher Waters (College of Osteopathic Medicine)

Vibrio cholerae is a gram-negative bacterium known for living in aquatic environments and causing diarrheal diseases. Cyclic di-GMP is an important secondary messenger located within V.cholerae that controls the switch between the microorganism's motile and stationary - marked by biofilm buildup - states, with high levels leading to more biofilm formation and low levels leading to greater motility. This messenger is produced by diguanylate cyclases (DGC) and broken down by phosphodiesterases (PDE). Previous findings show that znuABC deletion in the N16961 strain results in high c-di-GMP levels and that zinc inhibits a few DGCs that help make c-di-GMP. Because of this, we intend to explore if other V.cholerae mutant strains with znuABC deletions - such as E7646 and C6706 - also exhibit this trend of high biofilm formation and low motility. As a control, the mutant strain E7646 ?12 DGC - which lacks several DGCs crucial for c-di-GMP synthesis and biofilm formation - will be used. So far, we have made mutant strains of E7646 and C6706 and will perform motility and biofilm assays on all three mutant strains.

DEVELOPING A TECHNIQUE FOR BUILDING RANDOM BACTERIOPHAGE TRANSPOSON LIBRARIES
Presenter(s): Ashlynn Linet
Microbiology, Immunology, & Infectious Disease
Mentor(s): Christopher Waters (College of Osteopathic Medicine), Geoffrey Severin (College of Osteopathic Medicine)

This novel project aims to develop a strategy for creating bacteriophage transposon mutant libraries, similar to the genetic screening technique Tn-Seq used in bacteria, for the identification and characterization of essential bacteriophage genes. Three major hurdles exist to the development of such a tool: 1) identification of a suitable bacterial host, 2) identification of bacteriophage-specific selectable markers, and 3) isolation and propagation of transposon-containing bacteriophage. The cyclic oligonucleotide-based anti-bacteriophage signaling system (CBASS) is an abortive infection mechanism present in bacteria that protects against bacteriophage infection. Acb1 is a bacteriophage-encoded protein that degrades essential CBASS cyclic nucleotides, thus neutralizing CBASS and enabling successful bacteriophage replication. We hypothesize that bacteriophages normally restricted by CBASS in an E. coli host can overcome this defense through the acquisition of a transposon-encoded acb1 . To test this, we have engineered a plas

PHAGE INTERACTIONS WITH DEFENSE GENE VCA0483
Presenter(s): Mehak Banga
Microbiology, Immunology, & Infectious Disease
Mentor(s): Christopher Waters (College of Osteopathic Medicine), Jasper Gomez (College of Natural Science)

Phage therapy has recently gained attention as an alternative to antibiotics due to the emergence of antimicrobial resistance. Phage are viruses that specifically infect bacterial cells and cause cell death/lysis. However, bacteria can inhibit phage infection by utilizing various molecular defense systems. Using a Vibrio cholerae genomic library in Escherichia coli, we identified a unique cosmid that protects against T2, T4 and T6 infection. Transposon mutagenesis revealed that vca0483 is required for protection against T-even phage. I confirmed vca0483 was sufficient for T-even protection by performing PFU counts with a series of 10 phages. To identify whether vca0483 is protective against varying T-even phage, I screened related phages from the BASEL collection that were T-even like and identified BAS39 phage that was resistant to vca0483 protection. An in-depth genomic analysis of BAS39 showed a unique hypothetical protein that wasn't encoded in the rest of the T-even and the T-even like phages in the collection. I am currently working on identifying whether this unique hypothetical protein can inhibit vca0483

INFLUENCE OF PESTICIDE EXPOSURE ON MODULATING THE LUMBRICUS TERRESTRIS GUT MICROBIOME

Presenter(s): Tai Brass

Microbiology, Immunology, & Infectious Disease

Mentor(s): United States Geological Survey Upper Midwest Water Science Center

Earthworms (Lumbricus terrestris) are essential animals needed for the processing of soils in both agricultural and vermicomposting systems and require proper attention and care to ensure the success of ecosystem services. By feeding upon organic matter and mineral soil, earthworms pass this material through their guts and increase the availability of soil nutrients. This results in a shift in microbial composition that increases total soil diversity, with notable increases in Bacteroidetes and Proteobacteria (Aira et al., 2022). Microorganisms are critical in soil nutrient cycling, so dysbiosis within the earthworm gut may impact the success of invertebrate-accelerated decomposition. Despite this, little research has focused on the impact of insecticides, such as neonicotinoids, on the earthworm gut microbiome. The leeching of these pesticides can contaminate adjacent soils, and pesticidal seed coatings may pose an increased health risk to earthworms that feed upon plant seeds, which may influence's the earthworm's gut microbiome. To investigate these impacts, we characterized changes in the soil and earthworm gut, cast, and depurate bacterial communities with or without exposure to neonicotinoids through Illumina MiSeq Bacteria 16S rRNA amplicon sequencing. Soil samples were analyzed before, during, and after passage through the earthworm gut. Impact of pesticide exposure will be analyzed over the course of 3 months, potentially revealing differences in short and long-te

CAN MACHINE LEARNING BE UTILIZED TO EFFECTIVELY QUANTIFY INFECTIOUS PATHOGENS FOR INDIVIDUAL HOSTS?

Presenter(s): Jade O'Brien

Microbiology, Immunology, & Infectious Disease

Mentor(s): Ashwini Ramesh (College of Natural Science)

In most scientific fields, infection is a matter of infected or not infected, but our experiment aims to quantify the degree to which a host is infected. With the help of Flow Cytometry and the subsequent imaging analysis software, we compare manual spore counts within individual Daphnia samples to AI masking software trained to identify spore structures. Our research seeks to push the limits of artificial intelligence to minimize manual counting and improve the quality and speed of researchers in immunology and microbiology.

INVESTIGATING THE GENETIC BASIS OF TETRODOTOXIN METABOLISM: EXPLOITING REDUCED SYNTHESIS IN HOST-DERIVED ISOLATES.

Presenter(s): Julia Walton, Nick Demski

Microbiology, Immunology, & Infectious Disease

Mentor(s): Aretha Fiebig (College of Natural Science), Heather Eisthen (College of Natural Science), Samantha Westcott (College of Natural Science)

Tetrodotoxin (TTX) is a potent neurotoxin that blocks voltage-gated sodium channels, which are essential for generating action potentials. In the 1960's the structure of TTX was identified and in the 1980's researchers discovered that bacteria linked to marine animals are capable of producing TTX, yet the biosynthetic pathway has continued to elude scientific understanding. Since the first lab synthesis of TTX, chemists have optimized in vitro creation of TTX to a minimum of 24 steps. This lengthy process suggests that TTX may be metabolically expensive for bacteria to produce. Many papers suggest that TTX-producing bacteria isolated from their host rapidly halt production of TTX, but this claim is not supported by strong evidence. Nevertheless, if true, we can harness this trait to compare bacterial genomes and transcriptomes before and after TTX production stops to gain insights into its genetic basis. We chose 1 strain of Pseudomonas and 2 strains of Aeromonas from our collection of TTX-producing bacteria isolated from rough-skinned newts (Taricha granulosa) to passage through hundreds of generations in replicate, monitoring TTX production over time. Twice a week (~every 25 generations), we collect cell pellets for DNA and RNA sequencing and supernatant for TTX quantification. We prep

INFECTING HTR8 PLACENTAL CELLS WITH LISTERIA, AND EXTRACTING EV'S (EXTRACELLULAR VESICLES) FROM THEM

Presenter(s): Dieny Diallo

Microbiology, Immunology, & Infectious Disease

Mentor(s): Jonathan Hardy (College of Human Medicine)

Listeria is a foodborne bacterial illness that when contracted can cause fevers, muscle aches, diarrhea and more. It is especially dangerous for pregnant women as it can pass from pregnant women to their fetus and cause preterm birth, or miscarriages. This project consists of infecting HTR8 cells, which are a transformed placental cell line with Listeria . Using our cultured and treated cells, we then extracted extracellular vesicles (EVs) to analyze our protein content. Our data revealed that we had 81 proteins found. 70 of which were in both samples, while only 2 of the proteins found were solely in our treated sample and 9 of them were solely in our controlled one.

ANALYSIS OF DAPHNIA MICROBIOMES IN SEARCH OF SPIROBACILLUS CIENKOWSKII

Presenter(s): Anne Lemek

Microbiology, Immunology, & Infectious Disease

Mentor(s): Nina Wale (College of Natural Science)

Pathogens can be difficult to culture, both in vitro and in vivo , especially when little is known about their life cycle and biology. This may impede research on its infection dynamics, and so finding ways to effectively isolate a pathogen is crucial to studying how it behaves. Spirobacillus cienkowskii is one such pathogen. S. cienkowskii is a pleomorphic, Gram-negative bacteria that infects Daphnia , a genus of freshwater zooplankton found worldwide. Associated infections have high mortality rates and a high bacterial load at the time of death, but little else is known about S. cienkowskii . This is in part because it has never been cultured in vitro , and maintaining in vivo cultures is challenging. To address this lack of isolated cultures, a previous experiment exposed three evolutionarily divergent species of Daphnia to lake water thought to contain S. cienkowskii at two different temperatures. This experiment produced infected animals,

INVESTIGATIONS OF ASPERGILLUS ATACAMENSIS CELL WALL USING SOLID-STATE NMR ANALYSIS
Presenter(s): Aswath Karai
Microbiology, Immunology, & Infectious Disease
Mentor(s): Tuo Wang (College of Natural Science)

Aspergillus atacamensis, a halophilic fungi native to arid and saline habitats, plays a crucial role in nutrient cycling and ecological stability. However, understanding its survival mechanisms under fluctuating salinity presents challenges, particularly regarding cell wall composition. We investigated the cell wall glucan adaptations of A. atacamensis under various stressful and optimal saline conditions using solid-state NMR spectroscopy. These findings highlight the significance of cell wall modifications in A. atacamensis. This study improves our understanding of fungal resilience, with possible implications for managing fungi in environments with fluctuating salinity levels and biotechnological applications in stress tolerance

NEURO-IMMUNE INTERACTIONS IN ATOPIC DERMATITIS AND PSORIASIS: USING MOUSE MODELS
Presenter(s): Abhay Kakarla
Microbiology, Immunology, & Infectious Disease
Mentor(s): Gun Woo Lee (College of Human Medicine), Sangbum Park (College of Human Medicine)

Atopic dermatitis (AD) and psoriasis are two of the most common inflammatory skin conditions that severely impact daily life for millions of people. This research aims to explore how the interactions between immune cells in the skin lead to and sustain these conditions. We created mouse models to induce AD and psoriasis-like inflammation by applying two topical treatments (MC903 for AD and imiquimod for psoriasis-like inflammation) to the skin. We employed two groups of mice: wild-type CD1 mice from which we will collect tissue for hematoxylin and eosin (H&E) staining and CD1 mice genetically modified to express fluorescent Langerhans cells (LCs), which allows for live imaging. By comparing the ears (control and experimental), we can create a model for the role of LCs in the skin inflammation caused by AD and psoriasis. Through this work, we hope to further understand AD and psoriasis and pave the way for more targeted, effective treatments that offer relief to those living with these challenging skin disorders.

ASSESSING CONJUGATIVE TRANSFER EFFICIENCY AND HOST-RANGE OF ESBLS TO HUMAN GUT MICROBIOTA
Presenter(s): Samuel Snowden
Microbiology, Immunology, & Infectious Disease
Mentor(s): Charles Whitehead-Tillery (Graduate School Dean), Linda Mansfield (College of Veterinary Medicine)

As antibiotic usage increases worldwide, antibiotic resistance (AR) is becoming an increasingly prevalent issue, accounting for more than 2.8 million infections and 35,000 deaths yearly. Of these increased AR infections, extended-spectrum beta-lactamases (ESBLs) contribute significantly, causing 198,000 infections and 9,000 deaths yearly based on the CDC 2019 AR report. ESBLs are bacterially produced enzymes that hydrolyze beta-lactam antibiotics, including penicillin and first through third generation cephalosporins. They are known to cause a range of infections including pneumonia, urinary tract infections (UTIs), and various skin and blood infections. ESBLs are spread via horizontal gene transfer

(HGT), which includes transformation, transduction, and conjugation; however, research has shown that the main mechanism responsible for the transmission of ESBLs is plasmid-mediated conjugation. Furthermore, conjugation of these genes to members of the Enterobacteriaceae family plays a major role in the spread of ESBLs and subsequent disease. This study aimed to identify conjugation transfer efficiency and host range of ESBLs

COMPARISON OF 3 DIFFERENT LEPTOSPIRA CULTURE MEDIA

Presenter(s): Ashlyn Meyer
Microbiology, Immunology, & Infectious Disease
Mentor(s): Rinosh Mani (College of Veterinary Medicine)

Pathogenic Leptospira is a zoonotic bacterium transmitted through direct contact and thrives in aquatic and wet environments. In 2021, a deceased short-beaked common dolphin (Delphinus delphis delphis) was discovered in Southern California. Necropsy and polymerase chain reaction (PCR) analysis confirmed infection with Leptospira kirschneri. However, attempts to culture the bacterium in modified Ellinghausen-McCullough-Johnson-Harris (EMJH) medium were unsuccessful. This study aimed to evaluate the effectiveness of three different Leptospira media-EMJH, Hornsby-Alt-Nally (HAN), and VDL (a modified EMJH medium)-each prepared in both liquid and semi-solid forms. Two Leptospira interrogans serovars, Leptospira bratislava and Leptospira pomona, were used as positive controls. Kidney tissue samples from 17 aquatic mammals were inoculated into the three media types and monitored for bacterial growth. To reduce contamination, the samples were filtered before DNA extraction and PCR analysis. Growth was observed in all positive controls and some experimental samples; however, after filtration, no viable Leptospira growth was detected in any sample. PCR analysis determined that Leptospira was present but not actively replicating in the media. The most rapid and prominent bacterial growth occurred in VDL media, likely due to the adaptation of the control strains to this medium, as it is routinely used in our laboratory. Th

STUDYING NOVEL PHAGE DEFENSE SYSTEMS IN V. CHOLERAE

Presenter(s): Ariana Straus
Microbiology, Immunology, & Infectious Disease
Mentor(s): Christopher Waters (College of Osteopathic Medicine), Jasper Gomez (College of Natural Science)

Since the discovery of antibiotics, antibiotic resistance has been rapidly evolving, leading to one of the greatest public health threats. Phage therapy has been studied as an alternative to antibiotics for centuries, and has renewed interest as an effective treatment due to their ability to infect and lyse specific bacterial species. Bacteria, however, have evolved various phage defense systems to protect themselves from infection. To develop phage therapies, we must understand the mechanisms of phage defense systems. To address this, we use Vibrio cholerae as a model due to its constant interaction with phage in its environment. V. cholerae encodes two pathogenicity islands (VSP-1 and VSP-2) where only two phage defense systems known as CBASS and AvcID have been identified. Thus, we hypothesize that V. cholerae still harbors unknown phage defense systems. A previous screen of a V. cholerae cosmid library within Escherichia coli found a 25kb fragment that provides protection against T2 coliphage. Using a transposon mutant library, we identified vca0483 was involved in protection against T2. After creating an overexpression plasmid, we found that vca0483<

DOES SUBRENAL EMBRYONIC TISSUE TRANSPLANTATION ELICIT A CYTOTOXIC IMMUNE RESPONSE?
Presenter(s): Laura Stephan
Microbiology, Immunology, & Infectious Disease
Mentor(s): Margaret Petroff (College of Veterinary Medicine)

A successful pregnancy requires maternal immune tolerance to pregnancy-associated antigens (PAAs), including paternal alloantigens of the fetus and placental antigens. A key regulator of pregnancy, the placenta, helps establish an immuno-protective environment in the uterus by secreting immunomodulatory hormones and antiviral cytokines for tolerance. However, ongoing research is currently being done to better understand the mechanisms governing maternal-fetal tolerance, and of particular interest is the role of Autoimmune Regulator (Aire). Expressed in medullary thymic epithelial cells (mTECs), Aire presents tissue-specific antigens to T-cells to establish central tolerance and eliminate self-reactive T-cells via clonal deletion. While this protective mechanism ensures that all mature T-cells are tolerant, protection specifically against cytotoxic CD8+ T-cells is crucial as their autoreactivity leads to disease progression. In pregnancy, we hypothesize that Aire plays a role in presenting PAAs to developing maternal CD8+ T-cells as a mechanism of preventing immune-mediated rejection of the semi-allogeneic fetus. To test this, we removed a pregnancy-specific barrier, the placenta, by dissecting gestation day (GD) 8.5 embryonic tissue from Aire deficient (Aire-/-) or Aire-wildtype (Aire+/+) BALB/c mice and transplanting it under the kidney capsule for ten days. Kidney samples were used for
ENHANCING AI MICROSCOPY FOR FOODBORNE BACTERIAL CLASSIFICATION VIA ADVERSARIAL DOMAIN ADAPTATION ACROSS OPTICAL AND BIOLOGICAL VARIABILITY
Presenter(s): Sid Bhattacharya
Microbiology, Immunology, & Infectious Disease
Mentor(s): Jiyoon Yi (College of Agriculture & Natural Resources)

Rapid detection of foodborne bacteria is critical for food safety and quality, yet traditional culture-based methods require extended incubation and specialized sample preparation. This study addresses these challenges by i) enhancing the generalizability of AI-enabled microscopy for bacterial classification using adversarial domain adaptation and ii) comparing the performance of single-target and multi-domain adaptation. Three Gram-positive (Bacillus coagulans, Bacillus subtilis, Listeria innocua) and three Gram-negative (E. coli, Salmonella Enteritidis, Salmonella Typhimurium) strains were classified. EfficientNetV2 served as the backbone architecture, leveraging fine-grained feature extraction for small targets. Few-shot learning enabled scalability, with domain-adversarial neural networks (DANNs) addressing single domains and multi-DANNs (MDANNs) generalizing across all target domains. The model was trained on source domain data collected under controlled conditions (phase contrast microscopy, 60x magnification, 3-h bacterial incubation) and evaluated on target domains with variations in microscopy modality (brightfield, BF), magnification (20x), and extended incubation to compensate for lower resolution (20x-5h). DANNs improved target domain classification accuracy by up to 54.45% (20x), 43.44% (20x-5h), and 31.67% (BF), with minimal source domain degradation (<4.44%). MDANNs achieved superior performance in the BF domain and substantial gains in the 20x domain. Gr

INVESTIGATING THE ROLE OF INORGANIC ELEMENTS IN MACROPHAGE POLARIZATION AND IMMUNE FUNCTION
Presenter(s): Sooahn Jang
Microbiology, Immunology, & Infectious Disease
Mentor(s): BongJin Hong (College of Human Medicine), Thomas O'Halloran (College of Human Medicine)

Macrophage polarization is a key aspect of immune function, with M1 macrophages primarily involved in host defense and M2 macrophages contributing to tissue repair and immunoregulation. These distinct polarization states are critical for understanding macrophage responses in various diseases and therapeutic contexts. Essential metals such as iron, zinc, and copper serve as cofactors for enzymes involved in antimicrobial defense, and their dysregulation can affect macrophage polarization, inflammatory responses, and pathogen control. However, the precise roles and mechanisms of these metal elements in macrophage function remain unclear. Therefore, further investigation is essential to elucidate their contributions to immune regulation and host defense. In this study, I will investigate the homeostasis and fluctuation of metal elements during macrophage differentiation and polarization using the THP-1 human monocytic cell line, a widely used model for studying macrophage biology and immune responses. First, THP-1 monocytes will be differentiated into resting macrophage-like cells using phorbol 12-myristate 13-acetate. After differentiation, these cells will be polarized into M1 and M2 macrophages using IFN-Ɣ/LPS and IL-4, respectively. Macrophage differentiation and polarization will be assessed by measuring the expression levels of maker genes using qPCR. The metal content in each macrophage state will be analyze

NEUROSCIENCE

ROLE OF ENTERIC GLIAL COX2 IN POSTINFLAMMATORY GASTROINTESTINAL DYSFUNCTION
Presenter(s): Rafaella Lavalle Lacerda de Almeida
Neuroscience
Mentor(s): Brian Gulbransen (College of Natural Science)

Introduction: Acute inflammation has long term effects on bowel functions by promoting enteric neuroplasticity. Increased cyclooxygenase 2 (Cox2) activity is linked to enteric neuroplasticity, but the cellular source and mechanisms are not understood. Enteric glia are active in neuroinflammation and increase Cox2 and products including prostaglandin 2 (PGE2). Therefore, we tested the hypothesis that glial Cox2 activity promotes enteric neuroplasticity following inflammation resolution. Methods: We created an inducible cell specific Cox2 ablation model in enteric glia by crossing Sox10 CreERT2 mice with Ptges2(f/f) mice to generate Sox10 creERT2(+)::Ptges2 (f/f) mice. Mice were injected with tamoxifen for 2 consecutive days (i.p.,10mg/kg) prior to inducing colitis to activate Cre and ablate Cox2 in enteric glia (Cox2-gKO). Sox10 creERT2(-)::Ptges2 (f/f) mice were used as controls and also received tamoxifen injections. Acute colitis was induced using 2,4-dinitrobenzene sulfonic acid (DNBS). Healthy controls received saline enemas. Gastrointestinal functions were addressed using in vivo and ex vivo assays seven days after colitis. RNAscope was performed on longitudinal muscle myenteric plexus (LMMP) preparations to confirm the effectiveness of th

BURST FREQUENCY DIFFERENCES IN TRN NEURONS BASED ON ANATOMICAL LOCATION
Presenter(s): Orla Young
Neuroscience
Mentor(s): Charles Cox (Research & Innovation), Joseph Beatty (College of Human Medicine), Megan McGrath (College of Osteopathic Medicine)

The thalamic reticular nucleus (TRN) is an inhibitory structure that modulates neuronal communication between the thalamus and cortex. Both regions provide excitatory inputs to the TRN, but its output is entirely GABAergic, delivering inhibition to the thalamus. A classic characteristic of TRN neurons is their ability to fire in burst mode, which is a transient, high-frequency discharge of action potentials that ride a depolarizing crest capable of significantly inhibiting the thalamus. Previous research has demonstrated that burst properties of TRN neurons vary depending on their anatomical location. In rats, the bursting ability of TRN neurons follows a dorsal/ventral distribution with dorsal TRN neurons displaying less bursting than ventral TRN neurons. However, in mice, the strength of burst frequency corresponds to a shell/core distinction paired with a projection preference. Core TRN neurons generate more robust bursts and primarily project to first-order thalamic nuclei, while shell TRN neurons exhibit weaker bursts and project to higher-order thalamic nuclei. This study aims to investigate the burst characteristics of TRN neurons in both C57BL/6 mice and Sprague Dawley rats aged 14-60 days with particular interest in their location within the TRN. In addition, this study will test whether membrane properties of TRN neurons vary spatially across the nucleus and if these differences contribute to the observed variability in burst properties. This study will offer ins

MILD STRESS ALTERS MOUSE ESTROUS CYCLE
Presenter(s): Gwendolyn Urbain
Neuroscience
Mentor(s): Geoffroy Laumet (College of Natural Science)

Stress is known to have a complex role in many diseases. Chronic stress leads to increased risk of heart disease, psychiatric disorders, migraine, and many other diseases. Women are more likely to develop stress-induced diseases. Hormonal fluctuation is thought to play a key role in explaining why women experience chronic diseases at a rate almost twice as high as men. Previous animal studies inducing severe chronic stress, with several weeks' duration and life-threatening situations (predator odor), have been shown to decrease reproductive function and lengthen estrous cycle. However, how mild stress, which is generally acknowledged as a model for daily stress, affects hormonal fluctuation remains unknown. We aim to identify the impact of mild stress using a repeated restraint model on mouse subjects to aid understanding of mild stress-related impacts on hormonal cycles and stress-induced diseases. During this study, 19 mice were stressed using a repeated restraint model two hours daily for three consecutive days within a 17-day period. Vaginal smears for each mouse were taken daily within the same two-hour time slot. The smears were then staged using Vaginal Smear Cytology to identify the impact of mild stress. Results demonstrated that the stress mice had significantly longer estrous cycles, significantly less completed cycles, and spent significantly longer in the diestrus phase wi

INVESTIGATING DEVELOPMENTAL CHANGES IN VASOPRESSIN NEURONS AND VASOPRESSIN NEURAL CIRCUITRY IN MALE RATS
Presenter(s): Latrell Massey
Neuroscience
Mentor(s): Alexa Veenema (College of Social Science)

The neuropeptide arginine vasopressin (AVP) plays a role in the expression of various social behaviors across the lifespan, including juvenile social play behavior and adult aggressive and sexual behaviors. There are robust age differences in AVP cell number and density of its projections in the brain. Based on this information we hypothesize that AVP plays an important role in the transition from juvenile to adult social behaviors. Before we can test this hypothesis, we need to address two outstanding questions. First, previous research has shown that adult rats show more AVP-immunoreactive (AVP-ir) neuron number is lower in the bed nucleus of the stria terminalis (BNST) and medial amygdala (MeA) than juvenile rats. However, it is unclear whether this age difference exist at the transcriptional level. To address this question, we used fluorescent in situ hybridization to quantify AVP mRNA-expressing cells in the BNST and MeA of juvenile and adult male rats. We predict that adult male rats have more AVP mRNA-expressing cells than juvenile male rats. Second, previous research has shown that adult rats have denser AVP fiber projections from the BNST and MeA to the lateral septum (LS) and ventral pallidum (VP) than juvenile rats. However, it is unclear whether the same AVP neurons in the BNST and MeA project both to the LS and VP. To address this question, we infused retrograde neuroanatomical tracers into the LS and VP o

DETERMINING POTENTIAL SEX DIFFERENCES IN THE NUMBER OF VASOPRESSIN AND OXYTOCIN NEURONS IN THE JUVENILE AND ADULT RAT PARAVENTRICULAR NUCLEUS OF THE HYPOTHALAMUS
Presenter(s): Evan Wilson
Neuroscience
Mentor(s): Alexa Veenema (College of Social Science)

Arginine vasopressin (AVP) and oxytocin (OXT) are neuropeptides that regulate various social behaviors throughout the lifespan. AVP and OXT are primarily produced in the paraventricular nucleus of the hypothalamus (PVN). Signaling of AVP and OXT from the PVN to other brain regions has been shown to regulate social behavior in both adults and juveniles. Previous studies have shown that there are sex differences in the number of AVP and OXT neurons within the PVN of adult rats. However, it is unclear whether this sex difference also exists in juveniles and thus persists throughout life, or whether it exists only in adults and thus develops after puberty. Throughout the lifespan, social behavior transitions from juvenile social play to adult-specific behaviors such as mating, aggression and parental behaviors, with distinct social roles for males and females. Determining whether sex differences in AVP and OXT develop before or during puberty may explain the sex specific roles of AVP and OXT in the regulation of social behavior across the lifespan. Therefore, we investigated whether there are sex and age differences in the number of AVP and OXT neurons in the rat PVN. Brain sections containing the PVN were sectioned at 30µm thickness, and then processed for fluorescent immunohistochemistry. Images of the AVP and OXT-positive neurons were digitized using epifluorescence microscopy and then quantified.

PATHWAYS OF TDP-43 PROPAGATION
Presenter(s): Matthew Gagea
Neuroscience
Mentor(s): Martin Fernandez (University of Michigan)

TAR DNA Binding Protein 43 (TDP-43) is a protein that is associated with a variety of neurodegenerative disorders, including Frontotemporal Lobar Degradation and Amyotrophic Lateral Sclerosis. In these diseases, TDP-43 is known to mislocalize from the nucleus of cells to the cytosol and form filamentous aggregates because of its intrinsically disordered C-terminal domain. The resulting filaments impair the normal function of the cells. However, the mechanism by which 'prion-like' TDP-43 proteinopathy spreads throughout the brain remains unknown. A proposed mechanism of this propagation is that it is mediated via extracellular vesicles (EVs). It is hypothesized that secreted EVs carry misfolded TDP-43 filaments, which seed nearby cells, inducing protein aggregation near the affected cell. Preliminary results provide evidence of TDP-43 filaments within EV fractions as well as lysosomes, showing a possible broader endo-lysosomal pathway to aggregate containing vesicle neogenesis.

USE OF S100B VS. GLIAL FIBRILLARY ACIDIC PROTEIN TO LABEL ASTROCYTES IN BRAINS OF CHOW-FED VS. HIGH FAT DIET-FED MICE
Presenter(s): Arnalda Zhao
Neuroscience
Mentor(s): Gina Leinninger (College of Natural Science), Grace Lee (College of Natural Science)

The incomplete understanding of how the brain regulates energy balance prevents us from finding effective weight loss solutions. Astrocytes are a type of glial cell that have a critical role in feeding behaviors and energy balance. However, much is unknown about them. Previous studies have shown that in male mice fed a high fat diet (HFD), the astrocytes in the arcuate nucleus (ARC) experienced reactive astrogliosis, potentially leading to obesity. Glial fibrillary acidic protein (GFAP) expression increases in reactive astrocytes, so GFAP is commonly used as an astrocyte marker. However, few GFAP-immunolabeled cells are detected in the brains of chow-fed mice, even though they still have many resident astrocytes. We hypothesize that there may be a better marker to visualize astrocytes during normal physiology (e.g. in chow fed mice) as well as in HFD-fed mice that develop diet-induced obesity. To test this we immunolabeled GFAP and another protein that is expressed in astrocytes, S100 calcium binding protein beta (S100B), in brains of male and female mice fed chow diet and HFD. Specifically, we assessed expression in areas of the brain that contribute to ingestive behaviors, such as the arcuate nucleus (ARC), lateral hypothalamic area (LHA), lateral preoptic area (LPO), and the ventrolateral periaqueductal gray (vlPAG). Throughout all brain sections that we investigated, we

MAST-CELL DERIVED CHYMASE 4 SHORTENS THE DURATION OF INFLAMMATORY PAIN IN MICE
Presenter(s): Hannah Hua
Neuroscience
Mentor(s): Geoffroy Laumet (College of Natural Science), Sabrina de Souza (College of Natural Science)

Chronic pain affects 51.6 million adults in the United States (US Pain Foundation, 2023). Skin injury or infection triggers the up-regulation of pro-inflammatory molecules that activate pain-sensing neurons generating pain. Acute pain transitions to Chronic Pain when the body fails to subside from upregulation of pro-inflammatory molecules. The biological mechanisms underlying the resolution of acute pain remain unclear. Mast cells are immune cells involved in regulating inflammation. We previously showed that mast cells are necessary for the resolution of pain. Mast-cell-deficient mice have prolonged pain after skin inflammation. We seek to discover the molecules produced by mast cells that contribute to the resolution of pain. Mast cells release granules containing proteases like chymases in response to inflammation (Pejler, 2020). We hypothesize mast cell proteases play a role in pain resolution. Inflammatory pain was induced in mice by injection of Complete Freund's Adjuvant (CFA) in the intraplantar paw skin. Quantitative polymerase chain reaction (qPCR) showed an upregulation of Mcpt4 expression in the resolution phase in wild-type (WT) mice. Von Frey filaments were used to analyze for pain sensitivity. Blocking mast cell chymase using a pharmacological approach (chymostatin) delayed CFA-induced pain resolution compared to vehicle control. Injection of recombinant MCPT4 after CFA, improved pain resolu

CHARACTERIZATION OF VENTRAL TEGMENTAL AREA NEUROMEDIN S EXPRESSING NEURONS
Presenter(s): Katie McGrath
Neuroscience
Mentor(s): Michelle Mazei-Robison (College of Natural Science)

Despite the presence of treatments for opioid use disorder (OUD), opioids remain the leading cause of overdose deaths in the U.S. Studying neurobiological effects of chronic opioid use could lead to better treatments. The ventral tegmental area (VTA) is critical for motivated behaviors. Specifically, dysfunction of VTA dopaminergic neurons (DA) can contribute to addiction. We previously found that neuromedin S (NMS) gene expression is increased following chronic morphine in VTA DA neurons. Less than 5% of VTA DA neurons express NMS in naive mice, and this percentage increased in NMS-Cre mice that underwent chemogenetic manipulations for cell activation and morphine behaviors. To further study VTA-NMS neuronal expression and function, we're using a retrograde viral tracer approach to identify their projection targets. Our initial studies suggest that VTA-NMS neurons project to the nucleus accumbens (NAc) and lateral hypothalamus (LHA), but not the prefrontal cortex (PFC). To validate this, we injected retrograde viruses into these regions and validated using immunohistochemistry and cell counts. I found that VTA-NMS neurons project to the NAc, and most of these cells are also dopaminergic. Interestingly, they also project to the LHA, but to a lesser degree, and they don't project to the PFC. Furthermore, to determine the role of NMS in morphine behaviors, we developed a constitutive NMS KO mouse. Interestingly, NMS KO doesn't alter morphine behavi

TIME COURSE FOR CONSOLIDATION DISRUPTION BY PROTEIN SYNTHESIS INHIBITION
Presenter(s): Justin Jaraczewski
Neuroscience
Mentor(s): Hongbing Wang (College of Natural Science)

Memory consolidation is the process by which experiences are converted into information that can be recalled at a time point in the distant future. Understanding the time course that this process can be disrupted is important for determining potential therapeutic strategies and will help elucidate the cellular molecular mechanisms for memory consolidation. In this experiment, we tested the time course that Anisomycin, a protein synthesis inhibitor, could disrupt memory consolidation using a contextual fear conditioning paradigm. Mice were subjected to either a single shock or 3 shocks while in the testing chamber to assess stimuli strengths effect on memory consolidation speed and resilience. For mice which received 1 shock anisomycin disrupted memory at 4 hours but not 6 hours. While mice which received 3 shocks showed disruption due to anisomycin if it were administered at 1 hour but not 3 hours after training. Additionally, reconsolidation, the process where retrieved memories are consolidated once more following retrieval of the memory during, time course for disruption was tested. A similar contextual fear conditioning was run except mice received anisomycin injections following memory retrieval rather than training. Mice receiving a single shock would have their memories disrupted if anisomycin were administered immediately following

NO TIME TO DRINK: NEUROTENSIN IN THE LATERAL HYPOTHALAMIC AREA DOES NOT MEDIATE WATER DRINKING
Presenter(s): Anna Reschke
Neuroscience
Mentor(s): Gina Leinninger (College of Natural Science), Katie Thompson (College of Natural Science), Raluca Bugescu (College of Natural Science)

The lateral hypothalamic area (LHA) contains different neuronal populations that modulate drinking behavior necessary for survival. The Leinninger lab previously identified LHA neurons that co-express the neuropeptide neurotensin (Nts) as well as other signals, which we refer to as LHANts neurons. We found that activating LHANts neurons promotes voracious water drinking particularly during the light cycle. We hypothesized that if Nts released from LHANts neurons is critical for promoting drinking, then drinking behavior should be blunted by blocking Nts signaling. To test this, we expressed excitatory Designer Receptors Exclusively Activated by Designer Drugs (DREADDs) in LHANts neurons. Mice were pretreated with antagonists for either neurotensin receptor 1 (NtsR1), neurotensin receptor 2 (NtsR2) or a pan NtsR1/NtsR2 antagonist to block Nts-Nts receptor signaling prior to treatment with VEH (control, no activation) or the DREADD ligand CNO to activate LHANts neurons. Surprisingly, none of the Nts receptor antagonists diminished LHANts neuron-stimulated drinking. To test whether the Nts signal itself is necessary for drinking behavior, we injected Ntsflox/flox mice with an AAV-Cre virus in the LHA to selectively deplete Nts from LHANts neurons. Analysis in metabolic cages that record water intake revealed no differences in drinking between mice with

USING INTRINSIC SIGNAL OPTICAL IMAGING TO TARGET OPTOGENETIC CONSTRUCTS TO FUNCTIONAL CORTICAL COLUMNS IN THE MOUSE SENSORY CORTEX
Presenter(s): Mya Sebek
Neuroscience
Mentor(s): Shane Crandall (College of Osteopathic Medicine)

Intrinsic signal optical imaging (ISOI) is a useful, minimally invasive tool to localize precise neocortical regions activated by sensory stimuli. Specifically, ISOI takes advantage of the different absorption properties of oxygenated and deoxygenated blood to measure local changes in the hemodynamic response related to sensory-evoked neural activity. Researchers often use this method to identify cortical areas of interest for targeted electrophysiology recordings or pharmacological manipulations. However, utilizing this method to guide microinjections of optogenetic viral vectors into cell-type-specific Cre-driver mouse lines would enable powerful optical control of genetically defined neurons with high temporal and spatial precision. In the mouse whisker primary somatosensory cortex, sensory signals from individual whiskers are mapped to functional cortical columns called barrels. This study utilizes ISOI to target Cre-dependent adeno-associated viruses encoding Channelrhodopsin-2 to specific barrel columns in an established Cre-driver mouse to label layer 6 corticothalamic projection neurons. If successful, this approach will allow for new circuit-level studies investigating the spatial and temporal interactions between the primary sensory cortex and the sensory thalamus. Specifically, we plan to use in-vivo electrophysiological recordings and optogenetics to better understand how the neocor

DOES NEUROTENSIN EXPRESSION IN THE LATERAL HYPOTHALAMIC AREA VARY ACROSS LIGHT VS. DARK CYCLES IN MICE?
Presenter(s): Ian Render Flores
Neuroscience
Mentor(s): Gina Leinninger (College of Natural Science), Raluca Bugescu (College of Natural Science)

The Lateral Hypothalamic Area (LHA) orchestrates ingestive behaviors including drinking and feeding but via incompletely understood mechanisms. Many LHA neurons express the neuropeptide neurotensin, which is considered a feeding-suppressing peptide. Interestingly, activating LHA neurotensin neurons during the light cycle (when mice are usually asleep) has no effect on feeding but activating the same neurons during the dark cycle (when mice are usually awake and eating and drinking) suppresses feeding. We hypothesized that these different effects on feeding could be because LHA neurotensin neurons express more neurotensin in the dark cycle, so that when activated they release more of the anorectic neurotensin signal. To test this we collected brains from mice during the light and dark cycle (n=4 each).We then used using RNAscope to measure neurotensin mRNA expression in the LHA of these brains and counted the number of neurotensin-expressing cells.. The neurotensin-containing cells were separated into two categories: cells that contained a greater amount of neurotensin (bright) or cells that contained less amounts of neurotensin (dim). The results showed a significant increase in neurotensin expression in the LHA of mice during the dark cycle compared to the light cycle, with the primary driver being the difference between dim cells. These suggest that neurotensin plays an inhibitory role in feeding behaviors. This could be important for understanding increased rates of obe

HOW TO MAKE NEURONS GROW FAST
Presenter(s): Benjamin Nketsiah, Kaveri Nambiar, Talya Chakhachiro
Neuroscience
Mentor(s): Kyle Miller (College of Natural Science)

Axonal elongation is a critical process for neural development and regeneration, yet its underlying mechanisms and potential for therapeutic enhancement remain incompletely understood. This paper presents a comprehensive model linking axonal elongation to mechanisms of cell crawling and cytokinesis. Our model emphasizes the role of force generation, cytoskeletal flow, adhesion dynamics, and viscosity in driving axonal elongation. Computational simulations explore how manipulating these parameters accelerates axonal elongation. The findings reveal that increasing growth cone adhesion, optimizing cytoskeletal viscosity, and reducing axonal resistance can significantly enhance growth rates. These insights suggest potential therapeutic avenues for improving neural repair and functional recovery following injury that are not possible with the natural growth rate of axons. By bridging cellular and neuronal motility processes, this work provides a foundation for advancing regenerative medicine and biophysical research into neural dynamics.

TAU PATHOLOGY PRECEDES AMYLOID-BETA PLAQUE FORMATION AS THE MAIN DRIVER OF NEURODEGENERATION IN ALZHEIMER'S DISEASE
Presenter(s): Anja Lee, Anshul Shenoy, Anya Heany, Isabel Nunez-Regueiro
Neuroscience
Mentor(s): Chunqi Qian (College of Osteopathic Medicine)

Brains with Alzheimer's disease (AD) display two primary characteristics: neurofibrillary tangles composed of tau proteins and plaques formed from amyloid-beta (Aβ) peptide. One of the most fundamental questions in Alzheimer's research is which of the two aggregates first; knowing the answer to this question is essential for developing treatments that stop the progression of the disease. The predominant theory throughout most AD research has been that amyloid-beta aggregates first and that this aggregation leads to hyperphosphorylated tau proteins, which cause the neurofibrillary tangles, which then trigger Alzheimer's pathology and symptoms. However, there is mounting evidence against this theory. First, multiple drugs in phase three clinical trials which targeted Aβ did not slow cognitive decline . Aβ plaques are also found in the brains of cognitively normal individuals, which suggests they could simply be a sign of normal aging - not the catalyst of AD pathology. Third, research has shown that the severity of dementia is much more correlated with the presence of neurofibrillary tangles than amyloid-beta plaques. Finally, amyloid precursor protein (APP) production is increased after a traumatic brain injury (TBI), suggesting that Aβ may actually have neuroprotective effects. Considering this evidence, a relatively new theory has been proposed in AD research. The new theory hypothesizes that tau pathology precedes Aβ plaque formation and is the m

META-ANALYSIS OF LANGUAGE BIOMARKERS FOR EFFECTIVE EARLY DETECTION OF ALZHEIMER'S DISEASE

Presenter(s): Ankith Ram Mohan, Chacen Rasavong, Tom Fanning
Neuroscience
Mentor(s): Hezao Ke (College of Arts & Letters)

We are interested in exploring the neural impact of AD and MCI and its relation to language processing, in order to design more accessible and cost-low indices for early detection of AD. Specifically, we are conducting a meta-analysis analyzing the efficacy of a linguistic test (category fluency test) in differentiating healthy control, MCI, and AD.

THE RELATIONSHIP OF TRAUMATIC BRAIN INJURY AND NEURODEGENERATION OVER TIME USING MRI

Presenter(s): Alaina Barringer, Rylee Schlaud
Neuroscience
Mentor(s): Chunqi Qian (College of Osteopathic Medicine)

Aims: TBI affects many people each year. These brain injuries can have long term effects, such as decreased life expectancy and permanent ailments like Alzheimer's Disease, Dementia, and Chronic Traumatic Encephalopathy. TBI is very unknown and because of this there are few interventions. This study detected tertiary injuries in TBI by identifying white and gray matter volumes, as well as white matter integrity in the brain using DTI from MRI. Methods: This was an observational study that assessed neurodegeneration over approximately 5 years in neurotypical brain and a TBI brain. The participants were evaluated based on physical and psychological disability serverites and the expected recovery time depending on the severity. Each participant also underwent at least 2 MRIs, one being when they first entered the ICU and one being during the final neurological test. Four different conventional MRI sequences were performed during the study. Results: In the first MRI scan there were no brain matter volume differences between neurotypical and TBI patients. Overall brain atrophy did occur at up to 20% in various territories for TBI patients. The volumetric loss i

FUNCTIONALLY TESTING GENES INVOLVED IN GUT DYSFUNCTION USING F0 CRISPR SCREENING APPROACH IN ZEBRAFISH
Presenter(s): Hannah Hentkowski
Neuroscience
Mentor(s): Julia Ganz (College of Natural Science)

The nervous system is made of two main subdivisions, the central nervous system and the peripheral nervous system. The largest part of the peripheral nervous system is the enteric nervous system (ENS). The ENS consist of a network of nerves and glial cells that support and innervate the gastrointestinal (GI) tract. This network controls the essential functions of the GI tract such as motility, nutrient uptake, and inflammatory responses. Deficiencies in the development and maintenance of the ENS leads to many diseases such as Hirschsprung disease, inflammatory gut diseases, autism spectrum disorder, and devastating GI symptoms including diarrhea or constipation. Research in a collaborator's lab using a genome-wide screening approach has identified four candidate genes, BRAT1 , LUNATIC FRINGE , CDK18 , and NFASC, connected to GI dysfunction - constipation and/or diarrhea - in humans. However, it is not known which of the genes are connected to the GI phenotypes and if functional loss of the candidate genes changes how food moves through the gut. We used a F0 CRISPR screening approach to test the effect of functional loss of these genes on intestinal transit in zebrafish. This is researched by using an in vivo zebrafish mod

ANATOMICALLY-SPECIFIED NEUROTENSIN RECEPTOR-1 EXPRESSING NEURONS IN THE LATERAL PREOPTIC AREA SUPPORT WEIGHT LOSS
Presenter(s): Charlotte Schultz
Neuroscience
Mentor(s): Gina Leinninger (College of Natural Science)

Obesity increases the risk of comorbid health problems like diabetes and chronic pain, yet there are still limited treatments. The neuropeptide Neurotensin can act via Neurotensin Receptor-1 expressing neurons to reduce feeding and weight and NtsR1 is expressed in several brain regions, including the Lateral Preoptic Area (LPO). Previously, we found that DREADD (Designer Receptors Exclusively Activated by Designer Drugs)-activating LPO Neurotensin Receptor 1 (NtsR1) neurons decreased food intake, water intake, and respiratory exchange ratio in normal-weight and obese mice and increased locomotion in obese mice. However, we observed a large variation in these behaviors between mice. Post-hoc analysis revealed mice had differing amounts of DREADD expression in NtsR1 neurons across the anterior and posterior parts of the LPO. We hypothesized that DREADD-activating anterior vs. posterior LPO's NtsR1 neurons may promote different effects, and one of these might mediate decreased food and water intake and increased locomotion. To test this, we used immunofluorescence to label DREADD-expressing NtsR1 neurons and c-fos (a marker of activated neurons) and documented if DREADD-activated neurons were biased to the anterior or posterior LPO. Anatomical data were correlated with previously collected ingestive behavior and body weight data. We found that activating the posterior, but not the anterior, LPO NtsR1 neurons decreased ingestive behavior and in

A STUDY OF GUT MICROBIOME DIVERSITY AND EMOTIONAL REGULATIONS IN INFANTS
Presenter(s): Alexa MacKersie, Kanal Patel
Neuroscience
Mentor(s): Cathi Propper (Univeresity of North Carolina - Chapel Hill), Rebecca Knickmeyer (College of Human Medicine)

Emotional dysregulation in early childhood is associated with anxiety or depression later in life as children have been unable to learn and apply healthy behaviors to cope with negative feelings and events. Previous research suggests a connection between the gut microbiome and cognitive and emotional development, but it is unknown how the composition of the gut microbiome affects emotional regulation in infants. The purpose of this study is to determine whether the gut microbiome has a significant impact on the development and ability of infants to self-regulate. Infants (1-year old) completed the mask task paradigm where they were placed in a high chair in the center of the room along with an experimenter and their mother. Another experimenter came into the room and changed into four different masks behind the curtain and the infants' reactions were assessed for gaze aversion, looks to mother/experimenter, and self-regulatory behaviors. The interrater reliability tests conducted to analyze consistency between both coders for gaze aversion, looks to mother/experimenter, and self-regulatory behaviors produced intraclass correlation coefficients of 0.95, 0.99, and 0.99 respectively. The mean values of the three variables were 0.087, 0.536, and 0.003 respectively, indicating that the most common regulation behavior displayed within the infants is looking towards the mother/experimenter. When compared against the

MOLECULAR CONTROL OF CYTOSKELETAL FLOW AND NEURITE OUTGROWTH
Presenter(s): Chloe Murray, Jenny Dibley, Lydia Browning, Sydnie Schafer
Neuroscience
Mentor(s): Kyle Miller (College of Natural Science)

The elongation of neuronal extensions requires the transport of materials, mainly made in the cell body, to growth cones. In various types of neurons, including chick sensory, Aplysia Bag Cell, and Drosophila motor neurons materials in the axon shaft, including MTs and docked organelles, flow forward in bulk during outgrowth. Paradoxically, a recent report suggests that during the initial outgrowth of cortical neurons, MTs in the neurite shaft flow towards the cell body. To determine if this retrograde motion involves the sliding of MTs down a stationary cortical actin/spectrin meshwork or bulk flow of all components, we examined the motion of docked mitochondria, ER, actin filaments, and beads bound to the outside of the neurite. In all cases, these moved backward to the neuronal cell body at roughly the same velocity suggesting bulk retrograde flow occurs along the neurites during their initial outgrowth. To investigate mechanism, we tested and confirmed that the predictions of the clutch hypothesis apply to cortical neurons. Further, we found that addition of trypsin, which disrupts the cell attachment to the substrate, results in growth cone retraction in both 2D (coverslips) and 3D (collagen gels) environments. Collectively, these experiments suggest that in cortical neurites tension generated either in the cell body or along the neurite pulls materials in bulk towards the cell body, while the growth cone generates tractions forces that pulls it forward.

COGNITIVE DEFICITS OF RAI1+/- GRASS RATS, A MODEL FOR SMITH-MAGENIS SYNDROME (SMS)
Presenter(s): Amy Liu
Neuroscience
Mentor(s): Jamie Shi (College of Social Science), Lili Yan (College of Social Science)

Smith-Magenis Syndrome (SMS) is a rare neurodevelopmental disorder caused by haploinsufficiency of the retinoic acid-induced 1 (Rai1) gene. SMS is characterized by circadian rhythm and sleep disruptions, autism spectrum features, and intellectual disabilities. To understand the neural mechanisms underlying this disease, we developed a rodent model of SMS using CRISPR-based gene editing of the Rai1 gene using Nile grass rats (Arvicanthis niloticus), a well-established diurnal rodent model. Similar to SMS patients, Rai1 -deficient grass rats show disrupted locomotor activity and sleep rhythms. In the present study, we explored the impact of a Rai1 deficiency on cognitive function using novel object recognition (NOR) and object location memory (OLM) tasks. NOR evaluates non-spatial learning and object recognition involving perirhinal cortex, whereas OLM assesses spatial learning involving the hippocampus. The wildtype littermates (Rai1 +/+) spent more time exploring the novel object in NOR and novel location in OLM, indicated by performance significantly above the chance level i.e., 50% (67.7±4.5%, 65.6±5.0%, n=5; one sample t-test, ps < 0.05). The knock-out grass rats (Rai1

THE EFFECT OF RAI1 GENE DELETION ON METABOLISM, BODY WEIGHT, AND FOOD INTAKE IN DIURNAL GRASS RATS.
Presenter(s): Viola Weber
Neuroscience
Mentor(s): Katrina Linning-Duffy (College of Social Science), Lili Yan (College of Social Science)

Obesity is one of the common factures of Smith-Magenis Syndrome (SMS), a rare neurodevelopmental disease involved with multisystem dysfunctions. SMS patients experience sleep disturbances, intellectual disabilities, and often hyperphagia or compulsive eating. A key aspect of SMS is the presence of metabolic alterations and early-onset obesity. However, the underlying mechanisms remained unclear. To better understand relationships between SMS symptoms and genetic mutations, we developed a mutation line of the causal gene of SMS, the retinoic acid-induced 1 (Rai1) gene, using a well-established diurnal rodent model, the Nile grass rats (Arvicanthis niloticus). In the present study, we monitored the body weight and food intake in knockout (KO) and wildtype (WT) littermates obtained from the F2 - F4 generations. The weights of both female and male KO, (Rai1+/- , n = 11 or 8, respectively) grass rats were recorded and compared with WT littermates (n = 18 or 9) from between 2 - 19 weeks old. We also monitored the food intake in a subset (n = 3-5/sex/genotype) to assess it as a possi

USE OF EEGS TO IDENTIFY ACTIVITY OF THE DEFAULT MODE NETWORK IN THE DIAGNOSIS AND TREATMENT OF ADHD
Presenter(s): Hannah Cook
Neuroscience
Mentor(s): Chunqi Qian (College of Osteopathic Medicine)

The complete mechanisms of ADHD are not fully known yet. For everything that is known, there are several unanswered questions. There are also still a lot of questions about the most accurate way to diagnose. As of right now, diagnosis is usually done with testing and surveys. Using an EEG to diagnose ADHD could be a reliable way to look at the biological characteristics of ADHD in the brain to confirm or make a diagnosis. EEGs have already been used as a way to identify the DMN, and a refinement of this procedure would be revolutionary in diagnosing ADHD.

NEURAL ADAPTATION IN OCTOPUS ARM
Presenter(s): Ming Huang
Neuroscience
Mentor(s): Galit Pelled (College of Engineering)

Octopuses have a decentralized nervous system, with approximately two-thirds of their neurons located within their arms, allowing complex, independent motor functions and adaptive behaviors. This research investigates neural adaptation in octopus arm tissue through repeated electrical stimulation and recordings using a Multi-Electrode Array . Octopus arm slices were maintained under controlled perfusion conditions at a comfortable temperature and electrically stimulated to assess neural responsiveness. Neural activity was recorded both prior to and following stimulation to evaluate changes in firing rates, spike amplitudes, and interspike intervals and more. Preliminary results revealed distinct neural responses to electrical stimulation, with observed variations in spike activity indicating potential neural adaptation or reorganization within the arm tissue. Understanding how octopus arm neurons adapt to repeated stimulation offers valuable insights into the mechanisms underlying neural plasticity within decentralized nervous systems. These findings have potential implications across various fields, including evolutionary biology, neuroscience research, and the advancement of bio-inspired robotic technologies.

TRANSCRIPTION FACTOR EXPRESSION INTERACTIONS IN VENTRAL HIPPOCAMPUS NEURONS
Presenter(s): Juliana Benitah Botelho
Neuroscience
Mentor(s): Sarah Simmons (College of Natural Science)

The limbic system and the ventral hippocampus (vHPC) play a critical role in learning and memory consolidation in response to various stimuli, including stress, natural rewards, and drugs of abuse. The vHPC, particularly through its projections to the nucleus accumbens (NAc), is essential for regulating mood-related responses to stress. Within this neural circuit, alterations in FosB and androgen receptor (AR) transcription factor expression can influence circuit activity and susceptibility to stress-induced mood disorders such as anhedonia-like behavior. Additionally, sex differences in vHPC-NAc circuit excitability are modulated by AR signaling. Given that manipulating FosB and AR expression produces similar behavioral effects on stress susceptibility, these transcription factors may interact within this circuit. Such interactions could involve direct regulation, where one factor influences the expression of the other, or a synergistic mechanism in which both regulate overlapping downstream targets to affect stress resilience.

BREEDING BEHAVIOR IN RAI1 TRANSGENIC ARVICANTHIS NILOTICUS
Presenter(s): Nolan Lucera
Neuroscience
Mentor(s): Lili Yan (College of Social Science)

The Retinoic-acid induced 1 (RAI1) gene, that encodes a histone-binding protein, is a major gene contributing to a rare neurodevelopmental disorder, Smith-Magenis Syndrome (SMS). SMS is characterized by a low intellectual quotient, obesity, behavioral problems, and disrupted circadian rhythms in sleep and melatonin secretion. Every reported individual with SMS experiences sleep disturbances including daytime sleepiness, frequent nighttime awakenings, and decreased total sleep time beginning in early childhood. There are striking differences between nocturnal and diurnal species in their circadian rhythms and central responses to light and to melatonin. For instance, light promotes sleep in nocturnal species but wakefulness in diurnal ones. Therefore, a diurnal model with intact melatonin secretion will help better understand the role of Rai1 in regulating circadian rhythms and sleep, which may have downstream effects on other biological processes such as mating behavior and better translate to humans. To address the fundamental issues

INVESTIGATING THE RELATIONSHIP BETWEEN SWS/REM SLEEP RATIO IN THE FIRST HALF OF THE NIGHT AND SUSCEPTIBILITY TO FALSE MEMORIES

Presenter(s): Charvi Bagewadi Ellur, Nabila Inan
Neuroscience
Mentor(s): Mallikarjuna Bagewadi Ellur (Self Regional Healthcare)

The present research investigates whether susceptibility to false memories is predicted by SWS/REM ratio in the first half of the night. Memory consolidation during sleeping is influenced by interaction between slow-wave sleeping and sleeping in a state of rapid eye movement. In an experiment design, college students were recruited and sleeping patterns observed through self-reported diaries and available sleeping tracking tools. Baseline and post-sleep false memory task with a Deese-Roediger-McDermott paradigm were given to participants. Susceptibility to false memories was gauged by critical lure word recall and error rates in recognition. Initial findings reveal that participants with a reduced SWS/REM ratio had greater false recall of memories, substantiating that the function of REM sleeping in associative processing heightens susceptibility to distorted memories. These findings are in agreement with existing research on sleeping-mediated alteration of memories and substantiate that sleeping architecture has a profound influence on cognitive accuracy. These findings are important in explaining mechanisms behind false memories and have implications in optimizing sleeping patterns in a bid to improve fidelity of memories.

ANTEROGRADE VIRAL TRACING: A REVIEW OF ITS HISTORY, INNOVATIONS, AND FUTURE DIRECTIONS

Presenter(s): Elif Erdem
Neuroscience
Mentor(s): Michael Williams (College of Human Medicine)

Anterograde viral tracing is an important technique used to map neural pathways, investigate brain function, and offer insight into neural development, reorganization, and disease-related changes. This technique tracks the movement of a viral vector in an anterograde fashion, from a presynaptic neuron to a target region with postsynaptic neurons. While retrograde viral tracing has well-established methods, anterograde tracing techniques have historically been more limited. This poster will discuss the development and evolution of anterograde viral tracing, current methodologies, and innovations in the field. Additionally, it will explore potential future directions of this vital tool in neuroscience.

THE EFFECTS OF ENDOGENOUS NEUROTENSION ON FEEDING BEHAVIOR

Presenter(s): Maria Faraj
Neuroscience
Mentor(s): Gina Leinninger (College of Natural Science)

Obesity impacts over 40% of the US population, increases the risk of developing diabetes, and shortens lifespan. Most cases arise due to excessive consumption of calorie-dense foods and diminished physical exercise. However, how the brain regulates these behaviors and how they could be modified remains unclear. To address this knowledge gap, our team is studying lateral hypothalamic (LHA) neurons that express neurotensin (Nts), referred to as LHANts neurons. Prior work found that activating LHANts neurons suppressed food intake and motivated feeding while increasing locomotor activity, ideal behaviors for weight loss. LHANts neurons project to many areas in the brain, but we hypothesize that they primarily mediate weight loss behaviors via projections to the Ventral Tegmental Area (VTA), a region that densely expresses neurotensin receptor-1 (NtsR1). To study this, we optogenetically stimulated either all LHANts neurons or only those LHANts neurons that project to the VTA. To understand if this effect is due to Nts signaling via NtsR1, we pre-administered an NTR1 antagonist prior to optogenetic stimulation. For all tests we measured the effect on eating, locomotor activity, and body weight, as well as operant responding for sugar pellets, which is well established to measure the motivation to work for rewarding stimuli. Altogether, this work aims to further our understanding of LHANts neurons in modulating motivated feeding and suggest how leveraging this system may suppre

NMS EXPRESSIONS ROLE IN MORPHINE BEHAVIOR IN MICE.
Presenter(s): Abby Cheng
Neuroscience
Mentor(s): Michelle Mazei-Robison (College of Natural Science)

Roughly 48 million Americans suffer from addiction. By studying the neurobiological mechanisms that underly opioid use disorder we hope to better uncover novel therapeutics. The ventral tegmental area (VTA) is critical for reward processing, and has is linked to addiction. Our lab has identified VTA neuromedin S (NMS)-expressing cells as a candidate of study for morphine behaviors. We found that chronic morphine administration in mice increases VTA NMS expression in dopaminergic (DA) neurons, and that NMS-expressing neurons of the VTA have a role in morphine behaviors. To further investigate the role of NMS on morphine behaviors, we are currently using DAT-Cre mice, infused with a CRISPR guide against NMS into the VTA. By knocking down NMS expression from VTA DA neurons, we hope to uncover the necessity of this peptide for morphine behaviors. To do this, we will study the effects of the knockout on morphine locomotor activity and morphine conditioned place-preference. We expect VTA NMS knockout to decrease morphine behaviors. To confirm expression of the CRISPR guide, I've begun using immunohistochemistry (IHC). After perfusion and slicing of the brain, we performed IHC on VTA coronal sections using antibodies for the identification of DA neurons (TH) and CRISPR guide virus expression (HA). These brains were then imaged using a fluorescence microscope and I expect that some of the VTA DA-expressing cells will also co-localize with HA. Together, these data will provide a be

MAPPING TRACE METALS IN THE MOUSE BRAIN DURING PREGNANCY
Presenter(s): Chloe Heit
Neuroscience
Mentor(s): Alexandra Yaw (College of Agriculture & Natural Resources), Hanne Hoffmann (College of Agriculture & Natural Resources)

Sleep is important for everyday life but is especially important during pregnancy. During pregnancy women often get less than an ideal amount of sleep which has adverse effects on the body such as hormone imbalance, increased levels of stress, and a weakened immune system, all of which can affect both mother and fetus. Inorganic elements, like manganese (Mn) and zinc (Zn), are necessary for a healthy pregnancy. Systemic (serum and urinary) levels of manganese and zinc are correlated with sleep quality, but we do not understand how or if these elements may be acting in the brain. Sleep is regulated by the hypothalamus, where the suprachiasmatic nucleus (SCN), regulates the sleep-wake cycle and timing of hormone release. Our goals are to 1.) determine what elements are in the SCN and 2.) how those element concentrations change throughout pregnancy. This project aims to investigate the levels and distribution of elements levels in the hypothalamus of pregnant and non-pregnant mice using sectioning and laser ablation time-of-flight mass spectrometry (LA-ICP-TOF-MS) to identify hypothalamic brain regions with element changes. Based on preliminary data, there is a decrease in manganese and no change of zinc in the SCN between pregnant and late pregnancy, specifically gestation day (GD)18. Interestingly, zinc in the septal region and piriform area increase at GD18 compared to non-pregnant. These findings are

CAFFEINE MODULATES ADENOSINE AND CEREBRAL HEMODYNAMICS IN AWAKE, BEHAVING MICE
Presenter(s): Joslyn Claypool
Neuroscience
Mentor(s): Qingguang Zhang (College of Human Medicine)

Caffeine is one of the most widely used stimulants and is known to have an antagonistic effect on adenosine receptors. The neurotransmitter adenosine has been found to play a role in physiological functions like blood flow, sleep, and inflammation. While the relationship between caffeine and adenosine receptors is established, it remains unclear whether these effects remain constant across acute and chronic exposure. We set out to investigate the relationship of chronic caffeine consumption (15 continuous days) on extracellular adenosine levels and brain hemodynamics in head-fixed, behaving mice. In order to determine how caffeine impacts cerebral blood flow in specific brain regions, thin-skull windows were implanted over the somatosensory and/or prefrontal cortex. Using wide-field fluorescence imaging, we can visualize potential changes in the cerebral vasculature during acute and long-term caffeine exposure. We will then inject mice with adeno-associated virus to express G-protein coupled receptor activation-based adenosine (GRABAdo), and combined with fiber photometry, we will be able to measure extracellular adenosine levels. These experiments together can offer a deeper insight into the mechanisms behind how caffeine modulates cerebrovascular function and how tolerance may alter this. Uncovering this dynamic will provide a better understanding of caffeine's impact on neural activity and brain health, especially in conditions such as migraine, neuroinflammation, and n

EXPLORING THE PARAMETERS UNDERLYING THE INHIBITION OF DRUG-SEEKING FOLLOWING MEDIATED DEVALUATION OF COCAINE
Presenter(s): Allison Doneth
Neuroscience
Mentor(s): Alexander Johnson (College of Social Science), Bing Mo (College of Social Science)

In this study we examined the parameters underlying the disruption in cocaine-seeking following the mediated devaluation of cocaine. In previous experiments from the laboratory, rats were provided with cocaine self-administration training, during which they associated active lever responses with a cocaine infusion and tone-light conditioned stimulus (CS). Subsequently, rats experienced an aversion phase, in which the CS was presented, which evoked the retriveal of cocaine-associated memories. At this time, rats received an injection of LiCl to induce gastric malaise (instead of a cocaine reward). This lead to a devaluation of cocaine memory such that it became associated with feeling unwell, leading rats to no longer want to seek out the drug. In the current study, we confirmed that the retrieval of the cocaine reward memory is needed for the future disruption in drug seeking. To this end, rather than providing the cocaine-associated CS along with LiCl, the CS was omitted and rats received an injection of LiCl alone. Results showed that in the absence of retrieval of the cocaine-associated memory, gastric malaise produced by LiCl alone was insufficient to produce the future disruption in cocaine-seeking. This confirms that the attenuation of cocaine-seeking that follows mediated devaluation reflects a devaluation of the retrieved cocaine-associated memory. In addition, our lab has shown that inactivation of cells in the ventral tegment

DOES CRH EXPRESSION IN THE LATERAL HYPOTHALAMIC AREA OF THE MOUSE BRAIN CHANGE ACROSS THE LIGHT-DARK CYCLE?
Presenter(s): Grace Eliya
Neuroscience
Mentor(s): Gina Leinninger (College of Natural Science), Raluca Bugescu (College of Natural Science)

Corticotropin-releasing hormone (CRH) is a neuropeptide that is implicated in modulating feeding and drinking, but it remains unclear what CRH-expressing neurons in the brain modulate these ingestive behaviors. Previous studies reported that CRH is co-expressed with the neuropeptide neurotensin within the lateral hypothalamic area (LHA), a region of the brain that regulates feeding, drinking, and weight loss. In mice, activating these LHA neurons containing CRH+neurotensin causes opposing ingestive behaviors: during the light cycle it causes drinking with no impact on feeding, but activating the neurons during the dark cycle causes mice to restrain feeding with no effect on drinking. We hypothesized that expression of CRH might vary in the LHA between the light and dark cycle, which might explain why activating the CRH-expressing neurons causes different ingestive behaviors during the light and dark cycles. To test this hypothesis, we perfused C57/Bl6 Jackson Laboratory wildtype mice during the light (n=5) or dark (n=4) cycles. We then used RNAscope to label CRH mRNA and counted the number of cells CRH-expressing cells in the LHA during the light and dark cycles. We found no significant difference in CRH expression between the light and dark cycles. These data suggest that variations in CRH expression do not account for the differing ingestive behaviors after activating LHA CRH-expressing neurons. Going forw

NUTRITION & FOOD SCIENCE

GENES SPECIFIC TO E. COLI O121 IN LOW MOISTURE FOOD-BORNE ILLNESS OUTBREAKS
Presenter(s): Jonas Ahonen
Nutrition & Food Science
Mentor(s): Teresa Bergholz (College of Agriculture & Natural Resources)

Escherichia coli serotype O157 is the most common cause of E. coli related food borne outbreaks in high moisture foods like raw meat and dairy products. However, E. coli serotype O121 infections have recently been associated with low-moisture food products like wheat flour in both the United States and in Canada. While the dissication survival genetics of the O157 serotype has been extensively studied, there is little known about O121. The objective of this study was to determine genes exclusive to O121 isolates associated in low-moisture food borne outbreaks, not found in the general population of food-related O121 isolates, that contribute to its persistence in low moisture foods. Isolates were downloaded from the NCBI: Pathogen database and were processed and analyzed using a custom-built pipeline of genomic analysis tools like SRA-Toolkit, Trimmomatic, SPAdes, QUAST, prokka, Roary, raXML, and treeWAS. 6 genes of interest were found in the low-moisture strains, 4 of which were unnamed hypothetical proteins, while 2 were named proteins. The first is ompX, an outer membrane transport protein and IS66 transposase, a protein necessary for DNA transposition of IS66 family sequences. The next step of our research is to create deletion mutants and determine if the removal of any of the 6 identified genes significantly impacts the survival of O121 after desiccation.

GUT MICROBIOTA COMPOSITION OF PRESCHOOL AGED CHILDREN: A SUBSTUDY OF THE PRENATAL STRESS STUDY
Presenter(s): Alyssa Cosio
Nutrition & Food Science
Mentor(s): Sarah Comstock (College of Agriculture & Natural Resources)

The gut microbiome is filled with trillions of microorganisms ranging from bacteria to viruses and parasites. Prenatal stressors such as socioeconomic class, exposure to antibiotics, and adequate nutrition can affect a child's gut microbiome, which can lead to later health outcomes. There is a growing interest in investigating the connection between the effects of prenatal stress on the mother and gut microbiome diversity of the child. This study is a substudy of the "Prenatal Stress Study" completed by MSU's Psychology department. I aim to identify patterns in the gut microbiome of a cohort of 32 participants (aged 3-5 years). Fecal gDNA extraction was completed to isolate the DNA from the 32 samples. Then, Polymerase Chain Reaction (PCR) was completed to amplify the V4 region of the 16S rRNA gene. The samples were sent in for sequencing. The amplification of this gene will show the gut microbial diversity of the system. Subsequently, statistical analysis (using Rstudio) will be completed to further investigate microbial patterns. In addition to microbial data collected from the stool of children we have also collected demographic data through participant completed questionnaires. With further ana

EFFECTS OF PRE-TREATMENT AND MILLING TECHNOLOGIES ON PULSE FLOUR QUALITY
Presenter(s): More Pastrana Pedrero, Shamita Ingalagi
Nutrition & Food Science
Mentor(s): Sharon Hooper (College of Agriculture & Natural Resources)

The demand for pulses and pulse flour has increased over the past years. Pulses are high in protein and are a significant source of vitamins and minerals. Consumers' interests have switched from conventional wheat to plant-based alternatives. However, the absence of gluten in pulse flour affects dough rheology and food product quality. The objective of this project was to determine the effects of pre-treatment (raw, roasted and infrared heating) and milling technologies (hammer and roller mill) on pulse flour functional properties such as Rapid Visco Analyzer pasting properties and particle size distribution. Results showed that in general pulses with smaller particle sizes yielded higher peak and final viscosities in comparison to pulse flours with larger particles. This is because smaller particles have a larger surface area, which allows for better hydration and faster gelatinization. High viscosity is crucial in gluten-free for building structure especially in gluten free products.

GEOGRAPHICAL VARIATIONS IN EGG NUTRIENT DENSITY: A COMPARATIVE STUDY OF OHIO AND INDIANA LAYER HEN SYSTEMS IN LATE FALL AND EARLY WINTER MONTHS
Presenter(s): Kanon Nishijima
Nutrition & Food Science
Mentor(s): Jenifer Fenton (College of Agriculture & Natural Resources)

Regenerative, pasture-raised hen systems create synergistic relationships between hens, forage, soil, and weather. Foraging allows poultry access to nutrient-rich and biodiverse feed, producing eggs with a more favorable nutrient profile for human health. However, the impact of these factors on egg quality and nutrient profile varies by region. The objective of this research was to characterize monthly changes in egg characteristics and nutrient content influenced by geographical variations. This two-year study focused on two pasture-raising systems located in the Midwest: one in Ohio, and the other in Indiana. Twenty-four egg samples pooled to form n=12 replicate samples were collected monthly from September to December. Carotenoids were analyzed colorimetrically, and egg yolk fatty acid profiles were determined using gas chromatography-mass spectrometry. Yolk color was significantly darker in eggs from the Ohio layer hen system across all months. Similarly, a significantly higher total beta-carotene and carotenoid content in Ohio egg yolks was observed ($p < 0.05$). Total cholesterol was significantly higher in Ohio across the season ($p < 0.01$). Significant differences in the total n-6 and total n-3 were observed ($p < 0.05$). Ohio eggs exhibited a significantly lower total n-6:n-3 ratio in October-December ($p < 0.05$); a lower ratio is more favorable for human health, The findings reveal that geographical variations significantly influence the nutrient densi

ASSOCIATIONS BETWEEN MATERNAL EARLY- AND LATE-PREGNANCY DIET QUALITY WITH BREASTFEEDING INITIATION AND DURATION
Presenter(s): Annmarie Murphy
Nutrition & Food Science
Mentor(s): Maria Cinzori (College of Agriculture & Natural Resources), Rita Strakovsky (College of Agriculture & Natural Resources)

Breastfeeding is beneficial for infant development and maternal postpartum health. Experimental studies suggest that nutrients from high-quality foods consumed and stored during pregnancy are mobilized during lactation. However, the relation between diet quality and breastfeeding initiation and duration have not been extensively evaluated. To address this gap in knowledge, pregnant women (n = 160) from the Illinois Kids Development Study (I-KIDS), a prospective pregnancy and birth cohort, completed three-month semi-quantitative food frequency questionnaires at median 13 and 35 weeks gestation. We calculated the Healthy Eating Index (HEI)-2015 and Alternative Healthy Eating Index (AHEI)-2010 excluding alcohol (both scored out of 100 points). After pregnancy, women provided information on breastfeeding initiation and duration via questionnaire. In the current study, we will evaluate associations of maternal diet in pregnancy with breastfeeding initiation and duration using multivariable logistic regression and linear regression models, accounting for relevant covariates, including measures of socioeconomic status, health, and lifestyle. Most women in the study were non-Hispanic White (85%) and had a household income of $60,000 (74%). Half of women were nulliparous (49%) and one-third exclusively breastfed for six months (36%). The median (25th, 75th percentile) mont

FOOD ACCESSIBILITY IS RELATED TO PRESCHOOLERS' ANTHROPOMETRICS AND HOME EATING ENVIRONMENT
Presenter(s): Kayla Norman
Nutrition & Food Science
Mentor(s): Jiying Ling (College of Nursing)

This study examined the relationship between food accessibility, home eating environment, and preschoolers' anthropometrics to advance understanding of food environments and childhood obesity. Identifying the specific associations can help inform targeted interventions aimed at improving food environments. Baseline data from 200 preschoolers (ages 3-5) enrolled in a clinical trial across 26 rural Head Start centers were used. Most participants were non-Hispanic and White. Nearly one-third of parents had an income below $20,000, and 44.2% of parents were unemployed. Height, weight, and percent body fat were objectively measured. Parental feeding attitudes and practices were assessed using the 28-item Child feeding Questionnaire, while food management behaviors were measured with the 9-item Expanded Food and Nutrition Education Program Checklist. Home eating environment was assessed with the 18-item US Household Food Security Survey Module. Data analyses were conducted with IBM SPSS Statistics Version 27. Results revealed that less access to full-service restaurants was significantly correlated with higher BMI z-score and percent body fat in preschoolers. Moreover, parents with better food management behaviors, greater perceived feeding responsibility, and healthier home eating environments were associated with less access to convenient stores and more access to limited-service restaurants. These findings highlight the critical role of food accessibility in shaping children'

DOSAGE EFFECTS OF A MINDFUL EATING INTERVENTION ON CHILDREN'S ANTHROPOMETRICS
Presenter(s): Anusha Pandya, Skyler Shaman
Nutrition & Food Science
Mentor(s): Jiying Ling (College of Nursing)

This study aimed to explore the dosage effects of a mindful eating intervention on anthropometrics of preschoolers involving a clinical trial. Determining the optimal intervention length producing the most beneficial outcomes can guide the design of future programs for maximum effectiveness. Data was collected from 195 preschoolers and their caregivers in 26 Head Start daycare classes during the 2023-2024 academic year. The study included a 14-week intervention, introducing 26 fruits and vegetables through 13 weekly sessions. Additionally, the height, weight, percent body fat, and skin carotenoids of preschoolers were measured during in-person data collection. Of the 195 enrolled preschoolers, the mean age was 47.53 months. About 53.5% of the caregivers had a high school degree or lower and 33.7% were single. Approximately 35.3% of the families had an annual family income under $20,000, and each family had an average of 2.55 children. Preschooler participation was strong, with average attendance at 11.13 lessons. Number of weekly lessons attended had a significant, non-linear relationship with preschoolers' BMI z-score and BMI at post-intervention. The optimal dosage minimizing BMI z-score and BMI was ten lessons. In addition, the number of weekly lessons was negatively correlated with preschoolers' percent body fat, but the results were not statistically significant. These findings suggest mindful eating intervention positively impacting preschoolers' BMI when administere

IDENTIFICATION AND CHARACTERIZATION OF NOVEL LACTIC ACID BACTERIA VIA CULTURE-BASED AND SHOTGUN SEQUENCING APPROACHES
Presenter(s): James Nelon
Nutrition & Food Science
Mentor(s): Ahmed Abdelhamid (College of Agriculture & Natural Resources)

Commercial bacterial cultures used in dairy products ensure both consistent and quality characteristics. However, with a lack of variety in bacterial cultures available for commercial dairy applications, there is a strong desire to discover novel cultures to enhance product uniqueness while providing appealing sensory characteristics. Thus, the main goal of this project is to identify and characterize novel bacterial candidates from artisanal cheeses for potential dairy applications. Five artisanal cheeses, including brie produced with traditional commercial cultures, bleu and three Gouda varieties (plain, mustard seed, and nettle) produced using natural microbiota from raw milk were analyzed. In a two-pronged analysis, the cheeses were analyzed both with traditional culture-based approaches to isolate and characterize bacteria from each cheese, along with AVITTI shotgun metagenomic analysis to determine the unique cheese metagenomes through a bioinformatics pipeline. Through traditional laboratory techniques, twelve potential isolates were obtained with five isolates exhibiting desirable milk coagulation properties by achieving coagulation and reaching a pH of ~4.6 within 6 hours. When analyzed with shotgun metagenomic analysis, raw milk cheese contained a high abundance of Lactococc

ENHANCING SENSORY PRECISION: AN INVESTIGATION ON QUANTIFYING THE RESOLUTION OF SENSORY TESTING METHODS
Presenter(s): Alyssa Hawkins
Nutrition & Food Science
Mentor(s): Emily Mayhew (College of Agriculture & Natural Resources)

Predicting odor perception from odor mixture composition is a challenge olfaction. While progress has been made in predicting monomolecular odorant perception, olfaction primarily detects odor combination; requiring an understanding of mixture perception. To measure our progress in modeling the stimulus-percept relationship, we need high-resolution perceptual data on odor mixtures. In a previous study, we collected descriptive ratings using the rate-all-that-apply (RATA) method and explicit pairwise similarity ratings (SIM) on a set of odorants and their binary mixtures, and we found that the resolution of SIM was slightly higher than RATA, where a higher-resolution method can discriminate odor pairs with higher % overlap from odor-to-self-control pairs. We hypothesize that discrimination test methods will have higher resolution than RATA or SIM. In this study, we will recruit 12 subjects to participate in an odor triangle discrimination test using odorants from our previous study to directly compare method resolution. Gamma-undecalactone and acetoin and their binary mixtures will be pipetted into odor vials. These odors will be put into 6 pairs, ranging from odor to itself (100% overlap) to completely different odors (0% overlap), focusing on highly similar odors (100%, 90%, 80%, 70%, 50%, 0% overlap). Each pair will be presented in 10 trials across 3 sessions. Betw

DESCRIBING THE ASSOCIATION BETWEEN DIETARY DIVERSITY AND PRE-PREGNANCY BMI OR THE GUT MICROBIOME IN WOMEN IN A MICHIGAN COHORT
Presenter(s): Heli Sheth
Nutrition & Food Science
Mentor(s): Sarah Comstock (College of Agriculture & Natural Resources)

During pregnancy, having a healthy body weight and adequate micronutrients supports positive outcomes. Pre-pregnancy obesity in the United States has increased in recent years. MDD-W is a dietary diversity measure used to determine dietary micronutrient adequacy. This study determines the percentage of participants achieving minimum dietary diversity and the correlation between dietary diversity and pre-pregnancy BMI. Additionally, this study will examine how dietary diversity relates to microbiome diversity. Participants were recruited from a pregnancy cohort in Michigan (n = 131). 24-hour dietary recall assessed third trimester diet. The composition of gut microbiota in third-trimester stool samples was analyzed using 16S rRNA gene sequencing. The surveys were coded to calculate the MDD-W score, and BMI was determined using self-reported pre-pregnancy height and weight. Data analysis was performed using R Studio. Overall, 50% of participants were normal weight, 24% had overweight, and 26% had obesity. Additionally, 21% of participants did not achieve an MDD-W score greater than 5, indicating low dietary diversity. Pre-pregnancy BMI and MDD-W score during the third trimester were inversely correlated. A lower percentage of women with obesity had MDD-W scores of ≥5 than women of normal weight. Third trimester MDD-W scores tended to differ across BMI categories. However, the percentage of pregnant women consuming foods with low nutrient densities during the third trimester ac

GARDENING'S INFLUENCE ON DIETARY OUTCOMES AND ENVIRONMENTAL CONSCIOUSNESS IN PRESCHOOL-AGED CHILDREN

Presenter(s): Sophia Waldie
Nutrition & Food Science
Mentor(s): Katherine Alaimo (College of Agriculture & Natural Resources), Veronica Wirth (Residential & Hospitality Services)

Gardening has been shown to affect a variety of outcomes in children such as learning, behavior, development, and diet preference. Few studies have focused specifically on preschool children, ages 2-5 years of age. In collaboration with Keep Growing Detroit, a non-profit organization that supports urban farms and gardens, this study was conducted to investigate the effects of gardening on developmental and dietary outcomes in preschool children. A community advisory team was convened to assist with developing research questions, methods, interview guides, and interpretation. Preschool childcare providers with a center garden (n=8) and parents who actively garden with their preschool-age child (n=4) participated in semi-structured interviews by a trained interviewer. Interviews were recorded and transcribed verbatim, and analyzed using the software, Atlas.ti using a thematic coding approach. Preliminary analysis found that childcare providers and parents reported that gardening influenced children's environmental consciousness, relationship with nature, dietary behaviors, and basic scientific understanding. Through gardening, children demonstrated an emerging awareness of environmental health and respect for nature, along with a foundational understanding of plant growth and how food is grown. Children were more willing to try new foods they grew in their gardens. Childcare providers noted that garden produce sent home with families inspired home cooking and promoted health

PEAPOD 2: EXPLORING THE IMPACT OF A FOOD-BASED INTERVENTION ON THE PRENATAL GUT MICROBIOME

Presenter(s): Yash Khiraya
Nutrition & Food Science
Mentor(s): Sarah Comstock (College of Agriculture & Natural Resources)

The composition of the maternal prenatal gut microbiome significantly impacts infant gut microbiome development and long-term health. Diet during the later trimesters of pregnancy has been shown to be important for both fetal growth and brain development. While current evidence supports a need to increase fruit and vegetable consumption during pregnancy, there exists a gap in nutrition and practical applications for women facing life challenges including food insecurity, obesity, or risk for substance use disorder (SUD). Current literature has not identified a consistently effective method to alter the adult gut microbiome, so it is crucial to continue exploring interventions to understand disease prevention mechanisms, long-term microbiome shifts, and early-life intervention windows. With growing evidence of an association between higher diet quality and birth outcomes, it is vital to work towards increasing maternal fruit and vegetable consumption during pregnancy along with decreasing food insecurity. Hence, this project aims to evaluate the effectiveness of a 10-day, food-based intervention aimed at increasing fruit and vegetable intake to alter the composition and diversity of the prenatal gut microbiota in pregnant women (n = 30) experiencing food insecurity, obesity, or at risk for substance use disorder. The collection of stool samples and surveys allows for the assessment of gut microbial composition and diver

HOW CONSUMERS' KNOWLEDGE AND BELIEFS SHAPE THEIR PERCEPTION OF FOOD SUSTAINABILITY AND FOOD CHOICES.
Presenter(s): Anna Wagner
Nutrition & Food Science
Mentor(s): Emily Mayhew (College of Agriculture & Natural Resources)

Concerns about sustainability and food waste have been on the rise and are increasingly becoming more significant in the markets. However, studies have shown that most consumers have a limited understanding of key food-related sustainability topics and are not aware of the impact of their food choices. Food producers and consumers both play roles in improving the overall sustainability of the food system, however, production of more sustainable food options will be ineffective if consumers do not select them. Because of this, it is crucial to understand the knowledge that consumers have about the factors that impact food sustainability and product choice. The purpose of this study is to measure consumers' attitudes towards sustainability and food waste. Adult consumers (n>100) will be invited to complete an online 15-minute survey. They will be asked questions about what product characteristics they consider most important in a sustainable product; what sustainable food practices/behaviors they exhibit, and what factors impact their food purchase. They will also be asked a sustainability attitudes questionnaire and basic demographic questions. We will calculate response frequencies to determine which factors are perceived to have the largest impact on sustainability and which factors are/are not considered in consumer purchasing d

EFFECTS OF A SLEEP EDUCATION PROGRAM ON MICHIGAN STATE UNIVERSITY STUDENTS
Presenter(s): Reagan Pennycuff, Tyler Nagy
Nutrition & Food Science
Mentor(s): Robin Tucker (College of Agriculture & Natural Resources)

Introduction: High stress and irregular sleeping schedules promote sleep issues in university students. To determine the best format for sleep education, students participated in a discussion-based or asynchronous version of the Sleep Education for Everyone Program (SLEEP). Methods: MSU students who were dissatisfied with their sleep were recruited. Sleep quality and self-reported sleep duration (SD) were determined using the Pittsburgh Sleep Quality Index (PSQI); the Sleep Hygiene Index (SHI) evaluated the frequency of undesirable sleep behaviors. Time asleep, wake after sleep onset, sleep stages, time in bed, and nap duration were measured via Fitbits. Questionnaires were completed at baseline and week 6, and Fitbit measurements were taken at baseline, week 3, and week 6. Differences between and within groups were identified using a general linear model analysis. Results: 61 students completed the discussion-based SLEEP; 37 completed the asynchronous version. Both groups reported improved sleep quality over time ($p<0.001$); however, the discussion-based group experienced greater sleep quality improvement compared to the asynchronous group ($p=0.003$). A reduction in undesirable sleep behaviors and improved self-reported SD were also observed in both groups ($p<0.001$; $p<0.001$), and again, the discussion-based group improved more over time ($p<0.001$; $p<0.001$). Objective sleep mea

EXPLORING THE RELATIONSHIP BETWEEN SERUM OMEGA-3 LEVELS AND SLEEP QUALITY IN OBESE INDIVIDUALS: AN OBSERVATIONAL STUDY
Presenter(s): Kayla Fenton, Reaghan White
Nutrition & Food Science
Mentor(s): Jenifer Fenton (College of Agriculture & Natural Resources)

Disordered sleep, including insufficient and poor-quality sleep, is widespread, with individuals with obesity more likely to report sleep problems. Diet significantly influences health, including sleep patterns and quality. This study aims to investigate the relationship between omega-3 fatty acids and sleep outcomes among adults with overweight and obesity, a group often burdened with sleep disorders and metabolic complications. Sleep data was collected using Zmachine, a single-channel electroencephalograph, and Fitbit devices. Serum samples were collected at baseline, on day 7, day 14, and after the washout period, before repeating the process. The samples were methylated, and fatty acids were analyzed using gas chromatography-mass spectrometry. The data will be compared to investigate correlations between omega-3 fatty acid levels and sleep quality.

HUMAN MILK OLIGOSACCHARIDES BENEFICIALLY SHAPE THE INFANT GUT MICROBIOME
Presenter(s): Neha Gopalakrishnan
Nutrition & Food Science
Mentor(s): Sarah Comstock (College of Agriculture & Natural Resources)

The infant gut contains bacteria that regulate immunity, digestion, and metabolism. Human Milk Oligosaccharides (HMOs) are specialized sugars in human milk often lacking from modern infant formulas. HMOs are indigestible by infants but are beneficially metabolized by gut microbiota, and genes that code for HMO-metabolizing enzymes have been linked to improved immunity in infants. This study explores whether a strong association can be formed between infant diet and the abundance of HMO-metabolizing genes to understand how diet translates into the gut bacterial gene repertoire. I also assess the ability of quantitative PCR to replicate results from metagenomic sequencing of HMO metabolizing genes. DNA from stool samples of 3-month old infants, either exclusively breast or formula-milk fed, was analyzed using quantitative PCR to assess variations in the abundance of known HMO metabolizing genes, including Sialidase (Sia) and the 16S rRNA from Bifidobacterium (gBif). Human-milk fed infants had significantly higher amounts of gBif compared to their formula-fed counterparts. No significant difference in Sia gene abundance was detected between feeding groups, but trends demonstrated a higher relative abundance present in human-milk fed infants. These results highlight how diet can shape early gut microbiota, especially by promoting the growth of beneficial bacteria. Future studies should aim to utilize larger sample sizes to more representatively evaluate the im

EVALUATION OF THE ADAPTIVE RESPONSES OF SALMONELLA AND MICROBIAL COMMUNITIES IN ALFALFA SPROUTS
Presenter(s): Emilee Mulder
Nutrition & Food Science
Mentor(s): Ahmed Abdelhamid (College of Agriculture & Natural Resources)

Sprouts available commercially undergo minimal processing, which increases their risk of harboring pathogens such as Salmonella enterica , often linked to foodborne illness outbreaks . The goal of this research is to evaluate whether sprouts-associated microbial community can effectively compete with Salmonella during alfalfa sprout growth. To isolate sprout-associated microorganisms, five different types of sprouts have been collected for microbiological and molecular analyses. Sprout samples were homogenized, plated on microbiological medium, and the dominant bacteria were isolated. Additionally, DNA was extracted from the sprouts for shotgun genomic sequencing to characterize the microbiome composition. While Salmonella survival in sprouts is frequently studied , little research addresses how sprout-associated microbiota affects pathogen growth.This study aims to fill this gap by analyzing the composition and functional dynamics of sprout-associated microbes and their interactions with Salmonella during alfalfa sprout growth. Laboratory-grown alfalfa sprout seeds were inoculated with Salmonella (5.6 lo

UNDERSTANDING CONSUMER PERCEPTIONS AND BARRIERS TO PULSE PRODUCTS
Presenter(s): Saamia Hasan
Nutrition & Food Science
Mentor(s): Emily Mayhew (College of Agriculture & Natural Resources), Mariano Aldana Mejia (College of Agriculture & Natural Resources)

Pulses are nutritious, eco-friendly, and rich in protein, yet their consumption in the U.S. remains well below recommended levels. Increasing awareness and incorporating pulses to meals can promote public health and sustainability. The pulse focus groups aim to assess consumer preferences, benefits, and barriers for pulse-based products like pasta, crackers, and chips, focusing on flavor, odor, and texture. Our goal is to identify the key barriers to consumption and factors that encourage consumers to buy these pulse-containing products. These factors include better nutrition (higher fiber, protein, and micronutrients), lower environmental impact, alignment with plant-based diets, sensory appeal, convenience, and affordability over animal proteins. Four focus groups, each with eight to ten participants from the greater Lansing area, will explore consumer perceptions of challenges in developing pulse flour-based foods like pasta and crackers. Participants will be recruited via email and grouped based on their pulse consumption habits-two groups of regular consumers and two of potential adopters. Sessions will take place at Michigan State University's Sensory Evaluation Lab, recorded for thematic analysis, and facilitated using a structured discussion guide. Examples of pulse and wheat-based products will be presented to aid discussion. Our goal is to gain a thorough understanding of how consumers view pulse-based products and how to improve these products to promote pulse c

ASSOCIATIONS OF PER- AND POLYFLUOROALKYL SUBSTANCES WITH THE GUT MICROBIOME DIVERSITY OF INFANTS IN MICHIGAN
Presenter(s): Anish Gogineni
Nutrition & Food Science
Mentor(s): Courtney Carignan (College of Agriculture & Natural Resources), Rachel Bauer (College of Human Medicine), Sarah Comstock (College of Agriculture & Natural Resources)

Per- and Polyfluoroalkyl Substances (PFAS) are synthetic chemicals that break down slowly, leading to build up in the body. Many drinking water sites across Michigan have been found to be contaminated with PFAS. Further, the milk of lactating individuals consuming PFAS-contaminated water has been shown to contain PFAS. Exposure to PFAS can cause many negative health outcomes such as child developmental delays, decreased fertility, interference with hormones, reduced immunity, and increased risk of some cancers. There is the potential for these PFAS to negatively impact the gut microbiota of infants. In order to study this potential impact, 73 mother-infant dyads were enrolled and submitted human milk samples, stool samples, and survey questionnaires. DNA was extracted from the stool samples and sequenced via the V4 region of the 16S rRNA gene. The human milk samples were tested to quantify their relative PFAS contents. Alpha and beta diversity of the infant stool samples will be compared using the relative PFAS contents in the infant diet (i.e. human milk). If it is observed that PFAS is associated with the gut microbiota diversity in infants, these results strengthen the evidence for strict regulation of PFAS to mitigate effects on human health.

EXPLORING THE RELATIONSHIP BETWEEN OMEGA-6 FATTY ACIDS AND SLEEP OUTCOMES IN OBESE ADULTS: AN OBSERVATIONAL STUDY

Presenter(s): Angela Lumaj, Dharshini Senthilkumar
Nutrition & Food Science
Mentor(s): Jenifer Fenton (College of Agriculture & Natural Resources), Robin Tucker (College of Agriculture & Natural Resources), Sidney Fenton (College of Agriculture & Natural Resources), Vanessa Cardino (Graduate School Dean)

More than 1 in 3 Americans do not get enough sleep, with obese individuals experiencing sleep issues at a higher rate than those with a healthy weight. Insufficient and poor-quality sleep are common, costly, and linked to all 10 leading causes of death in the US. Diet significantly influences health and sleep quality, with previous research identifying a higher intake of omega-6 fatty acids and increased omega-6: omega-3 ratios as being associated with poorer sleep quality. However, limited studies have explored these associations in obese populations. This study aims to fill this gap by investigating omega-6 fatty acid profiles in overweight and obese individuals to identify potential links with disordered sleep. Sleep quantity was collected using FitBit devices, while sleep quality was measured using Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Index (PSQI) questionnaires using Qualtrics. Serum samples were collected at baseline, day 7, and day 14, followed by a 2-week washout period before repeating the process. The samples from baseline and day 14 of each period were methylated, and fatty acids were analyzed using Gas Chromatography-Mass Spectrometry. Given the increased prevalence of disordered sleep patterns within the obese population, exploring decreased omega-6 intake may contribute to greater i

PROCESSING OF BLACK GARLIC IN THE AUTOCLAVE TO ACHIEVE OPTIMAL COLORING

Presenter(s): Kaitlyn Marcum
Nutrition & Food Science
Mentor(s): Leslie Bourquin (College of Agriculture & Natural Resources), Ryan Walker (College of Agriculture & Natural Resources)

Black garlic provides many health benefits while also being sweeter and having a more subtle aroma and flavor as opposed to raw or minimally processed garlic. However, the typical process of creating black garlic requires 20 to 60 days depending on the processing conditions. This experiment utilized an autoclave to model industrial canning operations to reduce the process time to between 1-4 hours. Essentially, this experiment aimed to identify optimal processing conditions to create a more sustainable manufacturing process while also generating a more consistent product. Preliminary trials with increasing 30-minute intervals and varying pH solutions from 6.0-10.0 were used to determine the combination that would yield the most desirable black garlic product. Noticeable darkening was observed and measured using HunterLAB, and the color darkened as processing time increased. Soaking garlic cloves in different pHs had minimal effect on the final product's color, indicating that the most optimal black garlic would be achieved primarily based on processing time. From there, a factorial experiment (time x sugar source) was designed to drive the production of Maillard reaction products using a constant high temperature of 121°C. Three different sugar sources (fructose, inulin, and maltodextrin) were dissolved in deionized water and mixed with pressed raw garlic. Knowing that longer processing times produc

OPTIMIZING RETORT PROCESSING FOR BEAN QUALITY: EVALUATING TEXTURE & PACKAGING
Presenter(s): Rachele Noble
Nutrition & Food Science
Mentor(s): Lauren Thomas (College of Agriculture & Natural Resources)

Beans are an extremely popular consumed and nutritious food source. While beans are a hot commodity, when it comes to consumption they vary in texture and quality after processing. Which then lies the challenge. This project seeks to explore the influence of packaging and calcium chloride treatment on the texture and overall quality of retort-processed beans. Using both common and specialty bean market classes, the study assessed the effect of variety, packaging, and calcium chloride on the product's final quality. Retort processing is an essential method for preserving beans, but the impact of different packaging options/additives on their sensory properties has yet to be fully explored. This research will evaluate how these factors influence the beans' texture, ensuring that the resulting products align with consumer preferences. By investigating the interaction between calcium chloride treatment and packaging, the goal is to identify optimal combinations that improve texture, appearance, and consumer acceptance. This project aims to better understand processing protocols for beans processed within different packaging, creating a high-quality product to expand consumer acceptability of a highly nutritious food. The outcome of this project will contribute to refining the processing techniques for beans, offering new insights into improving product consistency and quality.

UNDERSTANDING CONSUMER'S PREFERENCE AND PERCEPTION OF PULSE-BASED PRODUCTS
Presenter(s): Sarah Coyne
Nutrition & Food Science
Mentor(s): Emily Mayhew (College of Agriculture & Natural Resources), Mariano Aldana Mejia (College of Agriculture & Natural Resources)

Products with pulse flour are a healthy and sustainable alternative to animal-based products. Pulses are the edible portion of a bean plant. These plants take up less space than cattle farms. Pulse-based products are high in protein and fiber compared to animal-based products which are low in fiber. This study is designed to gather insights on what consumers are looking for in pulse-based products. This will be achieved through four different focus groups consisting of eight participants each. The two groups will consist of regular consumers of pulse-based products, while the other two groups will include individuals who do not regularly consume them but are open to incorporating them into their diet. The aim of the focus groups is to achieve a comprehensive understanding of what consumers like and dislike in pulse-based products. The investigation of sensory characteristics will include products like pasta, crackers, and chips that are pulse based. Participants will be contacted via email and participation will be completely voluntary. Sessions will be in person, recorded, and a Verbatim transcript will be developed. The goal of this study is to determine the advantages and disadvantages of purchasing and consuming pulse-based products from a consumer perspective.

PRECLINICAL EVALUATION OF OMEGA-3 FATTY ACIDS FOR LUPUS INTERVENTION
Presenter(s): Shayla-Rae Johnson
Nutrition & Food Science
Mentor(s): Ashley Anderson (College of Osteopathic Medicine)

Lupus nephritis (LN) treatment conventionally relies on potent immunosuppressants and prolonged steroid use, often resulting in adverse effects including increased infections, bone loss, diabetes, and muscle wasting and disease recurrence when steroids are reduced or stopped. Recent mouse studies have shown promise for omega-3 fatty acids, particularly DHA from fish oil, in preventing LN. However, their potential to impact LN post-onset remains unexplored. This groundbreaking preclinical research aims to investigate DHA's efficacy as a treatment after LN onset, both independently and in combination with low-dose steroids. The study employs a unique approach using lupus-prone mice exposed to silica dust to rapidly induce LN, mimicking environmental factors in humans and enhancing research robustness. The primary objectives are to evaluate DHA's effectiveness in maintaining LN remission following initial immunosuppressive treatment, compare various DHA dosages and their impact on remission duration, and examine the complementary effects of DHA with low or moderate steroid doses. Comprehensive kidney health monitoring will be conducted through urine and blood tests, tissue examination, and advanced genetic analysis. This innovative research explores DHA, a natural supplement, as a potentially safer method for maintaining LN remission, which could transform LN management by offering a more affordable and less harmful approach to extend disease remission and prevent persistent

SPICES IMPROVE THE NUTRITIONAL QUALITY OF MEAT AND POULTRY PRODUCTS

Presenter(s): Summer Luick
Nutrition & Food Science
Mentor(s): Ilce Medina Meza (College of Agriculture & Natural Resources)

Western dietary patterns are strongly linked to preventable chronic diseases. One of the main things that sets the western diet apart is its higher levels of lipid consumption. The normal recommendation for fat consumption is 20%-35% of calories ingested, however the western diet averages 42% of calories from fat (Maldonado-Pereira et al., 2022). Chronic diseases like obesity, diabetes, hypertension, and atherosclerosis are caused by an overabundance of fat that accumulates in the body (Maldonado-Pereira et al., 2022). Home cooking methods cause oxidation of lipids in foods we eat through exposure to heat, light, radiation, and oxygen in the air. In industry, natural and artificial antioxidants are added to products to reduce oxidation and increase shelf time. Spices are a natural source of antioxidants that can be added to food and safely consumed. Therefore, we decided to determine how the addition of spices to meat and poultry products during home cooking affects fatty acid profiles. We hope the fatty acid profile will provide insight on how different methods of prepping food impact the nutritional quality of meat and poultry products.

EVALUATION OF MEAT/POULTRY SURFACE TEMPERATURE MEASUREMENT APPROACHES FOR USE IN IMPINGEMENT OVENS

Presenter(s): Ava Chavez
Nutrition & Food Science
Mentor(s): Bradley Marks (College of Agriculture & Natural Resources), Ian Hildebrandt (College of Agriculture & Natural Resources), Michael James (College of Agriculture & Natural Resources)

USDA FSIS Appendix A has identified Salmonella survival on fully-cooked meat surfaces as a scientific gap; however, it also requires processors to demonstrate sufficient surface lethality where surface drying may occur. The goal was to evaluate multiple meat surface temperature measurement methods for potential integration into surface lethality validation processes. Beef patty surface temperatures were measured during pilot-scale cooking trials using three methods: (a) thin-wire, (b) barbed thermocouples, and (c) rigid thermocouples inserted through the product until under the opposite surface. Commercial raw beef patties (~150 g) were obtained, frozen, and thawed (24 h, ~4°C) before experimentation. Six probes of one type or a combination of two types were placed with the probe tip just under the top surface. Then, the patties cooked in a moist-air impingement oven (218°C, 15%

humidity by volume, 7 min). Immediately upon oven exit, an infrared camera captured top surface temperature to compare with probe-measured temperatures. The mean midpoint/endpoint temperatures for methods (a), (b), and (c) were 76.9/80.6, 84.9/89.3 and 59.1/80.1°C, respectively. Probe variability for methods (a) and (b) were similar, with a mean standard deviation of ±6.4°C ($P>0.05$), but lower for method (c) (±2.4°C, P&l

ANALYSING THE EFFICIENCY OF ENZYMATIC PRETREATMENTS ON BLACK BEANS.

Presenter(s): Mary Geoghegan, Samantha Berenson
Nutrition & Food Science
Mentor(s): Winter Graham (College of Agriculture & Natural Resources)

The purpose of this research is to observe the efficiency of enzymatic pretreatments on black beans. The goal is to observe the efficiency of enzymatic pretreatments on de-hulling black beans using an aspirator and roller mill to separate hulls from beans. Black beans are treated with an enzymatic pretreatment then left out to air dry. The beans are then run through an aspirator to separate the loose hulls from the beans. In the collection container with the beans, the product was run through a roller mill to achieve further separation of hulls. The milled beans and separated hulls are weighed together using a scale, this is the initial weight. The sample is run through the aspirator again. Each collection container is then run through the aspirator individually for a total of three runs. The final hull collection is then sifted to remove any dust or broken pieces . The bean collection container also underwent sifting. The dust is collected and weighed. The beans are then dumped into a tray to be hand sorted. There are collection containers designated for hulls not separated via the aspirator, beans with hulls still attached, and beans with no hulls. After hand sorting each

SERUM ω-6 FATTY ACIDS AND ADOLESCENT MENTAL HEALTH: A TWELVE-MONTH LONGITUDINAL ANALYSIS OF UGANDAN ADOLESCENTS WITH PERINATAL HIV EXPOSURE/INFECTION

Presenter(s): Evan Nagy, Isaac Abraham
Nutrition & Food Science
Mentor(s): Amara Ezeamama (College of Osteopathic Medicine), Jenifer Fenton (College of Agriculture & Natural Resources), Vanessa Cardino (Graduate School Dean)

The increase of ω-6 polyunsaturated fatty acid (PUFAs) in the Ugandan diet has been associated with adverse mental health outcomes; however, the association of perinatal HIV exposure/infection remains understudied. This longitudinal study aims to quantify the association between serum PUFA levels and mental health in Ugandan adolescents with perinatal HIV infection (APHIV, n=126), those exposed but uninfected (AHEU, n=133), and those unexposed and uninfected (AHUU, n=124). We hypothesized that higher ω-6 PUFA levels would predict worse mental health, with stronger associations among adolescents affected by HIV. Self-reported anxiety, depression, and social stress were assessed using the Behavioral Assessment System for Children-3 (BASC-3) at baseline, 6 months, and 12 months. Serum fatty acid levels were measured at baseline for all adolescents and at 6 and 12 months for 37% of the cohort. A Type III analysis of variance (ANOVA) evaluated the association between total ω-6 PUFA tertiles and age/sex-standardized mental health Z-scores, reporting mean differences and 95% confidence intervals. Results by perinatal HIV status were presented if effect modification was detected ($p<0.10$). Among all adolescents, moderate or high (versus low) ω-6 PUFA levels were associated with higher self-reported depression MD [95% CI], (0.30 [0.13, 0.48]; 0.21 [0.00, 0.43]) and

READY TO APPLY SUSTAINABLE NANOPARTICLES TRAINING SYSTEM TO IMPROVE GRAPEVINE RESILIENCE

Presenter(s): Anjali Shrimankar, Cicero Pola, Quinn Armstrong

Nutrition & Food Science

Mentor(s): Carmen Gomes (Iowa State University), Ilce Medina Meza (College of Agriculture & Natural Resources)

Sour rot is an endemic disease throughout vineyards attributed to the fungal vector Botrytis Cinerea. The disease, prevalent in cool temperate climate regions, mostly infects grape clusters exposed to preharvest rains. Fungicide and bactericides are sprayed weekly to prevent this issue--but pose major environmental, human, and animal health concerns. This project promotes sustainable alternatives harnessing the antimicrobial nature of polyphenols in grape pomace. Nanoparticles encapsulating grape pomace extracts offer a sustainable solution to sour rot severity potentially replacing the use of commercial microbicides all together. Crude extracts from Pinot Noir and Riesling grapes were procured using a methanol and formic acid solution. The crude extract was then reduced through distillation and nitrogen evaporation. Phenolic profiling, for Pinot Noir grapes, provided: total phenolics, total flavanols, DPPH, FRAP (antioxidant activity), and total anthocyanins at 359.5 mg/g, 2.19 mg/g, 89.17%, 1.11 mg/g, and 4.44 mg/g respectively. Riesling measured at 99.24 mg/g, 5.80 mg/g, 91.17%, 0.56 mg/g, and 0.29 mg/g respectively. Nanoparticles were created using the crude extract, chitosan, Acetic acid, and sodium tripolyphosphate (STTP) through ionic gelation principles. Particle characterization techniques such as Dynamic Light Scattering (DLS) and Transmission Electron Microscopy (TEM) were used to assess the nanoparticles. The DLS yielding data averages for size (Z-avg), Poly-di

DID A "30 WHOLE PLANT FOOD CHALLENGE" INCREASE INTAKE OF WHOLE PLANT FOODS AMONG UNDERGRADUATE STUDENTS?

Presenter(s): Jordan Mikhalov, Logan Stoldt

Nutrition & Food Science

Mentor(s): Katherine Alaimo (College of Agriculture & Natural Resources)

Whole plant foods-such as whole grains, legumes, fruits, vegetables, nuts, seeds, and fresh herbs-are recognized for their role in preventing chronic diseases and supporting cardiovascular, metabolic, and gut health. This study examined the feasibility and effectiveness of a classroom-based intervention that encouraged undergraduate students to consume thirty different whole plant foods in one week. Students in an introductory nutrition course completed an assignment to record their intake of whole plant foods for one week (n=665). Afterward baseline assessment, students were invited to participate in the "30 Whole Plant Food Challenge." A post-survey collected intake data for a second week and asked students to indicate whether they completed the challenge (n=644). During another assignment, students reflected on their baseline assessment and identified perceived benefits and barriers they encountered to eating whole plant foods (n=690). Quantitative analysis to determine changes in plant food intake from baseline to post assessment was conducted for students who completed both intake assessments (n=308). A qualitative content analysis was conducted of a subset of students' reflections. Preliminary quantitative results showed increased intake of legumes, fruits, vegetables, whole grain, nuts, seeds, and herbs. Further quantitative and qualitative analyses will be reported. Short-term, classroom-based dietary challenges can effectively

EXPLORING BIOFILM DEVELOPMENT AND SANITIZER EFFICACY IN REDUCING SALMONELLA ENTERICA TRANSFER FROM STAINLESS STEEL TO CUCUMBERS
Presenter(s): Ruth Giblin
Nutrition & Food Science
Mentor(s): Ahmed Abdelhamid (College of Agriculture & Natural Resources)

Salmonella enterica is the second-most frequent cause of foodborne illness in the United States and thus a critically important pathogen within the food industry, particularly with fresh produce such as cucumbers. This project aimed to characterize the ability of S. enterica serovar Saintpaul (S. Saintpaul) and S. enterica serovar Newport (S. Newport) to form biofilms on food contact surfaces, quantify the transfer of biofilm cells from stainless steel coupons (SSCs) to cucumbers, and evaluate the efficacy of sodium hypochlorite, a known sanitizer for surface decontamination, in reducing biofilm formation and transfer to cucumbers. Biofilms were developed by inoculating SSCs with 1 mL Luria-Bertani broth (106 CFU/mL) for 72 h at room temperature. The SSCs were washed and treated with either sodium hypochlorite (200 ppm) or PBS as untreated control. Cucumber slices (2g) were pressed against the untreated and treated SSCs. Residual bacterial populations on the coupons and transferred cells on cucumber slices were enumerated by spread plating. Results indicated that both serovars formed robust biofilms on SSCs, resulting in a 0.7 log CFU increase per coupon compared to the initial inoculum. Approximately 1.5 log CFU/g transferred from the untreated SSCs to cucumber slices. Sodium hypochlorite treatment reduced Salmonella populations by 1.1 log CFU per coupon and decrea

FIBER INTAKE BY MICHIGAN CHILDREN AGED 1-5 YEARS
Presenter(s): Amar Hamdan
Nutrition & Food Science
Mentor(s): Sarah Comstock (College of Agriculture & Natural Resources)

Fiber is a key nutrient that is essential for the health of the digestive system. Fiber can promote gut health, regulate blood glucose levels, as well as support bowel movements. Fiber is emphasized as a nutrient that toddlers and preschool aged children need to consume, but not every child's diet includes sufficient fiber. In a previous study, a cohort of Michigan children was used to determine if children in Michigan aged 1-5 years were meeting the recommended daily fiber intake. This study provided valuable insights into fiber consumption patterns among young children but was limited by sample size. Using a larger dataset, the goal of this study is to determine if children aged 1-5 years in Michigan are receiving enough fiber in their daily diet. A questionnaire was collected that contains information about the child's diet. This information is then used in an equation from the PhenX Fiber Intake protocol to calculate fiber intake. The serving sizes from the protocol were adjusted to match portions sizes relevant to children. The information for the adjusted serving sizes was obtained from National Health and Nutrition Examination Survey data from 2017-2020 (pre-pandemic). This data was organized and averaged to fit the food and age groups for the

ANALYSIS OF ENZYMATIC PRETREATMENTS ON BEAN DEHULLING EFFICIENCY FOR COMMERCIAL APPLICATIONS
Presenter(s): Maureen Merritt, Rachel June
Nutrition & Food Science
Mentor(s): Winter Graham (College of Agriculture & Natural Resources)

This study investigates the effect of enzymatic pretreatments on the efficiency of bean dehulling, a critical process in the food and agricultural industries. The aim is to increase the separation of hulls from beans while minimizing energy consumption, material waste, and mechanical wear. Various enzymes, including cellulases, xylanases, and proteases, were applied to different bean varieties to assess their impact on dehulling performance. Enzyme-treated beans were compared to untreated samples in terms of hull removal rate, quality of dehulled beans, and overall process efficiency. The results show that enzymatic pretreatment significantly improves dehulling efficiency by reducing the force required for hull separation, leading to higher yields and fewer broken beans. Additionally, the study examines the potential for scaling up enzymatic dehulling for commercial applications, considering factors such as enzyme cost, treatment duration, and the environmental impact of enzyme use. Overall, enzymatic pretreatments offer a promising solution to enhance bean dehulling processes, providing a more sustainable, cost-effective alternative to conventional mechanical methods. This research has important implications for the optimization of food processing technologies and could contribute to the development of more efficient and environmentally friendly pra

THE PEAPOD2 STUDY: DIET ANALYSIS
Presenter(s): Melina Catenacci
Nutrition & Food Science
Mentor(s): Jean Kerver (College of Human Medicine), Sarah Comstock (College of Agriculture & Natural Resources)

It is important to consume a diet with high nutrient value and practice healthy lifestyle choices during pregnancy to ensure positive outcomes for mother and baby. For women facing disparities, healthy habits can be challenging. The Pregnancy Eating and Postpartum Development study (PEAPOD-2) analyzes the effectiveness of a food based intervention in pregnant women facing food insecurity, substance use disorder, or obesity. Participants were given food packages for a 10 day intervention. Packages contained 2 prepared salad kits, 4 grain bowls, 2 containers of yogurt, 2 bottles of kefir, 1 bottle of juice, 10 bananas, 2 bags of frozen fruit, and 4 soups. In addition to completion of questionnaires and following the intervention protocol, participants reported their dietary information using the Diet ID™ assessment tool. This technology asks participants to visually categorize their dietary intake and calculates nutritional intake. By comparing pre-intervention and post-intervention Diet ID™ information, the effectiveness of the food based intervention to increase participants consumption of nutritious foods can be evaluated. In the analysis of the healthy eating index (HEI) data for the PEAPOD-2 study for 44 participants, the pre and post intervention results had the same median (63), IQR (27), and maximum value (97). The minimum HEI value f

IMPROVING MICHIGAN HOP AND BEER AROMA AND FLAVOR USING A BIOSTIMULANT
Presenter(s): Zoey Zienski
Nutrition & Food Science
Mentor(s): Emily Mayhew (College of Agriculture & Natural Resources)

In beer production, terpenes are the key aroma volatiles that help produce the characteristic hop flavor and aroma. Increasing terpene production in hops is advantageous because it may improve the hop flavor imparted to beer or enable early harvest in cases where disease threatens the hop harvest. The natural plant biostimulant methyl jasmonate (MeJA) has been shown to increase terpene production in other plants, and so we hypothesized that application of MeJA would increase the aroma intensity of the hops and beer. We produced six hop samples (early harvest MeJA-treated and control; standard harvest once- or twice-MeJA-treated and controls) and brewed beer using each hop sample. A group of 120 untrained consumers were asked to rank subsets of hop samples' aroma and beer samples' hop flavor intensity. After ranking sample intensity, they used the "Rate All That Apply" method (RATA) on all hop and beer samples individually to describe their aroma and flavor attributes. The preliminary results concluded that the late harvest control and once-MeJA-treated samples had the highest rankings for both hop aroma and flavor intensity. We can conclude that when compared to early harvest samples, the late harvest control had a higher intensity of hops. Among late harvest samples, the most intense were the once-treated hops. This further shows that two MeJA doses is too much, causing the hops to not be as intense. In year 2, we plan on

PHARMACOLOGY & TOXICOLOGY

SELECTIVELY INACTIVATING CANNABINOID RECEPTORS TO LIMIT PSYCHOACTIVE EFFECTS WHILE ELICITING IMMUNE RESPONSES
Presenter(s): Jay Eoff
Pharmacology & Toxicology
Mentor(s): Norbert Kaminski (Research & Innovation)

Cannabinoid receptors, named for their behavior in response to cannabinoids (JWH, THC) are classified into two main types: cannabinoid 1 receptors (CB1s) and cannabinoid 2 receptors (CB2s). CB1s are predominantly found in the central nervous system, where their activation elicits a psychoactive response. In contrast, CB2s are primarily located in immune cells and peripheral tissues throughout the body, where they modulate immune responses. This presentation focuses on identifying CB2 antagonists that can harness the immune-regulating benefits of CB2 inhibition while avoiding the psychoactive effects associated with CB1 receptor activity.

A STUDY OF SEX DIFFERENCE IN INFLAMMATION AND CLINICAL CHANGES CAUSED BY CHEMICAL THREAT AGENT CHLOROPICRIN.
Presenter(s): Megha Suresh
Pharmacology & Toxicology
Mentor(s): Neera Tewari-Singh (College of Osteopathic Medicine)

Chloropicrin (CP), a toxic choking agent and agricultural fumigant, causes severe ocular effects, including lacrimation, irritation, corneal injury, conjunctival damage, and blindness. There are currently no effective treatments. Our previous studies have shown that ocular vapor exposure of 10% CP for 1 min caused eyelid swelling, ulceration, opacity, neovascularization (NV) and hyphemia in mice. However, sex differences in CP-induced ocular toxicity remain unclear. This study investigates sex differences in CP-induced corneal injury in mice. Male and Female Balb/C mice were randomly grouped. The left eye was exposed to CP vapor (10% CP for 1 min), while the right eye served as control. Clinical assessment and qPCR analysis of inflammatory markers (COX-2, CCL2, IL-1B) were performed at multiple timepoints post-exposure. Corneal ulceration was more severe at 1, 3, and 7 days, while NV and opacity worsened at 14, 21, and 28 days in both sexes compared to controls. Notably, eyelid edema at 1-day and corneal ulceration at 7-, and 14-days post-CP exposure was significantly more severe in male mice compared to female mice. In mol

INCREASING IMMUNOTHERAPY EFFICACY BY MODULATING TUMOR MICROENVIRONMENT WITH RADIOPHARMACEUTICAL THERAPY

Presenter(s): Isadora da Cunha Timochenco
Pharmacology & Toxicology
Mentor(s): Carolina de Aguiar Ferreira (College of Human Medicine)

The incidence of neuroendocrine tumors has increased significantly due to advances in diagnostic techniques. However, most patients present metastasis at the diagnostic stage, which reduces treatment options and, consequently, the chances of survival. Treatments using 177Lu-DOTATATE have shown promising results, since this radiolabeled compound targets somatostatin 2 receptors in Gastroenteropancreatic neuroendocrine tumors (GEP-NETs), which allows a high dose of radiation to reach the tumors. However, treatments using 177Lu-DOTATATE do not offer a cure. Another treatment option is immunotherapy, which uses immune checkpoint inhibitors. However, this has only yielded promising results for tumors classified as "hot" due to the characteristics of their microenvironment. GEP-NEts are tumors classified as "cold", which makes immunotherapy a less efficient option in this scenario. The goal of this project is to combine 177Lu-DOTATATE radiopharmaceutical therapy and immunotherapy to test if it could generate immunomodulatory effects in the tumor microenvironment, which in turn would result in a greater response from the immune system. The project has two phases: 1- Generate murine pancreatic cancer cell lines overexpressing human SSTR2 and characterize the tumor uptake and dosimetry of 177Lu-DOTATATE in immunocompetent mice. 2- To evaluate the immunologic effects of 177Lu-DOTATATE on tumor microenvironment and determine whether 177Lu-DOTATATE radiopharmaceutical ther

THE EFFECTS OF BLEACH, DYE, AND CONDITIONER ON HUMAN HAIR

Presenter(s): Mantaj Singh
Pharmacology & Toxicology
Mentor(s): Carl Boehlert (College of Engineering), Per Askeland (College of Engineering)

Many people dye or bleach their hair knowing that they both damage it. But, they also use conditioner to rejuvenate their hair. But which, bleaching or dying, damages the hair more on a microscopic level? Does using conditioner improve the hair quality? Samples of hair will be bleached, dyed, and conditioned and the effects will be observed using a SEM. Bleach will likely damage the hair more than dye on a microscope level by opening up the cuticles. Conditioner will possibly restore the hair quality by closing the hair cuticles via cationic substances.

EXPEDITED MULTI-ANIMAL MAGNETIC RESONANCE IMAGING FOR LONGITUDINAL AND FREQUENT TUMOR MEASUREMENTS IN PANCREATIC CANCER MOUSE MODELS

Presenter(s): Chaitra Kommaraju, Tejaswini Sivalokanathan
Pharmacology & Toxicology
Mentor(s): Katarzyna Kempinska (College of Human Medicine), Lorenzo Sempere (College of Human Medicine)

Pancreatic Ductal Adenocarcinoma (PDAC) remains one of the deadliest cancer types. PDAC is a heterogeneous disease with a dense stroma and reduced vascularization, which are challenges for effective therapies. Genetically Engineered Mouse Models (GEMM) have provided invaluable insight into the molecular mechanisms of pancreatic carcinogenesis, tumor progression, and treatment resistance. In particular, the well-established KPC model (Kras-driven, p53-deleted) mimics human PDAC and develops tumors spontaneously by 12 weeks of age. To effectively monitor tumor development and assess treatment responses in the KPC model, advanced in vivo imaging modalities such as Magnetic Resonance Imaging (MRI) are essential research tools. MRI provides a longitudinal assessment of detailed anatomical information and tumor growth. However, MRI is a time-consuming and expensive process. To overcome these limitations without compromising imaging quality, we implemented a multi-animal MRI procedure. This procedure can scan up to 4 animals in a fast, high-resolution, economical fashion, provide measurements for preclinical trial animal recruitment, and monitor treatment responses. We present as proof-of-concept the implementation of this multi-animal MRI procedure to validate the therapeutic benefit of standar

ASSESSING A SAFE DOSAGE AND NRF2 ACTIVATION BY RTA408 IN OCULAR TISSUE FOR EFFICACY STUDIES

Presenter(s): Libby Kelly

Pharmacology & Toxicology

Mentor(s): Ebenezar Okoyeocha (Graduate School Dean), Neera Tewari-Singh (College of Osteopathic Medicine)

Nuclear factor erythroid 2-related factor 2 (NRF2) is a transcription factor which regulates cellular response to oxidative stress and toxic threats via gene expression resulting in detoxification and oxidative stress reduction. NRF2 is usually under tight regulatory control via the KEAP1-CUL3 complex and is activated by conformational changes to Kelch-like ECH-associated protein 1 (KEAP1) in the presence of reactive oxygen species (ROS). RTA408 (Omaveloxolone) is a NRF2 activator approved for treatment of Friedreich ataxia (FRDA). RTA408 binds to KEAP1, inhibiting its interaction with NRF2 allowing it to translocate from the cytosol to the nucleus for gene transcription. The purpose of this study is to determine the efficacy of RTA408 in activation of NRF2 and any subsequent toxicity in ocular tissue of mice. We are interested in determining the concentration of RTA408 at which no toxic effects are observed and NRF2 gene expression is optimized. This will allow for further testing to determine if RTA408 is a viable treatment for chloropicrin induced ocular toxicity. We hypothesize that topical administration of RTA408 will activate the NRF2 pathway in ocular tissue without toxic effects. Groups of male mice, 5 - 7 weeks of age, were exposed to three different concentrations of RTA408 (0.0001%, 0.01%, and 0.1%) via topical application to ocular tissue and images were taken at various time points after initial exposure. Images were evaluated for presence and severity of ulc

ACETAMINOPHEN DOSAGE ON MYELOID CELLS AND LIVER RECOVERY IN MICE

Presenter(s): Maclain McAllister

Pharmacology & Toxicology

Mentor(s): Bryan Copple (College of Human Medicine)

Acetaminophen (APAP), commonly used for pain relief, can cause acute liver failure (ALF) when taken in large amounts. This study looks at how different doses of APAP affect the immune cells in mice, focusing on three types of immune cells, CD45+, F4/80+, and Ly6C+ cells, which we measured in the livers of mice given either 300 mg/kg or 600 mg/kg of APAP. Our research used flow cytometry to see how many of each cell type were present after treatment. Lower doses of APAP allowed for better recovery and cleanup of dead cells in the liver. This was because the immune cells could change from Ly6C+ monocyte-derived macrophages (MDMs), which are more inflammatory, to F4/80+ tissue-resident macrophages, which help repair. However, the higher dose of APAP prevented these immune cells from transitioning properly, leaving more inflammation and dead cells in the liver. This suggests that too much APAP can stop the liver from fixing itself properly, which could explain why higher doses are more dangerous. Our study shows that understanding these immune cells can help us find better ways to treat liver damage from APAP overdose.

MOLECULAR MECHANISMS OF CHLOROPICRIN-INDUCED FIBROSIS AND INFLAMMATION IN CORNEAL TISSUE FROM MICE
Presenter(s): Shambhvi Ojha
Pharmacology & Toxicology
Mentor(s): Neera Tewari-Singh (College of Osteopathic Medicine)

Chloropicrin (CP; CCl_3NO_2, trichloronitromethane), a chemical warfare agent, was first used in World War I due to its choking and lacrimation properties. It is now employed as a pesticide. The ocular effects of CP exposure include eye irritation, tearing, conjunctivitis, and blindness. Preliminary studies showed that ocular CP exposure in mice causes corneal injury, opacity, and disordered collagen, indicating fibrosis. Additionally, it causes eyelid swelling, ulceration, and hyphema, suggesting inflammation. The mechanisms involving CP-induced fibrosis and inflammation remain unclear. To further explore the mechanisms, male Balb/C mice (6-8 weeks old, n = 2-3/ group) were exposed to 10% CP in 10 µL DMSO (vapor) for 1 minute (~0.7652 ppb). The left eye was exposed to the vapor, while the right eye served as a control. Following euthanization, tissue collection occurred at 6 hours, 1 day, 7 days, and 28 days post-exposure. Relative expression levels of markers of fibrosis and inflammation were quantified using RT-qPCR. The results show a significant increase in the expression of fibrotic markers, including α-SMA, CTGF, CYR61, Col1a1, and Col1a2 in the CP-exposed corneal tissue at different time points compared to controls. Expression of inflammatory markers, such as IL-1β, CCL2, and CCR2, were upregulated at various time points post-exposure compared to the control. These findings suggest that CP ocula

TARGETING GPT2 TO OVERCOME CHEMORESISTANCE IN OVARIAN CANCER
Presenter(s): Vrinda Khullar
Pharmacology & Toxicology
Mentor(s): Sachi Horibata (College of Human Medicine)

Ovarian cancer presents a profound challenge due to its high mortality rates. One of the pressing issues in treating ovarian cancer is chemoresistance, which diminishes the effectiveness of chemotherapy. Our laboratory identified GPT2 (Glutamic-Pyruvate Transaminase 2) as a potential contributor to this resistance. GPT2 is an enzyme that catalyzes the conversion of glutamate and pyruvate to α-ketoglutarate and alanine. This is a critical enzymatic reaction in the glutaminolysis pathway, which cancer cells utilize for growth. GPT2 has been shown to play a crucial role in breast cancer, colorectal cancer, pancreatic cancer, and other cancer settings. However, its role in ovarian cancer chemoresistance remains unclear. This study investigates whether GPT2 inhibition can restore chemosensitivity in platinum-resistant ovarian cancer cells. Using CRISPR/Cas9 gene editing, we generated GPT2-knockout ovarian cancer cell lines and confirmed successful knockout via qRT-PCR and Western blotting.

EFFECTS OF CLOPIDOGREL ON ENDOTHELIAL TIGHT JUNCTION PROTEINS IN HYPERTENSIVE MICE
Presenter(s): Lucie Hranacova
Pharmacology & Toxicology
Mentor(s): Adam Lauver (College of Veterinary Medicine), Afolashade Onunkun (College of Natural Science)

One in four deaths result from thrombosis. Purinergic 2Y12 (P2Y12) antagonists manage arterial thrombosis by inhibiting platelets, preventing platelet aggregation, and reducing clotting risk. However, P2Y12 inhibitors increase adverse cerebral bleeding. Clopidogrel, a P2Y12 antagonist, has the lowest risk of cerebral bleeding, though some risk remains. Traditionally, its bleeding risk was attributed solely to platelet inhibition. However, our lab has shown that clopidogrel-induced bleeding is not entirely dependent on P2Y12 inhibition, as increased bleeding was observed in P2Y12 knockout mice treated with clopidogrel. Instead, endothelial dysfunction may explain this phenomenon. Endothelial cells regulate blood-brain barrier (BBB) permeability, and increased permeability heightens the risk of cerebral bleeding. Using hypertensive P2Y12 knockout mice, our lab demonstrated that clopidogrel increases BBB permeability independently of P2Y12. Hypertensive mice were studied due to the clinical significance of hypertension and its damaging effects on cerebral vasculature. An increase in BBB permeability may be due to disruption of tight junction proteins between endothelial cells. Tight junction proteins, including claudin-5, occludin, and zonula occludens-1 (ZO-1), help maintain BBB integrity. We hypothesize that clopidog

THE EFFECT OF PFAS ON BACTERIAL GROWTH
Presenter(s): Helen O'Shaughnessy
Pharmacology & Toxicology
Mentor(s): Tian (Autumn) Qiu (College of Natural Science)

Per- and polyfluoroalkyl substances (PFAS) are chemicals used in many products including nonstick or waterproof products and firefighting foams. These chemicals are widely present in the environment around the world and are associated with adverse biological effects. Bacteria are an important part of the ecosystem and microbiome in animals. Understanding the effect of PFAS on bacteria can help us understand the effect PFAS has on humans and the environment through the microbial communities living in and around us. The effect of PFAS on bacterial growth has not been extensively studied. In this study we investigated the effect of varying concentration of PFAS on the growth of Escherichia coli (E. coli). E. coli BW25113 were grown in LB broth, and their growth was tracked by UV-Vis measurements (OD600). Measurements were taken manually every 1.5-2 hours for eight-hours. E. coli growth was measured in the presence of 0-100 mg/L of perfluorooctanesulfonic acid (PFOS). We observed no significant effect of PFAS exposure on growth in LB medium. Next, we explored bacterial growth in a minimal medium of M9 supplemented with glucose and exposure to PFOS and Perfluorooctanoic acid (PFOA). Growth curve measureme

EVALUATING TOXICOLOGICAL OUTCOMES OF ANIONIC SURFACTANTS WITH VARYING CARBON CHAIN LENGTHS AND MOLECULAR WEIGHTS IN CAENORHABDITIS ELEGANS
Presenter(s): Jillian Luczkowski
Pharmacology & Toxicology
Mentor(s): Aidan Reynolds (College of Natural Science), Tian (Autumn) Qiu (College of Natural Science)

Exposures to anthropogenic surfactants in the environment can induce a variety of toxic responses from exposed organisms. Factors like molecular weight and molecular class have shown that these factors can influence toxicity mechanisms. It is thus critical to evaluate multiple toxicity outcomes in vivo to understand structure-relevant toxicity of surfactants. C. elegans is an established model organism offering advantages including conserved genetic homology with mammals (60%-80%), characterizable phenotypes, ease in culture, and has been used as a high-throughput screening model for toxicology research. Using C. elegans , we screened dextran sodium sulfate (DSS) at 7-20Kda, 40KDa molecular weights; perfluorooctanesulfonate (PFOS) and perfluorobutanesulfonate (PFBS) for their toxicity outcomes. We focused on developmental toxicity, intestinal integrity, neurotoxicity, and mortality phenotyping to assess toxicity outcomes in C. elegans through microscopy imaging experiments. We found at 5% concentrations, both DSS variants induced developmental delay and neurotoxicity.

ENGINEERED PEPTIDE SCRAMBLING FOR ENHANCED TUMOR-TARGETED DRUG DELIVERY VIA SMALL EXTRACELLULAR VESICLES

Presenter(s): Anika Babel
Pharmacology & Toxicology
Mentor(s): Assaf Gilad (College of Engineering), Masamitsu Kanada (College of Human Medicine)

Breast cancer affects approximately 609,360 people annually in the United States (as of 2022). Extracellular vesicles (EVs), cell-derived structures that transport biomolecules between cells, have emerged as promising carriers for targeted drug delivery. EVs can cross biological barriers, including the blood-brain barrier, making them ideal for therapeutic delivery. Our research uses a bioluminescent protein-based EV reporter, PalmReNL, to screen for cancer cell-binding peptides. By incorporating PalmReNL into EVs, we developed a high-throughput screening system to identify peptides with high affinity for breast cancer cells, potentially enhancing EV cargo delivery efficiency and targeting specificity. Previous studies from our lab showed that EVs engineered with the urokinase plasminogen activator receptor (uPAR)-binding peptide, a 13 amino acid sequence, exhibited the highest cancer cell binding activity among several tumor-binding peptides. We generated 24 scrambled versions of the uPAR-binding peptide and assessed their binding to breast cancer cells in vitro. Interestingly, some of the scrambled peptides significantly improved their breast cancer cell binding activities, while others lost their binding capacities, with some exhibiting an almost 2 fold increase. We further engineered EVs with these high-affinity peptides to enhance chemotherapy drug delivery, specifically methotrexate (MTX), which faces resistance

IMPACT OF TREATMENT INTERVENTION ON DETECTING BLOOD PRESSURE CHANGES IN RATS

Presenter(s): Avery VandenBussche
Pharmacology & Toxicology
Mentor(s): Adam Lauver (College of Veterinary Medicine)

In 2022, the FDA recommended dedicated clinical studies to detect 3 mmHg increases in systolic blood pressure (BP) for drugs intended for chronic use. Previously, we demonstrated that rat studies are statistically sensitive to detect relevant BP differences with group sizes of 8 in a 28-day study. This study examines how a high-fat diet, which raises BP by narrowing blood vessels, and a celiac ganglionopathy (CGX) treatment, which lowers BP, affects sensitivity to BP changes. We hypothesize that both interventions will decrease minimal detectable differences (MDD), confirming that the proposed study design can detect relevant increases in systolic BP. Data collected from a long-term study in Sprague Dawley rats (N=10), implanted with PhysioTel HD-S10 radio telemeters (DSI/Harvard Bioscience), will be analyzed. Statistical analyses will be performed using the R programming language using the emmeans , envstats , and lme4 packages to assess MDD (p-value = 0.05, power = 0.8) across group sizes of 3, 4, 6, and 8. We anticipate that group sizes of 8 will have a higher power to detect 3 mmHg differences

compared to control rat studies. Previous studies with group sizes of 6 achieved MDDs just below 80% power. We anticipate tha

ROLE OF ANGIOSTATIN IN ACETAMINOPHEN-INDUCED LIVER INJURY
Presenter(s): Kevin Conzemius
Pharmacology & Toxicology
Mentor(s): Bryan Copple (College of Human Medicine)

Acetaminophen (APAP) overdose is a leading cause of liver injury in the United States. In a majority of patients, activation of liver repair leads to a full recovery. In a small fraction of patients, however, liver repair processes fail leading to the development of acute liver failure (ALF). The mechanistic basis for deficient liver repair in these patients remains largely unknown, although, findings from our laboratory suggest that this may result from disruptions to fibrinolysis. To examine this further, we determined the impact of ALF on levels of plasminogen, a key component of fibrinolysis. In mice treated with 600 mg/kg APAP (AALF), a dose of APAP that produces ALF, blood plasminogen levels were reduced compared to vehicle-treated mice or mice treated with 300 mg/kg APAP (AALI), a dose that fails to produce ALF. Despite these findings, plasminogen protein levels in the livers of AALF mice were greater when compared to control mice and similar to that in AALI mice. Notably, levels of a proteolytic fragment of plasminogen, referred to as angiostatin, were lower in AALF mouse livers compared to AALI mice. To determine whether this reduction contributed to failed liver repair, ALF mice were treated with recombinant angiostatin. Treatment with angiostatin increased measures of inflammation and enhanced evidence of hepatic vascular injury indicating that angiostatin is detrimental to outcome

INVESTIGATING DRUG SENSITIVITY IN HIGH-TPPP3-EXPRESSING CISPLATIN-RESISTANT OVARIAN CANCER
Presenter(s): Tuna Korkmaz
Pharmacology & Toxicology
Mentor(s): James Lord (College of Natural Science), Sachi Horibata (College of Human Medicine)

Ovarian cancer is among the most lethal gynecological malignancies. One of the factors leading to this poor prognosis is the development of chemoresistance. Nearly all patients receive a combination treatment of platinum-based chemotherapy (carboplatin or cisplatin) and paclitaxel. While this regimen is initially effective, ~80% of patients will ultimately relapse and develop resistance to the platinum-based therapies. Recent findings in our lab revealed that the protein tubulin polymerization promoting protein 3 (TPPP3) is upregulated in cisplatin resistant ovarian cancer and is directly involved in mechanisms of cisplatin-resistance, indicating its potential as a therapeutic target. To identify compounds that could preferentially target resistant, high-TPPP3 expressing ovarian cancer, a high-throughput compound screening on high-TPPP3 expressing cells and TPPP3 knockout cells was done. This initial screen identified PI3K and mTOR inhibitors as top hits, ~40 compounds in total. We identified Buparlisib, PI-103, Vistusertib, and Torkinib as the most promising candidates. We hypothesize that pharmacologic inhibition of the PI3K/mTOR pathway will preferentially kill cisplatin-resistant ovarian cancer over TPPP3 knockout cells. To test this hypothesis we performed soft agar, 3D-colony formation assay to validate whether these compounds can preferentially kill resistant, high-TPPP3 expressing cells. Additionally, we performed western blotting to identify what part of the PI3K/

PHYSICAL SCIENCES

VISUALIZING THE EFFECTS OF ICECUBE OSCILLATIONS SYSTEMATICS
Presenter(s): Elisha Alemao
Physical Sciences
Mentor(s): Finn Mayhew (College of Natural Science), Tyce DeYoung (College of Natural Science)

This research presents a comprehensive analysis of systematic uncertainties in neutrino oscillation studies using the IceCube observatory's data. The investigation employs 28 systematic parameters to model oscillation analyses, focusing on the visualization of histograms based on reconstructed energy, cosine of the zenith angle, and particle identification (PID) relating to neutrino flavor and interaction types. Utilizing a combination of Python, JavaScript, and PISA, the Monte Carlo-based analysis tool, the study generates comparative plots of event distributions under varied parameter assumptions. Specifically, four out of five plots highlight discrepancies between pulled and nominal histograms to elucidate systematic variations. Additionally, a Flask-based web application was developed to facilitate parameter adjustments, enabling users to run simulations and visualize outcomes dynamically. Enhanced functionality allows users to specify parameter ranges, leading to the creation of animated visualizations that compile plots into videos for improved analytical clarity. This integration of computational modeling and interactive visualization significantly contributes to understanding systematic effects in neutrino oscillation, while also enhancing the accessibility of the analysis process.

ATTPC BEAM TUBE CONSTRUCTION
Presenter(s): Claire Ardelean
Physical Sciences
Mentor(s): Wolfgang Mittig (Facility for Rare Isotope Beams)

The Active Target Time Project Chamber (ATTPC) at the Facility for Rare Isotope Beams (FRIB) needed a new type of beam tube. The tube would need to be conductive and airtight. My project has been to design, construct, test and install this device for current and future experiments using the ATTPC.

IMAGE SEGMENTATION IN PATIENTS WITH LEFT VENTRICULAR ASSIST DEVICES
Presenter(s): Elliot Snyder
Physical Sciences
Mentor(s): Lik-Chuan Lee (College of Engineering), Sandra Hager (College of Engineering)

The Framingham Heart Study (FHS) reported that the lifetime risk of heart failure (HF) increased from 19.0% to 23.7% between 1965 and 2014, indicating a rising prevalence in the future. Treatment methods for HF vary depending on its severity and may include inotrope-dependent medication, heart transplantation, or continuous-flow left ventricular assist devices (LVADs). Patients with late-stage HF are commonly implanted with an LVAD, a mechanical pump that takes over the pumping function of the failing left ventricle (LV). HF patients with an LVAD show a high survival rate of 82.3% after one year, though this declines to 46.8% after four years. However, complications such as bleeding, infection, and right ventricular failure remain significant concerns. This project utilizes computed tomography (CT) images acquired non-invasively to assess the patient's cardiac anatomy. The next step involves image segmentation using ITK-SNAP, an interactive software application, to generate personalized cardiac models of the patient's heart in both preoperative and postoperative states. The postoperative model includes LVAD segmentation. Expanding the cohort of personalized cardiac models may enable the prediction of critical clinical parameters that influence the success of LVAD implantation.

INVESTIGATING NEURODIVERGENT APPROACHES TO PHYSICS: A PILOT STUDY OF NEURODIVERGENT UNDERGRADUATE PHYSICS PERFORMANCE
Presenter(s): Mason Moenter
Physical Sciences
Mentor(s): Erin Scanlon (University of Connecticut - Avery Point)

According to the National Science Foundation, as many as 20% of STEM undergraduate students may identify as neurodivergent. Research shows that neurodivergent students report performing physics tasks non-normatively, that is, in ways which are not supported by traditional pedagogy and assessment. Furthermore, neurodivergent students report negative feelings of recognition and belonging stemming from being unsupported by normative pedagogy. To date, no study exists which examines neurodivergent physics performance from neurodivergent students' standpoints. We present a pilot study as a part of a larger investigation into the ways neurodivergent physics undergraduates perform physics tasks through think-aloud interviews. We present results of the physics performance of two undergraduate physics majors, one neurodivergent and one neurotypical. By investigating neurodivergent physics undergraduate's performance, we can lay the groundwork for creating innovative, inclusive, and equitable physics curricula for future use.

ANALYSIS OF ALTERNATIVE DARK MATTER DENSITIES IN DWARF GALAXIES USING THE ICECUBE NEUTRINO OBSERVATORY
Presenter(s): Kieran Russell
Physical Sciences
Mentor(s): Dan Salazar-Gallegos (College of Natural Science), Mehr U Nisa (College of Natural Science)

Dwarf Spheroidal galaxies (dSphs) are suspected dark matter (DM) dense astrophysical objects within our galactic neighborhood. DSphs are otherwise faint high-energy neutrino sources which makes them ideal dark matter targets. An early IceCube Neutrino Observatory dark matter search toward dSphs was performed with an incomplete detector with 59 strings and 339.8 days of lifetime. This updated analysis is performed on IceCube's full 86 strings with 10.4 years of data from the Northern Hemisphere. One component of the neutrino flux calculation is known as the J-factor, an "astrophysical factor" that represents the density distribution of dark matter over a given dwarf line of sight. Variations in J-factor measurement types will yield significantly different values, therefore it is important to compare the limits and fits of this analysis between multiple DM dwarf catalogs. In this study, we use catalogs that vary in parameter amount and J-factor. We also study a dark matter mass range not well explored ranging from hundreds of GeV to 100 PeV in dark matter mass. We present the current IceCube sensitivity and preliminary limits on the velocity-weighted cross section of annihilating dark matter. We report that our data is consistent with the neutrino background.

OXIDATION STATE GRADIENT IN THE PROTOPLANETARY DISK: PIECEWISE OR SMOOTH?
Presenter(s): Hung Nguyen
Physical Sciences
Mentor(s): Gabriel Nathan (College of Natural Science), Seth Jacobson (College of Natural Science)

Solar system materials exhibit diverse redox states due to inherited accreted building blocks and planetary differentiation processes like core formation and Fe disproportionation. Meteoritic records suggest heterogeneous formation, with Earth likely assembling from materials of varying oxidation states. A broad redox range in Earth's progenitor materials is necessary to match the observed mantle compositions of Earth and Mars. Using the planetary accretion and differentiation model NB-Differentiate, we find that Earth and Mars' bulk mantle chemistry can only be reproduced if accreted material spans a wide range of redox states and increases in oxidation state over time. A key factor in these models is the initial redox distribution of terrestrial building blocks in the protoplanetary disk, which dictates accretion order. Prior studies have used constant, stepwise, and broken linear oxidation gradients to assign Fe and Si metal fractions in initial solids as a function of heliocentric distance. However, a broader parameter search revealed that two-step gradients exhibit degeneracy, converging to a single step function. Instead, we introduce an error function to model decreasing Fe and Si metal fractions across the protoplanetary disk. This approach is motivated by water's role as the primary oxidant in the solar system, suggesting that a building block's oxidation state is controlled by its water content. Our updated method provides a generalized framework for redox evolut

THE DIFFERENCE IN COMPOSITION OF WATERPROOF VS NON-WATERPROOF MASCARA AND HOW MASCARA HAS CHANGED THROUGH THE AGES

Presenter(s): Nina Vozenilek
Physical Sciences
Mentor(s): Carl Boehlert (College of Engineering), Per Askeland (College of Engineering)

Makeup has been utilized for centuries, more specifically mascara has been used since 4,000 BCE. How have mascara's ingredients changed throughout history and why have different types been made such as waterproof and non-waterproof mascara. What ingredients are utilized in waterproof and non-waterproof mascaras and why were these ingredients chosen. In order to answer these questions waterproof and non waterproof mascara of the same brand were analyzed. The analysis included using the Scanning Electron Microscope(SEM) to look at magnified pictures of the different mascara surfaces and also utilizing Energy Dispersion Spectroscopy(EDS) to see the composition of these mascaras. The structures differed as well as there being additional ingredients within the waterproof mascara. The results of this experiment are compared with past research and the composition of the different mascaras are analyzed to understand why specific ingredients have been chosen and how they have been adjusted from the past.

AN ANALYSIS OF METAL POLISHING

Presenter(s): Marie Shibata
Physical Sciences
Mentor(s): Per Askeland (College of Engineering)

In this project, I will be assessing the varying levels of smoothness of both hard and soft metals after polishing. In particular, I will compare the level of polish needed for practical mechanical purposes and the level of polish ideal for imaging the structure of a metal with the electron microscope. To do this, I will begin by preparing my samples of steel, copper, and aluminum, and polish each sample piece to a different degree. I will then use the microscope to take surface images using the secondary electron detector. I expect to see a very significant difference between the polished metals used for practical purposes and the metals polished for use in the microscope. I also expect to see more variability in the surface of the copper samples because the metal is softer.

ANALYZING MARTIAN REGOLITH FOR PHYSICAL HEALTH RISKS
Presenter(s): Adam Rhodes
Physical Sciences
Mentor(s): Michael Velbel (College of Natural Science)

Regolith is a layer of loose, rocky material that blankets solid rock. Planetary scientists need to study Martian regolith to assess crew health risks. Analyzing Martian regolith can reveal toxic chemicals that may threaten crew health. An analog is a sample of Earth regolith that mimics Martian regolith's chemical and geophysical properties. Planetary scientists use regolith analogs to predict Martian regolith properties before assessment. Understanding Mars regolith helps evaluate risks to crew health, including cardiovascular issues and damage to eyes or lungs if regolith contacts them. Natural regolith samples must be analyzed for sharp edges that can affect human lungs and contain a large reaction area similar to lunar dust particles. This research aims to ensure the health and safety of crew members exposed to Martian regolith. Sand grains imaged with a Keyence color optical microscope are smaller and mostly sub-angular or sub-rounded, while grains imaged by SEM are larger and more angular. This project enhances understanding of Martian regolith's effects on the human body and helps prepare for manned missions. Both natural regolith and simulant contain coarse, angular grains, though the grain sizes vary. The simulant closely matches natural regolith, allowing accurate predictions for health risks. Simulant regolith can be assessed for potential health hazards due to its similarity to natural reg

ASTROPHYSICAL APPLICATIONS: COMPARING MODELS WHEN MEASURING EXPERIMENTAL DATA PROVES NEAR-IMPOSSIBLE
Presenter(s): Jaydin Garrett
Physical Sciences
Mentor(s): Artemisia Spyrou (Facility for Rare Isotope Beams), Konstantinos Bosmpotinis (Facility for Rare Isotope Beams)

In the world of astrophysics, radioactive isotopes run wild. Radioactive - also referred to as unstable - isotopes are much more numerous than their stable counterparts. Often, they decay much faster than detectors are able to record them, making these isotopes notoriously hard, sometimes impossible, to run experiments on and with. In response, researchers have developed theoretical models that calculate nuclear reactions using mathematical formulas. This project aims to draw on available experimental data and compare them to theoretical calculations using the widely used nuclear reaction code TALYS. Within this project, a program was developed to create visual and numerical representations of the accuracy of the models. The program inputs a variety of variables into TALYS, takes the output TALYS returns and turns it into line graphs comparing the various theoretical models. If given, the program can also compare the models to experimental data. The goal of this project was to develop a code to efficiently perform theoretical calculations, compare data, and select the best set of theoretical variables. The resulting models can be recommended in the future for use in astrophysical calculations.

EXPERIMENTAL NUCLEAR STRUCTURE DATA
Presenter(s): Parameswar Nair
Physical Sciences
Mentor(s): Jun Chen (Facility for Rare Isotope Beams)

Experimental nuclear structure and decay data are essential for understanding nuclear reactions and radioactive decays. This research focuses on compiling and evaluating nuclear physics data from journal publications to create standardized datasets for the Experimental Unevaluated Nuclear Data List

(XUNDL) data base in the format of Evaluated Nuclear Structure Data File (ENSDF) under the US Nuclear Data Program. Data extracted from published sources are formatted into the ENSDF structure using tools like Tabula and processed with ENSDF utility codes developed at MSU and hosted on the website of the International Atomic Energy Agency (IAEA). The compiled datasets are submitted to the National Nuclear Data Center (NNDC) of USNDP for review and dissemination and will be made accessible to researchers around the world. This research enhances nuclear data accessibility, supporting applications in energy, medicine, and security.

SOIL REGOLITH ON RISK TO LUNAR CROP GROWTH
Presenter(s): Grace Jenkins
Physical Sciences
Mentor(s): Michael Velbel (College of Natural Science)

Regolith is the surface of soil over solid rock and contains different kinds of rock, dust, and other minerals. Planetary scientists need regolith analogs (simulants) to be able to create research and investigate regolith since it is difficult to collect real regolith from these planets. These scientists need to know about regolith on the moon because studying regolith can give insight on past water existence, which can give insight on whether crop growing can be possible on the planet. A natural regolith sample from earth must be analyzed to give insight into the original planet's atmosphere and confirm if the elements in the earth regolith match the Moon's regolith. To plan, and practice for, performing experiments on a natural sample that we do not have enough of, we must practice the investigation on a material that has attributes - specifically, measurable properties - that resemble those of the natural sample. To answer this scientific question, a natural regolith sample must be analyzed for similar properties close to those in the real regolith (i.e. if the regolith contains high amounts of iron, so should the sample). There could be minor differences between samples based on different atmospheric conditions, but overall if researchers make close simulants, they will be able to discover whether life can sustain on the moon.

EXPLORATION OF WITTIG REARRANGEMENTS: SUBSTRATE SCOPE AND APPLICATIONS
Presenter(s): Sandhya Manivasagam
Physical Sciences
Mentor(s): Darshika Singh (College of Natural Science), Robert Maleczka (College of Natural Science)

Wittig rearrangements are chemical reactions where upon deprotonation, the atoms of a functionalized ether reorganize to yield the corresponding alcohol (or ketone after tautomerization). These rearrangements demonstrate significant potential in green organic synthesis due to their high atom economy: that is, 100% of the atoms in the substrate are present in the desired product. In this work, the starting ether is functionalized by the addition of a silyl group on the carbon directly next to the oxygen atom. The presence of the silicon atom can stabilize the carbanion formed at the carbon bearing the silyl group. Wittig rearrangements may involve a [1,2]-, [1,4], or [2,3]-sigmatropic shift, which are differentiated by their reaction mechanisms and the resulting reorganization of atoms within the product. Due to its concerted nature and predictable stereochemical outcome, the [2,3]-Wittig rearrangement is the most thoroughly investigated of these rearrangements. In contrast, the [1,2]-Wittig follows a stepwise mechanism, while the [1,4]-Wittig can proceed via either mechanism. Many questions about these Wittigs, particularly those related to their regio- and stereoselectivity, remain unanswered. Therefore, this work explores the mechanistic details of [1,4]-Wittig rearrangements as well as the substrate scope of [1,2]- and [1,4]-Wittig rearrangements to broaden applications and support the advancement of this synthetic methodology. To achieve these objectives, awareness of

DETERMINATION OF POSSIBLE ISOTOPES FROM SEGA SPECTRUM VIA USING NNDC DATABASE
Presenter(s): Hang Su
Physical Sciences
Mentor(s): Hironori Iwasaki (Facility for Rare Isotope Beams)

This experience involved analyzing isotopes produced in the 50Cr + 12C and 50Cr + 27Al nuclear reaction. Using the Nuclear Levels and Gammas Search from the National Nuclear Data Center, I identified and studied the isotopes generated. I applied the PACE4 software to calculate the cross-section of the product isotope at an energy of 10.6 MeV/u and various beam energies, observing how the cross-section varied. To analyze the experimental data, I utilized the ROOT Object Browser, accessing the FRIB Fishtank to obtain the result spectrum. I used ROOT to identify peak energies from the experiment, which was crucial for understanding the reaction outcomes. Additionally, I compared the experimental data with information from nuclear databases to validate the findings. To present the results clearly, I created an Excel chart displaying the peak energies observed in the experiment. This experience enhanced my skills in nuclear data analysis, software tools like PACE4 and ROOT, and data visualization techniques. It also provided valuable insights into the practical aspects of nuclear physics experiments and the importance of accurate data comparison and presentation.

LANTHANIDE INVESTIGATIONS USING TRIS PYRAZOLE BORATE
Presenter(s): Madeline Benson
Physical Sciences
Mentor(s): Emily Gordon (College of Natural Science)

Synthesized tris pyrazole borate, and used this complex to investigate the structure of lanthanides such as divalent americium by the use of thulium, which is a reduction potential match for americium, samarium and europium.

QUANTUM DYNAMICS OF MOLECULES IN OPTICAL CAVITIES
Presenter(s): Anna Francisco, Bera Ayyildiz
Physical Sciences
Mentor(s): Angela Wilson (College of Natural Science), Benjamin Peyton (College of Natural Science), Jared Weidman (College of Natural Science)

Polaritons are quasi-particles formed by the resonance between a photonic mode of an optical cavity and an electronic excitation in a molecule. Recently, polaritonic chemistry has gained popularity for its utility in modifying molecular systems and their reactivity. However, the mechanisms underlying these chemical modifications remain elusive, thus theoretical work is necessary to provide explanations. In particular, theoretical explanations are needed across a broad range of chemical species in order to provide more effective predictions. Molecular polaritons can be modeled by combining a quantum theoretical description of molecular electronic excitations with a theoretical description of photonic modes. In this project, molecular excited states were obtained using the numerically exact Full-Configuration Interaction (FCI) method, and photonic modes were modeled as quantum harmonic oscillators. The strong-coupling interaction between them was treated using the Pauli-Fierz model Hamiltonian. FCI calculations were performed using the Forte electronic structure package, and polaritonic calculations were executed using Python. For a representative set of small molecules, changes in the excitation energies and electronic transition dipole moments were investigated by varying the cavity coupling strength and the size of the electronic basis. These results provide recommendations for the most accurate and efficient ways of modeling chemically-relevant polaritonic systems.

EFFECTS OF "SOIL" - REGOLITH - PARTICLES ON RISKS TO CREW HEALTH ON MARS: INSIGHTS FROM SAND GRAINS IN REGOLITH SIMULANTS
Presenter(s): Sofia Ferrari
Physical Sciences
Mentor(s): Michael Velbel (College of Natural Science)

Regolith is a dirt-like material consisting of rocks, dust, and other elements. Planetary scientists need to know about regolith on the Moon because it indicates what the environment is like and the elements present. It also can prepare them for hazards. An analog simulant is a material created to mimic what regolith is like on the Moon or Mars. Planetary scientists need regolith analogs stimulants to understand the surface of Mars and the Moon. It also allows them to test equipment in a controlled environment. Knowledge of regolith is needed to improve understanding of geology and weather patterns. It also would be helpful to extract minerals from the regolith. A natural regolith sample must be analyzed for its grain size and mineral composition. The purpose of developing regolith analog simulants is to create materials that closely mimic the physical and chemical properties of regolith on Mars. An electron microscope is a good method for magnifying regolith grains because it shows the elements present in a sample. It also allows scientists to see the shape of grains.

A COMPREHENSIVE CATALOG OF CLASSICAL VARIABLE STARS WITH TESS
Presenter(s): Jadyn Waggoner
Physical Sciences
Mentor(s): Joey Rodriguez (College of Natural Science)

Classical Variable stars (RR Lyraes, classical Cepheids, ɣ Doradus, δ Scutis, eclipsing binaries) provide a wealth of information about stellar evolution, with some being used as standard candles for distance measurements. To better understand their fundamental properties and evolutionary pathways, we aim to create a catalog of all classical variables that were observed during NASA's Transiting Exoplanet Survey Satellite (TESS) mission. Using custom made lightcurves through difference image analysis, we visually cleaned and sorted the TESS lightcurves into the various sub-classifications using different machine learning algorithms, testing the completeness of each method. From this effort on observations from TESS's 2-year primary mission, we will classify all 26 sectors containing ~ X billion stars. I will present the current status of this large-scale classification effort, and discuss our plans to extend it to the TESS extended missions.

MODELING NUCLEAR REACTIONS TO UNDERSTAND ELEMENT FORMATION IN ASTROPHYSICAL ENVIRONMENTS
Presenter(s): Ojas Fernandes
Physical Sciences
Mentor(s): Grigor Sargsyan (Facility for Rare Isotope Beams)

The origin of elements in the universe is deeply tied to nuclear reactions occurring in extreme astrophysical environments, such as stellar cores and neutron star mergers. To understand how these reactions produce new elements, we employ computational modeling to construct nucleon-nucleus effective interactions using the nuclear shell model. This approach provides detailed insight into the intrinsic properties of nuclei, allowing for improved predictive power when studying isotopes that are difficult to measure. Our research at the Facility for Rare Isotope Beams (FRIB) involves large-scale calculations using high-performance computing to determine nuclear cross sections - probabilities of specific nuclear reactions occurring. These calculations yield information on the energy states of nuclei and the likelihood of certain nuclear reactions under given astrophysical conditions. By integrating theoretical predictions with experimental data, we refine our understanding of the nuclear processes that drive nucleosynthesis. This work aims to enhance models of element production in stellar environments, contributing to a more comprehensive picture of cosmic chemical evolution.

COMPUTATIONALLY MODELING GAMMA RAYS FOR NUCLEAR ASTROPHYSICS
Presenter(s): Alexandria Hunter
Physical Sciences
Mentor(s): Mallory Smith (Facility for Rare Isotope Beams)

Nuclear physics is an important and wide-ranging field, with applications in medical sciences, isotope harvesting, national security, and astrophysics. One of the most important processes to understand is gamma decay. In gamma decay, an excited nucleus decays to a more stable state by shooting off energy. However, there are so many of these processes that there is not yet an accessible way to visualize all of these decay systems. Under the mentorship of Dr. Mallory Smith, I have built an interactive program to display the gamma decay of any given isotope on the chart of nuclides, as long as the dataset is available on the table. I am also working with Dr. Smith on an experimental analysis of raw gamma ray data from an astrophysical experiment. The applications of this research include better visualization for researchers and better access to this information for science communicators and the public.

MECHANISMS OF REDUCED GLOBAL LONGITUDINAL STRAIN IN HEART FAILURE WITH PRESERVED EJECTION FRACTION: A COMPUTATIONAL ANALYSIS USING A NOVEL SWINE MODEL
Presenter(s): Ming Huang
Physical Sciences
Mentor(s): Lik-Chuan Lee (College of Engineering)

Heart failure with preserved ejection fraction (HFpEF) is defined by normal ejection fraction but reduced global longitudinal strain (GLS), suggesting subtle myocardial dysfunction not evident through standard clinical metrics. This study introduces a novel swine model with immobilized ascending aorta (IAA) designed to investigate ventricular-arterial mechanical uncoupling in HFpEF. An integrated computational framework combining finite element (FE) analysis and closed-loop circulatory modeling was developed using realistic left ventricular geometries obtained from 3D echocardiography. Myocardial deformation was modeled by employing Fung-type passive hyperelasticity and active stress formulations, with boundary conditions representing epicardial stiffness and viscosity. Preliminary computational simulations effectively replicated experimentally derived LV pressure-volume loops and demonstrated reduced GLS consistent with mechanical uncoupling, particularly in the septal region. While preliminary findings closely align with experimental observations, comprehensive validation and further simulations are ongoing to fully elucidate the underlying biomechanical mechanisms. This combined experimental and computational approach promises valuable insights into the pathophysiology of HFpEF and may inform targeted diagnostic and therapeutic interventions.

MARTIAN REGOLITH AND ITS HEALTH RISKS TO ASTRONAUTS
Presenter(s): Himanshu Pramod Kuchekar
Physical Sciences
Mentor(s): Michael Velbel (College of Natural Science)

Regolith is a loose layer of dust, soil, and broken rock covering solid surfaces. This project improves understanding of Martian regolith simulants, essential for mission planning. MGS-1 aids in testing equipment, assessing astronaut health risks, and refining experimental methods for future Mars exploration and research applications. The natural regolith exhibits basaltic composition with feldspar, pyroxenes, and olivine. MGS-1 simulant closely replicates Martian regolith's mineralogy and texture. Minor discrepancies include sulfur content and volatile compounds, affecting experimental outcomes. MGS-1 effectively mimics Martian regolith, aiding mission preparation and hazard assessments. Differences in sulfur and perchlorates impact accuracy. Refinement based on new Mars data will enhance simulant realism for future studies.

SHARED MAGMA SOURCES IN THE EAST AFRICAN RIFT SYSTEM: GEOCHEMICAL AND THERMODYNAMIC INSIGHTS FROM NORTH ISLAND, LAKE TURKANA
Presenter(s): Joseph Owczarek
Physical Sciences
Mentor(s): Tyrone Rooney (College of Natural Science)

This research investigates magma chambers that fueled volcanic activity on North and South Islands, two volcanic isles situated in northern Kenya. These islands were formed by volcanic activity during the Axial Phase of the East African Rift System (EARS), which took place over the past 0.5 million years. The magma chambers are important because North and South Islands lie at the center of extension in the Turkana Depression. The depression is an area of broad extension that connects the Main Ethiopian Rift to the North Kenyan Rift. Unlike narrow rift zones, areas of broad rifting like the Turkana Depression are less well understood, making it a key site for studying unique rifting processes. Using X-ray Fluorescence (XRF) major element geochemistry data collected at Michigan State University, this study found magma fueling the chambers of both islands may have originated from the same source. To support this finding, the thermodynamic modeling tool Magma Chamber Simulator (MCS) was employed to replicate conditions within these magma chambers. MCS simulations of magma crystallization from South Island revealed results closely matching the geochemical characteristics of North Island, providing further evidence for a sha

TAMING BISMUTH CONTAINING HETEROCYCLES IN RARE EARTH METAL CHEMISTRY
Presenter(s): Emerson Cywinski
Physical Sciences
Mentor(s): Elizabeth Pugliese (College of Natural Science), Selvan Demir (College of Natural Science)

Single-molecule magnets (SMMs) are molecules that behave like small permanent magnets, where their magnetization is retained in the absence of a magnetic field. The storage of information on SMMs will revolutionize data storage capabilities. A key ingredient of SMMs are the lanthanide metal ions, which possess a large number of unpaired electrons. To gain insight into the reactivity and electronic structure of the lanthanide systems, the rare earth metal yttrium is also employed. An emerging topic is the development of organometallic bismuth complexes. The complexation of bismuth with the rare earth metals is underexplored but may lead to huge technological advances owing to the unparalleled physical properties of each element. Here, the synthesis of bismuth heterocycles, followed by coordination to yttrium yielding a new class of compounds, will be presented. For the first time, the large bismuth heterocyclic anion [BiC4Ph4]-, named bismolyl, was synthesized and isolated as a potassium salt, [K(crypt-222)][BiC4Ph4], and then reacted with an yttrium precursor to yield the first rare earth complex containing a tetraphenyl-substituted bismolyl ligand, Cptet2Y(BiC4Ph4). The synthesis of these compounds alongside their analysis through single-crystal X-ray diffraction will be presented.

SEARCHING FOR ASTROPHYSICAL NEUTRINO SOURCES IN THE CLASSICAL DWARF SPHEROIDAL GALAXY DRACO

Presenter(s): Naga Dutta Raghavendra Ithihas Akondi
Physical Sciences
Mentor(s): Dan Salazar-Gallegos (College of Natural Science)

Dwarf spheroidal galaxies are ideal objects for our analysis of dark matter due to their relatively low number of astronomical objects and minimal gas content, which reduces the neutrino background noise in our data. Through our Dark Matter search, we have discovered that the classical dwarf Draco exhibits a neutrino excess compared to background. To determine the cause of this excess in neutrino flux, we have conducted an astrophysical source survey. We consider astrophysical sources beyond dark matter annihilation like Active Galactic Nucleus (AGN), Pulsar (Psr), Supernova (SN), and Supernova remnant(SNR) that might explain this unexpected neutrino flux from a relatively empty galaxy. Through our research on the classical dwarf Draco, we have identified approximately 18 active galactic nuclei (AGNs) located directly behind the Draco within a 1 degree radius. These AGNs correlate well with our neutrino chart from IceCube, suggesting a possible explanation for our observation.

EXTRAPOLATION OF 16O(P,ɣ)17F RADIATIVE CAPTURE TO LOW ENERGY FROM EXPERIMENTAL DATA

Presenter(s): Curtis Chou
Physical Sciences
Mentor(s): Chloe Hebborn (Facility for Rare Isotope Beams), Patrick McGlynn (Facility for Rare Isotope Beams)

This project aims to evaluate the reaction rate of 16O(p,ɣ)17F capture reaction, which is a significant reaction in stellar nuclear fusion, by extrapolating to zero energy from existing data measured on Earth. I aim to use physics theory and statistical methods to extrapolate details about this reaction at zero energy, which simulates how the reaction happens in stellar environments like our sun.

EXPERIMENTAL NUCLEAR STATE LIFETIMES FOR CLASSICAL NOVA MODELS

Presenter(s): Chloe Ricker
Physical Sciences
Mentor(s): Christopher Wrede (College of Natural Science), Lexie Weghorn (Facility for Rare Isotope Beams), Lijie Sun (Facility for Rare Isotope Beams)

Classical novae are thermonuclear explosions on accreting white dwarf stars in binary systems. Through their nucleosynthesis, classical novae are predicted to diversify the interstellar medium with intermediate-mass nuclei [1]. These events are simpler to model and are more common than bigger contributors such as supernovae, providing ample amounts of data that can serve as a foundation for modeling more complex systems. Two key reactions within novae are proton captures on radioactive 22Na and 30P. The decay of 22Na releases a characteristic 1275 keV gamma ray, which space-based gamma ray telescopes have yet to detect, leaving its production uncertain [2]. Equally important are the unconstrained silicon isotopic ratios influenced by the 30P proton-capture reaction. This reaction serves as a critical checkpoint, regulating the flow of material to heavier masses and significantly impacting the isotopic composition of presolar grains, microscopic dust grains formed in stellar environments providing insights into nucleosynthesis. These experiments employ a common nuclear physics setup, Doppler Shift Lifetimes 2 (DSL2), located at the user-facility TRIUMF-ISAC2 in Canada, to measure the lifetimes of key excited states in both 23Mg and 31S, thereby reducing uncertainties in the reaction rates involving 22Na and 30P. Improved reaction rates will enable more accurate simulations of nova nucleosynthesis, strengthening

IMPACT OF REGOLITH ON CREW HEALTH RISKS ON MARS
Presenter(s): Michelle Hale
Physical Sciences
Mentor(s): Michael Velbel (College of Natural Science)

Regolith is a layer of loose, fractured rock or dust that covers the surface of planets, asteroids, and moons. Knowledge of regolith on Mars is necessary for planetary scientists because it shows information about the surface's composition and chemical composition. Studying regolith is crucial for identifying the resources that may be present or were previously present on Mars. A natural regolith sample must be analyzed in terms of its shape, light interaction, breakage patterns, and chemical properties, which include characteristics like luster, angularity, roundness, and color. An analog simulant is an artificial replica of a natural regolith, which mimics its chemical and physical properties. Planetary scientists use regolith analogs to test and improve equipment for future missions, evaluate the materials' responses to various physical and chemical conditions, and determine the most effective methods for resource extraction during these missions. Understanding regolith on Mars is essential for deepening scientific knowledge of the chemical and physical properties of the Martian surface. Currently, much of the knowledge of regolith is from Lunar samples instead of Martian ones.

ABUNDANCE SIGNATURE OF RAPID NEUTRON CAPTURE PROCESS (R-PROCESS)
Presenter(s): Pranav Agarwal
Physical Sciences
Mentor(s): Hendrik Schatz (College of Natural Science)

The origin and abundances of about half of elements heavier than iron has been attributed to the r-process. Analyses of significant features of the abundance signature formed by the r-process, visible for example in the distribution of elements and isotopes in in the solar system, are important to identify potential astrophysical sites of origin and for insights into the nuclear physics behind the properties of the nuclides involved. One such feature in the solar abundances chart is the peak at mass number 104. To be able to understand the conditions and reasons behind this peak, it is essential to recreate it using computational simulation models. SkyNet, a reaction network that simulates the r-process, was used throughout the analysis. A limitation of such an approach is the need for accurate nuclear masses, which are often not experimentally known and are approximated using several theoretical mass models. Here, I present my analysis of one such model, the Duflo-Zuker model, and how our ability to computationally simulate the said abundance peak and other relevant features is affected. An understanding of the abundance signature, hence, also provides guidance for future experiments at FRIB to measure exotic nuclei binding energies and unknown reaction rates. In this presentation, I aim to highlight current findings and future plans for this ongoing research project.

SEARCHING FOR HOT JUPITERS AROUND FAINT K-DWARFS

Presenter(s): Isaac Fournier
Physical Sciences
Mentor(s): Joey Rodriguez (College of Natural Science)

Hot Jupiters are Jupiter-like exoplanets that orbit their host stars with a period of less than 10 days. The occurrence rate of hot Jupiters around Sun-like G dwarfs is well understood to be close to 1% and drops close to 0 around M dwarfs. While there is some evidence that the occurrence rate increases around K dwarfs, too few hot Jupiters around K dwarfs have been discovered to make a compelling claim. Our goal in this project is to better understand the occurrence rate and the drop off. I built a pipeline that constructs light curves from Transiting Exoplanet Survey Satellite (TESS) pixel files that are then run through a vetter in the hopes of finding candidate hot Jupiters orbiting K dwarfs which we will follow up on through the MSU Observatory Research Program. So far, the project has yielded several planet candidates, one of which has been ruled out as an eclipsing binary system.

EXPERIMENTAL NUCLEAR ASTROPHYSICS - BAYESIAN ANALYSIS OF NUCLEAR RESONANCES IN 60ZN

Presenter(s): Bhavya Jain
Physical Sciences
Mentor(s): Christopher Wrede (College of Natural Science)

The study of nuclear resonances in 60^{60}60Zn is essential for understanding reaction rates relevant to explosive astrophysical environments, such as x-ray bursts. These thermonuclear explosions on the surfaces of accreting neutron stars drive nucleosynthesis through rapid proton capture reactions, influencing the composition of the burst ashes and the subsequent evolution of the neutron star's crust. However, key reaction rates, such as those of 59^{59}59Cu(p,ɣ)60^{60}60Zn and 59^{59}59Cu(p,ɑ)56^{56}56Ni, remain poorly constrained, limiting our ability to model these processes accurately. This work utilizes experimental data from the GADGET-II (time projection chamber) at the Facility for Rare Isotope Beams (FRIB) to analyze reaction products and extract resonance properties. By applying Markov Chain Monte Carlo (MCMC) methods within a Bayesian framework, we aim to classify proton and alpha events based on their range vs. energy distributions, where significant overlap complicates traditional classification techniques. The Bayes factor is used to quantify the likelihood of an event belonging to either category, refining event identification while mitigating experimental uncertainties. This approach enables precise extraction of particle types and their corresponding energies, which serve as critical inputs for resonance studies and reaction rate calculations. Ongoing efforts focus on optimizing th

REDESIGNING A REMOTE MEASUREMENT SYSTEM FOR JOSEPHSON JUNCTION TESTING

Presenter(s): Sara Sawford
Physical Sciences
Mentor(s): Norman Birge (College of Natural Science)

Josephson junctions are superconducting devices in which quantum tunneling allows a supercurrent to flow through the junction. These devices are essential for superconducting qubits in quantum computers or ultra-sensitive magnetometers. It is important to these applications to understand the critical current of a junction because the sensitivity of the equipment depends on precisely controlling and measuring this value. Our measurement systems rely on the remote control of instruments such as voltmeters, current sources, and magnetic field controllers to measure the critical current. However, the existing system lacks flexibility and modern features needed for newer experiments. This project focuses on redesigning this remote measurement system using Python-based Object-Oriented Programming. This new user interface will facilitate communication between laboratory instruments while improving accuracy and efficiency in the data collection. This new system will provide researchers with a more adaptable tool for studying Josephson junctions.

OBTAINING PRIMARY MELT COMPOSITION FROM OLIVINE-HOSTED MELT INCLUSIONS IN ETENDEKA PICRITES.
Presenter(s): Paige Sakorafos
Physical Sciences
Mentor(s): Tyrone Rooney (College of Natural Science)

Continental flood basalts are known to have a correlation with continental rifting. This is true for the Etendeka province, which was a precursor to the separation of Africa and South America. A challenge in these systems is establishing the composition of lava that formed within the mantle, as extensive crystal fractionation significantly modifies the compositions of erupted lavas. A solution to this problem is examining melt inclusions (tiny blebs of melt) trapped within crystals that formed early in the crystallization process. Twenty samples were collected from the Entendeka region with the intention of using olivine-hosted melt inclusions within the samples to find primary melt composition. This is a multi-year project, and the first steps focus on sample processing. Initial work focused on cutting and crushing the samples, followed by hand-picking the olivine grains from the crushed rocks to sort them for melt inclusions. Analysis of the melt inclusions requires first mounting them in epoxy, but a procedure for this mounting does not currently exist within our lab. I am currently developing a method for crystal mounting, which will have broader application within the lab. We decided on using a castable resin mounting method to reduce the effects of high heat on the grains. We will present the f

THE LONG-TERM DYNAMICS OF PRIMORDIAL BINARY PLANETESIMAL SYSTEMS
Presenter(s): Purvi Garg
Physical Sciences
Mentor(s): Jackson Barnes (College of Natural Science), Seth Jacobson (College of Natural Science)

This research is an assessment of the dynamical evolution of young binary planetesimal systems immediately following their formation. Binary planetesimal systems are direct products of the gravitational collapse of pebble clouds in protoplanetary disks. However, the long-term stabilities of these binaries are underinvestigated. Here, we use the General Use Binary Asteroid Simulator (GUBAS), which is designed to predict long-term (kyr) binary asteroid system behaviors. With this tool, we determine whether binary planetesimal systems formed from gravitational collapse remain on dynamically stable orbits or if they become unstable. If they become unstable we determine if they are gravitationally unbind or collide. We compare our results with observed binaries in the Kuiper Belt.

POSSIBLE RISKS TO HUMAN HEALTH ON MARS
Presenter(s): Leslie Lainio
Physical Sciences
Mentor(s): Michael Velbel (College of Natural Science)

Mars regolith is a top layer of unconsolidated rock fragments that rests on top of solid Martian rock. Understanding the makeup of regolith can help researchers determine any health hazards that may pose a risk for future astronauts. If Mars regolith is in fact dangerous to humans, it'll be important for astronauts to properly prepare before reaching the surface. An analog simulant is, in this case, regolith that closely resembles the regolith found on Mars. Planetary scientists need analogs in order to simulate conditions on Mars. It's important for astronaut's equipment to be prepared for the Martian environment, but since we don't have any real Mars regolith, simulants are the next best thing. More knowledge of Mars regolith is needed to improve scientific understanding of possible pulmonary, cardiovascular, and dermal risks that could pose a real hazard to crew members. A regolith sample must be analyzed for shape (sharp, angular grains are abrasive towards skin), size, and chemical composition to determine risks towards human health. My goal was to analyze regolith simulant grains to determine whether real Mars regolith is harmful to humans. MGS-1S, the sample I analyzed, is a close approximation of Martian soil in terms of mineral composition, which is important for understanding possible health hazards that could be caused by soil toxicity and dust exposure. For health risk applications, these simulants can be adapted to simulate specific Martian conditions, which p

ULTRAVIOLET INSIGHTS: CLASSIFYING TYPE IA SUPERNOVA SUBTYPES WITH SWIFT UV PHOTOMETRY
Presenter(s): Grace Showerman
Physical Sciences
Mentor(s): Jay Strader (College of Natural Science)

In recent years, the discovery of distinct Type Ia supernova (SNe Ia) subtypes has led to the identification of an increasing number of peculiar transients. While each SN Ia subtype provides valuable insights for understanding SN progenitors, not all subtypes are useful for cosmology. Some subtypes do not follow the canonical luminosity-width relationship for SNe Ia and contaminate cosmological samples, reducing their precision and accuracy. Improving our ability to identify these subtypes is essential to maintaining the utility of SNe Ia as probes of cosmological distance. To this end, we present a new method for classifying SN Ia subtypes using rest-frame UV photometry. Our method successfully removes all non-standardizable subtypes from a sample of 130 nearby SNe Ia observed by the Swift Ultraviolet/Optical telescope. We project that this diagnostic approach will yield ~90% pure samples of standardizable SNe Ia observed by the Vera C. Rubin Observatory Legacy Survey of Space and Time (LSST) at redshift $z > 0.5$ and will prove a valuable tool in ensuring the purity of modern cosmological samples of SNe Ia.

FINDING THE HIGGS BOSON AT HIGH PT IN THE DIPHOTON DECAY CHANNEL
Presenter(s): Nityaansh Parekh
Physical Sciences
Mentor(s): Joey Huston (College of Natural Science)

The signal to background ratio for the Higgs diphoton channel naturally increases as the Higgs pT rises. There can be further improvements to the S/B ratio by exploring the event characteristics to distinguish the signal from the background. This project aims to build on previous work that was presented at UURAF in 2024 by making use of Monte Carlo data, making use of ROOT to look at different event characteristics, generating events using Madgraph/Delphes and commenting on analyses within the HGamCore framework.

OPTIMIZING POISSON-EQUATION SOLVER FOR NUCLEAR COLLISION SIMULATION
Presenter(s): Zach Nolff
Physical Sciences
Mentor(s): Pawel Danielewicz (College of Natural Science)

The Poisson equation is a fundamental partial differential equation in mathematical physics that describes the spatial dependence of a scalar field, such as the electric potential or gravitational potential, around sources of the field. The Poisson equation can be used to find the potential function within a region, with respect to conditions at the region's boundary. My research focuses on optimizing the solving of the Poisson equation in nuclear collision simulations. In those simulations, the Poisson equation determines the electric potential, and thus the electric field, generated by charged particles, primarily protons and light nuclear clusters within the evolving system. The resulting electric field influences the motion of those particles. I wrote a program that provides a fast solution to the Poisson equation in one dimension, following a strategy envisioned for the nuclear collisions. I am now working on extending the solution to two and three dimensions.

ASSESSMENT OF A CAPACITOR CIRCUIT PROBLEM DESIGN AND DEMONSTRATION
Presenter(s): Dominic Bednar
Physical Sciences
Mentor(s): Daryl McPadden (College of Natural Science)

Electricity and Magnetism Projects & Practices in Physics (EMP-Cubed) is a flipped, active course that teaches principles of electricity, circuits, and magnetism in introductory physics. Rooted in Project Based Learning (PBL) and Communities of Practice (CoP), EMP-Cubed is focused on developing scientific skills like creating scientific models, evaluating those models, and teamwork. Using an iterative Backwards Design approach, this project created a new in-class problem for EMP-Cubed focused on the impact of charging and discharging capacitors in a complex circuit. We began by identifying the learning goals for the problem, then created a large, complex problem that requires a team to solve with the freedom for creative decision making and model/solution evaluations (following PBL & CoP principles). A demonstration was created in tandem with the problem, further meeting universal design for learning guidelines. The problem was tested with the EMP-Cubed undergraduate learning assistants, feedback collected, and changes made to the problem based on this initial testing, with the problem finally running in class with over 350 students. In this presentation, we show how multiple educational frameworks were woven into the design of this problem and highlight the iterative design process used to reach the final version.

EXCITING OSMIUM - TRENDS IN EXCITED ENERGY LEVELS IN OSMIUM ISOTOPES
Presenter(s): Ryan Chenoweth
Physical Sciences
Mentor(s): Vladimir Zelevinsky (College of Natural Science)

This research investigates the trends in the excited energy states of osmium nuclei in the second 2+ and 3- excited states. It is important to understand nuclear collective motion for any future experiments including the search for the nuclear dipole moment and violation of fundamental symmetries. Similar investigation into other isotopes has proven beneficial for past research, so this was conducted to see if those trends held true for more elements.

NEURAL NETWORK ASSISTED BEAM OPTIMIZATION
Presenter(s): Juan Lozano Gonzalez
Physical Sciences
Mentor(s): Fernando Montes (Facility for Rare Isotope Beams)

The SEparator for CApture Reactions (SECAR) is a device that is being run at the Facility for Rare Isotope Beams (FRIB), designed to directly measure capture reactions in unstable nuclei. These reactions are pivotal in stellar explosions and the creation of many elements essential to our universe. To be able to study these reactions, SECAR relies on a precisely focused beam of radioactive particles. However, the success of these measurements hinges on being able to accurately focus this beam, and to do so, the initial properties of the beam must be known. The beam's properties must be defined across five key dimensions: its spatial distribution in the x and y planes (x, y), the angles of particle trajectories relative to the normal vector in that dimension (aX, aY), and the energy spread of isotopes from the mean (dE). Without this information, improper beam focusing negatively affects the SECAR performance and effectiveness. To address this, we developed a neural network (NN) model that reconstructs the beam's initial state using images from beam viewers placed downstream of quadrupole magnets. These magnets help us to focus the beam, much like one would focus light with lenses. The model iteratively simulates the beam's passage through the quadrupoles, adjusting the predicted beam until the simulated images match the experimental ones recreating the initial beam. Currently, the method has successfully reconstructed numerous artificial beams-distributions with known aX, a

PLANT SCIENCES

GENETIC MAPPING OF MODIFIERS OF THE MAIZE SEMIDWARF2 (SDW2) GENE
Presenter(s): Madelyn Mulnix
Plant Sciences
Mentor(s): Addie Thompson (College of Agriculture & Natural Resources), Tammy Long (College of Natural Science)

Maize breeding traditionally uses inbred lines to develop hybrids with desirable traits, such as dwarfism, which can decrease lodging and increase yield. The Semidwarf2 (Sdw2) gene, responsible for dwarfism, is being studied to uncover its genetic basis and understand how the genetic backgrounds of various inbred lines influence height reduction. When heterozygous Sdw2 /B73 is crossed with other inbred lines, progeny exhibit approximately 50% segregation of the mutant allele, with height reduction modified by genetic factors. At the MSU Agronomy Farm, F1 populations were developed by crossing B73/Sdw2 (male) with diverse inbred lines (female), resulting in 319 Sdw2 plots and 49 control plots. Flag leaf height and top ear leaf height were measured for both wildtype and dwarf maize plants in each plot 72 days after planting. The key question is to identify the genes involved in the dwarf mutation and to see how the genetic background of the inbred lines affects the percentage reduction in plant height. Calculations were performed in Excel, and comparative figures were generated in R. F1 Association Mapping (FOAM) was applied to analyze genetic marker-trait relationships, while

PLANTS AND PLANT LANGUAGE THOUGH A HISTORY OF ART
Presenter(s): Christina King
Plant Sciences
Mentor(s): Jennifer Apland (College of Natural Science)

In my project, I ask how plants and the use of plant symbolism have impacted art throughout history and how the two are inherently connected by diving into the historical use and symbolism of 5 different plants: rose, lily, iris, tulip, and fern. To find this connection, I researched many articles on plants within paintings and poetry, Victorian flower language, plant symbolism, and its shifts based on culture and period. I analyzed this data by first providing a broad overview of how plant symbolism has been utilized within human culture before laying out the specific history of my five chosen herbarium specimens into posters. I aim to compile an overview of the symbolism for each of my five plants and how different cultures, rulers, religions, and periods influenced it, highlighting an example of painting and poetry for each. In a time of isolation, industrialization, and excessive work, it is important to look at plants' sentimental and cultural values, encouraging people to embrace them and care for their conservation.

MSU RESEARCH SUPPORTING SUSTAINABLE HORTICULTURE
Presenter(s): Cole Fisher
Plant Sciences
Mentor(s): Daniel Brainard (College of Agriculture & Natural Resources), Zachary Hayden (College of Agriculture & Natural Resources)

The MSU Horticulture program aims to enhance the sustainability of farming practices, focusing on methods like reduced or no-till farming, cover cropping, pollinator strips, and nutrient management. This research contributes to understanding how these practices influence vegetable production, especially regarding weed and nutrient management. As part of my internship in the Brainard and Hayden Labs, I investigated key areas, including low-till systems, nutrient management, and the role of cover cropping in improving sustainability. A significant focus of the work was on weed management using innovative technologies, such as solar-powered, autonomous farm droids, which minimize tillage while improving weed control. In parallel, I explored nutrient management techniques, including optimizing fertilizer application timing and integrating cover crops to reduce nutrient loss and lower fertilization costs. In addition to these aspects, my research involved examining how water application affects asparagus spear tip quality. Data collection was carried out using many techniques including remote moisture sensors and image analysis software (ImageJ) to assess the quality of asparagus spears. This work contributes to improving horticultural practices and offers valuable insights into managing nutrients, water, and weeds efficiently, which are crucial for achieving sustainable and profitable vegetable production.

2022-2024 CERCOSPORA FUNGICIDE SENSITIVITY SCREENINGS IN MICHIGAN GROWING REGION
Presenter(s): Jack Pritchard
Plant Sciences
Mentor(s): Emily Weedon (College of Agriculture & Natural Resources)

U.S. sugar is a 70 billion dollar industry with 55-60% of this sugar coming from sugar beets. A major concern to sugarbeets is the Cercospora Leaf Spot (CLS) caused primarily by the fungal pathogen Cercospora beticola, a disease impacting the leaves of the sugar beets. This study aims to measure the effectiveness of commonly used fungicides to evaluate their current effectiveness against CLS on sugarbeet samples. To investigate current fungicide efficacy, samples were collected from farms in southeast Michigan that had observed leaves with CLS and sent to the Willbur Lab. Samples of C. beticola were then removed from the leaves and isolated onto agar. The isolated samples were then treated with varying fungicides, and their growth after 2 weeks was measured. The amount of growth is then used to determine the efficacy of a certain fungicide known as an EC50 value. All fungicides used showcased an increase in fungal growth compared to previous years, with fungicides difenoconazole (Dif) and triphenyltin (Tin) demonstrating the least amount across the samples. Prothioconazole (Pro), pyraclostrobin (Pyra), and tetraconazole (Tetra) showed substantially higher rates of growth compared to previous years. The results show the fungicides Dif and Tin may be more effective in the areas sampled and should be considered when deciding which sprays

MSU PLANT BIOLOGY CONSERVATORY
Presenter(s): Joshua Gould
Plant Sciences
Mentor(s): Lisa Murphy (College of Natural Science)

Conservatories are greenhouses spaces that allow for the growing, collection, collaboration, and education of many different plants. MSU possesses its own conservatory that is utilized in numerous ways throughout the school and community. The Plant Biology Conservatory at MSU contributes to courses, clubs, other universities, and the public to a degree which may not be known, but should be highlighted to allow for further expansion and awareness of what the conservatory can do. The MSU conservatory gave the opportunity for an internship to be done at the greenhouses which inspired this presentation in order to promote and raise awareness of the space and all that it can offer for both the university and the public. Conservatories allow for education and acts as a living museum as well as a welcoming space for all those who visit, and this learning experience is to illustrate those factors of the conservatory here at MSU.

QUANTIFYING CROP PHOTOSYNTHETIC RESPONSE FOR COMPARISON WITH RAIN EXCLUSION SHELTER LIGHT CONDITIONS
Presenter(s): Maggie Jones
Plant Sciences
Mentor(s): Kevin Kahmark (Research & Innovation), Phil Robertson (College of Agriculture & Natural Resources)

Rain Exclusion shelters are widely used at Kellogg Biological Station (KBS) to allow researchers more control over water reaching experimental plants. After comparing light levels under shelters to ambient field conditions, I found that plants underneath shelters receive less light than plants in ambient conditions. At maximum midday solar radiation, 2-year-old shelters transmit 71.4% ± 1.6 of ambient photosynthetically active radiation (PAR) on average. To determine if this light difference significantly impacts photosynthetic activity of sheltered plants, I created light response curves (LRC) for four KBS crops. LRCs show photosynthetic activity rates at different light levels and can be used to find the light saturation point, or the light level at which a plant reaches maximum photosynthesis. LRCs were created using the LI-COR LI-6800 Portable Photosynthesis System in ambient conditions. Corn, soy, switchgrass, and wheat plants were 95% saturated at 1660, 1500, 1500, and 1300 µmol photons/m^2 s of PAR on average, respectively. These light saturation points are higher than the average midday shelter PAR value of 1270 ± 240 µmol photons/m^2 s, but lower than the average midday ambient PAR value of 1730 ± 230 µmol photons/m^2 s. Therefore, during midday, sheltered crops receive majority non-saturating light, and crops in ambient conditions receive majority saturating light. This contributes to different levels of photosynthetic activity in shelter condition

MAPPING GENETIC MODIFIERS OF LEAF LESION FORMATION IN THE MAIZE BELLA FLECK1 MUTANT
Presenter(s): Caitlin Dougherty
Plant Sciences
Mentor(s): Addie Thompson (College of Agriculture & Natural Resources)

Maize is a crucial crop for global food security, providing sustenance for millions and serving as a key component of animal feed. The success of maize as a species depends on various factors that influence its growth, development, and yield. Specific genetic mutations, for instance, impact stress tolerance, disease resistance, and environmental adaptability. The semi-dominant maize mutation in Bella fleck1

(Bfl1) has been shown to confer disease resistance while causing persistent leaf lesions, likely through a hypersensitive immune response. These lesions also reduce chlorophyll content, plant height, and overall productivity, to a varying degree in different genetic backgrounds. This study aims to identify the genes involved in lesion penetrance using an F-One Association Mapping (FOAM) panel segregating 1:1 for the mutation. Phenotypic data including chlorophyll content readings and lesion severity ratings will be collected to assess leaf lesion presence and the extent of its impact in each genetic background. A Genome-Wide Association Study (GWAS) will then be conducted to identify single nucleotide polymorphisms (SNPs) that are statistically associated with lesion traits. The GWAS algorithm will utilize a kinship matrix and principal components to account for population structure and relatedness within the FOAM. The results will be visualized using a Manhattan plot, and genetic regions near significant SNPs will be scanned for candidate genes potentially involved in

NAVIGATING YOUR BACKYARD WETLAND: POND MANAGEMENT
Presenter(s): Heather Fitchett
Plant Sciences
Mentor(s): Eva Farre Prokosch (College of Natural Science), Tammy Long (College of Natural Science)

Pond ecosystems are vital to biodiversity and environmental health, yet they often face challenges such as invasive species and degraded water quality. During my internship at The Pond Guy in Armada, MI, I worked as an assistant service applicator, gaining hands-on experience in professional pond management. The internship addressed a critical gap in knowledge on pond ecosystems and their maintenance, emphasizing informed ethical decisions, regulatory compliance, and sustainable practices. My work involved collaborating with a diverse team of certified applicators to prepare chemical and bacterial treatments, and manage invasive species like phragmites. I collected and documented field data to meet EGLE standards, ensuring treatments protected both ecosystems and local communities. Through observing and assisting experienced applicators, I expanded my knowledge of the ecological dynamics of ponds and the broader impact of invasive species management. This experience helped me apply academic knowledge to solve real-world environmental challenges while fostering teamwork in a professional setting. The hands-on nature of the work reinforced the importance of ethical decision-making in applying treatments and managing ecosystems responsibly. The internship not only enhanced my technical and professional skills but also deepened my appreciation for the

INNOVATIONS IN ENDOTOXIN TESTING: A COMPARATIVE ANALYSIS OF RECOMBINANT & TRADITIONAL LAL METHODS
Presenter(s): Kennedy Porter
Plant Sciences
Mentor(s): Tammy Long (College of Natural Science)

Endotoxin testing is vital for ensuring pharmaceutical product safety. The Limulus Amebocyte Lysate (LAL) assay, a widely used method, faces limitations, including variability and ethical concerns due to reliance on horseshoe crabs, whose populations are declining. The United States Pharmacopeia (USP) provides guidelines for endotoxin testing, but emerging recombinant technologies, such as recombinant Factor C (rFC) and recombinant cascade reagents (rCR), offer potential alternatives. This study evaluates the rCR method's performance compared to the LAL assay, focusing on functional equivalency, sensitivity, specificity, and compliance with USP standards.

PANELS AND PLANTS
Presenter(s): Shreya Balla
Plant Sciences
Mentor(s): Tammy Long (College of Natural Science)

As an intern at the MSU Herbarium, I learned about the significance of its collection while working with specimens and participating in events around campus. My background in illustration and comic art presented an opportunity to share the Herbarium's work in a unique way: through a Comic-Activity Book. My internship revolves around creating an educational comic about plant biology through the MSU Herbarium. I wanted to share the importance and process of the Herbarium's work, as well as bring plant biology education to younger audiences in a fun and educational manner. Despite herbaria's importance in research and documentation of the natural world, many people have never heard of them, or don't know what they are. In fact, environmental science topics, not just plant biology, is surprisingly scarce in curriculums throughout primary education. Increasing knowledge about the natural world from younger ages can increase the public's interest in the environment, which can have many benefits for society in the long run.

IMPACT OF ACC-DEAMINASE ON PLANT GROWTH AND DEVELOPMENT
Presenter(s): Sam Manson
Plant Sciences
Mentor(s): Sarah Lebeis (College of Agriculture & Natural Resources)

Ethylene is a phytohormone that influences a plant throughout its entire life cycle. The precursor to ethylene, 1-aminocyclopropane-1-carboxylic acid (ACC), is exuded from plant roots during times of stress. At which point, microbes containing the enzyme ACC-deaminase cleaves ACC, reducing ethylene levels. The purpose of this experiment was to determine the relationship between plant growth and development and microbial community composition. We measured plant biomass, developmental timing, and microbial abundance across several harvests at different stages in the plant's life cycle (vegetative, flowering, and senescence). To determine this, we inoculated Arabidopsis thaliana plants with two distinct synthetic communities containing microbes with differing ACC metabolism capabilities and grew them in environmentally controlled growth chambers. One such community contained members with ACC-deaminase activity while the other did not. Certain microbes in the ACC-deaminase positive group are able to use ACC as a nitrogen source, reducing ethylene levels in the plants, resulting in slower development time and subsequent greater biomass. Harvests in which ethylene production is high (flowering and senescence) have a greater number of ACC-deaminase isolates when plated, compared to the vegetative stage. On a broader scale, plants in contact with

UTILIZING MACHINE LEARNING TO ANALYZE THE FUNCTION OF MYOSIN XIA IN PLANT GROWTH AND IMMUNITY
Presenter(s): Carter Pasternak
Plant Sciences
Mentor(s): Amanda Koenig (College of Natural Science)

The cytoskeleton comprises actin filaments and microtubules and is vital for material transfer, organelle movement, and cell replication, among other functions, in plant cells. The cytoskeleton also plays a role in biotic stress through actin remodeling at infection sites, which facilitates the transportation of defense proteins and compounds, as well as vesicles and organelles. For example, Golgi bodies, chloroplasts, and peroxisomes aggregate at infection sites in a possible immune response, largely reliant on the actinomyosin system. Myosin XI proteins associate with actin filaments, drive cytoplasmic streaming, and transport organelles in plants. However, their specific role during infection and immune response remains unclear. We mined transcriptomics data from the literature and found that Myosin XI-A expression is upregulated in response to effector trigger immunity-related factors like flg22 and salicylic acid (SA), while other Myosin XI genes show less prominent changes in expression. Previous research has found XI-A knockout plants have fewer seeds and smaller siliques, suggesting impaired development in pollination and seed production. We hypothesize that Myosin XI-A may respond to the phytohormone salicylic acid during

IDENTIFICATION AND CHARACTERIZATION OF SUPPRESSOR MUTANT IN AN JASMONIC ACID ACCUMULATING ARABIDOPSIS LINE
Presenter(s): Sam Hu
Plant Sciences
Mentor(s): Christoph Benning (College of Natural Science)

Jasmonic Acid (JA) and its derivatives are important plant hormones involved in plant growth and stress responses. Plastid Lipase 3 (PLIP3) cleaves 18:3 (number of carbons: number of double bonds) acyl groups from chloroplast membrane lipids which are then metabolized to oxylipins including JA. The PLIP3 overexpression line (PLIP3-OX) showed increased levels of JA and its derivatives, altered leaf morphology, and stunted plant growth. We are interested in discovering novel components of JA synthesis and signaling processes. Toward this goal, we conducted a suppressor mutant screen in the PLIP3-OX line. One candidate, suppressor mutant 97, carries a recessive mutation leading in the homozygous state to partial reversal of the PLIP3-OX phenotype in addition to yellow leaves and a lipid phenotype similar to PLIP3-OX. Through next generation DNA sequencing of bulk DNA from an F2 mapping population, we have identified PGPP1, a gene involved in the biosynthesis of phosphatidylglycerol (PG), as the causal gene for the phenotype of suppressor mutant 97. A homozygous double mutant of PGPP1 and PLIP3-OX partially replicates the phenotypes of suppressor mutant 97 and has a novel lipid phenotype with decreased levels of chloroplast membrane lipids.

BIG CITY PLANTS: INVESTIGATING THE URBAN-RURAL GRADIENT OF A COMMON WEED SPECIES
Presenter(s): Claudia Colligan
Plant Sciences
Mentor(s): Asia Hightower (College of Natural Science)

Capsella bursa-pastoris , commonly known as shepherd's purse, is one of the most widespread wild plant species, thriving in both urban and rural environments. This project seeks to compare the abundance of Capsella bursa-pastoris populations throughout the country, categorizing them as either urban or rural. Urbanness will be defined using population, square footage, and impervious surface analysis. Using 2,000 specimen data-points, sourced using iNaturalist and GBIF, I will determine whether C. bursa-pastoris is a more rural or more urban species. Additionally, I will analyze how populations have moved over time, using more specimen data-points from 1920-2020. This project will provide insight into the distribution of weedy species.

USING COMMON GARDENING ISSUES TO BROADEN THE ACCESSIBILITY OF GARDENING
Presenter(s): Skylee Dwyer
Plant Sciences
Mentor(s): Sean Matthews (English Gardens of Royal Oak)

In my internship, I worked as a garden pharmacist. This role is focused on giving people advice about plant care, identification, and maintenance. To do this, I had to determine what type of intervention would most benefit the client, and form a plan with them if applicable. These interventions can include fertilizer usage, introducing a watering schedule, pest control, and introducing good plant care habits as well as other things that may be needed on a case by case basis. As an effect of my work, I was able to learn about the common pests and diseases in the area as well as common struggles of the average person in the area who is growing plants. Knowing this allows for a better comprehensive analysis of what would best help gardeners and will therefore make gardening more accessible to all.

CLEVELAND METROPARKS INTERNSHIP
Presenter(s): Julian Clark
Plant Sciences
Mentor(s): Karen Lakus (Cleveland Metroparks Rocky River Nature Center)

The Cleveland Metroparks is a vast network of nature reservations originally founded in 1912 by William Stinchcomb. While initially only covering 3 acres the park has grown to a much larger scale through land purchases and donations, now spanning 25,000 across 18 reservations forming a loop around Cleveland, aptly nicknamed "The Emerald Necklace". During the park's expansion, numerous nature trails were created around the park system for the purpose of public enjoyment. The parks are open to all, and aim to provide an inclusive space welcoming to all while simultaneously protecting and raising interest in the natural world. These values are upheld in all aspects of the park, from volunteer work and employee contributions to summer camps. During my internship I worked in all of these areas of the park, gaining valuable experience in the preservation of natural areas and interactions with the public.

A PEARADOX: EXPLORING THE CITRAMALATE PATHWAY AND ITS CORRELATION TO THE CREATION OF AROMA IN BOSC PEARS
Presenter(s): Alaina Cavin
Plant Sciences
Mentor(s): Randolph Beaudry (College of Agriculture & Natural Resources)

This experiment aims to identify if the citramalate pathway, known for its role in the aroma of apples, behaves the same in pears. We hypothesize that the citramalate synthase gene, MdCIM, can be characterized as an aromatic pathway in pears. Aroma increases as pears begin to ripen, therefore, the citramalate synthase gene should have increased expression as pears ripen. We measured the ripening of pears over 15 days using ethylene production, respiration rate, firmness, brix, TA, and color as ripening indicators. Every test date we measured aromatic volatiles and looked for straight and branched chain esters to identify the aromatic profile of pears. From there, we will analyze genomic RNA and cDNA for the citramalate synthase gene and look for trends in expression. Throughout this experiment, we will look for a relationship between ripening, the expression of the citramalate synthase gene, and the creation of straight and branched chain esters.

TESTING SOIL FOR POTENTIAL RHIZOCTONIA DAMPING OFF SUPPRESSION
Presenter(s): Isabella Rabac
Plant Sciences
Mentor(s): Linda Hanson (College of Agriculture & Natural Resources)

A rot of the root and crown in sugar beet can often be caused by the fungal pathogen Rhizoctonia solani. It is specifically caused by strains in the anastomosis group (AG) AG2-2. Recently, a disease nursery near central Michigan was inoculating varieties with Rhizoctonia solani AG2-2 and seeing little effect on their plants. There are several possible reasons for this, but one likely reason is that the soil might have disease suppression activity. Previous reports on suppressive soils show that suppression can be composed of biological and/or chemical factors (Expósito et al. 2017). Halloin reported a Rhizoctonia -suppressive soil on Michigan State's campus that had been used for sugar beet. After use with non-host crops for six years, it was tested and no longer suppressive, but o

MSU 4-H CHILDREN'S GARDEN INTERNSHIP
Presenter(s): Alison Weller
Plant Sciences
Mentor(s): Jessica Wright (College of Agriculture & Natural Resources)

The MSU Horticulture Gardens were established to demonstrate gardening techniques for students and the public, with a mission to aid in the understanding of plants and the roles they play in our lives. My role as a horticultural assistant intern focused on making that mission a reality through maintaining the Michigan 4-H Children's Garden, allowing visitors to experience high quality, healthy, and accessible themed garden displays. The Children's Garden hosts field trips, event days, and summer camps that aim to familiarize and engage children with their natural surroundings. To contribute to these goals, I created and hosted an insect themed scavenger hunt activity at the Bug Day event to encourage curiosity and a basic understanding of Michigan insects. Based on participation and feedback from visitors, the garden displays and Bug Day activity were successful in fulfilling the garden's mission. Due to the success of the insect scavenger hunt, it will be a recurring activity for the children's garden. trips, event days, and summer camps that aim to familiarize and engage children with their natural surroundings. To contribute to these goals, I created and hosted an insect themed scavenger hunt activity at the 'Bug Day' event to encourage curiosity and a basic understanding of Michigan's insects. Based on participation and comments from parents, children, and educa

UNDERSTANDING PROTEIN-LIPID INTERACTIONS AND MOVEMENT DURING LONG DISTANCE SIGNALING
Presenter(s): Luci Karakas
Plant Sciences
Mentor(s): Susanne Hoffmann-Benning (College of Natural Science)

Plants are, as most people are aware, unable to change location if something in their environment poses a threat to their well-being. Rather than simply escaping adverse conditions, they need to detect changes, transmit a signal throughout the plant, and adjust development accordingly. Our lab has identified several lipid-binding proteins in the plant phloem and through this we characterized their lipid-binding properties, localization, and stress response. PLAFP is a phosphatidic acid binding protein that is induced in response to ABA in drought and confers drought tolerance. To prove the movement of our protein, we cloned PLAFP-RFP behind an optogenetically controlled promoter identified as PULSE. This promoter was chosen because it can be activated under red light conditions and repressed under blue light conditions. It allows for spatiotemporal gene expression in specific Arabidopsis leaf tissue and subsequent movement studies. Flowering Locus T is used as our positive control as it is a protein that is proven to move throughout the phloem. GRIP is our negative control as it will not move throughout the phloem. We have generated all three transgenic lines and are moving forward to the optogenetic expression studies using confocal microscopy and RT-PCR. In this poster, we will describe our approach and analyze our results towards discovery of PLAFP movement and function. This research was supported by NSF-IOS grant #1841251 "EAGER: Lipids on

CREATING FUNCTIONAL BACTERIAL MICROCOMPARTMENTS THAT ARE TARGETED TO THE CHLOROPLAST OF PLANTS

Presenter(s): Sebastian Velazquez-Solis
Plant Sciences
Mentor(s): John Froehlich (College of Natural Science)

Bacterial Microcompartments (BMCs) are widely conserved bacterial "organelles" comprised of large, selectively permeable protein shells enclosing enzymatic cores of varied activity. BMC shells have been shown to consist of two primary shell components, a hexamer (BMC-H) and a trimer (BMC-T), as well as a secondary pentamer (BMC-P) shell component. When a hexamer and trimer are expressed in bacteria, they self-assemble to form a "wiffle ball" shell architecture, whereas, when hexamer, trimer and pentamer are expressed in bacteria they self-assemble to form a complete BMC shell architecture. The research presented here showcases our progress towards establishing a BMC shell architecture within the chloroplast of plants. To achieve this goal, we have generated constructs in which the genes for each shell component are assembled in tandem (Train Approach) with a hybrid linker peptide sequence inserted between each gene. When expressed in plants, the linker sequence is cleaved/removed thus releasing individual BMC shell components and subsequently allowing them to enter the chloroplast whereby they assemble into "wiffle ball" shell platforms. Indeed, over the past year, we have been able to generate a "whiffle ball" BMC platform within the chloroplasts of Arabidopsis. The current research presented here will focus on 1) developing methods to generate a greater yield of BMC shells within the chloroplasts of

YEAST-TWO HYBRID ASSAY TO DETERMINE THE INTERACTING DOMAINS IN ARABIDOPSIS CAMTA WITH CALCIUM-BINDING PROTEINS

Presenter(s): Madlyn Borton
Plant Sciences
Mentor(s): Yongsig Kim (College of Natural Science)

Yeast-two hybrid assay is a laboratory technique used to determine interaction between proteins using a bait protein fused to DNA binding domain and prey protein fused to activation domain. We are looking for information on these protein-protein interactions to determine which domain(s) of CAMTA are involved in interaction with calmodulin or CMLs. In plants it is necessary for them to develop efficient decoding, translating and relaying signaling systems. The calcium ion (Ca^{2+}) acts as a key secondary messenger in the amplification and transfer of signals. Our research question was: Which domain(s) of CAMTA are involved in interaction with calmodulin or CMLs are required for interaction? Do these interactions require the calcium ions? Is there competition among calcium-binding proteins for interaction with CAMTA proteins? For methods, Yeast-two hybrid assay was used to determine protein-protein interaction. In vitro pull-down assay will be used to determine the requirement of calcium ions for interaction. Some results were: The first IQ domain of CAMTA is required for the interaction with CaM. The roles of IQ and CBD domains and AV or KE mutations in interaction with CaM: The A/V mutation in the first IQ domain does not affect the interaction with CaM (maybe slightly). The K/E mutation or deletion of CBD weaken the interaction with CaM. On dro

CONTROL OF CAMALEXIN PRODUCTION BY THE JASMONATE SIGNALING PATHWAY PROMOTES PLANT RESISTANCE TO PECTOBACTERIUM CAROTOVORUM
Presenter(s): Liam Markell
Plant Sciences
Mentor(s): Bailey Kleven (College of Natural Science), Gregg Howe (College of Natural Science)

Plants have evolved unique mechanisms to adapt to changing environments, including the biosynthesis of specialized metabolites that help them interact with their surroundings. The plant hormone jasmonate (JA) regulates specialized metabolism by activating transcriptional programs that produce defensive compounds. JA achieves this by promoting the degradation of JA ZIM-domain (JAZ) transcriptional repressors. The Arabidopsis jaz Decuple (jazD) mutant, which lacks most JAZ proteins, constitutively accumulates high levels of many defensive compounds. In this study, we used the model plant species Arabidopsis thaliana to understand how JA-induced defensive metabolites protect against pathogens like Pectobacterium carotovorum ssp. carotovorum (Pcc), which causes soft rot disease in many crop species. Infection assays showed that jazD plants are highly resistant to Pcc<

HOW DOES BARK THICKNESS VARY AMONG WOODY SPECIES IN A DEGRADED OAK SAVANNA ECOSYSTEM?
Presenter(s): Benjamin Lutz
Plant Sciences
Mentor(s): Jack Pritchard (College of Natural Science), Lars Brudvig (College of Natural Science)

Bark thickness is a key functional trait in woody plants that can mediate responses to various sources of disturbance. One disturbance of particular relevance is fire, a key ecosystem process in savannas throughout the world, including oak savannas in Michigan. Thick bark insulates the interior of a tree and protects it from potentially lethal temperatures. Species and individuals vary in their bark thickness, which impacts survivorship in fire-disturbed ecosystems. However, a current knowledge gap exists in how woody plants of different species accumulate bark thickness as they age and grow. I aim to quantify the relationship between woody stem diameter and bark thickness. Data for this project will be collected at Michigan State's MacCready Reserve. Historically a fire-maintained oak savanna, decades of fire suppression at MacCready led to invasion of fire-sensitive tree species. I will collect bark thickness and stem diameter measurements on five of the most common tree species at MacCready, including both fire-sensitive and fire-tolerant species. I will then conduct regressions to understand relationships between bark thickness and woody stem diameter for each species. This research project will have a standalone outcome by filling the knowledge gap on how woody species accumulate bark thickness as they age. In addition, results could also inform current restoration decisions because variations in bark thickness likely mediates trees' responses to disturbance- for exam

DETERMINING CYTOPLASM TYPE IN POTATO BREEDING LINES
Presenter(s): Logan Sapienza
Plant Sciences
Mentor(s): Daniel Zarka (College of Agriculture & Natural Resources), David Douches (College of Agriculture & Natural Resources), Jessica Norling (College of Agriculture & Natural Resources), Madison Whyte (College of Agriculture & Natural Resources)

The goal of the MSU potato Breeding and Genetics Program is to develop superior potato lines while improving conventional breeding methods. In the program's gene pool, there are many male sterile plants that contain desirable agronomic and disease resistance traits. Breeding for these traits without accounting for the cytoplasm type perpetuates the presence of cytoplasmic male sterility (CMS) in the germplasm. CMS in potato (Solanum tuberosum L.) is a pervasive issue affecting breeding programs, creating a bottleneck caused by a lack of fertile male parents. In potato, there are 6 distinct cytoplasm types (M, P, A, W, T and D) tracing back to the origins of wild species. CMS is directly caused by cytoplasm types T, W and D showing phenotypes of decreased pollen viability, lobed microspores and non functional pollen grain respectively (Santayana, et al. 2022). Cytoplasm type is maternally inherited, so it is important to investigate the type of cytoplasm present when designing crosses. A solution to this problem lies in the identification of cytoplasm types for breeding lines in our program. By running a polymerase chain reaction (PCR) using previously identified genetic markers, we can understand and assess the cytoplasm types of MSU Potato Breeding and Genetics program breeding lines, leading to improved decision-making in parent selections and increasing male fertilit

MICROBIAL AND SECONDARY METABOLITE VARIATION OF SOIL SURROUNDING LOCAL BORODINIA LAEVIGATA
Presenter(s): Sophia Lanning
Plant Sciences
Mentor(s): Emily Josephs (College of Natural Science), Magie Williams (College of Natural Science)

Microbial communities are collections of many different microbes within a shared environment. Analyzing the composition of these communities in soil surrounding plant species can provide insight into the relationship between microbial communities and the plant of interest. It also provides information on the diversity of the microbiome surrounding that plant. Additionally, glucosinolates are chemicals produced by Brassicas that can protect them from herbivores or pathogens. Analyzing glucosinolate abundance in soil can be useful in identifying if a plant has adaptive or nonadaptive chemical defense. It also provides information on retention of glucosinolates in soil. Furthermore, we expect to see a positive relationship between microbial diversity and glucosinolate variation. Previous research has been done to characterize the microbial community composition and glucosinolate abundance for Boechera stricta , resulting in evidence that supports adaptive chemical defense. However, not a lot of research has been done on pan

VEGETATIVE GROWTH CURVES ON DIFFERENT ARABIDOPSIS THALIANA POPULATIONS EXPERIENCING DROUGHT STRESS
Presenter(s): Basia Love
Plant Sciences
Mentor(s): Sophie Buysse (College of Natural Science)

Increased average temperatures and decreased availability of water are two stressors that affect plants as a result of climate change. In the extreme case of drought, plants may use drought escape or drought avoidance to survive. Drought escape includes faster vegetative growth, earlier flowering and higher photosynthetic capacity. Drought avoidance includes increased water use efficiency, lower stomatal conductance and decreased growth rate. My study focuses on vegetative growth rate because it is a precursor to flowering. Further, lettuce, spinach, kale, mint and cabbage are some of the many crops that people eat that require the plant's vegetation. This study uses Arabidopsis thaliana as a model to understand howclimate shapes a plant's drought survival strategy. A. thaliana can be found in diverse climates all over the world; our study compares two populations of A. thaliana in a common garden experiment. One population was collected from Sweden with a long growing season, cooler average temperatures and more available water, and one population collected from Italy, with a short growing season, drier climate and less water availability. Plants from these two populations were grown under two conditions in the growth cha

XERICO DROUGHT TOLERANCE GENE EXPRESSION IN TOMATO
Presenter(s): Travis Yang
Plant Sciences
Mentor(s): David Douches (College of Agriculture & Natural Resources)

In our world, climate change is one of the most important issues that we will have to face in the future. One major consequence of this change is drought. Drought is a major contributor to crop loss around the world and can detrimentally affect yield and quality of crops (Conti et al 2013). Tomatoes are one of the most economically important crops and there are currently no commercially available drought resistant tomato varieties. The XERICO gene was discovered and characterized as an osmotic responsive gene in Arabidopsis that resulted in enhanced plant drought tolerance when it was overexpressed (Ko et al 2006). When induced by drought conditions, the resulting increase in abscisic acid production (ABA) stimulates stomatal closure which reduces transpirational water loss. Using Agrobacterium mediated transformation, this project aims to create transgenic tomato varieties expressing the XERICO gene with a drought stress inducible 7D2A promotor. Successfully transformed plants will be identified using PCR. Individuals identified containing

ASSESSING THE ACCURACY OF DRONE IMAGING FOR TAKING FIELD MEASUREMENTS OF PRAIRIE GRASSES
Presenter(s): Jacob Marsh
Plant Sciences
Mentor(s): Carolyn Malmstrom (College of Natural Science)

Fieldwork is essential for studying ecology, but is often limited by site accessibility, time constraints, and other factors. Drone imaging provides an alternative to collecting field data that may overcome such limitations. In this study, we assess the accuracy of using drone imaging to measure the diameter and stem count of prairie grasses grown in a field experiment, by comparing the results to traditional on-site measurements. Prairie grasses were selected as the test subject because they are common in prairie restoration and bioenergy research. A drone was flown at an altitude of 10 meters to capture 0.23 cm resolution images of Andropogon gerardii (big bluestem), Sorghastrum nutans (indiangrass), and Panicum virgatum (switchgrass) plants. These images were processed to create an 80% overlapping mosaic, which we used to measure the crown diameter and estimate the number of tillers for each plant in ArcGIS Pro using the "measure distance" tool counting stems by hand. Drone-based tiller counts predicted field measures for switchgrass ($r2 = 0.44$, $p = 0.0498$) and indiangrass ($r2 = 0.40$, $p = 0.0358$) but not big bluestem. Likewise, drone and field measures of crown diameters were significantly related, but only for switchgrass ($r2 = 0.67$, $p=0.0039$). Our results show that drone imagery ma

DEVELOPMENT OF RT-QPCR NORMALIZERS AND PROBES OF HOMOLOGOUS COLD-INDUCIBLE GENES FOR DOMESTICATED TOMATO SOLANUM LYCOPERSICUM AND WILD ACCESSION S. PENNELLII.
Presenter(s): Emma Weesies
Plant Sciences
Mentor(s): Madison Putmon (College of Natural Science), Yongsig Kim (College of Natural Science)

We are currently experiencing unprecedented climate changes. These harsh environmental conditions cause an interruption and reduction in agricultural crop production in fields. To continue to provide a secure food supply while simultaneously reducing the carbon footprint associated with the delivery of crops, it is necessary to establish crop production facilities such as greenhouses near consumers. One approach being taken is to develop a chilling-resilient tomato that will reduce the heating requirement during the cold nighttime without a growth penalty, eventually decreasing the production of carbon dioxide overall. Using qRT-PCR, validation of normalizers and testing of qRT-PCR probes for cold resistance genes in S. lycoperiscum and S. pennellii will produce data that will be analyzed using excel. Results will identify which candidate normalizer is best suited for S. lycoperiscum and S. pennellii and further develop the common probe sets for cold-regulated genes for parental lines. By identifying a candidate normalizer and developing a common probe set for cold-regulated genes in S. lycoperisum and S. pennellii,

CORRELATIONS BETWEEN ALLOPATRY, SYMPATRY, PHOSPHOROUS LEVELS, AND AM COLONIZATION
Presenter(s): Kelsey Renfro
Plant Sciences
Mentor(s): Andrea Case (College of Natural Science), Christopher Blackwood (College of Agriculture & Natural Resources)

Lobelia, like most terrestrial plants, form a symbiotic relationship with arbuscular mycorrhizal fungi (AM), benefiting the fungus with carbon, and the plant with phosphorus and nitrogen. Some plants can form a closer relationship with AM than others. However, it is not known what factors in the soil cause a plant to form more symbiosis with AM than other plants. We question if Lobelia plants living sympatically (living among other Lobelia species in the same space) would have different amounts of AM colonization than Lobelia living allopathically (Lobelia growing separately from others). We also aim to determine if higher levels of phosphorus in the soil would affect AM colonization. We studied the percent root length colonization of AM (PRLC) in several species of Lobelia roots collected between the years 2017-2023 from various sites from across the country. With this, we compared allopathy and sympatry, soil phosphorous levels, and PRLC. We have found a negative correlation with phosphorus levels and AM

FUNCTIONAL CHARACTERIZATION OF TRANSCRIPTION FACTORS MYB5 AND MYB31 IN THE MAIZE PHENYLPROPANOID PATHWAY
Presenter(s): Sophia Gudinas
Plant Sciences
Mentor(s): Erich Grotewold (College of Natural Science)

Maize is an important crop because of its nutritional value, industrial significance, and environmental impact. Phenolic compounds, produced by the phenylpropanoid pathway, such as anthocyanins, lignin, and flavonoids are specialized metabolites that perform a variety of functions in plant growth and development as well as the abiotic and biotic stress response (Fornale et al., 2010, Gomez-Cano et al., 2020). While many genes involved in maize phenylpropanoid biosynthesis are known, how the pathway is regulated is less well understood. Several transcription factors (TFs) have been identified as potentially important regulators of the pathway, but the consequences of loss-of-function of these TFs on metabolism and development remain unknown in maize. This research will consist of investigating the consequences of mutating the genes corresponding to ZmMYB31 and ZmMYB5 and their relationship to the production of phenolic compounds. By functionally characterizing these transcription factors in CRISPR-edited maize plants, we expect to observe their role in regulation of phenolic compounds. This anticipated function is based on their association with phenylpropanoid gene regulation, and their targeted manipulation can significantly improve the growth and development of maize plants.

ROOT ACYLSUGARS CHANGE IN TOMATOES ACROSS DEVELOPMENT
Presenter(s): Savannah Himebaugh
Plant Sciences
Mentor(s): Rachel Kerwin (College of Natural Science)

Plants in the Solanaceae family such as cultivated tomato (Solanum lycopersicum) and wild tomato (Solanum pennellii) produce acylsugars, a type of specialized metabolite, that combat herbivory by acting as sticky fly paper. Acylsugars are known to accumulate in glandular trichome tip cells and young root hairs in both tomato species. Acylsugars are made up of a sugar core with acyl chains attached. Trichome and root acylsugars are produced in dedicated cells and synthesized through independent biosynthetic pathways with distinct enzymes. The trichome pathway creates sucrose-based acylsugars in cultivated and wild tomato, and the root pathway creates inositol-based acylsugars in young roots of both species. Preliminary data shows that mature cultivated tomato roots also produce acylsugars, but they differ structurally from cultivated tomato trichome and young root acylsugars which suggests the presence of a third biosynthetic pathway. This project aims to characterize root acylsugar profiles in cultivated and wild tomato across development and compare these profiles to young root and trichome profiles within and between the two species.. The second part of this project is to identify when the developmental transition occurs in order to identify candidate genes for the hypothesized mature root acylsugar pathway.

THE ROLE OF HPR1 AND HPR2 IN PHOTORESPIRATION MECHANISMS IN A. THALIANA
Presenter(s): Emily Schley
Plant Sciences
Mentor(s): Amanda Koenig (College of Natural Science), Jianping Hu (College of Natural Science)

Photorespiration is an auxiliary pathway of photosynthesis that begins when RuBisCO oxygenates, rather than carboxylates, ribulose-1,5-bisphosphate (RuBP), generating cytotoxic 2-phosphoglycolate (2PG). Through a series of metabolic reactions across chloroplasts, peroxisomes, mitochondria, and the cytosol, photorespiration reassimilates 2PG into glycerate, which re-enters the Calvin-Benson cycle as 3-phosphoglyceric acid (3PGA). The peroxisomal protein Hydroxypyruvate Reductase 1 (HPR1) converts hydroxypyruvate into glycerate. The Hu lab used an hpr1 suppressor screen to identify a cytosolic photorespiratory shunt activated by glyoxylate accumulation in the cytosol, which involves Hydroxypyruvate Reductase 2 (HPR2). While both HPR1 and HPR2 catalyze hydroxypyruvate to glycerate, HPR1 preferentially uses NADH as an energy source and HPR2 favors NADPH. Secondly, HPR1 is subject to regulation by post-translational modifications (PTMs) like phosphorylation, whereas there is no evidence, currently, for HPR2 PTMs. Critically, HPR1 is localized in the peroxisome and HPR2 in the cytosol. The aim of my research is to understand the effect of the subcellular environment on HPR activity and regulation. To test this, I used site-directed mutagenesis and Gateway cloning to swap HPR1

PSYCHOLOGY

EXAMINING THE EFFECTS OF ENCULTURATION ON NARRATIVES AND INTERPRETATION OF MUSIC EXCERPTS
Presenter(s): Allison Doneth, Natalie Seitz, Yigit Akan
Psychology
Mentor(s): Julian Chambliss (College of Arts & Letters), Natalie Phillips (College of Arts & Letters)

This study investigated how participants' imagination is impacted by enculturation, specifically the imagination of narratives in response to instrumental excerpts. Participants were grouped into three cohorts; one from an isolated rural setting in Dimen, China; one from Springfield, Arkansas; one from East Lansing, Michigan. Each participant was tasked with listening to instrumental music and describing any narrative they imagined in response, including momentary imagery or full-fledged narratives. Some musical excerpts elicited narratives describing the same topics, themes, and words across all cohorts. For example, all groups reported imagining themes of grief while listening to a track titled "Groans of the Sick", and all three mentioned Tom and Jerry while listening to "Four Etudes for Orchestra, No. 4: Allegro con moto" by Stravinsky. The latter phenomenon inspired our creation of the term the "Tom and Jerry effect", which we used to describe niche pop culture references that appear in narratives across all the examined cultures. Western and Chinese listeners also mentioned themes that were not observed in the opposite culture. For example, Disney was only mentioned by Western cohorts, and the Chinese Grand Song was only referenced by Chinese listeners. As we investigate these moments of cultural alignment and divergence in music inspired stories, we point toward an innovative model for linking specific structures and tempo in music to the kind of stories peop

DIFFERENCES IN EARLY INTERVENTION SERVICE ACCESS BASED ON SOCIOECONOMIC STATUS
Presenter(s): Allison Miller, Devan Nahal, Malka Alfadel
Psychology
Mentor(s): Brooke Ingersoll (College of Social Science)

Introduction : Socioeconomic status (SES) has been identified as a significant factor influencing access to quality care, particularly for children experiencing developmental delays. Part C Early Intervention (EI), a federally funded program, provides intervention services to children with developmental delays from diverse backgrounds. This study aims to examine the impact of SES on service access within a sample of participants enrolled in the Part C EI program. Methods : Data was collected from the Reciprocal Imitation and Social Engagement Study (RISE) across four states (Illinois, Massachusetts, Michigan, and Washington). The sample comprised 150 parent-child pairs with social communication delays recruited through EI programs. Caregivers completed surveys at enrollment, which included a demographics and service use survey. SPSS will be used to analyze service hours provided by EI programs, unmet needs, and the likelihood of seeking additional services, with income as the primary measure of SES. Results : Regression analyses will be conducted to explore differences in service access based on income levels. Based on prior research, it is hypothesized that families with lower income levels will receive fewer service hours, report higher unmet needs, and demonstrate a lower likelihood of seeking additional services. Conclusion : Identifying disparities in service access based on SES is essential to ensuring e

RACIAL AND ETHNIC INFLUENCES ON PART C EARLY INTERVENTION SERVICE ACCESSIBILITY
Presenter(s): Haley Price, Mahmoud Abolibdeh, Megan Nichols
Psychology
Mentor(s): Brooke Ingersoll (College of Social Science)

Introduction : The federally funded Part C Early Intervention (EI) program provides services to infants and toddlers who are eligible based on developmental needs. Previous research suggests that racial minoritized children often face delayed diagnoses and reduced service use compared to White children. These disparities are tied to systemic barriers of minoritized groups. This current study aims to investigate service access within the Part C Early Intervention system based on different racial and ethnic backgrounds, using data from the Reciprocal Imitation and Social Engagement (RISE) Study. Methods : Data was collected from the RISE Study, a multi-site study conducted across four states (MI, IL, WA, MA). The study looked at 233 parent-child dyads with social communication delays. Caregivers completed a demographics survey, including race and ethnicity questions, and a services survey addressing weekly hours EI hours, unmet needs, and additional services outside EI at the beginning of enrollment. Data analyses will be conducted using SPSS. Results: The anticipated analyses will include regression models, particularly linear and logistical regression models. These models aim to explore whether there are differences in service access and usage based on racial and ethnic backgrounds within the sample. Given the previous findings of service disparities observed in minorities backgrounds, the current study hypothesizes non-whit

INDIVIDUAL AND SPOUSAL DEPRESSION PREDICTING MORTALITY
Presenter(s): Ariella Beal, Elizabeth St Martin, Maya Gill
Psychology
Mentor(s): William Chopik (College of Social Science)

Successful aging is a concept that encompasses maintaining one's physical, mental, and social well-being as one grows older. Choices you make in your everyday life have a substantial impact on how successfully you age. There's been work showing that aspects of individuals impact social aging, however this impacts the way other people in our lives influence successful aging. In the current study, we examined one source of aging variation--people's depressive symptoms. In a large sample of older couples, we found that a person's--and their partner's--depressive symptoms were associated with a higher risk of mortality over time.

CULTURAL VARIATION IN GENDER ROLE ATTITUDES
Presenter(s): Claire Christin
Psychology
Mentor(s): William Chopik (College of Social Science)

Sex and gender roles have been the subject of much empirical study. However, most of this research has been conducted in Western cultural contexts, primarily the United States and Canada. Little is known about cultural variation in these gender role attitudes and whether cultural characteristics affect how different men and women are in different cultures (let alone people from different sexual/gender minority groups). In the current study, we examined cultural variation in gender role attitudes in 318,440 internet respondents from 68 different cultures (49.7% women; 47.9% non-heterosexual). Cultural characteristics will include individualism/collectivism, GDP, income inequality, human development indices, cultural values, relational mobility, and tightness/looseness. We also examined whether these cultural factors moderated the size of group differences in terms of gender and sexual orientation differences. The current study is one of the largest and culturally diverse studies of gender role attitudes conducted to date. Implications and practical applications of the study will be discussed during the presentation.

ATTACHMENT STYLES AND RELATIONSHIP QUALITY OVER TIME
Presenter(s): Allie Tepper, Emma Wittkopp, Joseph Dean
Psychology
Mentor(s): William Chopik (College of Social Science)

This study examined the predictive roles of attachment orientations-attachment anxiety and attachment avoidance-in determining relationship quality. Drawing on attachment theory, we explored how individuals' underlying attachment styles influence their satisfaction, trust, and overall relational well-being in a series of relationship. Data were collected from 8097 adults (Mage = 33.72; 52.6 women; 49% married) through self-report measures assessing attachment anxiety, avoidance, security and multiple indices of relationship quality with romantic partners, friends, and relatives. We found that attachment styles mostly affected positive aspects of relationships. These findings were mostly specific to friendships and family relationships, but less so about relationships with spouses. Understanding these patterns can inform interventions aimed at fostering healthier attachment bonds and improving relationship outcomes. Future research should further explore the mechanisms through which attachment-related thoughts and behaviors influence relationship quality over time. By deepening our understanding of these processes, we can better identify strategies to enhance relational well-being and promote more secure and fulfilling romantic connections.

ATTACHMENT-RELATED PERCEPTIONS OF LIFE EVENTS
Presenter(s): Logan Gibson
Psychology
Mentor(s): William Chopik (College of Social Science)

This study explored how attachment orientations are associated with perceptions of life events, shedding light on why certain experiences may or may not affect attachment-related changes. Although there is evidence that life and relationship contexts have the potential to alter attachment anxiety and avoidance across the lifespan, life events often exert only modest or transient effects on attachment orientations. The current study (N = 929; Mage = 19.73; 74.3% women) examined associations between attachment orientations, perceptions of whether life events might engender personality changes, and perceptions of 20 hypothetical life events across nine dimensions (e.g., emotional significance, impact, control). Individuals high in attachment anxiety perceived life events as more challenging, impactful, emotionally significant, and likely to alter their worldview and negatively affect their social status-viewing them as likely to induce personality changes. Conversely, those high in attachment avoidance minimized life events' potential effects, perceiving them as less significant and less likely to alter personality. Future research could further examine whether attachment orientations shift in response to life events according to perceived event characteristics, thus refining our understanding of attachment development across the lifespan.

INVESTIGATING THE RELATION BETWEEN BODY APPRECIATION AND PHYSICAL HEALTH CONDITIONS
Presenter(s): Mahi Shah
Psychology
Mentor(s): Blair Burnette (College of Social Science), Emma Crumby (College of Social Science)

Body appreciation (BA) is defined as feelings of gratitude towards the functions, health, and features of the body, regardless of weight or shape. Prior literature has identified a positive association between body dissatisfaction and negative physical health conditions, such as stroke. It is important to investigate BA and physical health conditions to inform intervention efforts for both body image and physical health. This study aims to analyze associations between both current and past health conditions and body appreciation. Adults (Age=36.1±11.5 years) in the US (N=1019; 45.7% female, 50.1% male, 1.2% trans/nonbinary, 51.2% White, 48.8% racial/ethnic minority) were recruited via Connect, a crowdsourced research platform, and completed online surveys. We conducted linear regression models to examine associations between current and past physical health conditions and BA, with gender, age, and race as covariates. We found significant negative associations between BA and current hypertension ($p < 0.001$) and high cholesterol ($p < 0.001$), and a positive association between BA and past type 2 diabetes ($p = 0.031$). All other physical health conditions were not significantly associated with BA. These findings highlight the role of BA in cardiovascular and metabolic health conditions. Future research should further investigate this relation, including whether the relation is bidirectional.

INDIVIDUAL AND CLASSROOM WEBCAM USE NORMS AND ELEMENTARY STUDENTS' SENSE OF SOCIAL SUPPORT IN VIRTUAL CLASSROOMS
Presenter(s): Mikang Moon
Psychology
Mentor(s): Sharlyn Ferguson-Johnson (College of Education)

Research utilizing undergraduate samples suggests when students keep webcams on in virtual classrooms, it supports student's individual and collective sense of social presence, and is tied to a more emotionally supportive classroom atmosphere. Yet, whether these effects exist among younger students, who are developmentally and cognitively much different than undergraduate students, remains unexplored. This study utilizes data from 1,575 elementary school students nested within 65 classrooms (across 12 U.S. Midwest elementary schools) during the pandemic's first year. Students were surveyed regarding how often they kept their webcam on in synchronous online class sessions while learning remotely as well as perceived sense of social support from others at school. MANOVA results indicated more frequent individual-level webcam use in virtual classes was associated with higher perceived social support from others at school. However, at the classroom-level, both universal webcam on classrooms (kept webcams on always or most of the time) and low webcam use classrooms (kept webcam on less than half of the time) reported significantly higher collective perceptions of social support compared to classrooms with average webcam on norms (kept webcam on half to most of the time), suggesting a non-linear association between classroom webcam usage and perceived social support in virtual classrooms. The findings of this study provide novel insights into children's individual and collective

WORKPLACE GASLIGHTING AND EMPLOYEE REACTIONS
Presenter(s): Ventong Ya
Psychology
Mentor(s): Quinetta Connally (Eli Broad College of Business)

Organizational gaslighting is a prevalent and growing issue for employees worldwide, yet it remains overlooked in current literature, which primarily focuses on its impact on women in intimate partner violence (IPV) contexts characterized by social power imbalances. Due to the negligence, there is a narrow understanding of its manifestation and impact in the workplace setting. Workplace abuses, such as microaggressions, have been found to negatively impact employees, pressing the need to examine the potential adverse effects of gaslighting in the professional setting. The current study intends to address this gap by investigating the effects of workplace gaslighting on employees' emotions and work-related outcomes like job satisfaction and work motivation, while also assessing the potential moderating role of self-esteem. Using a quantitative experimental design, 100 participants will be recruited for this computer-based study simulating a white-collar workplace. Half of the participants will be subjected to a gaslighting manipulation before completing a non-measured work task, and pre- and post-task surveys will be used to measure emotional responses, work-related outcomes, and self-esteem. It is anticipated that employees exposed to workplace gaslighting will experience greater negative emotions and a decline in job satisfaction and work motivation. Furthermore, the study expects to observe the role of self-esteem as a moderator, with higher self-esteem acting as a buffe

CHANGES IN ATTACHMENT ARE LINKED WITH CHANGES IN RELATIONSHIPS
Presenter(s): Caelan Pitlanish, Dorothy Simon, Isabella Stephanoff, Jennifer Nederegger, Krishna Jariwala
Psychology
Mentor(s): William Chopik (College of Social Science)

Attachment avoidance, characterized by discomfort with closeness and reliance on self-sufficiency, has been linked to difficulties in interpersonal relationships. However, little research has examined how changes in attachment avoidance relate to relationship improvements over time. The present study investigates whether reductions in attachment avoidance predict improvements in the quality of friendships and parent-child relationships. Using a sample of 400 participants, we assessed attachment avoidance, friendship quality, and parent relationship quality at three time points, one month apart. Longitudinal analyses revealed that decreases in attachment avoidance were associated with greater perceived support from friends and parents both at the within and between person level. The effects were consistent across age and gender, suggesting that reductions in attachment avoidance may facilitate relationship growth across different life stages.These findings contribute to our understanding of attachment dynamics in adulthood and suggest that fostering reductions in avoidance-whether through natural development or targeted interventions-may enhance relational well-being. Future research should examine the causal direction of these associations and explore implications for relationship-focused interventions.

VARIATION IN MEMORIES OF ADVERSE CHILDHOOD EXPERIENCES
Presenter(s): Annika Jaros
Psychology
Mentor(s): William Chopik (College of Social Science)

People's memories of adverse childhood experiences are associated with several indicators of mental and physical. However, people's memories are not static and likely wax and wane across the lifespan. The degree to which these memories fluctuate-and why-is relatively unclear in the literature. The current study examined fluctuations in adverse childhood memories and examined linkages with fluctuations in social relationships, school contexts, and family of origin interactions. We surveyed 400 college students three times over the course of the semester with a month in between assessments. Participants completed the Childhood Trauma Questionnaire, academic stress, and support/strain from friends and family. Across all CTQ outcomes, having more support and less strain (on average, at the between-subjects level) was associated with lower types of all forms of adverse childhood experiences. At the within-subjects level, variations in parental support were more closely tied to reports of childhood adversity. Specifically, higher levels of parental support (relative to a person's baseline) were associated with lower physical abuse, sexual abuse, emotional neglect, and physical neglect. Variation in parental support was not significantly associated with emotional abuse. Variations in parental strain were less consistently related to variations in reports of childhood adversity. Peer support/strain and academic stress were associated with CTQ outcomes at the between-subjects

IDEOLOGICAL SIMILARITIES AND DIFFERENCES IN PARTISAN ANIMOSITY AROUND THE GLOBE
Presenter(s): Jolie Kretzschmar
Psychology
Mentor(s): Mark Brandt (College of Social Science)

Partisan animosity is the expression of dislike for a person's political outgroups. Debates have recently been sparked among scholars as to whether members of the political left and right experience partisan animosity in more similar or different ways. However, previous work specific to this topic has primarily been sampled from people in the United States. In two studies, we analyzed existing data from 8 European countries (N = 11,217) and 45 countries around the world (N = 43,774) to better understand if members of the left and right have similar or different psychological processes underlying expressions of partisan animosity. Our analysis also studies the relationship between a person's political extremity and partisan animosity. We have found inconsistent results from our two studies, with evidence of more similarities for respondents in the European sample and evidence of more differences for respondents in the global sample. However, both studies showed that people with more extreme political ideologies express more animosity to political groups who disagree with them. The wider number of countries sampled in these two studies will give the global context necessary to compare how members of the political right and left experience political animosity. Our hope is that study will lead to further research on partisan animosity and, more generally, political polarization.

AN EXAMINATION OF SPORT-RELATED PERFORMANCE ANXIETY IN COLLEGIATE ATHLETES
Presenter(s): Leah Meppelink, Liliana Ribusovski, Lucas Ring, Vikshita Pallerla
Psychology
Mentor(s): Jason Moser (College of Social Science)

Current research shows there is comorbidity between anxiety and depression, however less is known about the relations between sports related anxiety scale (SAS-2) and the following: anxiety (GAD-7), depression (PHQ-9) Social Anxiety/Social Phobia Inventory (SPIN), and anxiety sensitivity (ASI-3). Participants of this study included varsity collegiate athletes who completed an anonymous survey collecting quantitative and qualitative data to investigate what factors influence the development of SRPA. The sample (n =86) had a mean age of 19.65 years (SD=1.61) with the majority identifying as White (n =68) and female (n =63). Correlational analysis found that sport anxiety (SAS-2) scores correlated with general anxiety (GAD-7; r=.543, p<0.001), depression (PHQ-9; r=.

DIFFERENCE IN MENTAL HEALTH BETWEEN TRANSGENDER IDENTITIES
Presenter(s): Willow Milstein
Psychology
Mentor(s): Jae Puckett (College of Social Science), Kye Campbell-Fox (College of Social Science)

Research about transgender and gender diverse (TGD) people's lives has grown, particularly in recent years, however most studies do not attend to subgroup differences within this broad community. The limited work that has examined differences between groups has shown that certain gender groups may disproportionately experience mental health issues, such as nonbinary people. In this study, we examined gender differences in mental health in a sample of 854 TGD adults (average age = 35, 60.9% white). We compared mental health scores (depression, anxiety, social anxiety, and perceived stress) between transgender women (TW), transgender men (TM), nonbinary individuals assigned female at birth (NB AFAB), and nonbinary individuals assigned male at birth (NB AMAB). All ANOVA tests were significant, showing there were gender differences on these mental health variables. The post hoc tests showed that NB AFAB people had significantly higher depression, general anxiety, and perceived stress than TM, TW, and NB AMAB. NB AFAB individuals also had higher levels of social anxiety compared to TW. Given these gender differences in mental health, future research should explore gender differences in minority stress and how gender expression relates to mistreatment. It is possible that nonbinary people overall experience more misgendering and stressful situations, given the largely binary understanding of gender within the US.

THE RELATIONSHIP BETWEEN WEIGHT BIAS AND BODY APPRECIATION IN A MALE SAMPLE: IS SEXUAL MINORITY STATUS A MODERATOR?
Presenter(s): Connor Yee
Psychology
Mentor(s): Blair Burnette (College of Social Science), Emma Crumby (College of Social Science)

Experienced and internalized weight bias (i.e., negative attitudes and beliefs based on weight), have a profound negative impact on body image outcomes, including decreased body appreciation. However, this literature has primarily focused on female experiences, leaving gaps in our understanding of this relation in male populations. The current study aims to address this gap by analyzing the relation between weight bias and body appreciation in an all-male sample. Additionally, the study investigates whether this relation is moderated by sexual minority status, as sexual minority men may face unique appearance-related pressures. Undergraduate males (n = 451, Mage=19.8±1.8, 90.5% Straight, 9.5% Sexual minority) were recruited via SONA and completed online surveys for course credit. We conducted linear regression models to determine associations between enacted and internalized weight stigma and body appreciation, with sexual minority status as a moderator. Results indicated that both enacted and internalized weight stigma were negatively associated with body appreciation in a male sample (p < 0.001), but there was not a significant moderating effect of sexual minority status in either of these associations. These results s

AN EXPLORATORY ANALYSIS OF PHYSICIAN RESPONSES TO POSITIVE BEHAVIORAL HEALTH SCREENINGS
Presenter(s): Isabella Paoletti, Isabella Stephanoff, Sara Kani
Psychology
Mentor(s): Melissa Benbow (College of Osteopathic Medicine), Rachel Christensen (College of Osteopathic Medicine), Susan Frank (College of Osteopathic Medicine)

Despite frequently encountering behavioral health needs in pediatric clinics, primary care providers report inadequate training and uncertainty in responding to positive screenings, leading to inconsistent decision-making and a lack of standardized care (Connors, E.H., Arora, P., Blizzard, A.M., et al.). Given these challenges, this study aims to examine pediatricians' responses to positive behavioral screens at two MSU Pediatric clinics over a one-year period. At each clinic, parents of children attending an annual well-child visit completed a behavioral screening questionnaire (Pediatric Symptom Checklist or PSC-17), assessing internalizing, externalizing, and attention problems. Parents also answered five additional items regarding the child's functional impairment in various settings (e.g., home, school, peers, after-school activities). The results of the screenings, along with physicians' responses (no action; follow-up visit scheduled; referral to a behavioral health provider), were entered into a clinic database from which the study data will be drawn. The study will focus on pediatricians' responses to "positive" screens-those indicating clinically significant internalizing, externalizing, or inattention problems. Given gaps in the literature, data analysis will be largely exploratory. However, drawing from existing literature, we hypothesize that: (a) physicians will favor fol

INDIVIDUAL DIFFERENCES IN NARRATIVE PERCEPTIONS OF MUSIC: CONTRIBUTIONS OF IMAGERY ABILITY, EMPATHY, AND AUTISTIC TRAITS
Presenter(s): Rachael Farquharson
Psychology
Mentor(s): Bailey Rann (College of Social Science), Celeste Uhl (College of Social Science), J McAuley (College of Social Science)

Across cultures, there are general similarities in the degree to which listeners hear a story in instrumental music (i.e., narrativity) and their narrative engagement (NE) with that story (Margulis et al., 2019). Within a culture, however, there are large individual differences in narrativity and NE that are not well understood. The present study investigated individual differences in narrative perceptions of instrumental music. Of central interest was the contribution of auditory and visual imagery ability, empathy, and autistic traits. I hypothesized that participants who: (1) scored higher on auditory and visual imagery ability would experience higher NE and narrativity, (2) scored higher on empathy would experience higher NE, and (3) scored higher on autistic traits would experience lower narrativity and NE. To test this, I conducted an experiment where listeners attended to an instrumental excerpt and recorded whether or not they imagined a story. If they did, participants described the story. Subsequently, all participants completed surveys measuring NE, autistic traits, visual and auditory imagery ability, empathy, and personal background. Thus far, results for each hypothesis showed that: (1) there was no significant effect of visual or audito

OPIOID RESEARCH PROJECT
Presenter(s): A'nya Burks
Psychology
Mentor(s): Ann Annis (College of Nursing)

Michigan continues to battle the opioid crisis, with overdose deaths fluctuating despite intervention efforts. In 2020, the state reported 2,171 opioid overdose deaths, accounting for over 79% of all drug-related fatalities. While recent data shows a 5.7% decline in overdose deaths from 2022 (2,998 deaths) to 2023 (2,826 deaths), significant racial disparities persist, with Black residents overdosing at 2.7 times the rate of white residents. These trends highlight the need for policies that address substance use disorder (SUD) prevention, treatment access-including outpatient services-and harm reduction. This study examines the impact of Public Acts (PA) 84 of 2022 and 136 of 2020 on naloxone distribution, treatment access, and public health strategies in Michigan. PA 84 established the Opioid Advisory Commission to guide funding priorities for SUD and mental health services. PA 136 revised Michigan's Public Health Code to improve disease prevention and regulate healthcare access, expanding both inpatient and outpatient treatment options. Preliminary findings suggest these laws have strengthened policy coordination and improved SUD treatment access. Naloxone distribution has increased since their implementation, contributing to the decline in overdose deaths. The Opioid Advisory Commission has also advanced strategic allocation of opioid settlement funds toward treatmen

TESTING THE EFFECTS OF CESAREAN BIRTH ON MOUSE SOCIAL BEHAVIOR USING A NATURALISTIC APPROACH
Presenter(s): Holly Pringle
Psychology
Mentor(s): Alexandra Castillo-Ruiz (College of Social Science)

Birth occurs at a time of intense remodeling of the brain via key neurodevelopmental processes, and therefore any deviations of the birthing experience could affect brain development. Indeed, we previously reported that Cesarean-born adult mice have fewer and smaller vasopressin neurons in the paraventricular nucleus of the hypothalamus (PVN) in comparison to their vaginally born counterparts. Because the vasopressin system of the PVN regulates sociality, our previous findings suggest that Cesarean birth may alter mouse social behavior. To test this hypothesis, here we used a naturalistic approach: non-invasive observations of social behavior in the home cage. We used this method because most social behavior tests rely on testing mice in unfamiliar settings (e.g., an arena containing a novel mouse) which could potentially affect natural social behaviors. We positioned video cameras in front of cages containing adult mouse dyads of the same sex (male or female) and birth mode (vaginal or Cesarean) and recorded behavior for two hours during the early morning and early night. Social behaviors (allogrooming, huddling) and non-social behaviors (self-grooming, rearing, locomotion, nest-building, drinking, eating) were scored every 2 minutes for each mouse in the dyad. We are currently finalizing behavioral analysis. Our work is of significance given the high rates of Cesarean births across the world and that epidemiological studies suggest that Cesarean-born humans are at increa

MELATONIN BEFORE BED, COGNITIVE REGRET AHEAD: THE EFFECTS OF MELATONIN ON MORNING COGNITION
Presenter(s): Julia Burgess, Maxwell Mccort
Psychology
Mentor(s): Kimberly Fenn (College of Social Science)

Melatonin supplementation is beneficial to individuals with circadian rhythm disorders; it reduces sleep onset latency and wake after sleep onset, helping them to fall asleep faster and stay asleep longer. However, the effect of melatonin on sleep quality and subsequent morning cognition in young adults with relatively healthy sleep remains unclear. In two experiments, we examined the extent to which melatonin improves sleep in young adults and assessed cognition the following morning. Cognitive performance was assessed using the Psychomotor Vigilance Task (PVT), a vigilant attention task, and UNRAVEL, a placekeeping task. In the first experiment, participants were given either 2mg or 5mg melatonin with fast-acting and extended-release components or placebo, under double-blind conditions. Participants were given an eight-hour sleep opportunity, during which sleep was monitored via polysomnography. Findings suggested that melatonin did not have a beneficial effect on sleep and impaired morning cognition, increasing attentional lapses (PVT) and placekeeping errors (UNRAVEL). Furthermore, we assessed melatonin concentration in a subset of participants and found elevated melatonin in both the 2mg and 5mg groups. Our second experiment replicates the first, using only the 2mg and placebo conditions. Salivary melatonin was assessed in both the evening and morning for all participants. We predict that participants who received melatonin will have elevated morning melatonin and sho

TESTING THE EFFECTS OF CESAREAN BIRTH ON MOUSE SOCIAL BEHAVIOR USING A SOCIAL PREFERENCE APPROACH
Presenter(s): Keeley Stankus
Psychology
Mentor(s): Alexandra Castillo-Ruiz (College of Social Science)

Birth occurs at a time of intense remodeling of the brain and deviations from the natural birthing experience can affect brain development. Indeed, we previously reported that Cesarean-born adult mice have fewer and smaller vasopressin neurons in the paraventricular nucleus of the hypothalamus (PVN) in comparison to their vaginally born counterparts. Because the vasopressin system of the PVN regulates sociality, our previous findings suggest that Cesarean birth may alter social behavior in mice. To test this hypothesis, we exposed male and female vaginally and Cesarean born adult mice to the three-chamber sociability test, a commonly used test which measures social preference. Specifically, during the test an experimental mouse was placed in the middle chamber of the three-chamber apparatus and was allowed to explore the other two compartments: one containing a same-sex social stimulus (i.e., an unfamiliar mouse) inside a wire cage and the other containing an empty wire cage. Then the amount of time the experimental mouse spent in each chamber was recorded during the 5-minute test. We are currently finalizing data analysis. Our work is of significance given the high rates of Cesarean births across the world and that epidemiological studies suggest that Cesarean-born humans are at increased risk to be diagnosed with conditions characterized by strong social deficits.

EVALUATING THE RELATIONSHIP BETWEEN SUBSTANCE USE AND BODY APPRECIATION IN A UNITED STATES ADULT POPULATION

Presenter(s): Christina Pettinger
Psychology
Mentor(s): Blair Burnette (College of Social Science), Emma Crumby (College of Social Science)

Prior research has indicated a relation between substance use and poor body image. However, the existing literature exploring substance use and body image largely focuses on negative body image. As such, there is a need for research exploring how positive body image constructs (e.g.,body appreciation) relate to such health behaviors. This research will help identify who is at greater risk for compromising health behaviors and inform future interventions to target those populations. This study aimed to explore the association between body appreciation and substance use (i.e., alcohol, marijuana, cigarettes, e-cigarettes, and illicit substances). Adults (Mage=36.1±11.5 years) in the US (N=1019; 45.7% female, 50.1% male, 1.2% trans/nonbinary, 51.2% White, 48.8% racial/ethnic minority) were recruited via Connect, a crowdsourced research platform, and completed online surveys. We conducted zero-inflated negative binomial models to test associations between body appreciation and substance use. We found a significant association between higher body appreciation and not having used e-cigarettes, as well as a lower likelihood of using illicit substances. No other associations were significant. These results suggest little association between many kinds of substance use and body appreciation, with the exception of e-cigarettes and illicit substances. Since we only assessed frequen

MISERY DOESN'T LOVE COMPANY: COMMUNITY CONNECTEDNESS IN RELATION TO TRAIT HOPELESSNESS AND NEGATIVE EXPECTATIONS OF THE FUTURE AMONG TRANS AND NONBINARY INDIVIDUALS

Presenter(s): Amber Olguin
Psychology
Mentor(s): Jae Puckett (College of Social Science)

Transgender and nonbinary (TNB) people's mental wellbeing is shaped by their social support and experiences of minority stress. Even so, the data on community connectedness is inconclusive on its significance to resilience, but it may help TNB people who face high rates of stigmatization. We hypothesized that community connectedness would be negatively associated with negative future expectations and trait hopelessness, and that negative future expectations would be positively correlated with trait hopelessness. Using data from a larger study on TNB people's experiences of resilience (N = 854 TNB adults, average age = 35, 60.9% white), we found that community connectedness was negatively correlated with negative future expectations ($r = -.193$, $p < .001$) and trait hopelessness ($r = -.236$, $p < .001$). We also found that negative future expectations and trait hopelessness were positively correlated ($r = .398$, $p < .001$). These findings suggest that providing better avenues for community connection may also help to shift TNB people's feelings of hopelessness or negative outlooks for the future. Further research is

PREDICTING EXTERNALIZING SYMPTOM CHRONICITY FROM FUNCTIONAL IMPAIRMENT USING BEHAVIORAL HEALTH SCREENING DATA COLLECTED FROM WELL-CHILD VISITS

Presenter(s): Aria Kingstrom, Isabella Riopelle, Steffanie Joy Melan, Whitley Cymbal

Psychology

Mentor(s): Susan Frank (College of Osteopathic Medicine)

Previous research has demonstrated that children with chronic externalizing symptoms tend to have poorer social and economic outcomes into adulthood, but the transiency of those issues in childhood makes it difficult to identify which children may be at risk for chronic externalizing symptoms. The present study uses parent-reported behavioral health screening data from multiple Michigan State University Pediatrics clinics to assess whether dimensions of impairment can predict chronicity of externalizing symptoms. Our sample included the parent reports of children and adolescents who had two annual well-child visits occurring approximately one to two and a half years apart. Parents completed the Pediatric Symptom Checklist-17 (PSC-17), along with five additional items assessing functional impairment in various domains (i.e., home, burden of care, school, peers, extracurricular activities). Data analysis will test the prediction that parents of children with chronic externalizing symptoms will report more functional impairment at the initial screening than parents of children whose externalizing symptoms resolve over time. By identifying additional characteristics that imply higher risk for chronic externalizing symptoms, clinicians can better identify which children may need imm

INFLUENCE OF DIFFERENT VARIABLES ON BODY IMAGE IN ADOLESCENTS

Presenter(s): Laura Pawlick

Psychology

Mentor(s): Blair Burnette (College of Social Science), Emma Crumby (College of Social Science)

Body image perception in children and adolescents is influenced by various social and environmental factors that evolve with age. This study examines factors associated with body image in two age groups: children aged 6-11 and children aged 12-17. Data were analyzed from the National Survey of Children's Health, a population-based sample from across the United States. We analyzed associations between body image and social and environmental variables including bullying involvement (as victim and perpetrator), family resilience, parental influence, ease of making friends, and physical activity levels. Findings suggest that while many variables significantly affected body image across age groups (e.g. family resilience, adverse childhood experiences) across groups, some variables have a stronger association with body image in the older age group. For example, in younger children (6-11), being a bully does not significantly impact body image, whereas in older adolescents (12-17), engaging in bullying behaviors is associated with higher body image concerns. Conversely, being a victim of bullying similarly affects body image across both age groups. Difficulty of making friends also increased in significance in older adolescents. Surprisingly, the frequency of physical activity does not have a significant association with body image in either age group, con

EXAMINING THE ACUTE EFFECTS OF AEROBIC EXERCISE ON POSITIVE AND NEGATIVE MOOD STATES IN INDIVIDUALS WITH PTSD

Presenter(s): Lauren Patrick

Psychology

Mentor(s): Christopher Webster (College of Social Science)

PTSD is associated with significant mood dysregulation. Because mood dysregulation is associated with poor health outcomes, interventions are needed to improve mood regulation in PTSD populations.

Exercise has been shown to help reduce mood dysregulation and improve mental health outcomes. However, little research has investigated the immediate effects of exercise on mood dysregulation in individuals with PTSD. Therefore, this study aimed to investigate the immediate effects of acute aerobic exercise on self-reported measures of mood states. In this study, 68 female university students with a history of trauma and PTSD symptoms completed two conditions across two counterbalanced sessions. The experimental condition consisted of a 20-minute aerobic exercise activity, and the control condition consisted of a 20-minute sitting activity. Participants completed a self-report questionnaire before and after each experimental session on their current mood using the Profile of Mood States. Analyses were conducted using a 2 (condition: exercise, control) X 2 (time: pre, post) repeated measures, multi-level model. We predicted that the exercise condition would improve mood regulation, as evidenced by a decrease in negative mood states. The results of the study were consistent with our hypotheses, such that total mood disturbance was reduced in th

EXPLORING SOCIODEMOGRAPHIC FACTORS IN MENTAL HEALTH REFERRAL RESPONSES AMONG LOW-INCOME PARENTS USING PHQ-4
Presenter(s): Reese Buhlman, Sophia Tadavich
Psychology
Mentor(s): Jiying Ling (College of Nursing)

Patient Health Questionnaire-4 (PHQ-4) is used in clinical and research settings to assess anxiety and depression. However, there is limited knowledge about referral outcomes in research and how sociodemographic characteristics impact these outcomes. Therefore, this study aimed to investigate relationships between sociodemographic factors and mental health referrals among parents from low socioeconomic backgrounds. We analyzed data from 151 families participating in a cluster randomized controlled trial evaluating the effects of a mindfulness-based lifestyle intervention on improving physical and mental well-being. All preschool children were enrolled in Michigan Head Start programs. In parents' responses to the PHQ-4, we provided mental health referrals to those exhibiting at least mild anxiety and depression.Of the 151 families, 70 (46.4%) received a referral, and 34 (48.6%) responded to it. Although the results weren't statistically significant, they suggest certain patterns: non-Hispanic, Black, or multiracial parents with a female child were less likely to receive a referral. Parents who were separated, divorced, or widowed were more likely to get a referral compared to those single or married. Part-time employed parents were less likely to receive a referral than those full-time or unemployed. About 52.6% of rural parents didn't respond, compared to 50% of urban parents. Female and single pa

NOW YOU SEE ME, NOW YOU DON'T! INVESTIGATING PRIMING INFLUENCES ON QUITTING THRESHOLD IN A VISUAL SEARCH
Presenter(s): Albiona Beka, Michele Lleshi, Mila Vucelic, Sarah Miller
Psychology
Mentor(s): Mark Becker (College of Social Science)

When you search your refrigerator for cheese how do you decide that there isn't any and stop searching? Visual search researchers suggest that a "quitting threshold" dictates the number of items inspected prior to making this type of target absent decision. Importantly, this quitting threshold is flexible. For instance, when targets are rare the threshold becomes low, target absent reaction times (RTs) become fast and the likelihood of missing targets increases dramatically. Similarly, Moher (2020) found that the appearance of a highly salient distractor also produced increased misses and fast target absent RTs - suggesting a decrease in quitting thresholds. However, the salient distractor always shared visual features with the frequent distractors. We recently showed that the pattern reverses (i.e., slow target absent RTs and fewer misses) when the salient distractor shares features with the target. Based on this reversal we speculated that the distractor did not alter quitting thresholds but instead influenced evidence accumulation in a drift-diffusion decision making model. However, that behavioral data was not rich enough to provide direct evidence for our speculations. The current work replicates those effects while tracking eye-movements, providing rich data that allows us to investigate which aspects of the search and decision-making processes are influenced by salient distractors.&n

PRIMING OF PUPIL EVENTS: RESPONSE TO TASKS AND RELATION TO SURPRISE OR FATIGUE.
Presenter(s): Hannah Smith, Morgan Gaston, Shreya Shivakumar
Psychology
Mentor(s): Jan Brascamp (College of Social Science)

Pupillometry is a widely used measure of cognition in psychology. In this experiment, we utilized pupil responses to infer the basis of neural events occurring in the brain during effort-based tasks. This study aims to determine how timing and modality (auditory or visual) of the task influence the size of the pupil response. By manipulating timing, we investigate whether tasks that follow shortly after a similar task elicit smaller pupil responses (habituation) or larger ones (priming). Such effects may indicate, respectively, cognitive fatigue or surprise at the repeated occurrence of the task. In various conditions, we did observe habituation and priming of the pupil response. To further examine the role of surprise, we included a condition in which the task was likely to repeat in quick succession, rendering such repeat occurrences less surprising. For our auditory task, tasks that followed shortly after the previous one nevertheless elicited larger pupil responses, arguing against surprise as the cause for that priming effect. For our visual task, however, we observed habituation in this situation, indicating potential fatigue of the visual cortex after repeated sensory input. The combination of these phenomena give us vital insight into the nature of cognitive adaptation to certain events, and how neural fatigue can influence task-based responses.

CONTRAST SENSITIVITY ACROSS THE PSYCHOSIS CONTINUUM
Presenter(s): Jason Gilbert
Psychology
Mentor(s): Katharine Thakkar (College of Social Science)

Background: Individuals with schizophrenia (SZ) demonstrate measurable and robust impairments related to low-level visual processing, including altered contrast sensitivity. Interestingly, contrast sensitivity varies over the illness course: Chronic SZ patients have reduced contrast sensitivity while unmedicated, first-episode individuals have increased contrast sensitivity. To date, there is little evidence investigating whether contrast sensitivity is also associated with risk for psychosis in non-help-seeking individuals. In the current study, we investigated contrast sensitivity in unmedicated young adults with significant psychotic-like experiences (PLEs) --- a risk factor for psychotic illness. Methods: To date, 38 high levels of PLEs and 32 low levels of PLEs have completed a measure of contrast sensitivity. Subjective visual disturbances are assessed through the Bonn Scale for the Assessment of Basic Symptoms (BSABS). Social-risks factors are assessed using the Cumulative Adversity Scale and Perceived Discrimination Scale. Data collection in the young adult sample is ongoing. Results and discussion: Preliminary results indicate increased sensitivity ($d=-0.23$) and visual disturbances ($d=0.97$, $p<.001$) in High PLE compared to Low PLE young adults. These preliminary results are consistent with changes in contrast sensitivity across the psychosis continuum, potentially indicating excess retinal/brain dopamine and a compensatory or medication-related reversal of that

POLITICS AND PERCEPTION: HOW ACCURATE DO CLOSE OTHERS PERCEIVE EACH OTHERS' POLITICAL ORIENTATION?
Presenter(s): Ava Sudderth, Avery Bell, Lauriel Ellis, Nicole Bommarito
Psychology
Mentor(s): Hyewon Yang (College of Social Science), William Chopik (College of Social Science)

Studies about perceptions in close relationships found a mixture of tracking accuracy and bias (e.g., assumed similarity) in perceiving their close others' traits such as personality and humor. However, little is known about how partners perceive each other's political orientations. In general, previous research suggests that people are significantly more accurate than chance in perceiving the political orientation of non-acquaintances, although this could differ by the perceiver's political extremity and the target's attributes. Considering the significant role of the partner's political orientation in relationship quality, we will test the accuracy and bias in perceiving the close other's political orientation and how relationship satisfaction and other individual or relationship factors matter in the perception. We used nearly 400 dyads of romantic couples, family members, and friends, and employed the Truth and Bias model to investigate whether close others overestimate how liberal/conservative the other is, and if they assume their partner to be similar to them. Moreover, we will also explore whether these biases depend on the types of political orientations they are rating (e.g., fiscal or social political orientation) and would their judgment be moderated by individual/relationship factors. This study will add to the growing literature highlighting perceptions in romantic relationships and help us better understand the sources of truth and bias in perceiving the lov

THEMATIC ANALYSIS OF GLP-1 CONTENT ON TIKTOK
Presenter(s): Kayla Tracey
Psychology
Mentor(s): Blair Burnette (College of Social Science)

Mainstream media has long perpetuated weight normativity; the notion that health and weight have a linear relationship and that individuals are responsible for maintaining "healthy lifestyles" and "healthy weights". Modern day social media similarly perpetuates these norms in weight-loss centered media. Currently, a popular weight-loss discourse on social media is the use of pharmacological interventions for weight loss. Recently, public interest in glucagon-like peptide-1 receptor agonist drugs (GLP-1s) has skyrocketed due to their perceived weight loss effects. The increased public interest in GLP-1s for weight loss has led people to access the drugs in potentially dangerous ways, which could result in more adverse effects. Even when used as prescribed, GLP-1s have several potential negative side effects. Despite their potential risks, many people access GLP-1s through compounding pharmacies due to semaglutide shortages that arose after an increase of off-label drug usage. Compounded versions of the drug are not FDA approved and have the potential to be dangerous for numerous reasons. Studies have begun to explore social media content that may be contributing to the rise in popularity of Ozempic and other GLP-1s. A descriptive analysis of TikTok videos under the hashtag #Ozempic found that more than half of videos mentioned taking or planning to take Ozempic and taking Ozempic specifically for weight loss (vs. diabetes). This highlights that the majority of discourse aro

DO FRIENDS' FEATHERS FLOCK TOGETHER? INVESTIGATING FRIEND SIMILARITY IN PERSONALITY USING A ROUND-ROBIN DESIGN.

Presenter(s): Atea Nelson, Grace Yancho, Lisa Stuckman
Psychology
Mentor(s): Brent Donnellan (College of Social Science), Hyewon Yang (College of Social Science), Richard Lucas (College of Social Science)

Friendships are a fundamental component of social life, and one factor that may underpin their strength and dynamics is personality similarity. Research, including Harris and Vazire (2016), has shown mixed findings on whether friends share similar personality traits, with varying effect sizes suggesting whether and how friends are similar in their personalities is an open question. Therefore, the current study explores the key question of how similar friends are in terms of personality and if closer friends are friends more similar to each other. We leveraged two datasets. Study 1 examined 371 friend quads (N = 4,424) recruited through SONA and social media, in which participants reported on themselves and their friends on the Big Five personality traits and how they feel close to each other. Study 2 used around 250 informants (friends) and their target individual's reports of their Big Five and relationship closeness, which was again recruited via SONA. This study employs multilevel modeling and estimates the personality similarity between friends in terms of both self-report and perception via the ICC (intraclass correlation coefficient). This will have implications for understanding the extent to which similarity exists between friendships and how that simi

THE BENEFITS OF TYPES OF ATTENTION ON WORKING MEMORY

Presenter(s): Sam Kromberg
Psychology
Mentor(s): Susan Ravizza (College of Social Science), Taosheng Liu (College of Social Science)

The purpose of this study is to determine the varying effects of voluntary and reflexive attention on working memory for color. Participants are shown two colors and then are required to recall one of the colors on a color wheel. Their accuracy in the task is calculated by the degrees of error from the presented color. In one condition, we investigated reflexive attention by presenting a sudden onset stimulus that captured attention. The other condition investigates voluntary attention by cueing participants to preferentially attend to one color more than the other. Accuracy was predicted to be higher for the cued color in both conditions. It was also predicted that in the voluntary condition, decoding accuracy of the attended color should be greater than chance for the entire delay period while in the reflexive condition the color should show accurate decoding during the beginning of the delay period followed by a drop off to baseline decoding accuracy. Error was lower for attended colors than unattended colors in both conditions. We are currently collecting data to assess decoding accuracy of the EEG signal. These results will provide insight into the mechanisms underlying the benefit of attention to working memory.

THE IMPACT OF DISCRIMINATION, VICTIMIZATION, AND REJECTION ON POC TRANSGENDER AND NON-BINARY INDIVIDUALS COMPARED TO WHITE TRANSGENDER AND NON-BINARY INDIVIDUALS

Presenter(s): Alex Guo
Psychology
Mentor(s): Jae Puckett (College of Social Science)

Prior research suggests that transgender and non-binary (TNB) individuals experience significant mental health disparities compared to cisgender populations. Minority stress, or the unique stressors that TNB people experience, is a driving force of these health disparities. This study aimed to examine whether TNB People of Color (POC) report stronger impacts from minority stress. More specifically, we examined whether the associations between minority stress (discrimination, rejection, and victimization) and depression were stronger for TNB POC compared to White TNB participants. In this study of 854 TNB adults (average age = 35, 60.9% white), we conducted moderation analyses of our data gathered. We found that the effects of discrimination, victimization, and rejection over the past year were amplified for TNB POC, with increases associated with higher levels of depression. In contrast, there was not a significant association between discrimination, victimization, and rejection over the past year and depression for white TNB participants. In contrast, these two groups were similarly impacted by lifetime rates of discrimination, victimization, and rejection. These findings underscore the urgent need for further research on the compounded effects of minority stress on TNB POC, especially in today's increasingly hostile sociopolitical climate. Methodol

MOVEMENT AND LEXICAL RETRIEVAL
Presenter(s): Brianna Klopp
Psychology
Mentor(s): Susan Ravizza (College of Social Science)

Movement has been proposed to help word retrieval because of its activation of the general motor system. This study investigates how movement benefits word retrieval. Movement could be beneficial in recalling words with a strong action association (action hypothesis) and/or beneficial with words that have stronger articulation demands (motor speech hypothesis). Participants were placed into either the movement or no movement condition. They were shown a definition of a word and given 20 seconds to recall and type in their answer if they knew the word. If they did not know the word, they indicated whether they were in a tip-of-the-tongue state or they didn't know the word. They were then given 30 seconds to retrieve the answer. The movement group was instructed to tap on the keyboard with their index fingers whereas the no movement group was asked to remain still. The results showed that there was no evidence supporting the action hypothesis. Words with high action associations were not retrieved more often when participants were allowed to tap. Instead, the results supported the motor speech hypothesis, that movement improved retrieval for words that were more difficult to articulate. These findings suggest that activation of the motor system improves retrieval and demonstrates the close relationship between speech and gesture.

THE EFFECT OF TRAINING ON POLICE RECRUITS' THREAT ASSESSMENTS
Presenter(s): Rachael Blanchard
Psychology
Mentor(s): Joseph Cesario (College of Social Science)

Prior research examining police officers' threat assessments during the decision to use deadly force has primarily used static decision situations to study racial bias. However, there is a lack of research that examines police officers' threat assessments when faced with real-life scenarios as well as the effect of training on police recruits' perceptions of threat. This study investigated the effects of police academy training on police recruits' assessment of threats based on a variety of videos depicting common real-world policing scenarios. 54 police recruits from a large Midwestern police department were shown 40 video scenarios each before and after police academy training. Scenarios included either Black or White actors. Recruits rated how threatening they perceived the scenarios to be as they unfolded during viewing. This study hypothesized that officers would rate scenarios as more threatening after the completion of training compared to their ratings before training. Additionally, it was hypothesized that officers would rate scenarios involving Black actors as more threatening. Multilevel modeling examined the effects of training and target race on threat assessments, while also accounting for random actor effects.

UNEQUAL CARE: HEALTH DISPARITIES FACED BY BLACK WOMEN DIAGNOSED WITH PREECLAMPSIA
Presenter(s): Amaya Elliott
Psychology
Mentor(s): Alytia Levendosky (College of Social Science), Amy Nuttall (College of Social Science)

Black women often face racial and health disparities in healthcare. Black women are 3-4 times more likely to experience maternal morbidity than any other race. (Suresh et.all, 2022) Preeclampsia is a hypertension disorder that is commonly diagnosed in women during pregnancy but disproportionately affects more pregnant Black women than white women (Shahul et al, 2015). This disorder can be diagnosed by symptoms such as elevated blood pressure and organ dysfunction which causes an elevated risk for danger to women. Risk to Black women may be partially explained by having higher rates of diabetes and obesity prior to their pregnancy. (Suresh et.all, 2022). These underlying factors in addition to disparities concerning less access to quality care, education, and lower income put Black mothers at an increased risk for being diagnosed with preeclampsia during their pregnancy. One of the social determinants that has been proposed to contribute to preeclampsia diagnosis is racism and discrimination faced specifically in their healthcare. Black patients experience 3x more discrimination related to race, language, and culture than white patients (Conklin et al, 2024). Compared to white women, Black women are less likely to have preeclampsia-related blood tests (Docheva et al., 2

DEVELOPMENT OF A SELF-PACED VIRTUAL WELLNESS PROGRAM FOR GRADUATE STUDENTS IN SCHOOL AND REHABILITATION-FOCUSED GRADUATE PROGRAMS.
Presenter(s): Kevin Lim
Psychology
Mentor(s): Ka Lai Lee (College of Education), Kristin Rispoli (College of Education)

The mental health and wellbeing of students can be seriously impacted by personal, professional, academic challenges, which in turn can lead into stress, anxiety, and burnout. The intense and demanding nature of graduate programs present a complex interplay between long hours, financial strain, and workload. In response to such demands, a holistic approach to the wellness of these students can assist with fostering balance and success in their education. By utilizing a system already familiar to most MSU students and providing modules with wellness-related information and resources, the overall goal of this project is to provide a convenient self-guided D2L course that can foster self-efficacy and wellness amidst the demanding schedule of graduate students preparing for careers in counselor education, school psychology, and special education. This presentation will detail the process of developing the wellness program and present findings from interviews conducted with current graduate students in counselor education and school psychology regarding its perceived feasibility and usefulness.

INK AND IDENTITY: PERSONALITY PERCEPTIONS BASED ON TATTOOS
Presenter(s): Brooke Soulliere
Psychology
Mentor(s): William Chopik (College of Social Science)

People with and without tattoos are often judged differently despite being relatively similar to each other on several psychological characteristics. One limitation of previous research is that the type and characteristics of tattoos are largely neglected, despite these factors likely guiding judgments about tattooed people. Are people judged differently based on their tattoos, and are these judgments accurate? We examined these questions in 274 adults (Mage = 24.59, SD = 7.17; 71.2% women; 77.2% White) with 375 tattoos who agreed to have their tattoos photographed for the study and completed a battery of personality measures. Expert raters then judged their personalities based solely on the appearance of the tattoo. Although there was consensus about the personalities of people who had a particular tattoo (i.e., judges agreed in their perceptions of people with tattoos), these judgments were largely inaccurate, with a few exceptions. Specifically, judgments of openness to experience (based solely on tattoos) were modestly accurate and attributable to how wacky the tattoo was and whether affiliative symbols were present. Providing personal context to raters (e.g., tattoo meanings) slightly improved rater accuracy for extraversion and agreeableness, although generally accuracy was still low. The current study provides further descriptive information on how people use visual cues (in this case, tattoos) to judge others' personalities and the conditions under which those judg

DON'T LET YOUR GUARD DOWN: THE RELATIONSHIP BETWEEN COGNITION AND SONAR MONITORING PERFORMANCE
Presenter(s): Jessica Belknap, Joseph Gingell
Psychology
Mentor(s): Kimberly Fenn (College of Social Science)

Attention-demanding tasks become more difficult to perform over time. This results in progressive increases in reaction time and decreases in accuracy, an effect known as the vigilance decrement. Here, we investigated the extent to which individual differences in cognitive ability predicted the vigilance decrement in Sonar monitoring, a task in which individuals use auditory and visual signals to identify and classify nearby ships. 172 participants completed two experimental sessions. During Session 1, participants completed a cognitive battery of various tasks measuring attention, placekeeping, working memory, and decision making. They also completed the Armed Forces Qualification Test, an assessment of mathematics, reading comprehension, and vocabulary. In Session 2, participants completed a four-hour Sonar monitoring simulation. Presented with dynamic acoustic cues, participants classified signals into one of four categories based on their unique set of frequencies. We predict that across the Sonar monitoring simulation, reaction time to identify the signals will increase and accuracy in classifying the signals will decrease. Preliminary analyses support our hypothesis, with an 8% increase in reaction time across the 4-hour period. Additionally, we predict that performance on the cognitive assessments will predict the vigil

INVESTIGATING THE IMPACT OF STIMULUS MOVEMENT ON PUPIL SIZE INDEPENDENT OF LUMINANCE
Presenter(s): Gabriel Gampala, Isabella Padula, Mary Cottone
Psychology
Mentor(s): Jan Brascamp (College of Social Science)

This analysis seeks to explore how movement plays a role in pupil dilation or constriction while controlling for luminance. Pupil size is typically regulated by the pupil light reflex, which causes constriction in response to light, and the pupil dark reflex, which causes pupil dilation in the absence of light. These responses are largely regulated by light intensity, not necessarily the movement of the stimulus. Previous studies indicate that the movement of stimuli can increase arousal and attention to the stimulus due to a greater sympathetic response, leading to pupil dilation. In this study, participants are presented with visual stimuli including red and blue colored rectangles, black and white checkerboards, and moving dots. For the red and blue rectangles task, participants were asked to look at a center fixation point while the red and blue rectangles switched positions. In the black and white checkerboard task, participants looked at a center fixation point while the white and black checks switched places. The moving dots task involves a group of moving dots surrounding the fixation point which occasionally switch directions. We can isolate the response caused by movement since the net luminance is unchanged in all three tasks.

SEX DIFFERENCES IN ASSOCIATIONS BETWEEN ACTIVATION CONTROL & DISORDERED EATING SYMPTOMS IN A POPULATION-BASED SAMPLE OF YOUTH
Presenter(s): Isabella Riopelle
Psychology
Mentor(s): Carolina Anaya Maldonado (College of Social Science), Emily Sokol (College of Social Science), Kelly Klump (College of Social Science), Kristen Culbert (College of Social Science)

Low activation control - the tendency to struggle with initiating an action when there is strong desire to avoid it - is broadly associated with self-regulation deficits and increased vulnerability to psychopathology, including disordered eating (DE; e.g., drive for thinness, binge eating/purging). However, prior research on the role of activation control in DE is sparse and has exclusively focused on female college students. No studies have examined these associations in males or at other developmental stages (e.g., childhood/adolescence), despite pronounced sex differences in eating disorder prevalence (females > males) and increased risk for DE during adolescence. Investigating these links earlier in development and in males is crucial for determining whether low activation control could serve as an early risk factor for DE and whether its effects vary by sex. This study examined sex differences in the relationship between activation control and DE in male and female twins (N = 1,547; ages 7-17) from the Michigan State University Twin Registry. The Early Adolescent Temperament Questionnaire assessed activation control, and the Minnesota Eating Behavior Survey assessed overall levels of DE. Results indicated that lower activation control was associated with higher levels of DE, and this association was somewhat stronger in girls than boys. These findings suggest that low activation control may contribute to DE risk during adolescence in both sexes; however, the height

INVESTIGATING THE ROLE OF SPEECH RHYTHM AND AUDIOVISUAL ASYNCHRONY IN UNDERSTANDING SPEECH IN NOISY ENVIRONMENTS

Presenter(s): Chloe Baumer, Samyuktha Vijayakumar
Psychology
Mentor(s): Celeste Uhl (College of Social Science), J McAuley (College of Social Science)

Previous speech recognition studies show that altered speech rhythm hinders speech understanding in noisy environments (McAuley et al., 2020).The current study investigates the role of speech rhythm in auditory-visual (AV) speech conditions. The central hypothesis was that altering the target speech rhythm along with AV asynchrony will make it more difficult to comprehend speech in noise. Participants were presented with side-by-side videos of a target talker and a background talker presented amidst background babble. The participants task was to focus on the target talker and ignore the background talker and then report what the target talker said. The target talker's speech rhythm was either intact or altered with different levels of AV asynchrony. Consistent with previous research in auditory only conditions, results showed that participants reported fewer correct words in the altered speech rhythm condition versus the intact condition. Participants also reported more intrusion errors when the rhythm was altered compared to intact. Results also showed altering AV asynchrony worsened the proportion correct and led to higher numbers of intrusion error. Overall, altering AV speech rhythm and AV asynchrony in presence of a competing talker and background babble hinders speech recognition.

THE INFLUENCE OF SOCIAL CONTEXTS ON EXERCISE PERFORMANCE IN FEMALES

Presenter(s): Annika Schoenherr
Psychology
Mentor(s): Joseph Cesario (College of Social Science)

The impact of the presence of others on exercise performance has been an important topic in sport training and physical activity contexts. Physical activity is an essential part of maintaining a healthy lifestyle. Common places to exercise include one's home or a sports training complex. Sports training complexes offer a range of services, including coaching by personal trainers and various architectural configurations, with multiple full-length mirrors being a common industry standard. Regardless of location, exercise most commonly takes place in the presence of another individual (sometimes familiar to the exerciser), in front of a mirror, or under the guidance of an exercise coach or personal trainer. While previous research has explored the effect of the presence of others on exercise performance, general research has failed to provide a comprehensive analysis of what social context optimizes exercise performance in females. This study aims to discover how various social contexts, mirroring real-life conditions, might enhance or inhibit exercise performance. In a within-subjects design, 200 undergraduate females completed four bouts of running while exposed to various stimuli designed to mimic real-life social contexts found in a training facility. Distance ran was recorded for each bout of running. A motivation questionnaire was administered to assess the individual's prior exercise experience, and heart rate measures were recorded to evaluate perceived physical exert

EXAMINING THE EFFECTS OF FEATURE-BASED SUPPRESSION IN VISUAL SEARCH TASKS
Presenter(s): Alison Hanes, Lauren Broersma, Maxwell Mccort
Psychology
Mentor(s): Mark Becker (College of Social Science)

Research has shown that knowledge of a target's features (e.g., color, shape, or orientation) improves visual search performance through a process known as feature-based gain (FBG). It has also been suggested that knowledge of features commonly associated with distractors may produce a feature-based suppression (FBS), or down-weighting of those features, which may aid visual search. Compared to FBG, FBS is less understood and more controversial. To further investigate FBS and its impact on attention, we had participants view displays with 9 Landolt C's in a circular formation, each being one of 3 colors. The goal was to find the one Landolt C with a horizontal gap and indicate whether that gap was left or right-oriented. To encourage FBS, during a training phase, one color appeared frequently and never as the target. In most experiments, participants were not made aware of this contingency and had to learn the association implicitly. Across experiments, we also varied whether there was a FBG component (one color appeared frequently and always contained the target), which was done either implicitly or participants were explicitly told to attend that component. Our results show that FBS is effective when the FBG component was made explicit, but when both components were implicit, only the FBG component was effective. We also showed that FBS was inef

WHAT UNIVERSITY RESEARCHERS CAN LEARN ABOUT MENTAL HEALTH RESEARCH PRIORITIES FROM PEOPLE WITH LIVED EXPERIENCE OF MENTAL ILLNESS
Presenter(s): Sophia Futo
Psychology
Mentor(s): John Waller (College of Social Science), Katharine Thakkar (College of Social Science)

Mental Health Research Connect (MHRC) is a mental health research organization based in the MSU Department of Psychology. The overarching goal of MHRC is to bridge the gap between academic researchers and communities that stand to be directly impacted by mental health research. MHRC seeks to alert community members about research studies in which they might be interested, hear from community members about what they think mental health research should focus on, and sponsor regular outreach events. Utilizing the Mental Health Research Connect participant database, I will conduct a qualitative analysis of the 281 recorded active participants. I will review responses to open-ended questions about research priorities, barriers, and motivations for participating in research. Exploratory analyses will examine these priorities, motivations, and barriers as a function of key demographic information and mental health history, which includes, but is not limited to, sex assigned at birth, gender identity, race, age, and self-reported diagnoses. The findings of this study will help identify the necessary direction for future research in this field, informed by the insights of those with lived experience of mental illness, as well as inform researchers about the ways they can create the most inclusive research environment by accommodating participant needs. This

EXPLORING THE INTERPLAY BETWEEN SOCIAL SUPPORT AND SUBSTANCE USE ON PSYCHOLOGICAL OUTCOMES ACROSS THE SCHIZOTYPY SPECTRUM

Presenter(s): Payton Cooper
Psychology
Mentor(s): Christophe Delay (College of Social Science), Katharine Thakkar (College of Social Science)

Schizotypy (SZY) encompasses unusual personality traits-such as magical thinking and paranoid ideation-present in roughly 3.9% of the population. These traits indicate a predisposition to psychosis, and higher levels of these traits are associated with greater psychological distress and reduced well-being. Receiving social support is a well-established protective factor in SZY, and has been shown to reduce psychological distress and improve well-being. Conversely, substance use may exacerbate negative outcomes. However, it remains unclear how effective social support is at mitigating the impact of substance use on psychological outcomes in SZY. Insight into this interaction stands to elucidate the importance of social support-based interventions for substance-using individuals across the SZY spectrum. To explore this promising research area, we examined whether social support moderates or mediates the relationship between substance use, psychological distress, and well-being. Social support was assessed using the Brief 2-Way Social Support Scale, and categorized as giving or receiving emotional, instrumental (e.g. practical resources), or social support. Substance use severity was measured using the CRAFFT, while psychological distress and well-being were assessed via the DASS and PWB total scores, respectively. We hypothesized that social support woul

EMPATHY AND RELATIONSHIP QUALITY IN FRIENDSHIPS: THE ROLE OF PERCEPTIONS

Presenter(s): Amalia Rosenblum, Anne-Marie Muszkiewicz, Maggie West, Nadia Russo
Psychology
Mentor(s): Aislinn Low (College of Social Science), William Chopik (College of Social Science)

Being empathetic (and perceiving your partner as empathetic) promote greater satisfaction in one's relationships. It's possible that perceptions of empathy also play an important role in more nuanced relationship characteristics and functioning. Using a round-robin design, 190 friend quads (N = 760) completed measures of empathy (self- and observer reports) and ten subscales of the Network of Relationships Inventory (i.e., NRI; observer reports only). Univariate and bivariate social relations model analyses were applied. Across all judgements, relationship variance (i.e., uniqueness) accounted for the largest proportion of variance (60-70%) followed by perceiver variance (assimilation; 15-32%) and target variance (i.e., consensus; 7-18%). Empathy positively covaried with all NRI subscales except for conflict and antagonism. The current study demonstrates that judgments of empathy and relationship quality within the NRI are largely relationship-specific and have little consensus among friends. Moreover, covariance patterns demonstrate that judgments of empathy may play a distinct role within relationships and can provide insights into the interpersonal dynamics that shape overall relationship quality.

ACCURACY AND BIAS IN PERCEPTIONS OF CLOSE OTHERS' SENSE OF PURPOSE AND LIFE SATISFACTION

Presenter(s): Alyssa Marzullo, Danielle Tse, Javier Del Bosque Gomez, John Malinowski, Sydney Marzano
Psychology
Mentor(s): Gwendolyn Seidman (College of Social Science), William Chopik (College of Social Science)

This study examines people's perceptions of a close other's sense of purpose and life satisfaction. While prior research has explored the extent to which people are accurate or biased in their perceptions of close others, this work has focused on perceptions of traits, rather than well-being. We used the Truth and Bias Model (West & Kenny, 2011) to examine three forms of bias: 1) directional bias (over/under evaluating the close other), 2) tracking accuracy (the ability to correctly perceive a close other's qualities as they are relative to other people), and 3) similarity bias (the tendency to perceive close others as more similar to oneself than they actually are). 377 undergraduate participants completed a survey and nominated a close other to complete the same survey, resulting in 377 dyads (n = 754, Mage = 23.27, SDage =10.54, 74.1% female, 73.7% white). The relationships included friends (61.3%), romantic partners (5%), or family members (33.7%). Results showed that for people's perceptions of close others' sense of purpose, there was significant positive directional bias, significant tracking accuracy, and significant assumed similarity. For perceptions of life satisfaction, there was no evidence of directional bias, however, there was significant assumed similarity and tracking accuracy. We will also examine moderators of these effects, including the Big Five Personality traits (openness, conscientiousness, extraversion, agreeableness, and neu

FRIENDS JUDGMENTS OF PURPOSE IN LIFE
Presenter(s): Kayla Kas-Mikha, Neha Menon, Shadi Khamis
Psychology
Mentor(s): William Chopik (College of Social Science)

Friends play a central role in shaping individuals' well-being, identity, and sense of purpose in life. However, little is known about how friends perceive and judge each other's purpose and the extent to which these judgments reflect reality versus personal biases. This study applies the Social Relations Model (SRM) to disentangle multiple sources of variation in how friends evaluate one another's sense of purpose. Using a round-robin design of nearly 200 friend groups, friends rated each other's purpose in life, while also providing self-reports of their own purpose. The SRM framework allows us to partition variance in judgments into target effects (the extent to which people are generally seen as having high or low purpose), perceiver effects (the extent to which some individuals consistently see others as purposeful), and relationship effects (unique dyadic perceptions that go beyond general impressions). Additionally, we examine whether self-reported purpose aligns with peer ratings and explore how friendship closeness moderates these patterns. Results provide insight into whether purpose is an attribute that is reliably perceived by friends or is shaped by interpersonal biases. Findings revealed that judgments of purpose could be divided into target, perceiver, and relationship effects, particularly relationship variance. Given that friendships are critical for well-being and identity development, understanding how friends perceive each other's purpose offers importa

ADJUSTMENT AMONG PARENTS OF YOUNG CHILDREN WITH FOOD PROTEIN-INDUCED ENTEROCOLITIS SYNDROME
Presenter(s): Lauren Stimpson
Psychology
Mentor(s): Amy Nuttall (College of Social Science)

Food protein-induced enterocolitis syndrome (FPIES) is a non-IgE mediated allergy that emerges in infancy with the introduction of solid foods. FPIES causes acute medical emergencies characterized by repetitive, projectile vomiting that can lead to dehydration. Caregivers of children with FPIES experience high psychosocial burden. Caregivers with better knowledge of any disease typically report less burden. Coparenting refers to the ways in which individuals who share responsibility for raising children relate to one another in their roles as parents. Having a child with food allergies is associated with marital strain and mental health impacts, particularly for mothers. Mothers report worse mental health impacts than fathers. Mental health and coparenting have not yet been examined within parents of FPIES patients.

We surveyed N=67 female, married, heterosexual parents of children with FPIES. Data were collected via Qualtrics after recruitment through FPIES parent Facebook groups. We administered the GAD-7, CES-D

THE EFFECTS OF SLEEP DEPRIVATION ON ATTENTION CONTROL
Presenter(s): Ayaka Matzen, Julia Jankowski
Psychology
Mentor(s): Kimberly Fenn (College of Social Science)

Sleep is essential for cognitive performance, yet one-third of adults experience insufficient sleep each night. Previous research has shown that sleep deprivation impairs aspects of vigilant attention and inhibitory processing. Our study adopts a holistic approach to investigate the effects of sleep deprivation on attention control. Attention control is the ability to maintain focus on a task (vigilant attention) while suppressing irrelevant information (inhibitory control). This study consisted of two experimental phases: baseline tasks in the evening and criterion tasks in the morning, separated by a manipulation of sleep deprivation. Participants arrived in the laboratory at 22:00 and completed tasks measuring facets of attention control: sustained attention, inhibitory control, and multitasking. After this, they were randomly assigned, under double-blind conditions, to either remain awake overnight in the laboratory (Deprivation) or to go home and sleep in their habitual sleeping environment (Sleep). At 08:30, participants in the Sleep group returned to the laboratory, and all participants completed the same attention control tasks again. Our results suggest that sleep deprivation impairs many aspects of attention control; compared to the Sleep group, participants in the Deprivation group showed increased attentional lapses, decreased sustained attention, and impaired inhibitory control. This study highlights the importance of adequate sleep for maintaining cognitive f

A TALE OF TWO GRADIENTS: HOW KNOWLEDGE RESOURCES SHAPE MECHANISTIC REASONING ABOUT EDEMA
Presenter(s): Nicole Peters
Psychology
Mentor(s): Jennifer Doherty (Lyman Briggs College)

We are interested in researching how students learn to mechanistically reason through complex physiological phenomena in order to develop more effective learning activities. We use the Knowledge in Pieces theory to explore this developmental process. Our study bridges the gap between describing and developing reasoning by asking: How does the knowledge students activate impact their learning of the complex physiological phenomenon of edema? We conducted a case study with three undergraduate volunteers from a large university who had completed two semesters of introductory biology, including instruction on mechanistic reasoning in physiology. Students were interviewed and video-recorded as they reasoned through the causes of edema during air travel. Two with distinct reasoning trajectories were selected for in-depth analysis. Using Knowledge Analysis, we examined the knowledge elements they activated and how they connected osmotic and pressure gradients to explain edema. Our analysis revealed three key findings. First, the knowledge resources students activated-such as Student B brainstorming causes of swelling and Student A focusing on blood flow-shaped their reasoning but did not determine their success. Second, both students initially applied a single gradient (osmotic or pressure) before integrating the second, progressively refining their explanations. Third, the sequence of gradient introduction influenced how easily they incorporated

INVESTIGATING THE RELATIONSHIP BETWEEN LOCATION-BASED AND FEATURE-BASED ATTENTIONAL MECHANISMS

Presenter(s): Ian Render Flores, Morgan Dodd, Paige Abraham, Tristan Janisse
Psychology
Mentor(s): Mark Becker (College of Social Science)

To investigate whether feature-based and location-based attentional selection can co-occur, an initial experiment presented visual search targets that frequently appeared in a particular color and/or a specific quadrant of the display. The results suggest that the two biasing mechanisms were learned implicitly and were additive. However, an alternative explanation is that inter-trial priming, rather than an attentional biasing mechanism, could have been responsible for the observed effects. To address this, a follow-up experiment replicated the initial study but included a final test block that removed all location- and color-based contingencies, thereby equating the effect of inter-trial priming across all conditions. The results indicate that location-based attention does not depend on inter-trial priming, whereas feature-based attention might. In a subsequent experiment, the color cue was made explicit, allowing us to investigate whether implicit, location-based attentional selection would still be effective. While the color cue's validity influenced accuracy, reaction time data revealed the persistence of a location-based attentional bias. These findings provide novel and important insights into the prominent role of implicit location-based attention in selection. They also demonstrate that while feature-based attention can influence selection, it appears to function primarily through inter-trial priming or as a top-down, v

THE EFFECTS OF PERSONALITY FEEDBACK ON PERSONALITY ASSESSMENT

Presenter(s): Abby Marek, Connor Yee, Dhruv Bhatnagar, Isabella Riopelle
Psychology
Mentor(s): Hyewon Yang (College of Social Science), Lindsay Ackerman (College of Social Science), Richard Lucas (College of Social Science)

Feedback plays an important role in shaping individuals' self-perceptions and behaviors, but limited research examines how individuals change self-reported personality after receiving feedback. Broader research regarding responses to feedback demonstrates a complex interplay between reinforcing and contradictory feedback, as well as one's motivations and self-views. Self-verification theory proposes that individuals seek feedback that aligns with one's perception of themselves, supporting the idea that upon discordant feedback, individuals may change their self-reported personality to more closely align with their self-perception. Alternatively, self-enhancement theory suggests that people will seek particularly positive feedback in an effort to appear more socially desirable or to reach a more ideal self-image. This theory holds that individuals may change their personality upon reception of feedback that is perceived as negative. The present study focuses on how individuals respond to feedback regarding their personality, investigated in a large sample of Michigan State University undergraduate students. We explored whether individuals alter self-reported personality responses after completing an initial personality assessme

EXAMINING THE ASSOCIATION BETWEEN FOOD AND WEIGHT TRACKING AND INTUITIVE EATING WITH PSYCHOLOGICAL FLEXIBILITY AS A MODERATING FACTOR
Presenter(s): Claire Arkinstall
Psychology
Mentor(s): Blair Burnette (College of Social Science), Emma Crumby (College of Social Science)

The use of tracking devices and apps (e.g., Apple Watches, MyFitnessPal, Fitbit) to monitor eating habits and/or weight is increasingly popular among young adults. Food tracking specifically is associated with greater eating concerns and dietary restraint in college age students. However, research has yet to explore the effect of food and weight tracking on intuitive eating, an adaptive eating approach characterized by eating according to natural bodily cues. The current study explored the association between food and weight tracking on intuitive eating and whether psychological flexibility moderates this association. Participants were undergraduate students (N ?= 1975,?M age?= 19.53 ± 1.75, 75.4% female, 22.6% male, 1.8% trans/nonbinary) recruited through SONA who completed online surveys for course credit. We conducted linear regression models to assess the associations between food and weight monitoring on intuitive eating and whether psychological flexibility moderated these associations. Both food monitoring (p ?= 0.012) and weight monitoring (p ?= 0.006) were significantly and negatively associated with intuitive eating. Psychological flexibility was strongly associated with intuitive eating (p ?< 0.001), but did not moderate the

SOCIAL SCIENCE, ARTS, HUMANITIES

LEADING BY EXAMPLE: POLICY PROCESS TRACING INDIGENT DEFENSE REFORM IN MICHIGAN
Presenter(s): Adeline Meyers
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Marty Jordan (College of Social Science)

This research project analyzed the events leading to indigent defense reform in Michigan. Indigent defense reform is a critical, although often overlooked, state's issue. Despite the landmark Gideon v. Wainwright decision over sixty years ago, many states continue to struggle with funding and structuring indigent defense systems. The goal of this project was to use process tracing to determine the steps taken across the state by various actors that culminated in the establishment of the Michigan Indigent Defense Commission (MIDC), tasked with reforming Michigan's system in 2013. I initially used interviews with those responsible for running the MIDC to establish a rough timeline and continued to find records of meetings, news articles, and legal documents to find the motivations behind certain actions. I anticipate discovering that interest group efforts led to creating enough attention around the issue that the ACLU sued the state of Michigan over it in Duncan v. Granholm in 2007. In the following year, a report was published mentioning Duncan v. Granholm, which described in detail the issues within the existing system. Until 2011, the ACLU case went back and forth between the courts with appeals, and ultimately prompted state legislators to put a plan in place that finally became the MIDC. These fin

THE EVOLUTION OF CRIMINAL JUSTICE AND HUMAN RIGHTS IN SYRIA PRE WAR TO POST WAR
Presenter(s): Akaisha Thottam
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Camelia Suleiman (College of Arts & Letters)

This presentation explores the evolution of Syria's criminal justice system, focusing on the transition from pre-war authoritarian structures to the ongoing challenges of post-war reform. It investigates how the pre-war system, under the Assad regime, functioned as a tool of political repression, marked by limited judicial independence and widespread human rights violations. The Syrian civil war further disrupted the justice system, leading to the collapse of state institutions and the rise of non-state judicial mechanisms. The post-war period presents both challenges and opportunities for rebuilding the justice system. This study highlights efforts toward transitional justice and accountability for war crimes, analyzing the role of international organizations and Syrian civil society in promoting human rights reforms. By comparing pre-war authoritarian practices with post-war transitional justice efforts, this presentation provides insights into how Syria's criminal justice system can evolve to support long-term peace, justice, and human rights protection.

IMPORTANCE OF INTRAPERSONAL RESOURCES ON THE MENTAL HEALTH OF QUEER KENYANS
Presenter(s): Clare Wong
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Jonathan Choti (College of Arts & Letters)

The topic of queerness remains taboo in Kenya, often leaving queer-identifying individuals in the country feeling lost and marginalised. Drawing from interviews and recent literature in the field, this presentation explores the important role of support networks on the mental health of queer Kenyans and aims to highlight how community can alleviate the negative feelings related to isolation and oppression.

SUPPORTING HERITAGE LANGUAGE LEARNING IN FAMILIES
Presenter(s): Hannah Yoon
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Jungmin Kwon (College of Education)

This presentation will draw on my personal experience as a heritage language (HL) learner, teacher, and researcher to emphasize the importance of maintaining heritage language and offer practical strategies for families to support their children's HL development. Heritage language learning is crucial for preserving cultural identity and fostering bilingualism, yet many families face challenges in maintaining HL skills outside of formal education settings. The presentation will cover the importance of language-rich environments, strategies for integrating language learning into everyday activities, and the importance of maintaining home languages. Drawing from my own experiences in the classroom and research, I will also discuss how families can advocate for HL education in schools and the role of teachers in supporting heritage language learners. By fostering a supportive language environment, families can help their children thrive as bilinguals and keep their cultural heritage alive.

TRAUMA AND THE SYRIAN REFUGEES IN GERMANY
Presenter(s): Alya Kayat
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Camelia Suleiman (College of Arts & Letters)

For this project, I will explore the psychological and social impact of displacement on Syrian refugees, particularly those who have sought refuge in Germany. The focus on Germany is significant, as it hosts one of the largest populations of Syrian refugees, with over 20,000 individuals receiving support there. The Syrian conflict serves as the backdrop for this study as I investigate the complex relationship between displaced Syrians and the support systems available, with an emphasis on the mental health challenges that often arise in the aftermath of trauma. This is done with an awareness of orientalism, while navigating the lens of Western idealism. In particular, I will focus on conditions such as PTSD, depression, and anxiety-mental health issues that frequently develop after experiencing the profound losses, violence, and stress that accompany forced migration. Despite the prevalence of these conditions, they are often under-addressed, with many refugees experiencing persistent psychological distress long after their displacement. This underscores the need for ongoing mental health support for refugees to ensure their well-being into their new communities. The barriers that refugees face in accessing mental health care further complicate the situation. As such, this study aims to highlight the gaps in support and propose solutions to improve

U ONLY C ME THRU A SCREEN
Presenter(s): Cam Carmichael
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Lorelei d'Andriole (College of Arts & Letters)

u only c me thru a screen is a painting about digital presence and parasocial relationships. Some people know individuals only from what they post about on the internet, and though they barely see them in person, there's a mutual understanding of each other. I had very early access to the internet, so my digital presence is also a reflection of me growing up, including my gender transition. Using repurposed technology and self-portraiture I want to show the vulnerabilities of digital performance. Inspired by Glitch Feminism by Legacy Russel, gender performance through the technological landscape is liberating. Adding pink sculptural elements, glitter, and things that bring me joy, to show the viewer that though they see me through a screen they can see the real me.

MUSIC, ART, AND CULTURE IN BREGENZ
Presenter(s): Mckaylah Shank
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Michael Ristich (College of Arts & Letters)

Study abroad opportunities are often said to provide students with transformative experiences that broaden their perspectives, increase cultural empathy, and enhance their global awareness (Excel Network). This is especially true for study abroad moments when students are immersed in environments vastly different from their own, as it challenges their preconceptions and introduces them to new ways of life. With that said, my study abroad experience in Austria provided me with a deep appreciation for intentional living, the challenges of language barriers, and a stronger sense of gratitude for everyday moments. As I navigated life in Bregenz, I learned to connect more authentically with others, understand the complexities of communication beyond words, and appreciate the joy in simple experiences.Gaining this knowledge is important because it encourages me to be more present in my daily life and foster empathy for people who face cultural or language barriers. By sharing my story, I hope others will recognize the power of study abroad to shape both personal growth and a more empathetic worldview, which can help them engage more meaningfully with the diverse people and experiences around them.

MOTIVATION TO CONTINUE SPANISH LEARNING.
Presenter(s): Majdal Boulos
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Francisco Morales Rios (College of Arts & Letters)

This project will seek to analyse classroom performance and level of programme completion, among other relevant variables, in order to better understand why one might choose to continue pursuing fluency in a foreign language - or why they wouldn't.

AN OVERVIEW OF LANGUAGE ACQUISITION BY HARD OF HEARING AND DEAF CHILDREN
Presenter(s): Surabhi Gangadkar
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Kandy Patrick (College of Social Science)

Language acquisition is a fundamental aspect of human cognition, distinguishing us from other species. While many species have innate communication systems, humans are uniquely capable of producing an infinite number of sentences from a finite set of symbols. This literature review examines key theories of language acquisition, focusing on the behaviorist perspective of B.F. Skinner and the nativist theory of Noam Chomsky. Skinner's behaviorist theory, which suggests that language is learned through reinforcement and association, has been influential but has faced significant criticism from Chomsky, who posits that language acquisition is an innate ability. This review emphasizes the need for a broader understanding of language development, particularly among children who are deaf or hard of hearing. Unlike hearing children, these children acquire language through different modalities, such as American Sign Language (ASL) or spoken language, yet they undergo similar developmental processes. This review highlights research suggesting that children exposed to ASL from an early age acquire it in much the same way hearing children acquire spoken language, underscoring the universality of the human capacity for language development. The findings indicate that both biological and environmental factors play critical roles in language acquisition, and these factors must be considered when studying language development in diverse populations. This review ultimately calls for furthe

THE JOY PROJECT
Presenter(s): Blake Green
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Sarah Prior (College of Social Science)

Joy has frequently been mistaken for happiness. However, it serves an essential role in shaping workplace experiences, specifically in higher education. Joy is not measured overtime like happiness. It is an instantaneous experience. Joy is a choice and there are moments in our lives where we can choose joy. This choice embodies resilience. It is a necessary and important aspect of life. This project explores features of joy as subversive defiance, an act of agency. Workplace satisfaction is typically discussed in terms of performance, motivation, and morale. There is a clear difference between workplace satisfaction and joy. Joy transcends the measures used when discussing workplace satisfaction. There has been an absence of joy in higher education. This absence can lead to alienation in the workplace and burnout. Restoring joy in higher education is transgressive. When joy is centered in higher education, specifically leadership it can be transformative and move away from transactional interactions. Moreover, when joy is embraced by leadership the ability to lead is enhanced. It requires one to be intentional and dedicated.

LA CENERENTOLA SCENIC ART
Presenter(s): Melina Rodriguez
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Ranae Selmeyer (College of Arts & Letters), Thalia Hollinger (College of Arts & Letters)

Melina is painting the set for an Opera production for the Opera Department within the College of Music. This is a co-production with the department of Theatre's Design Area.

GREEN SPACES IN HEALTHCARE INDUSTRY
Presenter(s): Saumyaa Shah
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Melissa Fore (James Madison College), Samyuktha Iyer (College of Social Science)

The integration of green spaces in healthcare environments has gained increasing attention for its potential to enhance patient recovery, improve staff well-being, and promote environmental sustainability. This research explores the role of hospital gardens, outdoor landscapes, and green design standards in optimizing healthcare outcomes. Through an extensive literature review of 18 scholarly articles, this study synthesizes findings on therapeutic benefits, user preferences, sustainability frameworks, and implementation barriers. Key themes include the psychological and physiological advantages of access to nature, the importance of biophilic design in patient-centered care, and the challenges posed by spatial and financial constraints. While existing research highlights the positive effects of green spaces, gaps remain in cost-effectiveness analyses, long-term impact assessments, and policy implementation strategies. This study aims to bridge these gaps by proposing interdisciplinary approaches that incorporate evidence-based design principles and sustainable development frameworks. Findings suggest that incorporating green spaces in hospital design not only fosters healing environments but also aligns with broader sustainability goals. Future research should focus on integrating technology-driven planning tools, evaluating long-term patient outcomes, and developing policy guidelines to support widespread adoption. By addressing these areas, this study contributes to the

ESTHER
Presenter(s): Matthew Peterson
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Kirk Domer (College of Arts & Letters)

Esther was a production that highlighted the importance of collaboration while creating a show. For this particular process, Matty served as the Assistant Scenic Designer and learned a number of new construction and painting techniques during his time in residence at The A.D. Players at the George Theatre located in Houston, TX. Matty also learned the importance of being involved here at MSU, as four fellow Spartans were involved in this production.

PAINTING SURFACE PREPARATION
Presenter(s): Maddy Tenbarge
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Teresa Dunn (College of Arts & Letters)

In this experience, I built canvas frames, stretched canvas over the frame and prepared (gessoed) the surface.

RE-ENTRY AND RE-ORIENTATION; AN ANALYSIS OF THE UNDER-RESEARCHED CHALLENGES AND BARRIERS FACED DURING SOCIETY RE-ENTRY
Presenter(s): Adena Norwood
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): John Waller (College of Social Science)

Michigan has an incarceration rate of 599 per 100,000 people, meaning that it locks up a higher percentage of its people than almost any democracy on earth. Addressing this quantity of offenders requires expansive and formerly incarcerated person-informed reentry research. Unfortunately, there is a gap in resource access between NGOs and those who need the help of these organizations the most. Previously Incarcerated Individuals (PIIs) who were convicted of less violent crimes, come from less socioeconomically disadvantaged backgrounds and have more familial and financial support, more readily gain access to informed NGOs and resources. Those who are more disadvantaged and require more extensive rehabilitation are less likely to be offered the opportunity to engage with integral programs. In this analysis of methods for successful re-entry, I will utilize RC informed ethnographic field work to re-prioritize the methods that are most prominently supported in relevant literature. Through literature analysis alone, I initially identified three core components to succes

THE CREATIVE PROCESS TO CREATING FILM POSTERS
Presenter(s): Mia Burghardt
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Amol Pavangadkar (College of Communication Arts Sciences)

This presentation demonstrates the creative process of creating film posters in an intentional and engaging way. This includes the ways a creative ensures integrity through the usage of visual elements, concept development, and aesthetic design.

ADDRESSING AMPHIBIAN DISEASE AND THE PET TRADE: PERSPECTIVES FROM STATE AND FEDERAL AGENCIES
Presenter(s): Hope Sherwood
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Alexa Warwick (College of Agriculture & Natural Resources)

Globalization facilitates spread of pathogens via trade, which in turn can negatively affect human health and biodiversity. Managing disease in live animal trade networks is challenging because many factors, including state and federal regulations, influence the decisions businesses make about species traded and biosecurity practices used. In North America, the spread of Bsal is of concern for native salamanders. To better understand how U.S. state and federal agencies manage amphibian diseases and interact with pet amphibian trade networks, we conducted virtual focus groups with agency professionals (N = 44). Questions addressed agency actions, concerns, Bsal response, and potential solutions. Results revealed that most agencies lack formal amphibian disease response plans but enforce regulations for native species, including permitting and restrictions on certain imports. Surveillance efforts are sporadic, often reactive, and constrained by resource limitations. Participants expressed significant concerns regarding disease spread through the pet trade, particularly the release of exotic species, insufficient regulation of non-natives, and challenges posed by unregulated online and black-market sales. Proposed solutions included enhancing communication and coordination among states, establishing rapid response funds, improving disease testing capabili

ANALYSIS OF CHATGPT USAGE IN REDDIT FOR HEALTH
Presenter(s): Melissa Liu
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Celeste Campos-Castillo (College of Communication Arts Sciences)

We analyzed 837 posts from January 2019 to March 2023 that mentioned ChatGPT and health.

TURNING CRISIS INTO OPPORTUNITY: COLLABORATIVE SOLUTIONS IN LEBANON
Presenter(s): Cody Shene
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Ayman Mohamed (College of Arts & Letters)

Lebanon hosts over 1.5 million Syrian refugees, giving it one of the highest per-capita refugee populations in the world. This massive influx, driven by the Syrian Civil War, has placed immense strain on Lebanon's economy, infrastructure, and social systems. Refugees face limited access to employment, education, and healthcare, while local communities struggle with dwindling resources and increased competition in the job market. These challenges have heightened tensions between the two groups, creating an unstable social and economic situation. Addressing these issues is critical for improving stability and living conditions for both refugees and Lebanese citizens. This project examines community-based employment programs as a potential solution to these challenges. These initiatives aim to employ refugees and citizens together in public works projects, agricultural development, and other collaborative efforts designed to rebuild infrastructure and stimulate economic growth. Supported by international funding, these programs seek to reduce unemployment, alleviate poverty, and encourage cooperation, building trust while addressing shared challenges. Using qualitative data and case studies from regions in Lebanon heavily impacted by the refugee crisis, this research explores the feasibility and long-term benefits of these programs. By helping refugees maintain their dignity and independence while strengthening local communities, these initiatives promote social cohesion and

THE UNTAMABLE GARDEN: POSTMODERN & POSTCOLONIAL DIALOGUES IN VICTORIAN NATURE WRITING
Presenter(s): Ryan Alenzi
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): William Vincent (College of Arts & Letters)

This paper employs Mary Louise Pratt's framework of European planetary consciousness to juxtapose two contrasting portrayals of nature during the Victorian era. It examines Mary Webb's Romantic celebration of nature's fleeting beauty and inherent resistance to colonization against Gertrude Jekyll's Modernist, systematic approach to garden design-one that mirrors the British Empire's desire to control and order the natural world. Webb's work is shown to critique imperialist notions by emphasizing nature's untamable essence and universal accessibility, while Jekyll's meticulous arrangements reveal a subtle reproduction of colonial administrative practices in the domestic sphere. By analyzing how both writers navigate the tension between nature's inherent freedom and human attempts at domination, the paper interrogates the broader cultural and political implications of nature writing in a time marked by rapid industrial and imperial expansion.

MILLSTONES AND MYTHS: REIMAGINING NEWPORT TOWER THROUGH THE LENS OF ENGLISH GOTHIC NARRATIVE
Presenter(s): Ryan Alenzi
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): William Vincent (College of Arts & Letters)

This paper explores the enigmatic Newport Tower-a structure shrouded in myth, mystery, and multiple historical claims-by reinterpreting its story through the imaginative and evocative traditions of English literature. Drawing on archaeological findings, colonial documents, and the colorful tapestry of legends that span Viking sagas to Templar intrigues, the study investigates how narrative and myth-making have intertwined with the tangible evidence of stone and mortar. Through a comparative literary analysis, the paper uncovers parallels with the gothic and Renaissance texts that similarly blend fact and fable, ultimately arguing that the Tower's ambiguous past serves as a rich allegory for the interplay of history and storytelling in the canon of English literature.

LAW AND ORDER IN THE MIDDLE OF THE SYRIAN CIVIL WAR: AN ANALYSIS OF GOVERNANCE, CRIME, AND JUSTICE SYSTEMS IN CONFLICT ZONES
Presenter(s): Logan Wilson
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Camelia Suleiman (College of Arts & Letters)

This research examines the state of law and order throughout the Syrian Civil War, focusing on how domestic and international groups managed, enforced, or neglected legal systems. As formal government control weakened across the country, Syria experienced instability and lacked law enforcement measures. This study explores the complex interconnectedness between conflict and social justice. This is done with the idea of orientalism kept in mind, navigating through Western idealism. It provides a detailed analysis of legal structures and practices implemented by different parties including the Syrian government, opposition groups, and international bodies. Using a combination of secondary data, case studies, and eyewitness accounts, the research seeks to identify patterns in crime rates while also understanding and critiquing enacted resolutions. By examining the nature of such justice systems, the project addresses broader questions about the rule of law, sovereignty, and human rights. This work ultimately aims to contribute to academic discourse on law in conflict zones. It also strives to recognize the impacts of war on civilians and the lives of people in Syria specifically.

RESISTANCE THROUGH CRAYONS: ARTS-BASED RESEARCH AND CHILD CENTERED METHODOLOGY
Presenter(s): Asha Denny
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Emilie Smith (College of Social Science)

Arts-Based Research (ABR) is a method of participatory research practices that is commonly used within the adolescent population. It is associated with increased youth engagement, due to its multimodal methods of learning, allowing for various avenues of artistic expression. ABR promotes a creation of equilibrium of power dynamics between child and researcher, as it encourages the concept of thinking of children as cultural producers, with valuable communication input other than verbal. ABR creates alternative options of communication that relabel intellectualism and participatory research not through the participants' verbal contribution, but through different methods of learning and communication through arts. ABR is used as a method of participatory research that creates self agency amongst its participants, and promotes ideas of representation. ABR allows for critical analysis of childhood developmental studies through a lens other than one centered in eccentricism, making it an emancipatory and decolonizing practice and method. ABR's emancipatory concepts are exemplified through its theoretical framework often engaging with the intersections of minoritized identities such as race, disability, economic status, and ethnicity. It's decolonizing approaches to research centers children at the forefront, with interpretation of qualitative data from visual resources. ABR proves to play a pivotal role in the development of the study of adolescence and developmental psychology

SINO-KAZAKH WATER WITHDRAWL ON THE ILI RIVER
Presenter(s): Eleanor Pugh
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Norman Graham (James Madison College)

A water allocation agreement is yet to be reached for the flow of the Ili River, which spans from Xinjiang's Fruit Valley in China to Kazakhstan despite nearly 30 years of negotiations. On the Ili River, over water withdrawal coincides with the lingering adverse effects of Soviet water policy, creating an environmental crisis. The numerous dams on the Ili River, including eight on the Chinese side and the massive Soviet-era Kapchagay Dam enable large amounts of water withdrawal to feed irrigation in this arid region. The Ili River provides approximately 80 percent of the flow to endorheic Lake Balkhash, which has seen decreasing water levels due to the dam construction and water withdrawal, creating negative environmental impacts including increased salination and harming the fisheries, animal husbandry, and even agricultural industries in the region. China's hegemonic relationship over the basin has precluded a successful water allocation agreement, as Kazakh officials appear hesitant to confront China over its water use out of fear of losing Chinese economic investment. While increasing temperatures induced by climate change temporarily prop up the situation by providing an increased water flow from melting glaciers in the Tian Shan mountains, this flow is expected to decrease in the next 20 years. This paper will discuss the issues on the basin and

TASTE OF HOME: PRESERVING LEBANESE CULTURE IN METRO DETROIT THROUGH FOOD
Presenter(s): Kennedy Kilmer
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Ayman Mohamed (College of Arts & Letters)

The Arab-American community in Metro Detroit traces its origins to the late 1800s when the first Lebanese family immigrated to the area. Thriving in the early 1900s, this wave of immigrants laid the foundation for a flourishing Arab population, with Lebanese people now representing one of the largest ethnic groups in the area. Lebanese cuisine, in particular, has become a dominant presence in Metro Detroit's restaurant scene, serving as a powerful medium for cultural preservation. This presentation explores how the Lebanese population in Metro Detroit has maintained their cultural identity through the establishment of Lebanese restaurants. For many Lebanese immigrants, leaving behind the hardships of life in Lebanon has meant finding opportunity and a supportive community in Detroit. Restaurants have not only provided economic opportunity but also created spaces to celebrate and sustain Lebanese heritage. Drawing on qualitative data from secondary accounts of the Lebanese community in Metro Detroit, I will analyze the role of authentic Lebanese restaurants in preserving cultural traditions. This presentation will also trace the early history of Lebanese migration to Detroit and examine the strategies that have grown and sustained this vibrant co

MONEY VS MENTAL HEALTH: THE IMPACT OF LEBANON'S ECONOMIC CRISIS ON MENTAL HEALTH
Presenter(s): Tatiana Goffee
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Ayman Mohamed (College of Arts & Letters)

The COVID-19 pandemic has exacerbated economic challenges worldwide, but Lebanon has faced a particularly severe and prolonged crisis. Currently, 44% of Lebanon's population lives in poverty, with approximately 80% categorized as poor. A significant factor contributing to this crisis is the strain of hosting 1.5 million Syrian refugees, who constitute 25% of Lebanon's population. This influx has placed immense pressure on Lebanon's economy, infrastructure, and the mental health of its citizens. This study examines the mental health crisis among Lebanese citizens amidst the ongoing economic collapse. Evidence highlights alarming levels of stress, anxiety, and emotional distress, with many citizens reporting a noticeable decline in mental health since 2019. Researchers have raised concerns about the emergence of a mental health epidemic as the crisis continues to deepen. Using qualitative analyses and primary and secondary sources, this paper investigates the profound mental health challenges faced by Lebanese citizens. It explores how economic hardship, coupled with

SALOMANIA: SALOMÉ REINTERPRETED AS A FEMINIST CORNERSTONE IN CINEMA
Presenter(s): Ryan Alenzi
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): William Vincent (College of Arts & Letters)

This paper reexamines the 1922 film Salome-a cinematic adaptation of Oscar Wilde's play-and challenges its common classification as a queer work by instead foregrounding its strong feminist dimensions. While many critics have attributed a queer identity to the film, largely based on Wilde's personal life and the reputed sexual orientations of the cast, this study argues that such interpretations are largely superficial and unsupported by a close reading of the film's narrative and visual style. Through a detailed analysis of key scenes, character dynamics, and symbolic elements such as costume design and staging, the paper demonstrates that Salome more accurately reflects early twentieth-century feminist ideals. The film is shown to articulate themes of female empowerment, sexual agency, and the subversion of patriarchal norms, positioning it within the broader context of early feminist art. This reanalysis invites a more nuanced understanding of the film, urging scholars to move beyond reductive readings based solely on the identities of its creator and performers, and to appreciate its intrinsic commentary on gender and power.

RETHINKING CARE: A COMPARATIVE ANALYSIS OF SCHOLARLY AND DIGITAL MEDIA PERSPECTIVES
Presenter(s): Ryan Alenzi
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): William Vincent (College of Arts & Letters)

This paper examines the concept of care by comparing academic discourse with digital media narratives. Drawing on Sandy Grande's view of care as embedded in power structures, it explores how social media, blogs, and podcasts highlight personal, culturally contingent practices that often challenge scholarly perspectives. While academic frameworks underscore systemic forces that determine who is deemed worthy of care, digital stories emphasize everyday relational acts. By juxtaposing these viewpoints, this study reveals the need for a more holistic framework, one that acknowledges both the political dimensions shaping care and the intimate experiences through which it is enacted.

JORDAN'S PALESTINIAN POPULATION: BETWEEN INTEGRATION AND MARGINALIZATION
Presenter(s): Anton Gegaj
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Ayman Mohamed (College of Arts & Letters)

The Palestinian people have long been at the heart of Middle Eastern politics, with ongoing displacement shaping their experiences across the region. Jordan, where Palestinians constitute approximately two-thirds of the population, presents a unique case of self-discrimination within a nation often seen as a refuge. This study explores the systemic and structural discrimination faced by Palestinians in Jordan, particularly from government policies that limit their economic and political rights. Using a qualitative approach, the research synthesizes scholarly studies and reports, complemented by an interview with an anonymous Palestinian who formerly lived in Jordan. The findings reveal that this marginalization stems from the dual identities of being both refugees and Palestinians in a state governed by an ethnic minority, creating a paradox of exclusion within a majority population. The study also considers the broader implications of this discrimination, including its potential to drive calls for a new Palestinian state or significant governmental reforms in Jordan, echoing the aspirations of the Arab Spring. This research not only sheds light on the Palestinian struggle within Jordan but also situates it within a global context, emphasizing the need for fair and democratic governance to mitigate discrimination worldwide. By highlighting the interse

COLORBLIND RACIAL IDEOLOGY IN CO-OCCURRING SUBSTANCE-USE DISORDER AND POSTTRAUMATIC STRESS DISORDER RESEARCH: IMPLICATIONS FOR CLINICAL PRACTICE
Presenter(s): Jaidyn Choi
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Mallet Reid (College of Human Medicine)

People of color (POC) endure unique issues (e.g., racial trauma) linked with the onset of co-occurring posttraumatic stress disorder and substance use disorder (PTSD/SUD) and have worse health outcomes compared to White people. Given this, it is important to determine whether PTSD/SUD research addresses these issues or if it is characterized by colorblindness (the act of ignoring POC's experiences and needs). We searched PubMed and PsycINFO for PTSD/SUD research, identifying 135 studies for screening, which were imported into Covidence. A team of six screened these and selected 67 for our narrative review. We assessed the sample diversity of these studies and the extent researchers discussed or designed research to address the unique issues faced by POC, (e.g., discrimination). The racial composition of the samples was 55.72% White, only two studies discussed the relevance of race or racism with PSTD/SUD health outcomes, and zero interventions were designed to address POC's challenges. Meanwhile, half acknowledged the unique challenges faced by other disenfranchised groups (e.g., women and/or veterans). The colorblind nature of PTSD/SUD research means that clinicians are offering treatments for POC that may not be applicable to their needs, nor are there interventions available to address POC's unique challenges. Importantly, colorblindness has been observed across multiple domains in psychology and medicine. The consequence of this is that healthcare cli

"GET TO KNOW MY COMMUNITY": COMMUNITY DRIVEN GUIDANCE FOR FUTURE TRANSGENDER AND NONBINARY FOCUSED RESEARCH
Presenter(s): Arden Henderson
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Jae Puckett (College of Social Science)

Aims: Research pertaining to transgender and nonbinary (TNB) populations has not always reflected the concerns of TNB people and some research has perpetuated harm. Research should be guided by TNB communities to identify beneficial areas of research. Methods: We asked TNB focus group participants to share their perspectives to help inform future research with TNB populations. We coded responses across groups using reflexive thematic analysis. Results: Four themes were developed: (1) Increase the Utility and Accessibility of TNB Research, (2) Understand the Diversity of the TNB Community, (3) Document and Support TNB Survival in a Cisnormative System, and (4) Explore TNB Thriving. These findings emphasize the importance of TNB voices in developing research that benefits the community and addresses relevant concerns. Conclusion: This work adds to a growing body of literature that emphasizes the benefits of community-engaged research and can guide future studies to better address TNB people's needs.

HOW TO DIE: THE LIFE OF DIETRICH BONHOEFFER
Presenter(s): Camron Rost
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Kirk Domer (College of Arts & Letters)

How to Die: The Life of Dietrich Bonhoeffer is an intricate weaving of the life of the famous pastor and theologian, who, upset by the complacency he saw in the German church toward the Nazi party, makes the hardest decision he's ever had to make--a willing attempt to assassinate Adolf Hitler. Camron Rost served as the assistant scenic designer for Professor Kirk Domer. In residence for seven days during the tech/dress process at AD Players at the George Theatre in Houston, TX, he worked on this professional production with industry professionals in many design and technical fields.

COLORS OF GRIEF: A COMPARATIVE ANALYSIS OF KIESLOWSKI AND O'NEILL
Presenter(s): Ryan Alenzi
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): William Vincent (College of Arts & Letters)

I argue that Krzysztof Kieslowski's Three colours trilogy and selected episodes from "The Decalogue," along with Eugene O'Neill's plays "Mourning Becomes Electra," "The Iceman Cometh," and "Long Day's Journey into Night," hypothesize a magnetic imaging into the human psyche by inspecting how the characters deal with grief, identity, fate, and illusion. My analysis begins by showing how these works, despite differences in medium, cultural context and time, share huge thematic and stylistic similarities in their portrayal of characters that are going through mental hardships. At the core of this analysis focuses on external palpable places and colors as well as physical and psychological environments that work as an external manifestations of characters' internal states. In Kieslowski's films, this is done through the use of color symbolism, framing, and recurring visual motifs, O'Neill employs dialogue to create claustrophobic, psychologically charged settings. The analysis also explores how both artists use the theme of communication - or its failure - to emphasize the difficulty of human relationships. by examining scenes of miscommunication, silence, and unexpected connection, my paper shows how Kieslowski and O'Neill challenge audiences to reconsider their understanding of intimacy, love, and the barriers that separate individuals. By juxtaposing these works, I found that both artists engage with universal questions about the nature of existence, the power of illu

REDISCOVERING THE AESTHETIC EDGE: GENDER, URBANITY, AND THE CREATIVE SPIRIT IN GEORGE EGERTON'S 'A LOST MASTERPIECE

Presenter(s): Ryan Alenzi
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): William Vincent (College of Arts & Letters)

This presentation delves into George Egerton's "A Lost Masterpiece," exploring its nuanced examination of artistic inspiration amid the contrasting realms of urban chaos and pastoral memory. By situating Egerton's work within the broader currents of English literature-particularly within the aesthetic and Decadent movements-the talk unpacks how poetic language and vivid imagery articulate the internal struggles of a creative mind navigating a rapidly changing society. Emphasizing themes of gender and identity, the discussion reveals how Egerton's narrative not only echoes contemporary debates about the "New Woman" and the redefinition of feminine experience but also challenges the conventional boundaries between art and everyday life. Attendees will gain fresh insights into the enduring dialogue between creative expression and societal transformation, underscoring the timeless resonance of Egerton's literary innovations within English literary studies.

SILENT SACRIFICES: GENDER, MELODRAMA, AND THE BURDEN OF CARE IN MAGARI AND ITALIAN CINEMA

Presenter(s): Ryan Alenzi
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): William Vincent (College of Arts & Letters)

This essay analyzes a pivotal scene from Magari (If Only) (2019) to examine how the film engages with gender roles, melodrama, and Italian cinema's portrayal of domestic labor. Through formal elements such as mise-en-scène, character blocking, cinematography, editing, and performance, the scene constructs Benedetta as both a maternal figure and an altruist, yet it simultaneously entraps her within this caregiving role. The film denies Benedetta personal agency, framing her identity as inseparable from her domestic responsibilities. Unlike traditional family melodramas that highlight female resistance through heightened emotional expression, Magari presents her entrapment as a quiet inevitability, reinforcing patriarchal expectations in both narrative and visual structure. Drawing on Thomas Elsaesser's and Joseph Bitney's discourse on family melodrama, the analysis situates Magari within a broader tradition of films that explore the intersection of gender, family, and power. While classic melodramas such as Mildred Pierce dramatize the tension between maternal sacrifice and individual ambition, Magari strips away this conflict, offering no alternative for Benedetta beyond her expected role. This essay argues that the film's refusal to grant Benedetta narrative autonomy deepens its critique of gendered labor by embedding her oppression within the everyday. In doing so, Magari not only engages with the conventions of family melodrama but also redefines its limits, exposing ho

NEUROSCIENCE, NEURODIVERSITY, AND THE WORKPLACE: HOW AUTISM THEORIES INFORM REAL-WORLD EXPERIENCES
Presenter(s): Nadine Shetiah
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Ariel Cascio (College of Human Medicine)

There are many different theories about what autism is, from cognitive and psychological models to neurological explanations (Fein 2020, Hens et al. 2019, Verhoeff 2012). These theories don't just exist in research; they also shape how autism is understood in everyday life, including in the workplace. In this study, we explore how autistic and non-autistic people talk about autism in work-related contexts, analyzing how they use ideas from major theories to explain similarities, differences, and challenges. Some of the theories we examine include Intense World Theory, which focuses on sensory hyperfunctioning; Mirror Neuron Theory, which suggests differences in imitation learning; and Social Motivation Theory, which suggests that reduced social motivation plays a key role in autism. We also consider theories like Monotropism and the Double Empathy Problem, which emerge from a neurodiversity model of autism that challenges traditional deficit-based models by centering autistic experience as part of human neurological diversity.Through thematic analysis of interviews, we explore how these theories arise as participants talk about things that make work harder or easier. Participants also talked about the many things autism meant to them outside of these theories. Our findings show that clinical and research theories of autism are part of how autistic people describe their experiences. By looking at how autistic and non-autistic in

CINEMATIC DESIRE: NEGOTIATING APPARATUS, ABSENCE, AND THE MORAL IMPULSES OF SIN AND VIRTUE
Presenter(s): Ryan Alenzi
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): William Vincent (College of Arts & Letters)

This paper explores Christian Metz's analysis of cinematic pleasure as a multifaceted negotiation between psychic desire and socio-political forces. Metz argues that film spectatorship is driven by a layered desire: for narrative coherence, visual satisfaction, and the reassuring fantasy that compensates for the inherent "lack" of representation. Pleasure, in Metz's view, is not a mere enthrallment with illusion but a complex process of disavowal, where viewers simultaneously engage with and reject the screen's tangible emptiness. Central to this process is the fetishistic investment in cinematic objects, which both masks and echoes the anxiety of absence, while also reflecting deeper moral tensions reminiscent of the seven deadly sins and corresponding virtues. This duality is further exemplified by the metaphor of the child's contradictory beliefs, symbolizing the internal negotiation between primal impulses and higher ethical sensibilities. Ultimately, Metz's analysis reveals that the cinematic experience is a dynamic interplay between internal contradictions and constructed visual narratives, making the act of watching a deeply personal and morally charged engagement.

HUMOR AND POLITICS IN ELIA SULEIMAN'S CINEMA
Presenter(s): Ryan Alenzi
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): William Vincent (College of Arts & Letters)

This presentation explores the innovative cinematic approach of Elia Suleiman, a leading Palestinian filmmaker whose work uniquely blends humor with political critique. It examines how Suleiman employs humor not only as a form of resistance against the absurdities of the Israeli-Palestinian conflict but also as a vital means of survival amid oppression. The analysis delves into his technical use of visual comedy and an episodic narrative structure that disrupts traditional storytelling, offering a mosaic of the Palestinian experience rather than a singular narrative. Additionally, the presentation highlights the autobiographical elements present in Suleiman's films, which imbue his work with a deeply personal perspective, thereby humanizing the broader socio-political realities. By critiquing both the strengths and limitations of his style, the presentation positions Suleiman as a transformative figure in Palestinian cinema, whose work challenges conventional narrative forms and invites viewers to reconsider the intersection of humor and politics.

THE ROAD FORWARD
Presenter(s): Abby Yheaulon
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Xia Gao (College of Arts & Letters)

The Road Forward is a five-color screen print inspired by the Nihonga Art Movement in Japan. This piece blends traditional Japanese aesthetics with contemporary artistic influences, utilizing a combination of illustration, digital design, and AI. Through layered printmaking, it pays homage to classical Japanese art while incorporating modern visual styles, such as the bold strokes found in graphic novels, which are prominently featured in the red ink layer. While traditional Japanese ink colors are derived from natural materials, The Road Forward embraces a fusion of East and West by adopting a more saturated color palette. This stylistic choice is influenced by pop culture artists like Andy Warhol, whose vibrant hues and bold compositions redefine the relationship between color and storytelling. At the heart of the piece, a young girl is illuminated by a guiding light, symbolizing progress and self-discovery. She represents not only myself but all individuals navigating an uncertain future. Despite stepping forward into the unknown, she is never truly alone-her past, like the fog, surrounds and shapes her journey. This concept reflects the universal experience of personal growth, history's impact on ident

LOVESPELLED: SHORT TV PILOT
Presenter(s): Victoria Irish
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): Amol Pavangadkar (College of Communication Arts Sciences)

Lovespelled was a short TV pilot written and produced in a Special Topics course last Spring semester. Over the course of the production, everybody involved developed and improved their knowledge base. Through technical skills, story and writing skills, logistic and coordination skills, and social/communication skills, Lovespelled was a project that both mattered in terms of creating an inclusive, fantastical comedy, as well as bettering the capabilities of everyone involved.

COLONIAL BUDS AND OUR SPUDS
Presenter(s): Ryan Alenzi
Social Science, Arts, Humanities (multiple disciplines)
Mentor(s): William Vincent (College of Arts & Letters)

This paper examines the historical, cultural, and economic impact of the potato. It traces the etymology of the term "potato" from its indigenous roots, detailing its botanical origins in South America and subsequent adoption and adaptation by various cultures. By exploring its role in the Columbian Exchange, the study highlights how the potato became a staple crop that significantly influenced global population growth and food security. The analysis also considers the crop's role in shaping agricultural practices, particularly in Ireland, where its susceptibility to disease led to the devastating Irish Potato Famine. Moreover, the paper delves into the cultural narratives surrounding the potato, from iconic culinary traditions to its symbolic representation as a resilient food source for the poor. Through an interdisciplinary approach that incorporates historical, botanical, and socio-cultural perspectives, the work illustrates the transformative legacy of the potato in the context of colonial trade and modern agriculture.

SOCIAL SCIENCE: GENERAL

SUPPORT FOR RECREATION THROUGH COMMUNITY FOUNDATION FUNDING: EXAMINING ALLOCATIONS ACROSS CATEGORIES IN NORTHERN FOREST REGION STATES
Presenter(s): Corbin Harnden
Social Science: General
Mentor(s): Elizabeth Perry (College of Agriculture & Natural Resources)

Community foundations cover every inch of the U.S., aiming to meet the needs of their area through philanthropic giving. Within the Northern Forest region of the U.S. (northern New England through the northern Great Lakes states; Maine to Minnesota), there lies a mixture of rural and urban identities. Even within this mix of land use and population densities, all these states claim to support outdoor recreation in their economies. Indeed, the Bureau of Economic Analysis corroborates this for each state examined. Given this breadth of identities but all within a common geography of the Northern Forest and common goal of supporting outdoor recreation within their economic profiles, we sought to examine if community foundation projects represented this commitment to outdoor recreation. After examining the annual reports of community foundations accredited through the National Standards program (CFNS), we used a two-mode social network analysis approach (community foundations and topics represented in their breakdowns of annual giving) to examine what funding categories are being prioritized. This quantitative approach highlighted recreation's placement within the topics (i.e., where recreation is actually sought after) and painted an overall picture of foundation-specif

ENHANCING WORKFORCE READINESS IN THE HOSPITALITY INDUSTRY: A GENDER-BASED STUDY OF HOSPITALITY BUSINESS STUDENTS' INTERNSHIP EXPERIENCES
Presenter(s): Benjamin Kim, Kira Saroken, Yongwoo Nam
Social Science: General
Mentor(s): Mi Ran Kim (Eli Broad College of Business)

Internships play a crucial role in preparing hospitality business students for the workforce by bridging the gap between academic learning and professional application. This study explores the self-identified achievements, strengths, and areas of improvement within hospitality students after completing their internships, with a focus on gender-based differences. Grounded in Experiential Learning Theory (ELT) and Work-Integrated Learning (WIL), the study examines how internship experiences contribute to career readiness and professional development. A survey of 373 hospitality business students (155 male, 218 female) collected qualitative and quantitative data on their internship reflections. The findings reveal that students excel in interpersonal skills, customer service, leadership, and teamwork, while areas for improvement include time management, confidence, stress management, and technical skills. Notably, female students reported greater strengths in customer service, teamwork, and leadership, but also highlighted challenges related to self-confidence and communication. Male students emphasized professionalism, problem-solving, and technical skill development but reported weaknesses in public speaking and workplace relationships. The study underscores the importance of structured internships in shaping students' career trajectories and highlight

RACIAL PERCEPTIONS AND PRESSURES IN THE CRIMINAL JUSTICE SYSTEM
Presenter(s): Emily LeGault
Social Science: General
Mentor(s): Clifford Broman (College of Social Science)

When analyzing the criminal justice system and its intersection with race, it is important to analyze the perceptions and pressures. The goal of this project is to analyze what college students believe this issue is defined as in their world as well as how progress can be made. In collaboration with the student body at Michigan State University, the mission is to identify commonalities and draw conclusions to bring unity in understanding. The goal is to result in progress by identifying spaces for improvement in the media-heavy justice system we all observe, work with, and coexist beside. By identifying strengths, weaknesses, and barriers in the justice system based on the perception of race we can bring light to compressed spaces to make the world a brighter/more understood place to live. Systems in the United States cannot be changed in a day as their roots are deeply embedded into our world, our goal is to find these places and isolate spaces of improvement with the intersection of perceptions.

AWARENESS OF FOOD INSECURITY AND STIGMA ON MSU'S CAMPUS
Presenter(s): Ainsley McNamara, Chloe Alexander
Social Science: General
Mentor(s): Melissa Fore (James Madison College), Samyuktha Iyer (College of Social Science)

Our project examines the resources available to address food insecurity experienced by MSU students. Specifically, we would like to know how well the MSU Food Bank addresses food insecurity on campus. Using a survey distributed to the student population, we will ask questions about student awareness of the food bank and food insecurity at MSU. Our survey will collect demographic data to see what communities are utilizing the food bank and what groups might need more outreach and intervention. We also ask questions about satisfaction with nutritional value of food, access to other resources, and how often students feel like they need more support. We hope to bring our findings back to the food bank to improve their programming and services.

MSU STUDENT RECYCLING INITIATIVE
Presenter(s): Mason Hambley
Social Science: General
Mentor(s): Nathan Moore (College of Social Science)

Recycling is commonly regarded as an important step in the creation of communities which are sustainable. In this study researchers designed and analyzed a survey aimed at finding out the primary motivators of recycling among the student population at MSU. Previous studies have found that altruistic motivators such as wanting to do the right thing for both the environment and society play a key role in motivating recycling tendencies. Along with this there is evidence that monetary rewards also play a key role. Our findings are in line with previous research but we have also been able to identify barriers to recycling on campus. We argue that the elimination of these recycling barriers will be the most important factor in improving diversion rates on campus and off campus. It seems that the primary barrier to recycling is a lack of access to places to recycle, namely in off campus communities where there are often no recycling facilities available to residents. There are also barriers to recycling on campus as there is a distinct lack of places to reliable recycle bottles and cans in on campus residences. We also suggest some potential solutions to address these barriers as well as identifying next steps for research including a recycling audit of off campus residencies to see which places do and do not have recycling facilities for residents.

CHARLIE AND DANIELLE SUNSHINE COMMUNITY GARDEN CASE STUDY
Presenter(s): Alayna Tisch, Jayce-London White
Social Science: General
Mentor(s): Melissa Fore (James Madison College), Samyuktha Iyer (College of Social Science)

The primary focus of our research is on how to create social capital and build stronger, more cohesive communities through the medium of community gardens. We will begin by exploring the Danielle and Charlie Sunshine Garden's role in enhancing the quality of life within the neighborhood of Greencroft Park.

DISCREPANCIES IN MDOC REPORTING
Presenter(s): Ainsley McNamara, Antwan Hart
Social Science: General
Mentor(s): Melissa Fore (James Madison College)

The validity of the Critical incident reports made by the MDOC comes into question when some of the data is incorrect. When data is incorrect, it not only calls the validity of these reports into question but also undermines public trust in the MDOC's transparency and oversight efforts. These inaccuracies directly contradict the claims of transparency and oversight which undermines efforts to hold facilities accountable, as decisions could be based on faulty information. As a result, we must question who is responsible for this data and why they are failing to ensure the data is correct. Overall, the inaccuracies and lack of accountability suggest the Prison Oversight Committee legislation is essential to obtaining accurate, transparent reporting and meaningful accountability.

NOSTALGIA, MARKETING AND FOOD
Presenter(s): Grace DeMilio, Kayla Smith
Social Science: General
Mentor(s): Melissa Fore (James Madison College), Samyuktha Iyer (College of Social Science)

Over the past few years, nostalgia has seemed more prevalent than ever. It's on the TV, in clothes, or the grocery store. Processed food companies seem to be adding more and more nostalgia to the food they sell. From the original packaging of Pepsi to M&M commercials that seem to have been playing for the past 20 years. This is not some happy accident: processed food companies are doing this with intention. Many of these efforts are for the older generation but to create that nostalgia they have to start somewhere. They market straight to children as young as possible to begin creating nostalgia towards their food and customer loyalty later down the line. This makes one wonder how this will affect them in the future. This food is being pushed on them from a very young age. In theory, they would gain a dependence on it. Additionally, if this is being marketed as nostalgic food for them, wouldn't it become a source of comfort in the future? This made us curious and posed a question: how do processed food companies use nostalgia to target consumers, and how does that affect the consumer in return?

HIDDEN GEMS: UNDERSTANDING VISITOR USE LEVELS AT MICHIGAN'S MOST LOVED WILDLIFE MANAGEMENT AREAS
Presenter(s): Avery Ramseyer
Social Science: General
Mentor(s): Elizabeth Perry (College of Agriculture & Natural Resources), Lydia Kiewra (College of Agriculture & Natural Resources)

There are over 200 State Wildlife-Managed Areas (SWMAs) throughout Michigan. These public lands are managed by the Michigan Department of Natural Resources Wildlife Division (MDNR WLD) for wildlife, wildlife habitat, and wildlife-based forms of recreation (e.g., hunting, fishing, trapping, bird watching) (Strong, 2022). Due to their geographic diversity, varying proximity to urban areas, and different habitat types, identifying common patterns among SWMAs is challenging. However, there is limited knowledge on the number of visitors that use SWMAs annually, as well as which seasons have the highest use-levels. To address this, we have partnered with the MDNR WLD to gain a better understanding of visitation patterns at ten SWAs that encompass the many diversities present in the public lands of their SWA system. In this poster, I will be presenting on different annual use levels in Bill Rollo Memorial Grouse Enhanced Management Sites and Cannonsburg State Game Area using GPS location data from two Cobalt Community Research foundational reports. The Cannonsburg data was collected in 2021, while the Bill Rollo data was collected in 2023. I hypothesize that Cannonsburg State Game Area will have higher annual visitation than Bill Rollo GEMS, with peak use occurring in the summer. I also expect that Bill Rollo GEMS will have the highest use-levels during the

TELL US HOW YOU REALLY FEEL: THE STRONG OPINIONS OF MOUNTAIN AND E-BIKERS
Presenter(s): Chloe Frye-Anthony, Zoey Crossley
Social Science: General
Mentor(s): Caitlin Henry (College of Agriculture & Natural Resources), Elizabeth Perry (College of Agriculture & Natural Resources)

Outdoor recreation is an integral part of the human experience. From playing outside as a kid to managing your mental health as an adult, it's part of what grounds us and makes us human. Therefore, it's important to study which activities people partake in when recreating outdoors. This affects who will be found in certain places, how many people will be there, and how we manage spaces to provide for this demand while maintaining the integrity of the natural space itself. These patterns are tracked over many scales from federal, to state, to local levels. We used the Michigan Statewide Comprehensive Outdoor Recreation Plan (SCORP) to establish the benefits of outdoor recreation and then compared the results of an online panel sample survey with these benefits. Particularly, we compared whether mountain bike/ebike users perceived differing levels of impacts along natural surface trails statewide. Results found that while this group was more likely to perceive negative impacts like litter and trail degradation, they were also more likely to agree that natural surface trails enrich the surrounding communities. These results align with the overall theme of the SCORP that Michigan's outdoor recreation opportunities are integral across many facets: from quality of life to boosting the state's economy.

DO SPARTAN COMBOS ENCOURAGE OVERCONSUMPTION?
Presenter(s): Elliot Whitney, John Vethacke, Natalie Bron, Reina St Juliana
Social Science: General
Mentor(s): Melissa Fore (James Madison College), Samyuktha Iyer (College of Social Science)

Ready-made meals are provided to students through various academic programs, whether it be in grade school, or educational facilities following graduation. Although the implication of meal programs generally prove to be beneficial to the improvement of the public diet, it fails to address the potential predicament of overconsumption. The overlap of sustainability and proper consumption presents a challenge in balancing environmental responsibility with student well-being. Taking a deep dive into the flaws of the meal swipe function at educational facilities however, potential solutions are able to be constructed. This research explores how Michigan State University's Combo-X-Change feature, as part of the dining hall plans, impacts food consumption and food waste. The study consists of data collected through survey participants at Michigan State University, answering questions regarding their thoughts on the topic at hand. By analyzing patterns in food disposal habits, frequency of unused meal swipes, and opinions on potential resolutions, this study aims to highlight key areas where waste is able to be minimized. The significance of this research lies in its potential to contribute to a reduction of food waste on not only Michigan State University's campus, but also neighboring living-schooling facilities nationwide.

WORKING TOGETHER ACROSS DIFFERENCES: A QUALITATIVE STUDY OF AUTISTIC PERSPECTIVES ON EMPLOYMENT.
Presenter(s): Nadine Shetiah
Social Science: General
Mentor(s): Ariel Cascio (College of Human Medicine)

Autistic individuals often face significant barriers to employment, shaped by workplace norms rooted in neurotypical expectations. This qualitative study explores the perspectives of autistic and non-autistic individuals on navigating shared workspaces and differing understandings of work. This research highlights the challenges autistic individuals encounter, including misaligned communication styles and inaccessible workplace practices. By emphasizing the value of neurodiversity and fostering education around these differences, this research highlights the potential for more inclusive and equitable employment environments.

PARENTING WORKSHOP ON CHILD CARE SUBSIDY FOR LOW INCOME WORKING FAMILIES WITH CHILDREN
Presenter(s): Joa Song, Susma Mangar
Social Science: General
Mentor(s): Kyunghee Choi (College of Social Science)

Background:The Child Care Subsidy(CCS) program in the U.S. provides financial assistance to low-income families to cover child care costs while parents work, attend school, or participate in training programs. In Michigan, this program, the Child Development and Care (CDC) program, is administered by the Michigan Department of Health and Human Services (MDHHS). Despite eligibility, only 10% of families utilize the subsidy. This study aims to increase CDC take-up ra tes by providing a parenting workshop for Head Start-eligible low-income parents, addressing barriers to access and enrollment.
Methods: The disparity between the number of eligible families and the low take-up rate has been identified as i) lack of knowledge on CDC, ii) complex application processes, and iii) insufficient

availability of child care providers accepting CDC. We use two component of intervention. First, partnered with MDHHS, we deliver parenting workshop which consists of CDC eligibility, CDC application process and selecting quality child care in-person and online. Second, using a brokerage mode, we hold drop in helping hours at Head Start school to promote and facilitate parental need on these components. Each case will be logged to monitor application process. We plan to collect pre and post data on knowledge on CDC and parenting outcome

RCAH PRISON ARTS
Presenter(s): Elena Forman
Social Science: General
Mentor(s): Guillermo Delgado (Residential College in Arts & Humanities)

This project is multifaceted. First, there is the visual and poetic art created by the men incarcerated in the Handlon Detention Facility. These artists wrote poems with the prompt "something you care about" and with the knowledge and wish they be included in this final exhibition. They then created or described drawings to be included with the poems which eventually were made into risographs by Elena Forman and Professor Guillermo Delgado. The second aspect of this project was a study on mass incarceration in the United States including its effects on families and community members. This became a podcast with interviews from organizations, students, and family members. This aspect of the project works to emphasize the severe injustices facing our society in terms of incarceration and the first aspect highlights the humanity bearing the brunt of these costs. It also is beautiful artwork that deserves to be celebrated.

SENSOR TECHNOLOGY TO MEASURE SOCIAL INTERACTIONS OF CHILDREN WITH DISABILITIE
Presenter(s): Emily Stephenson, Zainab Alsalihi
Social Science: General
Mentor(s): Sarah Douglas (College of Social Science)

Early childhood is critical for developing social skills (Phillips & Shonkoff, 2000), yet children with autism spectrum disorders (ASD) often face challenges in peer interactions (Bellini et al., 2007). This leads to limited friendships (Kasari et al., 2011), social rejection (Chamberlain et al., 2007), and heightened anxiety and depression risks (Mazurek & Kanne, 2010). Traditional data collection methods for informing ASD interventions are time-consuming, subjective, and require lengthy observations (Milfort & Greenfield, 2002). There is a pressing need for efficient technologies to assess social interactions, especially in inclusive settings (Shi et al., 2017). Emerging technologies aim to assist educators in measuring social engagement for children with ASD, such as apps (Marcu et al., 2013). However, many require extensive teacher observation or data analysis, making them impractical for inclusive classrooms (Milfort & Greenfield, 2002). Automated systems like LENA (Dykstra et al., 2012) evaluate language environments, while sensor technologies help track child location and movement patterns to promote social engagement (Irvin et al., 2017; 2021; Wallisch et al., 2022). Yet, few validated tools capture social engagement data comprehensively. This presentation highlights the use of innovative technology to measure social interactions among children with ASD and their peers, including social networks, interaction ini

FAMILY SOCIODEMOGRAPHIC FACTORS RELATED TO PARENTAL CONSENT FOR HAIR SAMPLE COLLECTION
Presenter(s): Noreen Andrea Francisco
Social Science: General
Mentor(s): Jiying Ling (College of Nursing)

Hair cortisol concentration is a non-invasive, objective biomarker widely used to assess chronic stress in children. However, obtaining hair samples requires parental consent, and the likelihood of consent may be influenced by various family sociodemographic factors. This study explored the relationship between family characteristics and parental consent for hair sample collection in children participating in a larger intervention study. Data was collected from 164 preschoolers and 154 parents. The mean age of preschoolers was 46.98 months (about 4 years), ranging from 34 to 63 months (about 5 and a half years); 50.6% were female. Most children were White (72%), and 13.1% identified as Hispanic. The parent's mean age was 31.44 years, ranging from 19 to 69 years, with the majority being White (79,9%) and 42.2% being single. Employment status varied: 30.5% worked full-time, 27.9% part-time, and 41.6% were unemployed. Approximately 59.1% of families earned ≤ $29,000 annually and 40.9% earned ≥ $30,000. Overall, 68.5% of parents consented to hair sample collection. Reasons for refusal included feeling uncomfortable, not having enough information, concerns about DNA collection from hair, and child preference. Parental employment status was significantly correlated with their consent (p=.004), with unemployed parents more likely to consent. Although not statistically significant, fathers showed a

SLEEPING BEAR DECADAL COMPARISON OF VISITOR USE
Presenter(s): Patrick Cox
Social Science: General
Mentor(s): Elizabeth Perry (College of Agriculture & Natural Resources)

Sleeping Bear Dunes National Lakeshore (SLBE) is one of three designated national lakeshores managed by the US National Park Service. SLBE is a National Park Service unit in Michigan and hosts over 1.5 million annual visitors. The landscape is cherished by Michiganders and out-of-state visitors alike and provides them the opportunity to experience the distinctive environs and amenities that Lake Michigan's lakeshore provides. In 2014, we collaborated with the National Park Service to investigate visitor use patterns and attitudes at the Platte and Crystal Rivers and North Manitou Island. This study was conducted during peak visitation season totaling 1,044 surveys completed, providing information about visitor attitudes and behavior. In 2024, we revisited SLBE with a new study investigating visitor attitudes and behaviors, with a 12-week sampling period at five locations across the national lakeshore, including the Platte and Crystal River sites sampled in 2014. A total of 1,360 surveys were collected, with the Crystal and Platte Rivers surveys comprising over 40% of surveys collected. With two data sets, a decadal comparison focusing on visitor use characteristics, motivations, and intended use of these rivers is to be completed alongside a descriptive statistical analysis on the basic demographical and meta-data information across datasets. Understanding the patterns of visitor use at these rivers in

INFORMATION ACCESS AND PATIENT-CENTERED HEALTHCARE: QUALITATIVE FINDINGS FROM THE MICHIGAN STROKE TRANSITIONS TRIAL (MISTT)
Presenter(s): Chris Marcum
Social Science: General
Mentor(s): Amanda Woodward (College of Social Science), Jen Hirsch (College of Natural Science), Linda Zhang (College of Social Science)

The transition home from hospitalization after a stroke is a difficult one. Patients and caregivers face a range of emotional, social, and health-related challenges as they navigate stroke recovery. The Michigan Stroke Transitions Trial (MISTT) was designed to test whether a social work case management (SWCM) intervention would improve patient-reported outcomes in stroke survivors who return home. While the original trial did not find many significant results, patients and caregivers reported anecdotally that it was helpful. This presentation presents data from a secondary analysis of SWCM case notes looking at what case managers did and how they did. This poster will focus on the role of information in patient activation and how the social workers in the MISTT study bridged this information gap between professionals and clients to lead to positive outcomes.

NATIONAL HONORS SOCIETY AND THE PRACTICE OF COMMUNITY ENGAGEMENT
Presenter(s): Abby France, Emily Curtis
Social Science: General
Mentor(s): Melissa Fore (James Madison College)

National Honors Society at the High School levels serves to educate students on how to excel in leadership, scholarship, service, and character. Our goal with this project was to research the effectiveness of National Honors Society at Spring Lake High School, and how well it prepares students for community service knowledge expected in a college setting. When entering the UGS 200H class this fall as first year studnts, we felt as though the service oppourtunties provided to us through National Honors Society in High School were not consistent with the nuanced view on community service at Michigan State. Understanding the course material in this class felt more challenging for us compared to other students, and we beleive that there are ways that Spring Lake High School can improve to better teach their students about meaningful community service. We seek to improve community engagement practices as well as understanding, in order to better transition high school seniors into navigating the service experiences offered in college.

SOCIOLOGY

SPEAK OF THE DEAD: HOW WE TALK OF THOSE WE HAVE LOST
Presenter(s): Jesse Rayer
Sociology
Mentor(s): Kristen Mapes (College of Arts & Letters)

Quite often, death is shied away from in Western culture. When it's spoken of, it's a step away from it- 'she passed on' or 'he left'. But grief can destroy a person if not properly processed, and speaking about the subject is frequently an integral part of that. This project focuses on how people speak of those they've lost, when given space to. This series of ten interviews, similar to mini oral histories, searches for this information. What words do they use? What is focused on? What appears to be most important for them to get out? Learning these things can bring more understanding to the value of them, and the importance of speaking on it- even the things we cringe from. It can help each individual be more understanding to that part of the grieving process. And if even one person can be at peace sooner, isn't that worth it? More talking means more awareness of other people's grief: often we feel alone after a death, isolated in a way many aren't prepared for. But hearing other people's experiences can build a stronger community in this delicate moment. The presentation will be on the findings of this initial research.

BARISTAS UNITED: THE CONSTRUCTION OF "BAD JOBS" WITHIN CONSTRAINED LABOR MOVEMENTS
Presenter(s): Elliott Smith
Sociology
Mentor(s): Monique Kelly (College of Social Science)

Previous scholarship has looked at the rise of precarious employment, the resultant construction of "bad jobs", and the decline of working-class socio-economic status. In 2021 workers at Starbucks began to organize prompted by poor working conditions. The Starbucks corporation, noted for its categorical and wide-ranging attempts to suppress organizing attempts by workers, continues to challenge workers to date via old and new anti-union tactics. Using content analysis of 54 videos posted to Tik-Tok by Starbucks workers, themes arose of workplace hostility and precarious employment and how employer's challenged workers organizing. What workers felt was a "bad job" was partially an extension of the anti-union effort of the Starbucks corporation itself. These issues left many workers feeling disempowered, which could lead them to quit their jobs for some in the sample. These findings highlight the issues of "bad jobs" as not just issues of economic security but also the right to unionize.

SLEEP SOCIOLOGY; AN INVESTIGATION INTO COLLEGE SLEEPING CULTURE
Presenter(s): Meredith Linzmeier
Sociology
Mentor(s): Sarah Prior (College of Social Science)

Sleep is a vital determinant of health, yet it is undervalued in Western society, particularly on college campuses, where productivity and socializing often take precedence over rest. This research examines the sociological dimensions of sleep, focusing on how cultural norms, institutional policies, and systemic inequities shape sleep health among college students. Drawing on Bronfenbrenner's social-ecological model and the concept of sleep stewardship, the study investigates how individual sleep behaviors intersect with a broader sleep-deprived society. This study situates the undergraduate experience within broader socialization periods to explore how harmful cultural values around sleep are reinforced. Findings from surveys and interviews reveal that the cultural glorification of "grind culture" pressures students to sacrifice rest, while systemic barriers such as economic instability and inequitable access to safe sleep environments exacerbate these challenges. Disparities in sleep patterns tied to race, class, and neighborhood conditions underscore the need for a public health approach that addresses these inequities. Challenging the biomedical model's emphasis on individual responsibility for sleep health, this study advocates for a multidisciplinary framework that integrates sociological insights and reframes sleep as a collective responsibility. By promoting sleep stewardship through education

DISCREPANCIES IN PRESCHOOLERS' SOCIAL SKILLS AND PROBLEM BEHAVIORS IN SCHOOL VERSUS HOME SETTINGS

Presenter(s): Chanel Issa, Jordan Benzing
Sociology
Mentor(s): Jiying Ling (College of Nursing)

This study examined the differences in children's social skills and problem behaviors in school versus home settings. Understanding these differences is crucial for designing comprehensive interventions that address the needs of preschoolers across both school and home environments. Approved by the IRB, the preschoolers' caregivers were recruited non-randomly from 16 Head Start centers in the Midwestern U.S. Following parental consent, caregivers completed a Qualtrics survey to assess their preschoolers' social skills and problem behaviors in the home setting. Subsequently, teachers completed a separate Qualtrics survey evaluating the preschoolers' social skills and problem behaviors based on their observations in the classrooms. A total of168 preschoolers from 154 families were evaluated. Of the 154 caregivers, 42.2% were single, and 59.1% reported an annual family income below $30,000. A notable discrepancy emerged between caregiver and teacher assessments of preschoolers' behaviors. Teachers reported a higher proportion of preschoolers at high risk for social skill deficits compared to caregivers (13.0% vs. 5.0%). Specifically, teachers rated social cooperation (51.30%) higher than caregivers (38.47%), whereas caregivers rated social interaction (56.18%) higher than teachers (37.44%). Regarding problem behaviors, caregivers identified a higher proportion of preschoolers with high risk level

UNDERSTANDING THE CONSEQUENCES OF EXCLUSIONARY SEXUAL EDUCATION: A QUALITATIVE ANALYSIS OF MSU UNDERGRADUATE PERSPECTIVES

Presenter(s): Amanda Bacon, Onyx Bromley
Sociology
Mentor(s): Sarah Prior (College of Social Science)

Exclusionary sex education further disadvantages students who are already at an increased risk for harm (Baker 2019). The content of formal sex education is harmful for students regardless of sexual orientation. The LGBTQ+ community feels these effects in a disproportionately detrimental way due to their already disadvantaged social position. Reform in this sector of public education is needed to ensure equitable public health and safety information for all students. The need for this reform is further shown by the striking inequalities in STI and sexual assault victimization rates among LGBTQ+ individuals (Elia and Eliason 2010; Cary et al. 2022; Baker 2019; Truman and Morgan 2022; Movement Advancement Project n.d.). Qualitative coding methods allowed us to conceptualize the experiences of students at Michigan State University in relation to this systemic issue. During this coding process several themes were identified to show specific ways students are affected by this lack of information. These themes include information shared between peers, a lack of connection in dating apps, and emotional consequences of engaging in hookup culture. In analyzing these themes, it is clear that educationa

DEFINING CONSENT: EXPLORING MSU STUDENTS' PERCEPTIONS AND UNDERSTANDINGS
Presenter(s): Lauren Golden, Riley Michael
Sociology
Mentor(s): Sarah Prior (College of Social Science)

This research seeks to understand how Michigan State University students view the sexual culture on campus, specifically their understanding of sexual consent. By utilizing qualitative journal data, we hope to uncover similarities or variances in MSU students' definitions of consent. To explore students' perspectives, we analyzed their responses to written free-response questions about their definitions of consent. We then coded these responses into thematically based categories. Our research resulted in 9 thematic subcategories that fell into the overarching theme of students' self-perceived definitions of consent. Our findings relating to how students define consent fall into the subthemes: asking for permission, defined only in sexual settings, non-sexual consent, it is an agreement, verbal consent, enthusiastic consent, consent as a mutual agreement, consent is revocable at any time, and that one is only capable of consenting when of clear mind and sober. <p style="line-height:1.38;margin-bottom

PERCEPTIONS OF TRANS REPRESENTATION IN MEDIA
Presenter(s): Olivia Beauchamp
Sociology
Mentor(s): Clifford Broman (College of Social Science)

A study analyzing the perceptions of the representation transgender people receive in media. Gathering data from surveys and interviews, this study aims to understand where the public stands on the quantity and quality of trans representation in media.

INTERVENTIONS USED TO PROMOTE MENTAL HEALTH AND WELL-BEING OF INTERNATIONAL STUDENTS: A LITERATURE REVIEW
Presenter(s): Amanda McGill
Sociology
Mentor(s): ChengChing Liu (College of Nursing)

Stress, limited health literacy, and cultural and linguistic barriers contribute to the vulnerability and poor mental health of international students. Current research suggests the use of various interventions to help these students cope with such vulnerabilities. Each intervention has its own limitations and benefits, and many have a need for improvement.

AN ANALYSIS OF THE RELATIONSHIP BETWEEN TRUST LEVELS OF THE GOVERNMENT, POLITICAL PARTICIPATION, AND RACE
Presenter(s): Courtney Paszkiewicz
Sociology
Mentor(s): Clifford Broman (College of Social Science), Katrina Groeller (College of Social Science)

Studies indicate that there are significant discrepancies between racial attitudes and beliefs towards the United States government. In the United States, differential power and racial stratification has embedded itself into governmental institutions. This has had an impact on how racial groups perceive and trust the government as well as their likelihood to participate in politics. This study aimed to identify the relationship between race, trust levels of the government, and political participation. To assess the relationship, this study employed a survey and interviews to examine the current attitudes of different racial groups. The survey asked topic questions that ranged from films, representation of different people in films, racial and ethnic stereotypes, perceptions and feelings about the criminal justice system, government, and diversity. The hypothesis of this study is that race determines the level of politi

CONSENT
Presenter(s): Marlena Ooten
Sociology
Mentor(s): Sarah Prior (College of Social Science)

My research is focused on consent. Many individuals don't learn about consent from a young age. This research is to help adolescence become aware and educated about consent.

AMERICAN PERCEPTION OF FOREIGN FILM
Presenter(s): Abby Googe
Sociology
Mentor(s): Clifford Broman (College of Social Science)

This presentation explores the characteristics of the American perception of foreign film. It focuses on how Americans interact with foreign film, view its cultural significance, and their overall sentiments toward film made in foreign languages and other countries. Additionally, it delves into the practical aspects of watching foreign films, particularly how Americans feel about aids to understanding, such as subtitles and dubbed audio, and how these aids influence their viewing experience. Research conducted also gives insight into how foreign film has impacted cultural understanding and shifted perspectives toward different nations. shifted perspectives toward different nations and what foreign countries and languages Americans prefer to consume film from.

COMMUNITY-BUILDING AMONG TRANSGENDER & GENDER-DIVERSE MEDICAL STUDENTS & RESIDENTS
Presenter(s): Sullivan Whiting
Sociology
Mentor(s): Andrea Kelley (Lyman Briggs College)

Transgender and gender diverse (TGD) medical students and residents report facing hostile learning environments through their training. Hostility comes from microaggressions, structural barriers to belonging, and problematic curricula. Similar barriers have been identified for those considered underrepresented in medicine (URiM), which includes individuals who are Black, Hispanic/Latinx, and Indigenous. Success in medical education requires mentorship. However, TGD mentors (especially TGD mentors of color) are few and far between. Well-intentioned organizations may outwardly signify TGD inclusivity which is then undermined by individual practices. Using qualitative, focus group data we answer the questions, how and where do TGD medical students and residents create queer community? How do TGD medical students and residents navigate efforts of trans inclusion during their training? We found that participants built community within their cohort, among near-peer TGD trainees and outside their programs through social media. Barriers to community building include performativity and a lack of intersectional support. Intentionality is necessary to foster a sense of belonging, so programs and individuals should facilitate conditions that are conducive to community-building. Mentorship and support must be intersectional, so TGD students are

SCIENCE, TECHNOLOGY, ENGINEERING, MATHEMATICS

WAREHOUSE SIMULATION UTILIZING THE ROBOMASTER EP PLATFORM
Presenter(s): Liam Wells
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Richard Frost (College of Engineering), Shaunak Bopardikar (College of Engineering)

This poster documents the design of a robot that can move items from designated spots given an input, and move them all to a designated drop location. The robot being utilized for this project is the RoboMaster EP programmed using the python developer SDK package. The main issue in this section of the simulation is the accumulated error that builds up from perceived orientation inaccuracy, as the robot continues to collect and drop objects. Additionally, distance sensor and vision marker information are often inconsistently fluctuating, resulting in numerous challenges that impeded the development of the simulation. A series of solutions were tested and selectively implemented in order to combat this inaccuracy, which are detailed on the poster. After the completion of the single-robot simulation, a multi-agent approach was implemented in which two of the same robots would work together to bring objects from varying starting locations to varying drop points. This simulation utilizes a middle drop point in which the first robot would drop off objects at an intermediate drop point, and the second robot would move that object to a final destination, given a set of inputs. The main concern with the multi-agent addition is the coordination between the two robots in order to ensure the items are moved with optimal performance. Various solutions were tested and implemented in order to ensure optimal cooperation and task coordination between the two agents, which are detailed on t

HOW DO WE GET FRESH AND AFFORDABLE FOOD FOR ALL RESIDENTS IN LANSING AND NEARBY AREAS?
Presenter(s): Michael Yu
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Melissa Fore (James Madison College)

Food apartheids (often referred to as food deserts), are formed when residents in an area do not have easy access to fresh, affordable, and/or healthy food. This could cause various health problems such as diabetes, heart disease, and obesity, and could be difficult financially for residents in the area. This presentation seeks to reduce food apartheid problems within Lansing and East Lansing. It also looks to find which solutions work best. The literature review found that for most cities, adding supermarkets made little difference in how far people traveled for food. When cities focused on community gardens and smaller stores like ethnic markets, they found small but positive changes.

COCOA PRODUCTION'S CONNECTIONS TO EMISSIONS AND SUSTAINABILITY
Presenter(s): Joseph Lee, Rj Mensching
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Michael Adetayo Olabisi (College of Agriculture & Natural Resources)

Greenhouse gas (GHG) emissions are a primary driver of climate change, resulting from human activities such as fossil fuel combustion, deforestation, and industrial processes. The major contributors to GHG emissions include energy production, agriculture, transportation, and industry. Among these, the transportation sector plays a significant role, accounting for approximately 15-25% of global emissions. This is primarily due to the reliance on petroleum-based fuels in road transport, aviation, maritime shipping, and rail systems. Road transport, including passenger vehicles and freight trucks, is the largest emitter, followed by air travel and shipping. The sector's impact varies by region, influenced by energy policies, infrastructure, and technological advancements. Reducing transportation emissions is essential for mitigating climate change. Key solutions include transitioning to electric vehicles (EVs), increasing fuel efficiency, expanding public transportation, and integrating renewable energy sources. Governments and industries worldwide are investing in clean mobility solutions, yet challenges such as infrastructure development, economic feasibility, and policy implementation remain. Addressing these barriers requires coordinated efforts from policymakers, businesses, and individuals to shift toward sustainable transportation. This paper explores the primary sources of GHG emissions, quantifies the transportation sector's contribution, and discusses strategies for

CACAO-LINKED DEFORESTATION GREATLY HARMS ECOLOGICAL SYSTEMS
Presenter(s): Siddharth Karthikeyan, Sidharth Unniyampath
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Michael Adetayo Olabisi (College of Agriculture & Natural Resources)

In 2024, the U.S. chocolate market broke records for confectionary sales and is expected to grow, as is the ecological footprint of chocolate's rawest form: cacao. The replacement of forests by monocultures is known for its adverse environmental effects, including reduced biodiversity and soil nutrient levels. The unique characteristics of cacao trees exacerbate the impact of deforestation on ecological systems in the regions in which they are grown, particularly in West Africa and Central and South America. We use data to estimate the effects of cacao-linked deforestation on three measures of ecosystem health: biodiversity, carbon sequestration, and soil quality. We find that cacao-linked deforestation has lowered biodiversity and threatened efforts to protect it, reduced carbon sequestration, and degraded soil quality in cacao-producing regions. These findings call for using environmentally conscious agricultural methods, such as agroforestry, to mitigate the detrimental ecological effects associated with cacao-linked deforestation.

THE EFFECT OF HIGH-INTENSITY INTERVAL TRAINING ON TRKB AND GAP-43 EXPRESSION IN THE CEREBRUM OF POSTNATALLY GROWTH-RESTRICTED MICE
Presenter(s): Val Pallett
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Michael Kim (College of Education)

Tropomyosin receptor kinase B (TrkB) activates several signaling pathways that aid in neuronal development, differentiation and survival. Growth associated protein 43 (GAP-43), a presynaptic protein, is involved in axonal growth, synaptogenesis, and neural regeneration. Both proteins are critical for maintaining cognitive function, and their dysregulation has been found in neurodegenerative disorders such as Alzheimer's disease (AD). Notably, early-life growth restriction has been associated with an increased risk of cognitive impairment and AD-like neuropathology. Exercise, particularly high-intensity interval training (HIIT), has been shown to enhance neuroplasticity-related protein expression, potentially mitigating cognitive deficits associated with growth restriction. This study aims to determine whether HIIT influences the abundance of TrkB and GAP-43 in the cerebrum of postnatally growth-restricted (PNGR) mice. PNGR was induced using a validated cross-fostering nutritive model, and mice were assigned to either a sedentary or HIIT group. Following the HIIT exercise protocol, Western blot analysis was performed to quantify TrkB and Gap-43 protein levels in cerebrum tissue. The results can be used to determine whether exercise positively affects the brain by increasing proteins related to neuroplasticity.

ECG CLASSIFICATION USING DEEP LEARNING
Presenter(s): Igor Araujo Jordao
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Chris Gerlach (College of Engineering)

Cardiovascular diseases are the leading cause of death worldwide, with heart disease alone accounting for one in every five deaths in the United States. Many of these cases are linked to irregular heart rhythms, which can indicate underlying cardiac conditions. Electrocardiograms (ECGs) provide a non-invasive method for detecting these arrhythmias by capturing the heart's continuous electrical activity. However, interpreting ECG signals remains a time-consuming and complex task, particularly in capturing the subtle temporal dependencies that distinguish normal from abnormal rhythms. To address this challenge, we utilized a dataset derived from three PhysioNet databases, containing ECG recordings resampled to 128 Hz and standardized to a fixed length per signal. These recordings represent three patient groups: Arrhythmia, Congestive Heart Failure, and Normal Sinus Rhythm. We applied machine learning and deep learning techniques to classify these signals, examining how feature extraction, frequency-domain transformations, and signal refinement impact model performance. By exploring different representations of ECG data, this study aims to improve the interpretability and effectiveness of machine learning-based arrhythmia detection, providing a foundation for future advancements in automated clinical decision support.

IMPROVING STRAWBERRY QUALITY IN CONTROLLED ENVIRONMENT PRODUCTION: A PHYSICOCHEMICAL AND SENSORY STUDY
Presenter(s): Lily Wei
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Emily Mayhew (College of Agriculture & Natural Resources)

Strawberries are a universally loved fruit, with the industry seeing continuous growth in demand year after year. Strawberry production in Michigan, however, is limited. Controlled environment (CE) production is a promising method for growing strawberries in Michigan year-round, however, the standard variety, 'Albion' does not meet the yield efficiency to be profitable under CE. We aimed to measure the physicochemical and sensory quality of 4 cultivars ('Albion', 'Mara de Bois', 'San Andreas', and 'Seascape') grown at 4 day/night temperatures ranging from 18/10ºC to 27/19ºC. Strawberry samples were cut in half, with one half used for sensory evaluation and the other half for physicochemical measurements. A consumer panel (n=103) came in for 3 sessions and assessed CE-produced strawberries for liking (appearance, shape, texture, flavor, and overall), attribute intensity (ripeness, freshness, firmness, juiciness, strawberry flavor, sweetness, and sourness), and Just-About-Right (JAR) scaling (size and firmness). Physicochemical measurements included exterior color using a Hunter colorimeter, instrumental firmness using a Texture Analyzer, total soluble solids using a destructive Brix meter, and titratable acidity using an autotitrator. Sample differences in sensory and physicochemical measurements will be analyzed using ANOVA and LSD post-hoc tests. Pearson's correlation analysis

EFFICIENT FITTING FOR LARGE-SCALE THREE-DIMENSIONAL DATA CUBES IN ULTRAFAST DYNAMICS ANALYSIS
Presenter(s): Doyoung Wang
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Elad Harel (College of Natural Science)

Understanding ultrafast electronic state dynamics is essential in fields such as material science and spectroscopy, where time-resolved measurements capture transient phenomena. Extracting decay constants from large-scale three-dimensional data cubes, such as hyperspectral or time-resolved datasets, requires efficient and accurate multi-exponential fitting techniques. However, the computational complexity of high-dimensional data presents significant challenges in achieving both speed and precision. This ongoing study evaluates the performance of various numerical optimization algorithms, including Nelder-Mead simplex, trust-region reflective, and Levenberg-Marquardt methods, for extracting decay constants from ultrafast dynamics data. By assessing computational efficiency, convergence stability, and fitting accuracy, we identify trade-offs between precision and processing speed. Preliminary results reveal that while some methods offer robust parameter estimation, others struggle with high-dimensional constraints, leading to inefficiencies or convergence issues. Ultimately, this study aims to determine the most efficient algorithms for decay constant extraction in ultrafast spectroscopy, balancing accuracy and computational performance.

HAZARDS OF "SOIL" PARTICLES TO HUMAN HEALTH
Presenter(s): Cassidy Fishman
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Michael Velbel (College of Natural Science)

Regolith is the loose layer of sediment that covers the solid surface of a terrestrial body. Planetary scientists investigate lunar regolith to accurately assess possible microbial living conditions or future human exploration. An analog simulant is a terrestrial material used to represent chemical and mechanical properties of regolith for research or experiments. Planetary scientists utilize regolith analog simulants to accurately test and predict possible reactions of lunar regolith. To plan, and practice for, performing experiments on a sample that we have an insufficient quantity of, we must practice the investigation on material that has measurable properties that resemble those of the natural sample. Greater knowledge of lunar regolith is needed to improve scientific understanding of material handling and possible physical and chemical uses. To understand what hazards lunar regolith poses to humans, a natural regolith sample must be analyzed for particle size, shape, and texture, along with size-distribution. The overall objective is to create an understanding of how lunar regolith can be utilized without impacting the health of human researchers. Conducting a comparison between regolith samples that do not pose a health risk to humans and lunar regolith samples would allow for an accurate assessment of the relative safety of lunar samples. This c

"MY PRIVILEGE IS BLINDING": CONVERSATIONS AND RESEARCH CONCERNING TWO-SPIRIT AND LGBTQ+ INDIGENOUS PEOPLE IN REPRODUCTIVE HEALTHCARE SETTINGS
Presenter(s): Ross Rogers
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Danielle Gartner (College of Human Medicine), Heather Howard (College of Social Science)

The healthcare experiences of Indigenous and LGBTQ+ people are frequently studied separately. Therefore, there is little research regarding the reproductive and sexual healthcare experiences of those who are both Indigenous and exist outside of colonially-imposed gender binaries and sexual norms. We sought to understand the perspectives of professionals in Indigenous reproductive health regarding the experiences of Two-Spirit and LGBTQ+ Indigenous people. As part of a larger study on the impact of the ACA on Indigenous peoples' health, we conducted semi-structured interviews with 20 Tribal health policy experts, researchers, healthcare administrators, and providers across Indian Country who were identified using snowball and purposive sampling. Interviewees were asked about experiences of Two-Spirit and LGBTQ+ Indigenous people accessing reproductive and sexual healthcare in the context of the ACA. Interview data were analyzed using grounded theory. The interviews revealed uneven awareness among professionals in Indigenous reproductive health regarding the experiences, barriers, and needs of Indigenous Two-Spirit and LGBTQ+ patients. Interviewees highlighted healthcare barriers, identified successes and failures in care delivery, and recommended service improvements. Some areas for further research include identifying geography and nation-specific factors that influence healthcare access, using cultural tradit

EXPLORING THE INFLUENCE OF MATERNAL NUTRITION ON BREAST MILK IL-6 IMMUNE RESPONSES
Presenter(s): Natalie Mourou
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Masako Fujita (College of Social Science)

The nutritional content of maternal diet during breastfeeding is important for infant health. Maternal nutrition may benefit milk's immune capacity to provide direct or indirect protection against infectious disease. This study investigated the immune activity of milk in relation to maternal dietary characteristics. Specifically, we evaluated whether the balance between appropriate and inappropriate milk immune activity may differ by maternal nutrient intake. Data from an ongoing study on maternal stress and milk immunity among Michigan mothers were used. 24-hour dietary recalls characterized nutrient content of diet. We characterized milk in-vitro immune responses by incubating milk with RPMI mammalian cell-culture medium prepared with and without Salmonella (harmful bacteria). The baseline and the incubated milk specimens were assayed for interleukin-6 (IL-6) as a biomarker of pro-inflammatory activity. We defined appropriate response as a substantial (e.g., a 3-fold) increase in IL-6 in Salmonella-stimulated, but no increase in the specimens incubated without Salmonella. Preliminary data from 48 mothers revealed 28 with appropriate milk immune responses had higher intake of beta carotene ($P < 0.05$, t-test). The results suggest that maternal nutrition may influence milk immune response, furtheri

HOW WAR AND DROUGHT IS AFFECTING SYRIA'S AGRICULTURAL SUPPLY CHAIN
Presenter(s): Harrison Lucinski
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Camelia Suleiman (College of Arts & Letters)

The civil war and, according to NASA, the worst drought Western Asia has seen in 900 years have not only destroyed Syria as a country but also devastated its agricultural supply chain. Syria has been known as the "birthplace of agriculture" since gaining independence. Due to its geographical location bordering the Tigris and Euphrates rivers, there was always a plentiful water supply to sustain this agricultural oasis. However, when the civil war and a devastating drought compounded, not only did the country's political and economic status rapidly deteriorate-widely covered by mainstream news-but its agricultural status suffered as well. The entire supply chain collapsed. Components such as crop cultivation, livestock management, processing, storage, distribution, and retail were in disarray. Even a minor disruption to any of these branches can have cascading negative effects. This highlights the critical role of supply chains-not just in agriculture but in any business or economy-often overlooked or ignored. During the civil war, over 50% of the rural population declined, crippling economic stability, agricultural production, and vital irrigation systems. Over the last two decades, Syria's agricultural supply chain has weakened, leaving the country's only hope in outside assistance from other nations and allies.

THE HATE THEY GIVE: MASS SHOOTER MOTIVES AND BEHAVIORS
Presenter(s): Matthew Marshall
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Lori Ann Post (Northwestern University)

Background: Mass shootings are inherently hateful acts, yet the specific role of hate in shaping shooters' motives and behaviors remains understudied. This study examines the prevalence and nature of hateful behaviors among mass shooters, distinguishing those with hate-based motives from others. Methods: Data were drawn from social media, mass killing databases, eyewitness accounts, and police reports of mass shootings (1966-2024). Four independent raters coded observable forms of hatred, including racism, antisemitism, xenophobia, homophobia, and misogyny. A validated composite metric, the Hatred Scale (Cronbach's Alpha: 0.86-0.91), was developed. One-way ANOVA analyzed the relationship between mass shooting motives and the Hate Scale, and linear regression examined associations between the Hate Scale and fatalities, injuries, and shooter demographics. Results: The Hatred Scale identified 20 indicators of hateful behaviors (mean score: 3.45). Hate-motivated shooters (20%) scored significantly higher (mean = 6.43; SD = 9.18) than non-hate-motivated shooters (mean = 1.66; SD = 6.22). Hate-motivated shooters caused more fatalities (mean = 9.09) compared to others (mean = 6.6). Regression analysis confirmed a positive association between hatred levels and fatalities (coefficient = 0.157, p = 0.036). Notably, 57% of shooters exhibited no evidence of target

ENGINEERING PERSPECTIVES ON GLOBAL HEALTHCARE: OBSERVATIONS FROM PERU'S URBAN AND REMOTE MEDICAL SYSTEMS
Presenter(s): Josie Cayen, Katherine Heinecke, Leah Wilson
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Evangelyn Alocilja (College of Agriculture & Natural Resources)

As Biosystems Engineering students, studying abroad in Peru with the Michigan State University College of Osteopathic Medicine provided us with a unique opportunity to observe how healthcare systems operate in diverse environments and how engineering principles can be applied to medical challenges. This program allowed us to explore the contrasting medical infrastructures of Lima, a metropolitan city with advanced healthcare facilities, and Iquitos, a more remote city with limited resources. Additionally, traveling to villages along the Amazon River exposed us to the challenges of delivering medical care in isolated regions and the innovative, low-resource solutions used in these communities. By engaging with local healthcare professionals and observing diagnostic practices, we gained valuable insight into biomedical engineering applications, medical device accessibility, and the role of technology in global health. At the same time, it became clear that the medical disparities in these communities were further perpetuated by social factors and the health of the surrounding environment. The lack of a system for proper waste disposal, access to clean water, and climate control in hot and humid conditions all contributed to increased medical challenges. From these observations, it became clear the importance of viewing healthcare challenges from a OneHealth perspective. This experience deepened our understanding of how engineering can bridge healthcare disparities and reinfo

FLUOCINOLONE ACETONIDE IMPROVES MÜLLER CELL VIABILITY IN HYPERGLYCEMIC CONDITIONS: IMPLICATIONS FOR DIABETIC MACULAR EDEMA TREATMENT

Presenter(s): Brooke DuRussel

Science, Technology, Engineering, Mathematics (multiple disciplines)

Mentor(s): Brett Trombley (College of Natural Science), Susanne Mohr (College of Natural Science)

Background: Diabetic macular edema (DME) involves fluid accumulation in the macula, affecting cone photoreceptors and Müller cells. While intravitreal anti-VEGF injections help some patients, about 30% do not respond. For these patients, corticosteroids are the only alternative, but their effects on the diabetic retina are not well understood. This study aimed to evaluate the impact of fluocinolone acetonide (FAc), a steroid used for DME treatment, on Müller cell function under hyperglycemic conditions. Methods: Müller cells (rMC-1 rat cell line; hMC human cells) were treated with 5mM or 25mM glucose, with or without FAc (0.05ng/mL), for up to 96 hours. Müller cell function was assessed by measuring cell death and size using DeNovix CellDrop FL. Results: FAc (0.05ng/ml) reduced hyperglycemia-induced cell death by 100±6% in rMC-1 cells ($p<0.0001$) and 94.5±5.5% in hMC cells ($p<0.0001$). When administered 48 hours after the start of hyperglycemia treatment, FAc significantly reduced cell death (25.6±7.4%) compared to untreated cells (44.8±6.27%, $p<0.0001$), indicating strong interventional capabilities. Pre-incubation with FAc had no effect. FAc also reduced hyperglycemia-induced cell size by 90±10% ($p=0.037$). There was a strong correlation between hyperglycemia-induced cell size and cell death ($r=0.4292$; $p=0.0363$). Conclusion: FAc improved Müller cell viability in hyperglycemic conditions by potentially reducing cell size. Expanding steroid therapy, alone or with anti

MOVEMENT VARIABILITY IN A SKILL LEARNING ENVIRONMENT WITH NON-REDUNDANT TASK CONSTRAINTS

Presenter(s): Nikolas Pearson

Science, Technology, Engineering, Mathematics (multiple disciplines)

Mentor(s): Narae Shin (College of Education), Rajiv Ranganathan (College of Education)

One of the hallmarks of skilled performance is the ability to not only produce a high level of success, but produce it consistently. However, despite these consistency in achieving the movement outcome, the movement patterns of skilled performers can unintentionally be quite variable. This phenomenon is made possible by motor redundancy, which affords multiple solutions to achieve the same task outcome. In this study, we address how movement variability changes in learning with constraints present, especially when the task is not redundant. Participants learned a bimanual virtual throwing task on a robotic manipulandum for two days, where the goal was to slide a virtual puck as close as possible to a target. The motion of the puck was determined by the sum of the left- and right-hand velocities. A non-redundant system was made by removing user input from the left-hand and setting that velocity to 50% of the success criterion (i.e. the velocity required to land perfectly on the target). Despite the left-hand's limited role, participants demonstrated successful learning, as indicated by reduced task error and decreased velocity variability. Critically, the left-hand velocity converged toward 50% of the target velocity, suggesting that participants adapted their movement patterns to increase task performance, even in the absence of redundancy. T

A PROGRAM TO ANALYZE QUADRUPOLE FOCUSING TRANSPORT LATTICE FOR TRANSPORT OF HEAVY ION BEAMS
Presenter(s): Allison Diebol
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Luis Garabito Ruiz (College of Natural Science)

Beams of energetic charged particles can be focused with an alternating gradient lattice of quadrupole magnets. In this project, we develop a Python program to model the transport of a heavy ion beam using parameters consistent with beams in the Facility for Rare Isotope Beams (FRIB) at MSU. The program is structured to allow rapid approximate evaluation of lattices. Diagnostics to help visualize the response of the beam phase space to focusing lattices are constructed. System invariants are monitored to check consistency of results. Several focusing options are evaluated and analyzed for potential use in FRIB.

AUTOMATION OF LASER ALIGNMENT AND FIBER COUPLING ASSISTED BY MACHINE LEARNING
Presenter(s): Balaji Venkatesh
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Xing Wu (Facility for Rare Isotope Beams)

All optical physicists can tell you how precise laser alignment and fiber coupling are the cornerstones to a good experiment. However, manual alignment is time-consuming and is prone to human error. In this journey, I explored the automation of laser alignment and fiber coupling using machine learning techniques to enhance precision and efficacy. A feedback-driven optimization system is implemented, utilizing learning algorithms to predict precise beam positioning to maximize coupling efficiency. Then, the system adjusts laser positioning using adaptive control strategies. Automation significantly reduces alignment time while achieving optimal coupling efficiency comparable to or exceeding manual methods. By running the system at a set frequency, drift and hysteresis can be dealt with-resulting in constant maximum power output. By integrating machine learning into optical alignment systems, there are substantial improvements to be had, from scalability to autonomy.

VARIATION OF B (0 TO 3) TRANSITION RATE WITH SELECT EVEN MASS HEAVY NUCLEI
Presenter(s): Balaji Venkatesh, Nick Rohde
Science, Technology, Engineering, Mathematics (multiple disciplines)
Mentor(s): Vladimir Zelevinsky (College of Natural Science)

General features of collective octuple motion are still not well understood, specifically, the B (E3; 0+ -> 3+) = B (E3). Previous studies have identified a linear correlation between 2+ and 3- spin parity in even-mass Xenon nuclei, suggesting a potential relation applicable to other heavy nuclei. We aim to explore the existence of such a relationship across a broader range of heavy nuclei, utilizing previously experimentally determined energy values stored in the ENSDF. We chose to examine the existence of the relationship in the following nuclei: Uranium (A = 226-242), Californium (A = 244-252), Curium (A = 236-250), Polonium (A = 190-218), Thorium (A = 214-236), Radium (A = 206-232), and Mercury (A = 196-204). This framework could be applied to a broader pool of possible nuclei for the successful search of the atomic EDM.

EVALUATING CONSUMER PERCEPTION OF FRESHNESS AND QUALITY IN CUT FRUIT: A SENSORY STUDY ON PACKAGING IMPACT

Presenter(s): Courtney Maurer

Science, Technology, Engineering, Mathematics (multiple disciplines)

Mentor(s): Emily Mayhew (College of Agriculture & Natural Resources)

Packaging shapes consumer perception of food freshness and quality, influencing overall satisfaction. This study examined whether a new packaging design would enhance perceived blinded fruit quality and packaged fruit freshness. A 100-person consumer panel evaluated two packaging designs (control and proprietary) in a two-phase study. Phase 1 included blinded evaluation where participants assessed fruit samples without seeing the packaging, using three-digit blinded cups in a randomized order. They completed a paired preference and specified difference test to evaluate freshness. Phase 2 included a visual evaluation before tasting where participants viewed the fruit in its packaging, answered packaging-related questions, and used the "Check All That Apply" (CATA) method to describe taste, appearance, and texture. This structured approach captured sensory and visual influences on consumer perception. Preliminary results indicate a statistically significant preference for melon samples stored in the proprietary packaging compared to the control ($p < 0.05$). However, no significant preference difference was observed for pineapple samples between the two packaging types. When asked about packaging preference, panelists significantly favored the proprietary design for melon, whereas no significant difference was found for pineapple packaging. These resu

ENHANCING LOCAL STRAWBERRY PRODUCTION: SENSORY AND INSTRUMENTAL EVALUATION OF CULTIVARS AND GROWING CONDITIONS

Presenter(s): Sarah Samir Modi

Science, Technology, Engineering, Mathematics (multiple disciplines)

Mentor(s): Emily Mayhew (College of Agriculture & Natural Resources)

Local strawberry production in Michigan is limited, creating reliance on imports. Therefore, there is a need to optimize strawberry cultivars and growing temperatures to achieve high-quality and high-yield production locally. This study seeks to enhance the economic sustainability of controlled growing systems and encourage Michigan greenhouse farmers to fully utilize their resources. We hypothesized that growing temperatures significantly impact the sensory attributes of strawberries and that consumer preferences vary depending on these conditions. We conducted a sensory evaluation on four strawberry cultivars ('San Andreas', 'Mara Des Bois', 'Seascape', and 'Albion') which were grown under four different day/night temperature treatments (27/19, 24/16, 21/13, 18/10°C). Non-destructive measurements, including diameter, mass, and color, were taken using a digital caliper, laboratory analytical scale, and colorimeter respectively. Sensory evaluations were conducted wherein panelists evaluated samples on set parameters; a descriptive test to assess consumer preferences. Panelists were given halves of five strawberry samples, with warm-up solutions, water, and crackers for palate cleansing. On the remaining halves, destructive measurements were performed to determine firmness, °Brix, and acidity using a texture analyzer, digital °Brix reader, and titratable acidity device. The findings indicate that lower temperatures (18/10°C and 21/13°C) produced higher-quality strawberries,

VISUAL & PERFORMING ARTS

AN EXPLORATION OF THE POPULARIZATION OF CAPRIS FOR WOMEN IN THE 1960S AND 70S
Presenter(s): Liv Ceithaml
Visual & Performing Arts
Mentor(s): Theresa Winge (College of Arts & Letters)

Capri pants owe their popularity to Mary Tyler Moore. The actress changed television when she first debuted her capri pants fashion. Although the actress was not the first woman to wear capris, her regularly wearing them on The Dick Van Dyke Show (1961-1966) popularized them among American women. Mary Tyler Moore changed fashion for women and led to the modernization of the "housewife" in TV. Pants were not commonly worn by women in the 1960s. Pants were first created due to men's discomfort while riding horses and wearing robes though they were not used in day-to-day life until later. Women also wore trousers during the nineteenth century but typically only for horseback riding, and they often wore long skirts to cover the pants. Capris were normalized for women until the 1970s because Mary Tyler Moore influenced the greater public by wearing them on television. The design of capris is first attributed to the German designer Sonja de Lennart. The design was then popularized by A-List celebrities like Aubrey Hepbern. Although designers like Coco Chanel used capris as a symbol of empowerment in her designs, the pants were never picked up as a trending item until Lennart created the capris that emphasized a woman's figure. This research presentation explores how Mary Tyler Moore helped popularize capris as a fashionable garment for women.

EXPLORING THE EFFECTIVENESS OF SIGNS AND LANDMARKS IN WAYFINDING
Presenter(s): Hayley Asai
Visual & Performing Arts
Mentor(s): Rebecca Tegtmeyer (College of Arts & Letters)

In wayfinding contexts, signs and landmarks are crucial for the navigation of any given physical space. Those moving through a space will use the visual language on signs and the reference points of landmarks to navigate and direct themselves to an end goal. Visual design aspects evident in elements such as typeface choice, style, use of applied colors, and additional imagery are critical in informing a user's information-processing. This concept is necessary in the creation of a wayfinding system which accurately guides the user through a space. With in-depth inquiries into an existing system, we are able to gain insights surrounding the current obstacles and challenges that could be improved with attention to basic design decisions. This research project concerns the effectiveness of wayfinding systems, specifically the utility of signs and landmarks. The Michigan State University Main Library has served as the context for investigation. The overarching research questions guiding this project are: In what ways do the present signs and landmarks succeed or fail at guiding library visitor in their end goals? What challenges and obstacles are evident in their navigation? How can design better intervene in providing a more positive navigating experience for library visitors? The project is in

STANDBY THEATRE IN LONDON ...GO!
Presenter(s): Ally Doederlein
Visual & Performing Arts
Mentor(s): Karen Kangas Preston (College of Arts & Letters)

I have been involved in theatre since elementary school, but did not start studying stage management until a few years ago. Since coming to Michigan State, I have studied stage management and technical aspects of theatre. My interest in pursuing stage management as well as my interest in studying abroad led to exploring the role of a stage manager in England since there is a strong theatre presence there. I started with reading a UK stage management book and some articles before leaving for my study abroad. I connected with UK stage managers online via a Facebook group and arranged interviews for when I arrived. During my time in London, I conducted these interviews and was able to shadow two different stage management teams during rehearsals and performances. By living in London, I was able to meet with stage managers in person, shadow teams, and tour venues, and I gained valuable knowledge that would not be possible if I was sitting in a classroom at home in the United States. While shadowing Back to the Future , I experienced firsthand how scenic automation works in a musical of that scale, which is important to understand and knowledge I will use in my future career. Being exposed to theatre in London and truly immersing myself in it for five weeks enhanced my basic understanding of London theatre which allowed me to dive deeper into my specific area of study: stage man

MAKING MONSTERS: COMMUNITY ENGAGEMENT THROUGH CERAMICS
Presenter(s): Addison Preister
Visual & Performing Arts
Mentor(s): David McCarthy (Residential College in Arts & Humanities)

Through a collaboration with the East Lansing public library, I brought the monsters that kids drew to life through clay. For this project the library held a monster themed read aloud day for a group of nine children, where each drew a monster. Based on the drawings, I lead a group of Michigan State University students through the multi-day project of sculpting the children's creations. Once the clay creations were finished and painted, they were given back to the children. The goal of this project was to get kids interested in clay, provide a free opportunity for students to use clay, and to connect people together. As we bring monsters to life, my hope for is that this event introduces kids to how fun and personalized pottery can be, and gets them interested in exploring it further.

ENGAGING LOCAL CHILDREN WITH SPACE-BASED CREATIVE ACTIVITIES
Presenter(s): Kate Brown
Visual & Performing Arts
Mentor(s): David McCarthy (Residential College in Arts & Humanities), Shannon Schmoll (College of Natural Science)

This presentation examines observations made while providing community children a space to explore their creative freedoms in the context of space-related lessons. Through partnership with Abrams Planetarium and utilizing community connections such as school science night outreach participation and the Spartan Young Astronomers Club, local children were given the opportunity to enhance their learning at these events with creative-based activities. At these programs, children were taught many diverse facets of the science of space: meteoroids, spectroscopy, gravity, archaeoastronomy, naked-eye astronomy, and astronaut training. They could then participate in a craft relative to the lesson. For example, during the astronaut training session, they could make paper collage astronaut suits, and after learning about light spectroscopy, they could make bookmarks with a spectrum they saw from a specific element. At both school science nights and Spartan Young Astronomer club meetings, participants were given an art project matching the meeting's theme. These art projects defined the children's interest in the topic, as well as allowed them to relate their creative experience with the science they were learning. Watching every child's project develop into an entirely unique culmination of both science and art was both rewarding and fascinating. It

CONDUCTING ARTS-BASED WORKSHOPS WITH LOCAL INCARCERATED YOUTH
Presenter(s): Abigail Bowers, Lily Dixon
Visual & Performing Arts
Mentor(s): David McCarthy (Residential College in Arts & Humanities)

In Spring 2024, Lily Dixon and Abigail Bowers established a registered student organization that partners with the local youth detention center to provide arts programming for incarcerated youth. The partnership aims to address educational inequities and foster skills and relationships vital for the youth. Over the past year, Dixon and Bowers have built supportive connections with the youth, observed their skill development, and witnessed their artistic vulnerability grow. This poster will showcase a summary of their work with incarcerated youth and an outline of an art installation composed of the collected art pieces. They also conducted a literature review that emphasizes the significance of arts programming for justice-involved youth.

SWEET GRASS
Presenter(s): Caden Baan, Chris Kozlowski, Neda Fellows
Visual & Performing Arts
Mentor(s): David McCarthy (Residential College in Arts & Humanities)

Our project follows the story of how working with local communities and research led to the creation and execution of a public event detailing the importance of Sweetgrass. We discuss its importance in communities locally and around the world, both culturally and environmentally. With the help of the Digital Scholarship lab, we had the opportunity to work with new forms of technology to create a walk-in, pop-up experience, creating strong engagement for viewers alike. Along with research provided through Michigan State University's Beal Garden, we were able to display information that is not overtly well known or talked about. Working with these two local communities available to Michigan State students, viewers were able to experience a presentation held in the 360 room that allowed them to learn about such an important plant. The narrative includes reflection on how doing such work helped all participants grow and learn more about the world and communities around us.

PLANT FAMILIES IN ART AND ANCIENT MEDICINE
Presenter(s): Kaeden Carlsen
Visual & Performing Arts
Mentor(s): David McCarthy (Residential College in Arts & Humanities)

Exploring the relationship between plant various plant families found within the Beal Botanical Gardens and their connection to paintings throughout history and ancient medicinal practices. These connections vary widely throughout history, from the medicinal practices of ancient Greek civilizations to paintings within the Dutch Golden Age.

SOCIALLY ENGAGED PRINT MAKING
Presenter(s): Isabella Cucchetti
Visual & Performing Arts
Mentor(s): David McCarthy (Residential College in Arts & Humanities)

An event will be put together in the interest of looking at participatory art and how it interacts with the community surrounding it. This event will be a workshop which invites people who were not previously involved in an art-focused community and perhaps do not consider themselves artists to experiment with and experience artistic creation. The hope is that in a low-barrier, low-stakes environment, participants can step outside of their comfort zone and really engage with the creative process.

DEFENDING YOURSELF AGAINST MANIPULATIVE FORCES USING MAGIC
Presenter(s): Abby Brumbaugh, Addison Beal, Ashley Morgan, Fletcher Wasnich
Visual & Performing Arts
Mentor(s): David Watson (College of Arts & Letters)

The practice and belief in "Magic" has changed dramatically throughout the centuries of human history. Different cultures, religions, and societies have used what we refer to as magic in important rituals, ceremonies, and daily life. Through studying this practice throughout history, we have created our magical ritual, pulling from many different sources of magic practice such as numerology and the Hieroglyphic Monad. The goal of this magical ritual is to rid the participants of manipulative forces from their lives, a form of protection spell. This has been achieved through a variety of different forms, including several symbols, candles, flowers, and other components related to protection, the ridding of evil, and purity of self from related literature.

FROM SHAME TO PRIDE: EMBRACING MY MEXICAN ROOTS IN ART
Presenter(s): Daniela Ruiz Barajas
Visual & Performing Arts
Mentor(s): D'Ann Desimone (College of Arts & Letters)

Since moving to the U.S. from Mexico, I have developed a deep passion for art and design. A key influence in this journey has been Professor D'Ann de Simone, whose mentorship has encouraged me to push my creative boundaries. Her emphasis on experimentation, iteration, and attention to detail has shaped my understanding of design. Beyond technical growth, her support has empowered me to embrace my identity as a Mexican artist, transforming what once made me feel ashamed into a source of pride. This shift has allowed me to infuse my heritage into my work, making my designs more authentic and personal. This encouragement would lead me to create a painting that would blend different techniques to visually express my heritage. In my painting, I will create a structured background with black and gray geometric forms, symbolizing stability. Over this, I'll layer fluid, organic shapes with bold red and yellow lines that twist and break through, representing my experience navigating two cultures. Inspired by Pedro Friedeberg, I'll contrast precise lines with free-flowing movement to create energy and tension. Friedeberg's journey also resonates with me. As an Italian artist who found his artistic identity in Mexico, he shaped his style through cultural fusion. Similarly, my creative path has evolved since moving to the U.S. Through my art, I aim to express my identity and celebrate my heritage. I look forward to continuing to push boundaries and exp

ALL THAT I KNOW
Presenter(s): April Montoye
Visual & Performing Arts
Mentor(s): D'Ann Desimone (College of Arts & Letters)

In my artistic practice thus far, I have more questions than answers. Why do we make art? What does it mean to be a woman? What does it mean to be yourself? My mother taught me to sew just as she was taught by her mother. My grandmother taught me to bake just as she was taught by her mother. At 21, I am still trying to understand my place in the world. I do know that my identity as a woman is very important to me, although I often don't understand it. I find catharsis in intergenerational conversations with the women around me. I find out more about myself and my place in the world with each thing that I make. My work often explores pieces related to my gender identity as a woman, and I am interested in historical art of or by women. I've learned about Professor de Simone's craft in my time as her Studio Research Assistant. Like her, I have a passion for textiles, secondhand and vintage items. Working with de Simone inspired me to use my artistic practice to explore my womanhood through a mixed media approach in a project titled All that I know. I anticipate that I will make a 36x36" mixed media painting on an octagonal wooden panel. I will incorporate a found photograph of a statue of a woman that has been corroded by acid rain. I am interested in this image because it is a traditional depiction of a woman in western fine art. The worn-down appearance of the statue conveys the ecological effects of climate change. The statue of the woman has a pleading look on her face. W

SENTINEL
Presenter(s): Wensel Poston
Visual & Performing Arts
Mentor(s): Lorelei d'Andriole (College of Arts & Letters)

This work is a canid figure with a blacklight lantern for a face, with a mechanical component that turns to watch its audience as they move around the room. Its purpose is to mirror my own struggles with severe paranoia and feelings of inhuman separation from my peers. Its black glossy fur contrasted with the bright light and silver lamp serve to, in its correct setting of extreme darkness, make parts of it nearly invisible and others extremely and unavoidably bright. It serves as a contrast between the darkness of the environment, in which it could blend if not for its obsessive nature, and the abrasively bright light of the blacklight with which it searches for secrets that don't exist and it cannot change.

SOCIETY: WOVEN BY WOMEN
Presenter(s): Ana Wingle
Visual & Performing Arts
Mentor(s): Rebecca Schuiling (College of Arts & Letters)

This presentation and associated works explore the role of women and textiles in shaping societies. By examining themes within the roles women play through the use of textiles, we deepen our understanding of how societies were created. Themes of creators are expressed through the process of spinning yarn from fibers. Economic freedoms are shown through a wedding gown and its role within society. Rituals and customs are explored through embroidery techniques and symbolism. Community is represented by a garment inspired by the women at Michigan State University. The theme of voice and power is expressed in a garment inspired by Mary Queen of Scots. The last work explores the structures of society through weavings depicting the roles of the first women. This research addresses the gap in our awareness of the roles women and textiles play in the creation of cultures, customs, and society.

Women and the hands that built civilizations are diminished to domestic labor and not recognized as true contributors. It highlights textiles as both a form of voice for women and oppression throughout society. Women's voices and their stories are integral to the construction of our world, and it is important to understand the way in which our world was built and shaped. This research was conducted through literary analysis of mythologies, stories, and further texts. Ar

THE PROMINENCE OF BOOK BANS
Presenter(s): Phoenix Poole
Visual & Performing Arts
Mentor(s): Lorelei d'Andriole (College of Arts & Letters)

More and more often across the United States, books of all kinds are being banned from schools. For one reason or another, materials for learning are finding themselves censored. These books are no longer accessible to those who might benefit from the knowledge held within. It is not too dissimilar to the ultimate preservation of knowledge, keeping it so far locked away that only a select few can access it. In both cases people that could use the information are kept separate from it for seemingly arbitrary reasons. The preserved books are still readable, even if they are only accessible by select individuals. I argue that both book banning and extreme preservation are bad. I plan to examine the connections between different banned books and look into where each individual book is banned. I will preserve these books by growing crystals over them. The books will be open to particularly striking or discussed pages and will be unclosable. I plan on choosing 3-4 books in particular of differing subject matters and preserving them with different color crystals. During the research I expect to learn what kind of books get banned, why books get banned, and ways to best preserve books. The piece would be a lot about the process over the final product. The crystals relate to nature, while the books relate to the made world. This piece fits into my portfol

PRESENTER INDEX

MENTOR INDEX

MICHIGAN STATE
UNIVERSITY

URCA.MSU.EDU