

2026 Research Symposium



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Welcome to the 2026 University Research Symposium!

The 2026 Symposium marks the 35th anniversary of Illinois State University's annual celebration of student scholarship.

For more than three decades, the Symposium has served as the university's premier campus-wide showcase of undergraduate and graduate research. Befitting this milestone year, the 2026 Symposium features a record number of presentations, including 473 posters and e-posters presented across the morning and afternoon sessions. Additional satellite events featuring oral presentations bring total student participation to nearly 500 students.

Research is central to ISU's commitment to excellence in teaching, learning, and scholarship. Across our curricula, students engage in research through course-based projects, independent studies, summer research programs, capstone experiences, and thesis or dissertation work. Faculty mentors play a vital role in guiding these experiences, engaging students in both faculty-led and independent research. This year's Symposium reflects that strong culture of mentorship, with the participation of 183 faculty mentors.

Participation in research also prepares students for success beyond the university. Through the research process, students develop essential career-ready skills such as critical thinking, problem-solving, collaboration, communication, and project management. Presenting their work helps students learn to articulate complex ideas, respond to feedback, and engage with diverse audiences—skills highly valued in graduate study and across a wide range of professions. ISU's Career Services is on-site to provide headshots and resources.

Research at Illinois State also fosters interdisciplinary collaboration, both within the university and with external partners. As part of the Symposium, we highlight several faculty-led research projects supported through ISU's Advancing Research and Creative Scholarship (ARCS) initiative, which brings together collaborative teams of faculty and students across disciplines; as well as projects from the Connected Communities Initiative (CCI), our partnership agreement with OSF HealthCare, and the Illinois Innovation Network (IIN). We also feature information from our own interdisciplinary research Centers.

We invite you to enjoy all the Symposium has to offer.

Dr. Gina Hunter, Director, Office of Student Research

Dr. Craig Gatto, Interim AVP for Research

Dr. Claudia Petrescu, AVP for Graduate Education and Internationalization Initiatives

ACCOUNTING

BOTTOM-LINE MENTALITY AND WORKERS PERCEPTIONS OF ORGANIZATIONAL CITIZENSHIP BEHAVIORS

Presenter(s): Lopez, Victor (Undergraduate, Accounting)

Mentor: Nathan Hartman

Authorship: Victor Lopez, Nathan Hartman

Across multiple industries, organizations hire employees who are willing to work in teams and cooperate with others, which means they place a high value on employees who are helpful and are willing to fulfill tasks beyond their job description. These discretionary behaviors, or organizational citizenship behaviors (OCBs), are unwritten tasks that organizations hope workers perform as they benefit their organization. Because OCBs are not on the job description, they have often gone unrecognized, and it's not clear if today's employees still view OCBs the same way as employees did 25 years ago. We believe changes in work culture and the bottom-line mentality (BLM) at work greatly impact what employees now perceive as OCBs. In this study, we plan to survey students and workers to examine organizational citizenship behaviors and bottom-line mentality. It examines how competitive incentives influence discretionary helping behavior and contributes to the broader research stream on citizenship behavior.

BLM is a competitive way of thinking where the outcome is the main priority, devaluing ethics and other people for competitive reasons.

AGRICULTURE

A COMPARATIVE ANALYSIS OF U.S. AND BRAZILIAN GRAIN POLICIES

Presenter(s): Cortina Zanella, Marina (Undergraduate, Agriculture)

Mentor: Maria Boerngen

Grain support programs play a central role in stabilizing farm income and shaping global commodity markets. This study compares how the U.S. Agriculture Risk Coverage (ARC) and Price Loss Coverage (PLC) programs, along with Brazil's Minimum Price Guarantee Policy (PGPM), influence producer behavior, domestic market outcomes, and international trade dynamics. Using documented case examples and policy descriptions from USDA and CONAB, the analysis highlights how each program is structured and evaluates the economic consequences these policies generate for prices, production decisions, and overall market performance.

NUTRITIONAL INFLUENCES ON SKELETAL GROWTH AND DEVELOPMENTAL DISEASE IN YOUNG HORSES

Presenter(s): Flater, Rosalind (Undergraduate, Agriculture)

Mentor: Michelle Kibler

Growing horses up to two years of age require proper nutrition, exercise, and management to support normal skeletal development and prevent developmental orthopedic diseases (DODs) such as osteochondritis dissecans (OCD), physitis, and flexural limb deformities (FLDs). During the first two years of life, horses experience rapid bone growth that is highly influenced by energy intake, protein quality, and mineral balance. Nutritional imbalances—such as excessive energy intake, excesses or deficiencies of crude protein and amino acids, or improper ratios of calcium, phosphorus, copper, or zinc—may disrupt growth plate function and potentially lead to orthopedic disorders including OCD, physitis, and FLDs.

Osteochondritis dissecans primarily affects articular cartilage and the underlying subchondral bone, resulting in structural abnormalities. Flexural limb deformities involve the inability to fully extend the limb; in some foals, this condition prevents standing, while others may knuckle over at the fetlocks. Physitis is characterized by swelling around the growth plates. Many of these DODs can be treated through nutritional correction if identified early; however, surgical intervention may be required in more severe cases.

This study reviewed proper nutrient requirements for foals, weanlings, and yearlings, with an emphasis on age-appropriate dietary adjustments, balanced forage, and concentrate programs. Scientific data were collected from extension publications, peer-reviewed journal articles, and veterinary manuals published from 2017 to the present.

Young horses up to two years of age have high and continually changing energy requirements. Proper mineral balance is critical for skeletal integrity, including maintaining a calcium-to-phosphorus ratio of approximately 1.5:1 and a zinc-to-copper ratio between 3:1 and 4:1. Deviations above or below these ratios may increase the risk of developing DODs. Energy requirements also change as horses grow and can be estimated based on age. Protein requirements typically decrease from approximately 14.5% in weanlings to about 11.3% by 18 months of age. These requirements may also vary depending on breed and activity level.

Because bone development begins in utero, it is equally important that pregnant mares receive adequate nutrition. Feeding a mare-and-foal ration or high-quality forage that meets both the mare's and the developing foal's nutritional needs is essential. If a young horse develops a DOD, mobility issues may arise; however, these can often be managed or corrected through dietary adjustments, controlled exercise, and corrective farriery when addressed early. If not identified promptly, surgical intervention may become necessary.

Maintaining a balanced diet alongside appropriate exercise and management practices is crucial for healthy skeletal development and minimizing the risk of DODs in growing horses. Understanding the critical role nutrition plays in bone development can help owners prevent mobility issues while saving time and financial resources.

HOW TO BUILD A PROFITABLE AND SUSTAINABLE FARM BUSINESS FOR THE NEXT GENERATION

Presenter(s): Kerber, Nicole (Undergraduate, Agriculture)
Brent, Tyson (Undergraduate, Agriculture)
Cortina Zanella, Marina (Undergraduate, Agriculture)
Harrell, Ethan (Undergraduate, Agriculture)
Holtgrave, Jacob (Undergraduate, Agriculture)
Quigley, Owen (Undergraduate, Agriculture)
Ruholl, Joe (Undergraduate, Agriculture)

Mentor: Maria Boerngen

Agriculture dominates the Illinois landscape, with nearly 75% of the state's land dedicated to farming. Despite this, approximately 50% of farms do not have a succession plan in place, and 21% lack a next generation to whom the farm can be passed. At the same time, Illinois net farm income has declined by 63% from 2023 to 2025. These trends raise serious concerns about the long-term sustainability of farm operations. Using information gathered through interviews with professional farm managers across the state, this research highlights the importance of proactive succession planning and identifies key challenges and strategies for building a profitable and sustainable farm business for future generations. Illinois agriculture is largely driven by family-owned operations, which represent approximately 96% of farms across the state. However, prolonged periods of declining profitability, combined with a widespread lack of succession planning, have caused younger generations to pursue alternative career paths. Addressing these issues is critical to maintaining the local rural communities and the global food supply.

EFFECTS OF COMPOST INCORPORATED VERSUS SURFACE APPLIED ON SOYBEAN YIELD AND SOIL HEALTH

Presenter(s): Kuchanapally, Maheshwari (Graduate, Agriculture)

Mentor: Fanson Kidwaro

Authorship: Maheshwari Kuchanapally, Fanson Kidwaro

Compost application is increasingly recognized as a sustainable soil management practice that enhances soil health and nutrient availability in Agricultural system. However, the method of compost application incorporated versus surface applied may influence its effectiveness in improving soil properties and crop productivity. This study evaluated the effects of compost application method on soybean (*Glycine max* L Merr) yield and soil health at Illinois State University Research Farm in Lexington, Illinois, across two growing seasons, 2024 and 2025. The 2024 experiment compared incorporated versus surface-applied compost treatment, while the 2025 experiment included an untreated check along with the other two application methods. A Completely Randomized Design was used for four replications per treatment. Plant growth parameters: Plant height, pods per plant, and Yield components Seed moisture, grain yield, and soil health indicators were measured, including soil pH, OM, total soil carbon, and total soil nitrogen, CEC, and macro and micronutrients. Results indicated that compost application method did not significantly affect the plant height, pod production, and seed moisture, grain yield at either site, $P>0.05$. However, at the 2025 site, both compost treatments significantly enhanced soil CEC compared to the untreated check incorporated, +6.38 meq/100g, $P=0.003$, surface applied, +4.57 meq/100g, $P=0.019$. Compost also significantly increased soil nitrate, sulfur, calcium, Mg, and boron concentrations at the 2025 site, though these effects were not observed at the 2024 site. Multivariate analysis revealed no significance of overall treatment effects on the combined sites of plant growth yield parameters at either location. The site-specific response suggests that soil properties, environmental conditions, and baseline fertility strongly mediate compost effectiveness. The study demonstrated that while compost amendments can significantly improve multiple soil health parameters, particularly CEC and micronutrient availability, short-term yield benefits may not be immediately apparent under all conditions. Incorporation and surface application methods perform similarly, suggesting that compost applications, either incorporation or surface applied increase micronutrient availability. These Findings underscore the importance of considering soil health improvements as distinct from immediate yield responses when evaluating organic amendment strategies for sustainable soybean production.

KEY WORDS: Compost Application, Incorporated compost, Surface-applied compost, Soybean Yield, Soil Health.

PRIMARY STRESSORS IN ILLINOIS EQUINE VETERINARIANS AND THE INFLUENCE OF DEMOGRAPHIC AND PROFESSIONAL BACKGROUND

Presenter(s): Nation, Megan (Undergraduate, Agriculture)

Mentor: Drew Lugar

Co-Mentor: Michelle Kibler

Authorship: Drew Lugar, Michelle Kibler, Megan Nation

Equine veterinarians experience physically demanding work environments, long hours, financial pressures, and increased occupational injury risk, all of which contribute to elevated stress and concerns about burnout and workforce shortages. Despite the essential role equine veterinarians play, limited data exists on the stressors affecting this population. This study aimed to quantify primary occupational stressors among equine practitioners in Illinois and examine relationships between stress and demographic and professional factors.

Our survey was administered in November 2025 to licensed equine veterinarians practicing in Illinois following Institutional Review Board (IRB) approval. Participants were identified through the American Association of Equine Practitioners (AAEP) directory. The survey collected demographic information (age, gender, ethnicity), professional characteristics (years since graduation, practice type, income, and travel distance), workload measures (hours worked per week and emergency shifts per month), career outlook, and Perceived Stress Scale (PSS) scores. Participants also ranked six occupational stressors: work-life balance, personal finances, risk of injury, human-client interaction, non-medical office activities, and coworker interaction. A total of 25 complete responses were received, representing a 37% response rate.

Work-life balance emerged as a major stressor, with 28% of participants reporting it had a major effect on daily life. Personal finances and human-client interaction were also impactful stressors; 44% of participants rated personal finances as a moderate or major stressor, and 60% rated human-client interaction as having a moderate effect. In contrast, coworker interaction more often ranked in lower impact categories, with 24% of participants rating it as a minor stressor. Perceived Stress Scale (PSS) scores ranged from 7-29, with 44% of respondent in the low stress category, 52% in the moderate stress, and 4% in high perceived stress, indicating a wide variability in perceived stress levels. Although 93% of veterinarians intended to remain in equine practice over the next year, only 67% planned to remain for the next five years. Additionally, 32% of participants were aged 65 or older, suggesting a potential future workforce shortage.

These findings demonstrate that occupational stress in equine veterinary medicine is strongly associated with workload, emergency responsibilities, and work-life balance, compounded by financial pressures and risk of injury. Quantifying these stressors provides a foundation for future research regarding veterinarian well-being and address potential shortages in the equine veterinary workforce in Illinois.

COMPARISON OF BASIL (*OCIMUM BASILICUM*) CULTIGENS IN A CONTROLLED ENVIRONMENT VERTICAL FARM

Presenter(s): Stevens, Sarah (Graduate, Agriculture)

Mentor: David Kopsell

Authorship: Sarah Stevens, David Kopsell, Robert Rhykerd, LC Yang, Michael Barrowclough

The global push for sustainable urban development necessitates the exploration and implementation of innovative, localized food production strategies. This study investigated the potential of Controlled Environment Agriculture (CEA), specifically in a vertical farming and hydroponic context, to identify diverse basil (*Ocimum basilicum*) cultivars best suited for high-density, efficient urban production. Seed of five basil cultivars—'Genovese', 'Holy' (Tulsi), 'Sweet Thai', 'Greek', and 'Cinnamon' were purchased from Johnny's Selected Seed (Albion, ME), seeded into coir fiber root cubes, and grown for two week using LED grow lights under a 16-hour photoperiod with a ½ strength Hoagland's nutrient solution in a Freight Farm® Leafy Green Machine (2017) with set points of 23°C and 70% RH. After two weeks, transplants were moved to 2.13 m vertical towers at a 10 cm spacing, with light supplied by LED strips on a 15-hour photoperiod and nutrients supplied with a ¾ strength Hoagland's solution. Non-destructive analytical methods were employed three times over a four-week growth period to quantify growth patterns and record morphological differences. Key metrics included SPAD meter readings (an estimation of average percentage of Nitrogen in the plant's tissue), plant height, number of nodes, internode length, and total leaf count. Findings suggest significant variation in growth habit, vigor, and overall biomass accumulation among the tested cultivars. SPAD was not significantly different across the measurement dates for each cultivar ($P=0.781$). Harvest weight differed among the basil cultivars ($P<0.001$), ranging from 1.45 g per plant for 'Holy' basil to 7.51 g per plant for 'Cinnamon' basil. This work informs best management practices for selecting appropriate basil varieties for commercial urban agriculture, enabling producers to optimize yield and resource use efficiency while catering to specific localized market demands. This study contributes to the descriptive literature on optimizing crop selection for efficient, localized food systems in urban areas.

BIOLOGICAL SCIENCES

REGULATION OF CELL SHAPE IN ARABIDOPSIS BY TRM18 PROTEIN

Presenter(s): Abdullah, Abu Habib Md (Graduate, Biological Sciences)

Mentor: Viktor Kirik

Authorship: Abu Habib Md Abdullah, Nora Lubkeman, Viktor Kirik

Plant cells lack defined Microtubule-organizing Centers (MTOCs), yet they assemble highly ordered microtubule arrays that are pivotal for cell division, elongation, and cell shape regulation. The TONNEAU1 (TON1) protein of Arabidopsis is homologous to the human centrosomal protein Fibroblast Growth Factor Receptor 1 Oncogene Partner (FOP), and both play a crucial role in regulating microtubule array architecture. However, the exact molecular role of TON1 remains poorly understood. It was found that TON1 associates with a large family of TONNEAU1-like Recruiter Motif (TRM) proteins, comprising 34 members. Our results indicate that targeted overexpression of TRM18 under the GL2 promoter significantly reduces trichome branching and localizes to the nuclear envelope. Enrichment of TRM18 in the nuclear envelope suggests the hypothesis that it may participate in microtubule organization at this site. Moreover, the role of TRM18 in the nuclear envelope shape regulation will be investigated. To elucidate the function of TRM18, we are testing its role in cytoskeleton organization and nuclear envelope shape regulation of Arabidopsis.

ATTACHMENT ISSUES: FINDING TRANSCRIPTIONAL REGULATORS OF MSHA PILUS IN VIBRIO CHOLERAЕ

Presenter(s): Alexander, Joseph (Graduate, Biological Sciences)

Mentor: Kyle Floyd

Authorship: Debajyoti Basu, Anindita Saha, Kyle Floyd

Vibrio cholerae is an aquatic Gram-negative bacterium and causative agent of the life-threatening diarrheal disease cholera. *V. cholerae* is most commonly endemic to warm estuarial waters, where the ability to form multicellular biofilms is critical for environmental survival. Current O1 El Tor pandemic strains of *V. cholerae* utilize the type IV mannose-sensitive hemagglutinin (MSHA) pilus for surface attachment and initiation of biofilm formation in the environment; yet, upon entering the mammalian host, cell-surface presentation of MSHA pili is detrimental to colonization and infection. Therefore, understanding how *V. cholerae* regulates MSHA pilus production to transition between these two vastly different niches is necessary to fully understand both environmental persistence and host infection. To date, knowledge of the transcriptional regulatory pathways that modulate MSHA pilus production is limited. Thus, through this work, we seek to identify transcriptional regulators of *msh* gene expression.

MSHA pili have been described to be encoded by ~17 genes (*mshHIJKLMNEGFBACDOPQ*), arranged in two predicted operons (*msh-I*: *mshHIJKLMNEGF* and *msh-II*: *mshBACDOPQ*); with *msh-I* controlled by two potential promoters (P1, P2), and *msh-II* by one potential promoter (P3). Work in our lab has demonstrated that P1 and P2 promoter activity is responsive to environmental signals, such as temperature and salinity. To date, we have observed no activity from the predicted P3 promoter. To identify regulators that modulate activity of the P1/P2 promoters, we have employed transposon mutagenesis with plasmid-based transcriptional reporters for P1/P2, as well as promoter pull-down assays.

To date, transposon mutagenesis has identified ~270 individual mutants exhibiting reduction in P1 activity. Identification of transposon localization in these strains is ongoing, with three potential transcriptional regulators identified so far. Currently, work is underway to validate the control of MSHA promoter activity by these newly identified transcriptional regulators; as well as screening for transposon mutants with altered P2 activity. Promoter pull-down assays for P1 have also yielded a target band of interest, currently undergoing identification.

Together, these studies will help to reveal the wider transcriptional regulatory network controlling MSHA pilus production, providing valuable insights into the mechanisms *V. cholerae* utilizes to persist within the environment and infect the host.

IONIC AND MOLECULAR MECHANISMS OF NEURONAL TEMPERATURE ACCLIMATION

Presenter(s): Amirfazli, Mehdi (Graduate, Biological Sciences)

Mentor: Wolfgang Stein

Maintaining stable neural function across different temperatures is a critical challenge for most animals. Since poikilothermic animals lack internal temperature regulation, their nervous systems directly experience environmental temperature changes. Therefore, their nervous systems provide a useful model for studying mechanisms that maintain neural stability across different temperatures. Neuronal activity arises from the movement of ions through membrane ion channels, producing electrical currents that underlie signal transmission and are sensitive to temperature. Temperature directly influences ion channel kinetics and the balance of ionic conductances, potentially disrupting neuronal excitability and network stability if compensatory mechanisms are not engaged. Although these ion channels and currents change with acute temperature shifts, the impact of long-term temperature acclimation on their function and expression remains unclear. Understanding this is essential because acclimation determines how neuronal networks maintain stable activity across sustained environmental temperature changes. Because oscillatory network activity depends critically on specific inward and outward currents in pacemaker neurons, we focus on I_h , an inward current that supports rebound from hyperpolarized states, and I_A , a potassium current that regulates the slope of rebound depolarization.

Neuronal excitability depends on the coordinated balance of multiple inward and outward currents; maintaining this balance may be critical for preserving network stability across temperatures. We hypothesize that temperature robustness emerges from compensatory adjustments in ionic conductance balance rather than from the intrinsic stability of ion channels.

To test our hypothesis, we quantify the temperature responses of I_h and I_A in identified neurons of the well-characterized crustacean stomatogastric nervous system in animals acclimated to either 10°C or 20°C.

Our preliminary data indicate smaller volume I_h currents in non-acclimated animals ($N = 12$, 0.59 ± 0.82 nA) compared to warm-acclimated animals ($N = 3$, 2.48 ± 3.27 nA), particularly at 10 °C for both acclimated and non-acclimated groups, suggesting that temperature acclimation may alter the properties of I_h in pacemaker neurons. We are currently increasing the sample size to improve statistical power. To determine whether the functional changes observed in I_h currents reflect underlying transcriptional regulation rather than post-translational modulation, we will isolate neuronal cell bodies and quantify I_A and I_h channel gene expression using quantitative PCR. This analysis will allow us to distinguish whether temperature acclimation may alter channel expression levels or instead modifies channel function through non-transcriptional mechanisms.

EXAMINING SELFISH GENETIC ELEMENT TRANSMISSION RATES AFTER DNA INTERVAL DELETION IN THE FILAMENTOUS FUNGUS *NEUROSPORA CRASSA*

Presenter(s): Baughman, Osprey (Undergraduate, Biological Sciences)
 Rimmey, Allison (Graduate, Biological Sciences)
 Haynes, Megan (Undergraduate, Biological Sciences)
 McAleese, Jenna (Undergraduate, Biological Sciences)

Mentor: Tom Hammond

Authorship: Allison Rimmey, Osprey Baughman, Megan Haynes, Jenna McAleese, Tom Hammond

Neurospora crassa is an ascomycete fungus that is found in diverse environments around the world. Regions include tropical, subtropical, and temperate climates, where the fungus is easily obtained from burnt vegetation. Some isolates of *N. crassa* contain a selfish genetic element called Spore killer-3 (Sk-3). The element is described as selfish because it transmits itself through sexual reproduction with bias, defying Mendel's Law of Segregation and (theoretically) increasing its frequency at the population level. Sk-3 achieves biased transmission through a process called meiotic drive. There are two different types of meiotic drivers, including true drivers, which come with little to no direct cost on gamete formation, and killer meiotic drivers, which decrease the number of viable meiotic products. Ascomycete fungi like *N. crassa* are particularly useful for studying meiotic drivers because they package their sexual spores (called ascospores) into spore sacs called asci. For example, an *N. crassa* isolate that contains no killer meiotic driver will typically produce eight viable ascospores in an ascus when it mates with another isolate that also does not contain a killer meiotic driver. Therefore, examining asci for numbers of viable ascospores can give direct insight into the presence of a killer meiotic driver in the genome of an ascomycete fungus.

Sk-3 is approximately four million base pairs long and includes hundreds of genes; however, it is thought to require only two genes to function as a killer meiotic driver. One of these genes should encode a poison (for spore killing) while the other should encode an antidote (for resistance to killing). While the antidote gene has been identified and named *rsk*, the poison gene has yet to be located within the genome. In this study, we are investigating the role of four DNA intervals in spore killing by Sk-3. These four intervals, i358, i383, i397, and i399, are thought to be located near or within the gene required for spore killing (i.e., the poison gene). We examine the effect of deleting each interval on spore killing and the rate of Sk-3 transmission through sexual reproduction. We anticipate that our results will help precisely define the location of the killer gene within Sk-3 and help answer questions concerning Sk-3's evolution.

INVESTIGATING THE IMPACTS OF LAND USE ON AQUATIC BIODIVERSITY WITHIN AN AGRICULTURAL WATERSHED USING ENVIRONMENTAL DNA

Presenter(s): Benson, Jenna (Undergraduate, Biological Sciences)

Mentor: Kara Andres

Authorship: Gwen Church, Katelin Meek, Kara Andres

Biodiversity within riverine systems is crucial for the ecosystem's health and function, yet many of these ecosystems are being disturbed through increased human impacts, threatening the biodiversity within. While the general patterns of decreased biodiversity within riverine systems are well documented, little is known about how biodiversity across multiple taxonomic groups responds to land uses in the surrounding watershed. [JB2.1]The Mackinaw River watershed is home to a vast majority of biodiversity in central Illinois. While many nature preserves are contained within this watershed, there is also significant disturbance from copious corn and soybean farms in the surrounding watershed. Environmental DNA (eDNA) can be used to efficiently measure the biodiversity and taxonomic composition of multiple species groups through sampling traces of DNA shed by organisms into the surrounding environment. In this study, we used eDNA metabarcoding to assess alpha and beta diversity across taxonomic groups at sites spanning a gradient of agricultural land use along the Mackinaw River watershed in central Illinois. To assess land use, we created a GIS map with 5-km buffers around each eDNA sampling site and applied a land use raster map to determine agricultural impact. We assessed biodiversity using eDNA metabarcoding with 12S and 18S primers to target fishes and eukaryotes, respectively. Our results revealed that alpha diversity of fishes was significantly higher in slightly and moderately disturbed sites, while eukaryotes were the most diverse in highly disturbed sites. Beta diversity among sites was high for both species groups. These findings demonstrate how land use in the surrounding watershed can impact the biodiversity of aquatic organisms across different taxonomic groups, providing important insights into potential conservation strategies to sustain the biodiversity of freshwater systems.

TESTING FOR SEXUAL DIMORPHISM IN THE SCALY-BREASTED WREN (MICROCERCULUS MARGINATUS)

Presenter(s): Cohen, Dinah (Graduate, Biological Sciences)

Mentor: Carlos Rodroquez-Saltos

Authorship: Dinah Cohen, Fernanda Duque, Carlos Rodriguez-Saltos

Sexual dimorphism is a common phenomenon in the animal world and occurs frequently among birds. While many birds exhibit extreme differences in plumage between the sexes, this is not always the case. Subtle dimorphism in body size or feather coloration, for example, has been detected using multivariate analysis in songbirds and in parrots. In many cryptic ground-dwelling birds, both male and female birds have dull plumage, appearing sexually monomorphic. That is the case of the Scaly-breasted Wren (*Microcerculus marginatus*), a bird that shows remarkable precision in timing its song. However, it is not known whether this behavior is sexually dimorphic. Based on a close examination of museum specimens of this species, we tested for sexual dimorphism in body measurements and feather coloration. Using this information, future studies will be able to investigate sexual selection in the timing of their song.

GENETIC PARENTAGE ASSIGNMENT FOR HOUSE WRENS

Presenter(s): Doyle, Katelyn (Undergraduate, Biological Sciences)
Gorman, Darren (Undergraduate, Biological Sciences)
Torres, Adrianna (Undergraduate, Health Sciences)

Mentor: Pirmin Nietlisbach

Co-Mentor: Rachael DiSciullo

Authorship: Katelyn Doyle, Darren Gorman, Adrianna Torres, Scott K. Sakaluk, Charles F. Thompson, Rachael A. DiSciullo, Pirmin Nietlisbach

Northern House wrens (*Troglodytes aedon*) are migratory songbirds that are socially monogamous; however, extra-pair mating is common. Social monogamy is when two individuals cohabit and engage in the care of offspring. Extra-pair paternity is a reproductive strategy in which a female mates with other males besides her socially paired mate. This mixed reproduction results in offspring in the same nest sharing the same mother but different fathers. The goal of this project was to determine paternity of the nestlings, which will allow us to later compare male song of individuals that fathered offspring in the same nest. Blood samples were collected from nestlings and parents during the breeding season. DNA was extracted using the Qiagen DNeasy Blood and Tissue Kit following standard protocols, then quantified using a NanoDrop and diluted to a standard DNA concentration. Polymerase chain reaction was performed to amplify the genes needed to determine paternities. GeneMapper software was used to analyze data obtained from fragment length analysis. We will use a Markov chain Monte Carlo method for pedigree reconstruction and parentage analysis in R, a statistical analysis software. We looked at seven different genetic markers called microsatellites, which are highly variable repetitive stretches of DNA that provide sufficient genetic variation to identify fathers. Although this work is ongoing, we expect to see multiple paternity within many nests, as previous studies in our lab have shown that 25-35% of nests have at least one extra-pair offspring. Investigating extra-pair mating in house wrens can help us understand why and how female birds engage in extra-pair mating, which remains largely unknown.

ESTABLISHING PLANT TWO-HYBRID ASSAY FOR DETECTING PROTEIN-PROTEIN INTERACTIONS IN ARABIDOPSIS AND TOBACCO

Presenter(s): Draper, Olivia (Graduate, Biological Sciences)
Castelino, Ashral (Undergraduate, Biological Sciences)

Mentor: Viktor Kirik

Authorship: Katelyn Olivia Draper, Ashral Castelino, Mary Bock, Trevor Rickerd, Viktor Kirik

Protein-protein interactions (PPI) are fundamental molecular events in living cells. While there are many assays that can detect these interactions, they often use heterologous organisms, are complicated, and are not quantitative. The novel Plant Two-Hybrid assay (P2H) is a plant cell adaptation of the popular Yeast Two-Hybrid (Y2H). We developed two plasmid vectors to fuse tested proteins with either Gal4 DNA Binding Domain (DBD) or VP16 Activation Domain (AD). Gateway compatible vectors provide researchers with a versatile cloning system to introduce proteins of interest. In the event of a PPI, reconstitution of the chimeric Gal4-VP16 transcription factor will induce the expression of HTB3-EGFP which is readily detectable and quantifiable as fluorescence. Focusing the signal to the nucleus by fusion of EGFP with the histone HTB3 facilitates detection by localizing it to a small and highly sensitive area. The use of Arabidopsis trichome specific promoters limit potential whole plant toxicity. We show that these Arabidopsis promoters are also active in tobacco pavement cells, allowing transient expression and rapid testing. To validate the principle of P2H, MYB23 and GL3 Arabidopsis proteins, which have been shown to interact previously, were used as a positive control. A truncated version of GL3, which does not interact with MYB23, was used as a negative control. P2H assay has been validated in Arabidopsis and tobacco, providing two approaches to observe PPIs. P2H provides a robust and accurate assay which will facilitate plant cell research by sensitive detection and easy quantification of the PPI strength in plant cells.

EXPLORING BEHAVIORAL PLASTICITY ACROSS INDIVIDUAL PERSONALITY VARIATION IN NORTHERN HOUSE WRENS

Presenter(s): Eufemia, Katie (Graduate, Biological Sciences)

Mentor: Pirmin Nietlisbach

Individuals often differ consistently in behavior, and such variation can have important fitness consequences. Behavioral plasticity allows individuals to adjust behavior across environmental contexts, yet it remains unclear how average behavior and plasticity are related within individuals, particularly across multiple traits and contexts in wild populations. This study will quantify individual variation in male aggression, provisioning rate, and clutch size across various ecological contexts including lay date, nest stage, and nestling age, in a population of Northern House Wrens (*Troglodytes aedon*). Using a reaction-norm framework, I will estimate individual differences in average behavior and plasticity to test whether these components covary and contribute to behavioral syndromes. I hypothesize that there is a trade-off between maintaining consistently high aggression and behavioral plasticity, where individuals with higher average aggression incur greater energetic maintenance costs, which may constrain their ability to express plastic responses, whereas less aggressive individuals face lower maintenance costs and are therefore able to allocate more energy towards context-dependent behavioral adjustments. Because these behaviors differ in the magnitude and directness of their fitness consequences, this approach will provide insight into the adaptive significance and maintenance of behavioral plasticity. Our results will further the understanding of how personality and plasticity jointly shape fitness in natural populations.

THE HOT NEW HAIRDO: A STUDY OF THE IMPACT OF URBANIZATION ON THE COATS OF PEROMYSCUS

Presenter(s): Fritz, Sylvia (Graduate, Biological Sciences)

Mentor: Javier delBarco-Trillo

Urbanization creates novel environmental conditions that can drive rapid phenotypic change in wildlife. In particular, urban environments alter thermal regimes, substrate composition, and visual backgrounds, potentially influencing pelage traits in small mammals. Previous studies have documented consistent shifts in animal coloration in cities, often toward darker or duller phenotypes, which may reflect adaptive responses to urban heat island effects, changes in camouflage requirements, or altered selective pressures. However, the pelage of small mammals such as mice, remain comparatively understudied along continuous gradients of urbanization.

This project examines how urbanization influences multiple dimensions of pelage phenotype in the native *Peromyscus* mice by integrating analyses of hair length and hair coloration in animals trapped across a gradient of urban intensity. Urbanization was quantified using percent impervious surface, allowing assessment of trait responses along a continuous environmental gradient rather than categorical habitat classifications. Hair length was measured from multiple dorsal and ventral hairs per individual to capture both within and among individual variation. In parallel, pelage coloration was quantified using reflectance spectrophotometry on the same specimens to objectively characterize variation in color and brightness across the urbanization gradient.

By combining fine-scale morphological measurements with spectrophotometric color data, this study evaluates whether urban environments are associated with coordinated shifts in both the structural and visual properties of mammalian pelage. The results provide a more comprehensive understanding of how urbanization influences mammalian phenotypes and contribute to broader discussions of urban-driven trait variation, thermal ecology, and the mechanisms underlying phenotypic responses to anthropogenic environmental change. Additionally, this work highlights the value of museum collections for investigating ecological and evolutionary responses to urbanization across spatially heterogeneous landscapes.

INSECT COMMUNITY AND POPULATION RESPONSE TO GENETICALLY MODIFIED FIELD PENNYCRESS (*THLASPI ARVENSE* L.)

Presenter(s): Graunke, Joshua (Graduate, Biological Sciences)

Mentor: Scott Clem

Authorship: Joshua Graunke, Scott Clem

Modern day agriculture is in dire need for practices that mitigate negative environmental impacts. Cover crops or intercropping, provide a wide variety of environmental benefits for agricultural systems but see barriers in adoption due to the uncertainty of economic gain (Popovici et al., 2023). Field pennycress (*Thlaspi Arvense* L.) is an over-winter cash crop that not only provides the environmental benefits of cover crops but also can be harvested as a byproduct to bring economic gain to crop managers (Sedbrook et al., 2014). However, to get to this state, pennycress has to be genetically modified by lowering glucosinolate levels to make byproducts more palatable for consumers (Alexander et al., 2008). Glucosinolates are plant defense compounds that provide the plants with chemical compounds to defend against herbivore attack. It is not yet understood how the genetic changes of these plants affect the insect community dynamics surrounding them and if these changes will cause pennycress will be less viable in agricultural setting. To address the question of how decreased levels of glucosinolates affect insects populations and communities, preliminary lab and field trials were conducted. Lab trials involving introducing a common herbivore, western flower thrips (*Frankliniella occidentalis*), to pennycress lines differing in glucosinolate content showed that herbivore populations may not be significantly affected by glucosinolate content, but higher herbivore damage may affect the seed pod production of modified plants. Field trials involving collecting samples of insects in pennycress fields with differing glucosinolate contents reveals that overall abundances may not be significantly affected by glucosinolate content, but certain insect show preference to different genetic cultivars of pennycress.

CASCADING EFFECTS OF LANDSCAPE DEGRADATION TO INDIVIDUAL BUMBLE BEE HEALTH

Presenter(s): Long, Brenna (Graduate, Biological Sciences)

Mentor: Ben Sadd

Authorship: Brenna K. Long, Ben M. Sadd

Insect pollinators provide critical ecosystem services, yet several key native pollinators, including North American bumble bees, have experienced population declines. Pesticides, floral resource loss, and pathogens are proposed as potential drivers, though their severity and interactions may vary throughout landscapes and between bumble bee species. Adequate floral resources are crucial, because bumble bees have specific foraging targets of pollen nutrition, including favored macronutrient ratios. However, in landscapes where floral resources are inadequate, specific nutritional targets may not be met, with physiological consequences. Developmental stress may ensue for pollen-dependent bumble bee larvae, affecting growth and immunity, and subsequently pathogen resistance. Such a 'multi-stressor' effect will have individual, colony, and population health and fitness ramifications. We hypothesize that variation in diet macronutrient ratios and concentrations will affect bumble bee larval pathogen infections by influencing immunity, with variation among species congruent with decline status. Using four synthetic diets varying in protein:lipid ratios and quality (protein- or lipid- favored and either high or low nutrition), we measure larval development and immunity of a stable (*Bombus impatiens*) and declining (*B. terricola*) species. Moreover, outcomes of experimental exposures to *Vairimorpha bombi*, a pathogen associated with North American bumble bees declines, are assessed. We predict naturally favored, higher protein ratios and nutrition will support immunity and infection resistance, but the declining species will be more sensitive to dietary alteration. This study will increase our understanding of causal mechanisms underlying bumble bee conservation challenges and allow us to improve planning and land management practices for improved conservation outcomes.

HOW DOES EXPOSURE TO HEAT OR COLD INFLUENCE THE EXPRESSION OF HSP GENES WITHIN THE CRANIAL TISSUES OF TURTLE EMBRYOS DURING DEVELOPMENT?

Presenter(s): Mercado, Matthew (Graduate, Biological Sciences)

Mentor: Rachel Bowden

Co-Mentor: Ryan Paitz

Authorship: Jacob Rollins, Matthew Mercado, Clinton Warren, Madison Wilken, Rachel Bowden, Ryan Paitz

Developing embryos are highly sensitive to incubation temperatures, such that heat waves and cold snaps can disrupt growth and reduce survival. Heat-shock proteins (HSPs) are well-studied molecular chaperones that may safeguard the embryo's proteins from denaturing when exposed to periods of thermal stress. During embryonic development, the nervous system is critical for sensory, motor, and vital life-sustaining processes; however, this system is sensitive to thermal stressors, especially the brain, where neural cells can be at risk of death. While we know that oviparous vertebrates, such as turtles, are sensitive to incubation temperatures during embryonic development, we are only beginning to understand how their responses are mediated. In this study, we investigated how four different HSP genes responded to transient 3-day exposures to heat ($32\pm3^{\circ}\text{C}$) or cold stressors ($22\pm3^{\circ}\text{C}$) at two different stages of embryonic development. We predicted that heat exposure would increase HSP expression, while cold exposure would decrease expression. Our results will help us understand how HSP genes respond to brief exposure to thermal stressors and how HSP responses are affected during different stages of embryonic development in ectothermic vertebrates.

THE ROLE OF FKBP51 IN REGULATING EMBRYONIC SENSITIVITY TO GLUCOCORTICIDS

Presenter(s): Montet, Eric (Undergraduate, Biological Sciences)

Mentor: Ryan Paitz

Authorship: Eric Montet, Ryan Paitz

Glucocorticoids play a critical role in regulating development and stress responses, but excessive glucocorticoid exposure during embryonic development can impair growth and survival. Cellular sensitivity to glucocorticoids is partially regulated by the binding protein FKBP51, a chaperone protein that acts as a negative regulator of the glucocorticoid receptor. The objective of the first study was to test whether inhibiting FKBP51 would increase embryonic sensitivity to corticosterone, resulting in more reductions in embryo growth and survival. To test this hypothesis, chicken embryos were randomly assigned to one of four treatment groups: control, corticosterone, FKBP51 inhibitor (SAFit2), or a combination of both corticosterone and SAFit2. Eggs were injected with pure vegetable oil, or oil containing corticosterone and/or SAFit2. Embryonic development growth and survival were then assessed after 14 days of development. Our findings were consistent with previous research, as corticosterone exposure significantly reduced survival and growth of the eggs. However, the inhibition of FKBP51 did not increase embryonic sensitivity to glucocorticoids during the developmental period. A second study was conducted to examine whether glucocorticoid exposure could induce FKBP51 expression in the developing brain. In this ongoing experiment, embryos are injected with varying doses of corticosterone, and FKBP51 levels will be measured to determine whether corticosterone will induce dose dependent changes in FKBP51 expression. Together, these studies investigate the role of FKBP51 in regulating embryonic development responses to glucocorticoids, while simultaneously exploring how glucocorticoid exposure may influence FKBP51 regulation. Understanding how these genes are expressed is important for elucidating how early life exposure to stress hormones (such as corticosterone) affects developmental outcomes, both physically and psychologically.

AGGRESSION AND EXTRA-PAIR PATERNITY: DO MEAN MALES MAKE MANY YOUNG?

Presenter(s): Oldham, Olivia (Graduate, Biological Sciences)

Mentor: Pirmin Nietlisbach

Authorship: Olivia Oldham, Rachael DiSciullo, Scott Sakaluk, Charlie Thompson, Pirmin Nietlisbach

Socially monogamous species, such as the Northern House Wren (*Troglodytes aedon*), frequently engage in extra-pair copulations, resulting in discrepancies between social and genetic paternity. Extra-pair mating, or reproduction outside of the established pair, produces a social father that raises the young and a genetic father that sires the offspring. This variation can alter realized reproductive success among males. Aggression may promote extra-pair reproductive success, as bolder individuals are more likely to engage in risky behaviors such as intruding into neighboring territories. Aggression and boldness are highly correlated in a behavioral syndrome in House Wrens. Additionally, aggressive males may increase within-pair paternity by more effectively deterring rivals from their own nests. However, aggression comes at energetic and survival costs, reducing parental investment through decreased provisioning and potentially increasing predation risk. To test whether aggression predicts paternity success, I will conduct simulated territorial intrusions in a wild population of House Wrens in central Illinois. During the female's fertile period, a conspecific mount will be placed on the nest box and paired with a 10-minute playback of House Wren song. Behavioral responses, including latency to approach and attack, attack frequency, and time spent aggressively displaying, will be recorded via video and audio. Behavioral variables will be reduced using principal component analysis (PCA) to generate an aggression score for each male. Blood samples from parents and offspring will be used to assign genetic paternity. The proportion of extra-pair offspring will be analyzed in relation to male aggression scores to determine whether aggression predicts reproductive success. If extra-pair offspring's true genetic father can be identified, their aggression scores will also be evaluated and compared to see aggression's impact on extra-pair paternity. These data will reveal how aggression affects the true reproductive success of male House Wrens.

STANDARDIZATION OF SPERM BUFFERS IN PEROMYSCUS FOR ASSESSING INTRINSIC AND EXTRINSIC ENVIRONMENTAL VARIABLES

Presenter(s): Romps, Sydney (Graduate, Biological Sciences)

Mentor: Javier delBarco-Trillo

Authorship: Sydney Romps, Javier delBarco-Trillo

A requirement of every living organism on this planet is that it must be able to reproduce to pass on genetic information. The field of Reproductive Biology investigates all traits and processes of reproduction and has important applications across other broad fields of biology like ecology, evolution, physiology, endocrinology, and animal behavior. However, with broad applications across fields and species-specific differences among study organisms, it can be difficult to standardize methodological approaches. In the case of mammalian sperm cells, a buffer medium is required to allow the continued survival of sperm cells in vitro, mimicking the environment they encounter within the female reproductive tract. Most work with sperm cells focuses on the relationship between sperm traits and the intrinsic or extrinsic environmental variable of interest. For such studies, different researchers may have used different buffer mediums, yet comparisons among buffer mediums on how they may differently affect sperm traits are lacking. Here, using a within-male design, four sperm buffers are compared among sperm samples from mice in the genus *Peromyscus* to determine which buffer provides the best longevity of sperm cells over time. *Peromyscus* mice are the most abundant North American mammal, and a fantastic model to implement novel comparisons involving their reproduction at local, regional, and national scales. By determining the buffer that best promotes longevity of *Peromyscus* sperm cells, we can encourage the standardization of methodology in future studies.

MICROBIOME DIFFERENCES IN NORTH AMERICAN DEER MICE ACROSS GEOGRAPHICALLY ISOLATED POPULATIONS

Presenter(s): Shaw, Lee (Graduate, Biological Sciences)

Mentor: Pirmin Nietlisbach

Authorship: Pirmin Nietlisbach

An individual's gastrointestinal microbiome (the composition of bacteria, fungi, and viruses that live within the host) is an essential part of its digestive tract, as it helps the host process consumed food and indirectly contributes to changes in its immune system and nervous system. The microbiome responds to changes in diet, environmental exposure, and the interactions that happen between the host and its microbiome. However, isolating these contributors to the microbiome's composition and structure is difficult, as the three are interconnected. I am conducting a project in which multiple geographically isolated populations of North American deer mice, *Peromyscus maniculatus*, are sampled to investigate the effects of spatial distance, host population size, and host genetic diversity on the microbial communities at each sampling site. The sampling area, located within the Canadian Gulf Islands, an archipelago between Vancouver Island and Washington's San Juan Islands. By comparing each sample site's microbial composition with the host's population size and genetic diversity, I will determine the extent of association between population size and host genetic diversity in small, isolated populations. I will compare the differences in host genetic diversity, host population size, and the spatial distribution of sampling sites to differences in sampled microbiome compositions. My second objective will focus specifically on Mandarte Island, as it is the most sampled island with good representations for both young and adult mice. I seek to analyze the microbiomes of the Mandarte island population to investigate their composition across the population's age classes. Juvenile mice, as they wean from their mothers and leave their dens will start to consume solid foods which will cause their microbiome to change. These juveniles have a composition intended for a milk-based diet, but as they age and start to consume solid food, their microbiomes will shift to a composition that is best suited for their new diet. This project will assess how various factors affect microbiomes by testing how an individual's microbiome shifts in response to the genetic diversity of the host, the host's population size, and to the distance between populations, and how age-related dietary changes affect microbiome composition.

BECOMING A CIVIC STEM PROFESSIONAL: HOW SITUATED PRACTICE INTEGRATES CIVIC INTENTIONS INTO IDENTITY

Presenter(s): Soyebi, Blessing (Graduate, Biological Sciences)
Steilmann, Paula (Graduate, Biological Sciences)
Lim, Sori (Undergraduate, Nursing)

Mentor: Rebekka Darner

Authorship: Blessing Soyebi, Sori Lim, Kate Evans, Paula Steilmann, Rebekka Darner

Effectively addressing today's complex socio-scientific issues, from public health crises to environmental sustainability demands evidence-based, technical solutions. However, STEM undergraduates often report lower civic involvement than peers, which may be due to emphasis on technical mastery over societal impact and limited satisfaction with civic opportunities (Dauer et al., 2021). The study aims to evaluate the effectiveness of a civic engagement course in preparing STEM majors to become civically engaged scientists, equipping them with the skills and mindset to translate their STEM knowledge and skills into civic action to address societal issues they are passionate about solving. To assess the effectiveness of this approach, our mixed-methods study evaluates a summer bridge course at a Midwestern University. The research was guided by a central question: How do students' scientific civic engagement predictors, specifically their knowledge, value, efficacy, and intended actions, change from before to after a 6-week course experience? Using pre- and post-surveys and qualitative data, we analyzed these changes using established frameworks for civic action (Campus Compact, 2020) and the Predictors of Scientific Civic Engagement instrument (Alam et al., 2022). This research provides an evidence-based model for engaging STEM majors in civic engagement, demonstrating how targeted coursework can effectively equip STEM students to address the challenges facing our society.

PICKING A FIGHT: INVESTIGATING AGGRESSION-IMMUNE TRADE-OFFS IN THE JAMAICAN FIELD CRICKET (*GRYLLUS ASSIMILIS*)

Presenter(s): Szwed, Sydney (Graduate, Biological Sciences)

Mentor: Ben Sadd

Co-Mentor: Scott Sakaluk

Authorship: Scott Sakaluk, Ben Sadd

Life-history theory posits that organisms distribute limited resources among growth, maintenance, and reproduction. Male aggression may determine access to females and hence reproductive success, whereas immunity contributes to maintenance, ensuring survival and future mating. We hypothesized that any trade-off between investment in aggression and immunity could be realized through one of two non-mutually exclusive routes, with immune investment determined by: (1) an intrinsic difference in male investment in these traits, or (2) through direct costs of male-male competitive interactions. We tested these two alternatives in male field crickets, *Gryllus assimilis*, using a reciprocal approach, in which we first determined whether the outcome of an aggressive interaction is influenced by competitors' relative baseline immunity, and then assessed how engaging in aggression subsequently affects male immunity. To investigate the intrinsic costs of investing in aggression, we quantified male aggression and combined cellular and humoral immune assays to determine whether dominant males have lower baseline immunity compared with subordinate males. We found no association between baseline immunity and a male's dominant status, suggesting no intrinsic investment trade-off between traits associated with fight dominance and the immune parameters we measured. In a companion study, males were subjected to three rounds of staged competitive interactions, providing a spectrum of fight outcomes, or were kept uncontested as controls. Hemolymph was subsequently collected for immune assays to assess the direct costs of aggression and fight outcome on immunity. We predicted that males engaging in fights would have decreased immunity relative to control males, with the reduction more pronounced in dominant males. This work provides an integrative assessment of the trade-off between aggression and immunity, contributing to our understanding of factors maintaining variation in immunity.

URBANIZATION AND THE ULTRASONIC VOCALIZATIONS OF WILD DEER MICE (*PEROMYSCUS MANICULATUS*)

Presenter(s): Thomas, Lydia (Graduate, Biological Sciences)

Mentor: Javier delBarco-Trillo

Authorship: Lydia Thomas, Javier delBarco-Trillo

Urbanization is a source of great concern regarding its influence on surrounding wildlife. Anthropogenic activity in urban areas affects many aspects of wildlife ecology, including physiology, demography, morphology, and behavior. The impact of urbanization on acoustic communication by wildlife has been a subject of particular interest. This has been studied in a wide array of taxa, including birds, prairie dogs, and crickets. The influence of urbanization on vocalizations that are outside the range of human hearing (greater than 20 kHz), however, has not been rigorously investigated. Mice in the genus *Peromyscus* produce these vocalizations, known as ultrasonic vocalizations (USVs). *Peromyscus* use USVs in three main social contexts: courtship, competition, and maternal care. These vocalizations have been thoroughly characterized in wild brush mouse (*P. boylii*) and California mouse (*P. californicus*) systems; however, little work has been done investigating *Peromyscus* vocalizations in controlled social contexts and in the context of urbanization. This project aims to (1) contribute to the characterization of wild *Peromyscus* USVs, (2) determine if the USVs of urban and rural mice differ, and (3) assess how captivity impacts these vocalizations. For this project, deer mice (*P. maniculatus*) were trapped in highly urban and highly rural areas within the locales of Chicago, IL and Bloomington-Normal, IL. We recorded USVs of urban and rural mice in the lab within courtship and competitive social contexts. Recordings were then analyzed, identifying different vocalization types, and quantifying their number and their spectral traits. We have found vocalization types that have not been previously characterized in this genus. Sex, social context, and degree of urbanization have emerged as potential determinants of variation in the types, number and characteristics of USVs. Ongoing work includes analyzing recordings of individuals born in captivity, illuminating the degree to which these vocalizations can respond plastically to environmental input. Results from this study will contribute to our knowledge regarding the effects of urbanization on wildlife behavior, in addition to informing efforts for the mitigation of human-wildlife conflict in the future.

SOCIAL RESURRECTION: SOCIAL INTERACTIONS AND RESTORATION OF DISTURBED BUMBLE BEES MICROBIOTA

Presenter(s): Timsina, Ravi (Graduate, Biological Sciences)

Mentor: Ben Sadd

Authorship: Paul Emmert, Jade Rehberger, Ben Sadd

Eusociality represents a major evolutionary transition. Eusociality, and social living more generally, have several associated benefits but also counter costs, affecting their evolution. The ecological dominance of eusocial insects suggests advantages of group living, including reduced predation risk, better resource utilization, and increased tolerance of adverse conditions. Conversely, costs include greater likelihood of pathogen transmission due to individual proximity and high relatedness. However, little attention has been given to the transfer of beneficial microbes among group individuals as an additional benefit of sociality, including those that help defend against disease. Both intrinsic, including host immunity, and extrinsic factors, including infection and antibiotic exposure, can disrupt the structure and functioning of a beneficial microbiota, leading to dysbiosis. We hypothesize that sociality can maintain a healthy gut microbiota, with social interactions facilitating the spread of beneficial microbes or resurrecting beneficial microbial communities following dysbiosis. Using the bumble bee *Bombus impatiens*, we test this hypothesis by disturbing a focal individual's gut microbiota through a stimulation of host immunity or antibiotic treatment. Subsequently we expose these focal individuals to solitary or social settings, before assessing gut microbiota structure and health effects. We show that in solitary situations, dysbiosis of beneficial gut communities is persistent. However, dysbiotic gut microbial communities are resurrected by social interactions, and predict that this will be accompanied by associated health benefits. This work furthers our understanding of host-microbiota relationships, including how social transmission of beneficial microbes may favor the evolution of social living.

TESTING MALE AND FEMALE RESPONSIVENESS TO VARYING COMPONENTS OF MALE NORTHERN HOUSE WREN (*TROGLODYTES AEDON*) SONG VIA PLAYBACK EXPERIMENT

Presenter(s): Vilsick, Lucy (Undergraduate, Biological Sciences)
Banks, Heidi (Undergraduate, Biological Sciences)
DeWeese, Eva (Undergraduate, Biological Sciences)
Roberts, Lyda (Undergraduate, Biological Sciences)
Mangieri, Brianna (Undergraduate, Biological Sciences)

Mentor: Pirmin Nietlisbach

Co-Mentor: Rachael, DiSciullo

Authorship: Lucy Vilsick, Heidi Banks, Eva DeWeese, Brianna Mangieri, Lyda Roberts, Scott Sakaluk, Charles Thompson, Pirmin Nietlisbach, Rachael DiSciullo

Northern house wrens (*Troglodytes aedon*) are one of many species of songbirds that use song to choose a mate for the breeding season. However, it is not known what about the male's complex song attracts the female or elicits the strongest response in males. In this species male song is made up of many correlated components, including a softer introduction section and a louder terminal section. In the playback experiment we present here, we dive deeper into how males and females react when different aspects of song are emphasized. The goal of the experiment was to elicit differential responses to synthesized songs in which correlated components were decoupled, and to determine whether house wrens have a preference for a particular song component, such as the length of the introduction section. We tested the hypothesis that different songs evoke different responsiveness. The responses we gather, especially from females, will indicate which components or combinations of components are preferred. Our study organism, the Northern house wren, is a songbird commonly found in the United States and Mexico that breeds here in Illinois. House wrens have a preference for human-made bird houses, which allows us to readily study them in natural environments when houses, called nestboxes, are provided. In our study area, 820 nestboxes are provided, allowing study of 600-900 house wren nests per year. Male songs were recorded in the field in 2018, then reconstructed on a computer to generate ten song exemplars that randomly decoupled the song traits of (1) introduction length, (2) terminal section length, (3) song rate, and (4) number of unique notes. An 11th song that was an average of the four manipulated song traits served as a control. Songs were used as playback stimuli at unoccupied nestboxes in the field during the 2021 breeding season. Playback trials were video recorded, and recordings were analyzed using scoring software called Solomon Coder to determine male and female arrival times and visitor duration. We will use a multivariate selection analysis to measure linear and non-linear selection acting on song component preference. Traditionally, bird song traits have been studied individually even though song itself is typically composed of multiple correlated components. Therefore, this multivariate approach is necessary to examine the relationship between correlated song traits and preference because it explores whether sexual selection of song is based on the overall structure of the song rather than individual components.

BIG OR SMALL, HOT OR COLD: THE EXPRESSION OF HEAT-SHOCK PROTEINS IN TURTLE EMBRYOS VARIES WITH THE TIMING AND DIRECTION OF TEMPERATURE CHANGE

Presenter(s): Warren, Clinton (Graduate, Biological Sciences)

Mentor: Rachel Bowden

Co-Mentor: Ryan Paitz

Authorship: Clinton Warren, Madison Wilken, Matthew Mercado, Jacob Rollins, Ryan Paitz, Rachel Bowden

The induction of heat-shock proteins (HSP) during the development of oviparous ectothermic vertebrates, such as turtles, may be an important compensatory response during transient thermal stress. In the red-eared slider turtle, we recently observed a decline in the expression of several HSP genes within whole trunks over early embryonic development. This ontogenetic shift in HSP expression may lead to differing responses to thermal stress across embryonic development, with potential implications to growth and survival. In this study, we explore the response of 5 HSP genes within whole embryo trunks to transient exposures (1 to 3 days) of either increasing (heat) or decreasing (cold) fluctuating thermal stress at two distinct periods of development 10 days apart. Two of these HSPs broadly tracked changes in mean temperature: rapidly increasing in response to heat and decreasing in response to cold, although these responses appeared dampened at later developmental periods. Moreover, returning embryos to intermediate baseline conditions after 4 days of heat or cold exposure resulted in those exposed to cold having higher expression than those exposed to heat after 24 h back at baseline. These results indicate that upward and downward shifts in mean temperature, in addition to absolute temperature, are important in shaping the response of HSPs during transient thermal stress in turtle embryos. Lastly, the expression of most HSPs declined across the overall sampling window in association with increasing embryo mass and stage, which may partly underly the variation between earlier and later responses to transient thermal stress.

THE TORTOISE OR HARE? TEMPERATURE AND DEVELOPMENTAL RATE AFFECT TRANSCRIPTOMES DURING DEVELOPMENT

Presenter(s): Wilken, Madison (Graduate, Biological Sciences)

Mentor: Rachel Bowden

Co-Mentor: Ryan Paitz

The effects of warm incubation temperatures on ectothermic embryos are complex and include acceleration of developmental rate and a suite of post-hatch phenotypic effects among offspring when comparing offspring that experienced different developmental conditions. In a previous study using RNASeq, we found that on day 6, *Trachemys scripta* embryos incubated at warm temperatures (31°C) had 4357 genes differentially expressed compared to embryos at cool temperatures (26°C). Because of the design of the study, it was unclear if this difference resulted from embryos being sampled at different developmental timepoints or different incubation temperatures. To tease apart these early developmental and temperature effects, eggs were incubated at either 31°C±3 or 26°C±3 for 6 days and then swapped to the opposite temperature for an additional 6 days to produce embryos at the same developmental stage in each treatment. A second group of eggs was incubated at either 31°C±3 or 26°C±3 for 6 days and then all moved to an intermediate temperature of 29°C±3 for an additional 6 days. Preliminary results indicate that, as expected, experiment 1 produced stage matched individuals and experiment 2 did not. Transcriptomes will be compared to identify genes and processes most affected during these early time periods to better understand the complex effects of temperature on early development.

STUDIES DIRECTED TOWARDS THE TOTAL SYNTHESIS OF A SUPPRESSION AGENT OF HIPPO-YAP SIGNALING NETWORK INVOLVED IN TUMOR GROWTH IN BREAST CANCER CELLS

Presenter(s): Alongi, Gia (Graduate, Chemistry)

Mentor: Shawn Raynard Hitchcock

Breast cancer is the most frequent and molecularly heterogeneous female cancer, arising from aberrant cell proliferation within breast glands. It is classified into distinct intrinsic subtypes, including Luminal A, Luminal B, HER2- enriched, and Basal-like, each with diverse natural gene expression patterns. Therapy approaches have evolved to account for this molecular variation, focusing on more biologically based treatments. The Hippo pathway is a biological pathway that plays a significant role in breast cancer by regulating cell proliferation, migration, and invasion. Its dysregulation is associated with aggressive tumor characteristics and poor patient outcomes. Overactive enzymes associated with Hippo pathway, known as YAP and TAZ, promote cancer stem cells and metastasis, making the pathway a potential therapeutic target of small drug synthesis. In this context, the authors Khaled A. M. Abouzid and Ching S. Chen developed a new structurally novel 1,2,4-oxadiazole based derivative that can serve as a breast cancer agent for the targeted biological pathway. The synthetic pathway that they developed has multiple steps and used the chemical agent phosgene, which is a dangerous chemical that was used for chemical warfare in World War II. We are developing a synthetic route that is more environmentally friendly and involves fewer synthetic transformations. This poster will present the chemistry that has been accomplished thus far in terms of developing an environmentally friendly and efficient synthesis of the 1,2,4-oxadiazole based drug.

DEVELOPING A USER-FRIENDLY FIELDABLE MASS SPECTROMETRY-BASED METHOD FOR ONSITE PROCESSING OF FINGERNAIL SCRAPING EVIDENCE FOR EXOGENOUS CHEMICAL SCREENING USING 3D-PRINTABLE ION SOURCE ACCESSORIES

Presenter(s): Anderson, Madelynn (Graduate, Chemistry)
 Boester, Bryse (Undergraduate, Chemistry)

Mentor: Christopher Mulligan

Authorship: Madelynn Anderson, Bryse Boester, Riley Means, Blaise Jones, Christopher Mulligan

The increasing global use of natural and synthetic drug compounds and prevalence of hazardous chemicals in occupational environments necessitate the development of rapid and fieldable screening methods for the onsite detection of exogenous chemicals resulting from tactile exposures. Here, a common toothpick is investigated for its dual ability to collect fingernail scrapings and serve as a medium for mass spectral (MS) analysis, along with its applications in forensics and occupational safety. In this method, an ordinary toothpick is used to scrape under the distal nail edge of a mock human hand to collect fingernail scrapings before the application of a spray solvent and high voltage for MS analysis. This work aims at the use of a portable mass spectrometer to allow for field analysis and 3D-printed accessories to streamline the workflow, allowing for MS analysis for novice users without extensive training. Use of a portable mass spectrometer allows users to perform rapid chemical exogenous screening outside of the traditional laboratory space. A 3D-printed toothpick holder is constructed using electrostatic dissipative polyethylene terephthalate glycol (ESD-PETG) filament. The benefits of such a holder include sample preservation, ease of use, and prolonged analysis time. The ESD-PETG holder allows the user to scrape under the distal edge of a fingernail while preventing user-borne contaminations, conserving the integrity of the evidence. The holder also integrates a solvent channel, allowing users to pre-load a spray solvent before MS analysis. This has a dual benefit of providing extended solvent release and alleviating the need for mid-run solvent additions, allowing for longer periods of sustained spray and enhanced MS analysis. Eliminating the need for mid-run solvent aliquots makes such a method more user-friendly and accessible to those without extensive lab training. Work presented here outlines the application of wooden tip spray to field portable instruments and the integration of 3D-printed design adaptations. This work is aimed at improving and expanding the applications of toothpick scraping and wooden tip ionization MS via enhanced accessibility and usability.

ORIENTED ANTIBODY CONJUGATION TO GOLD NANOPARTICLES VIA A LIPOIC ACID LINKER BY MICROBIAL TRANSGLUTAMINASE

Presenter(s): Barlow, Haydn (Undergraduate, Chemistry)

Mentor: Jeremy Driskell

Authorship: Haydn Barlow, Faith Breausche, Emily Beitello, Jon Friesen, Jeremy Driskell

The improvement of antibody orientation upon a surface allows for greater sensitivity and lower detection limits of biosensors and immunoassays. The majority of current assays utilize N-hydroxysuccinimide (NHS) to modify antibodies through surface accessible lysines. This random orientation on a surface like gold nanoparticles (AuNPs) causes improper orientation which can lead to a decrease in available antigen capture sites. Our research group has worked to attach payloads onto the Fc region of antibodies in a targeted, or site-specific, manner to improve its orientation and ultimately the accessibility of antigen capture sites. Microbial transglutaminase (mTG) has the reported function of conjugating payload containing primary amines (e.g. NH₂-PEG-lipoic acid) to the Q295 residues which is highly conserved across antibodies. Our group has found previous success in the site-specific conjugation of biotin by mTG stretching across different antibody host species and subtypes. Additional work showed improved orientation in mTG modified biotinylated antibodies on streptavidin-coated well plates in contrast to randomly biotinylated antibodies through NHS modification. Currently, we are investigating lipoic acid as a payload for mTG conjugation. Lipoic acid is comprised of a disulfide bond that will break in near proximity of an unfunctionalized AuNP and result in a covalent linkage between the two. The strong nature of gold-sulfur bonds may allow for great stability and improved loading capacity. These effects can be further improved by correcting the antibody orientation with mTG. This further demonstrates the applicability of mTG modification to an increasing catalogue of linkers for immunoassay usage and enhanced sensitivity.

OPTIMIZATION OF PEG SPACER ARM LENGTH FOR ENHANCED ORIENTATION OF SURFACE-IMMOBILIZED ANTIBODIES

Presenter(s): Betangah, Moses (Graduate, Chemistry)

Mentor: Jeremy Driskell

Authorship: Moses Betangah, Faith Breausche, Emily Beitello, Jeremy Driskell

The immobilization of antibodies to surfaces to act as biorecognition agents is critical to the performance of immunosensors. Ideal immobilization methods will orient antibodies such that the antigen-binding (Fab) regions are readily accessible for antigen capture. Previously, we developed an mTG-mediated site-specific conjugation strategy for the oriented immobilization of antibodies on surfaces via the fragment crystallizable (Fc) region. This approach significantly improved the antigen-capture abilities of immobilized antibodies compared to random methods such as physisorption and NHS conjugation. Here, we aim to further improve this strategy by optimizing the PEG spacer length between the antibody and the surface, a parameter known to influence the antigen-capture abilities of immobilized antibodies. To this end, we biotinylated anti-HRP antibodies both randomly and site-specifically, using biotin-antibody PEG spacers of varying lengths (PEG2, PEG4, PEG11/12, and PEG23/24), and immobilized them onto streptavidin-coated surfaces. An ABTS-based enzyme-capture assay was used to compare the antigen-capture abilities of the antibodies. Our results show that whereas PEG length has minimal impact on the antigen-capture abilities of site-specifically conjugated antibodies, longer PEG lengths can significantly enhance the performance of randomly conjugated antibodies. We attribute this to a combination of increased ligand density and improved orientation for randomly conjugated antibodies.

HIGHLY ORIENTED ANTIBODY CONJUGATION TO GOLD NANOPARTICLES THROUGH VARIOUS AMINO CROSSLINKERS BY MICROBIAL TRANSGLUTAMINASE

Presenter(s): Breausche, Faith (Graduate, Chemistry)

Mentor: Jeremy Driskell

Authorship: Faith Breausche, Haydn Barlow, Emily Beitello, Jon Friesen, Jeremy Driskell

The sensitivity of biosensors and immunoassays can be greatly improved by optimizing antibody orientation on the surface. Historically, antibodies have been immobilized through randomly positioned lysine residues using chemical methods such as N-hydroxysuccinimide (NHS). This approach, however, may lead to improper orientation and diminished antigen binding function. To improve the antibody's orientation upon immobilization, our group sought to site-specifically attach a payload onto the Fc region using microbial transglutaminase (mTG) to function as a chemical tether. mTG has been reported to conjugate a primary amine of a payload (ex. NH₂-PEG4-Biotin) to the conserved Q295 residue of an antibody. We have previously reported successful site-specific conjugation of biotin across various host species and subtypes of antibodies utilizing mTG. Additionally, site-specific biotinylated antibodies showed improved orientation upon a streptavidin-coated surface as opposed to randomly biotinylated antibodies modified with NHS. Currently, we are investigating the adsorption of mTG modified antibodies onto a gold nanoparticle (AuNP) surface through various immobilization strategies (i.e., biotin—streptavidin, alkyne—azide click chemistry, His-tag—Ni²⁺NTA, and lipoic acid—unconjugated AuNP surface). As expected, results show improvement, across the aforementioned modification strategies, in antibody orientation upon binding to its complimentary functionalized AuNP surface when compared to randomly modified antibodies. This work demonstrates the flexibility of mTG to site-specifically install many established linking chemistries and provides new opportunities to improve the sensitivity of biosensors and immunoassays.

ISOLATION AND CHARACTERIZATION OF A KEY INTERMEDIATE IN THE ASYMMETRIC SYNTHESIS OF A COMPUTATIONALLY DERIVED COVID-19 PROTEASE INHIBITOR. A JOURNEY FROM THE CHE 220 CLASSROOM TO A CHEMISTRY RESEARCH LAB

Presenter(s): Breede, April (Undergraduate, Chemistry)

Mentor: Shawn Raynard Hitchcock

Authorship: Austin Carter, Shawn Raynard Hitchcock

SARS-CoV-2 is a novel coronavirus that has had an impact on everyone's lives due to an outbreak of one of its strains, COVID-19. At the time of the outbreak, there were no true treatments other than supportive care like, oxygen therapy, fluid management as well the recent approval for antiviral drugs developed for anti-HIV (lopinavir/ritonavir), Ebola (remdesivir), and antimalaria drugs (hydroxychloroquine).¹ Rathi and coworkers were among some of the many researchers working to find a cure for this devastating virus. By working with a crystal structure found from X-ray diffraction, they were able to use their recent success and discovery of a Human Immunodeficiency virus protease inhibitor that interacted well with both the hydrophobic and hydrophilic regions of the protease.² With this knowledge, Rathi and coworkers were inspired to investigate the hydrophobic and hydrophilic binding domains of the COVID-19 protease. A protease is an enzyme that is essential in the propagation of the life cycle of the virus, and these inhibitors have proven to be highly effective tools in the long-term treatment of viral infections. Specifically, proteases break down long chains of cellular proteins into smaller fragments. These smaller fragments are then used in the ultimate creation of more viral particles. The usage of a protease inhibitor prevents the binding of a protease to a cellular protein which then prevents the breakage of the chain and the replication of the virus.⁵

Using a technique called molecular docking Rathi and coworkers were able to propose a potential protease inhibitor that would match the binding domains of the Covid-19 protease by hydrophobic interaction, π -stacking and hydrogen bonding.³ Rathi and coworkers proposed a structure but did not provide a synthesis of the material. With this information in mind, our research was originally based on formulating a potential synthesis of this protease inhibitor. Through the course of synthesizing the proposed inhibitor based on Rathi and coworker's findings, it was observed that a reaction late in the overall synthesis yielded an unexpected mystery product. Our work then turned to synthesizing and isolating this intermediate product such that we could better understand how to run the reaction for the largest amount of the product without the intermediate. Through further investigation we were able to tentatively identify the unexpected intermediate. This poster presentation will present the overall synthesis of the Covid-19 protease inhibitor and a discussion on the origin and analysis of the mystery intermediate.

INVESTIGATING (5+2) CYCLOADDITIONS

Presenter(s): Brozenec, Rachel (Undergraduate, Chemistry)

Mentor: Andy Mitchell

The purpose of this research was to study (5+2) cycloadditions. To do this, the starting material, Maltol, was modified through sequential reactions such as protection, bromination, and the amination of the resulting bromide. The resulting amine product was modified with a protecting group, followed by the cycloaddition reaction. As the reactions were run, the products were examined by Thin Layer Chromatography (TLC), purified by Flash Column Chromatography, and analyzed by ^1H and ^{13}C NMR spectroscopy. Overall, these reactions provided a learning experience of various reactions and lab techniques as well as a stock of materials that can be used for further research on (5+2) cycloadditions.

SYNTHESIS AND REACTIVITY OF A P-IODOPHENYLACETYLIDE RHENIUM SELENIDE CLUSTER

Presenter(s): Coronado, Dana (Graduate, Chemistry)

Mentor: Lisa Szczepura

Authorship: Dana Coronado, Lisa Szczepura

The Szczepura lab has previously synthesized various rhenium chalcogenide clusters containing para-substituted phenylacetylide ligands, $[\text{Re}_6\text{Se}_8(\text{PEt}_3)_5(\text{C}\equiv\text{C}-\text{C}_6\text{H}_4-\text{X})](\text{SbF}_6)$ where $\text{X}=\text{NO}_2$, CO_2Me , H , CH_3 , OMe . Our more recent efforts have led to the synthesis and characterization of a para-iodophenylacetylide ligand coordinated to the metal cluster, $[\text{Re}_6\text{Se}_8(\text{PEt}_3)_5(\text{C}\equiv\text{C}-\text{C}_6\text{H}_4-\text{I})](\text{SbF}_6)$. The para-iodophenylacetylide complex is of interest because aryl iodides are often reactive in cross-coupling reactions. To date, we have coupled $[\text{Re}_6\text{Se}_8(\text{PEt}_3)_5(\text{C}\equiv\text{C}-\text{C}_6\text{H}_4-\text{I})]^+$ with $\text{HC}\equiv\text{C}-\text{C}_6\text{H}_4-\text{COOMe}$, via the Sonogashira coupling reaction. The synthesis and characterization of $[\text{Re}_6\text{Se}_8(\text{PEt}_3)_5(\text{C}\equiv\text{C}-\text{C}_6\text{H}_4-\text{I})](\text{SbF}_6)$ and of $[\text{Re}_6\text{Se}_8(\text{PEt}_3)_5(\text{C}\equiv\text{C}-\text{C}_6\text{H}_4-\text{C}\equiv\text{C}-\text{C}_6\text{H}_4-\text{COOMe})](\text{SbF}_6)$ will be outlined in this presentation.

GOLD NANOPARTICLE-POLYMER COMPOSITES AS GREEN X-RAY RADIATION SHIELDING MATERIALS: A LEAD FREE ALTERNATIVE

Presenter(s): Donaldson, Ian (Undergraduate, Chemistry)

Mentor: Jun-Hyun Kim

Co-Mentor: Marjorie A. Jones

Authorship: Garrett M. Milligan, David C. Platt, Michaela Kirchoff

Conventional X-ray radiation shielding heavily relies on protective equipment derived from lead material, which raises significant health and environmental concerns due to the toxicity. This work focuses on the development of stable polymer-gold nanoparticle (AuNP) composites as a safer more sustainable alternative for X-ray shielding in medical and industrial applications. Nanoscale Au particles could offer promising radiation shielding capability and safety given their high atomic number and biocompatible nature, while the polymer matrix provides great stability and processibility. Initially, biocompatible poly(N-isopropylacrylamide) (PNIPAM) particles with two different sizes (200 nm and 500 nm) were prepared to serve as stable host materials. Subsequently, in situ formation of AuNPs was carried out under light irradiation in the presence of polymer particles, enabling effective integration of multiple AuNPs throughout the polymer particles. X-ray radiation shielding performance was systematically examined by varying composite particle concentration, surface charge, and incorporated AuNP size. The shielding efficiency was then compared to the corresponding gold and lead standard solutions where X-ray attenuation increased proportionally as a function of concentration but inversely proportionally with decreasing the size of AuNPs. This work establishes a foundation for developing next-generation radiation shielding materials that could replace conventional lead-based equipment, offering improved safety, reduced environmental impact, and potentially enhanced comfort for users in medical and industrial settings.

EFFORTS TOWARDS THE SYNTHESIS OF NAPHRINE AND PSEUDONAPHRINE, NEW AGENTS FOR ASYMMETRIC SYNTHESIS. DIASTEREOSELECTIVE SYNTHESIS AND APPLICATION.

Presenter(s): Holvey, Cole (Undergraduate, Chemistry)

Mentor: Shawn Raynard Hitchcock

Authorship: Shawn Raynard Hitchcock

Using a chiral auxiliary-based approach, the asymmetric synthesis of two structurally novel derivatives of ephedrine and pseudoephedrine, namely “naphedrine” and “pseudonaphedrine”, are being pursued. This process was launched by cyclization of commercially available (S)-phenylglycinol with carbon disulfide and hydrogen peroxide. The cyclized product, a chiral 1,3-oxazolidine-2-thione was then acylated using propanoic acid and the coupling agent EDC with the nucleophilic catalyst (N,N-dimethylamino)pyridine. This process afforded the N-propanoyloxazolidine-2-thione in 75.30% yield after recrystallization. The N-propanoyl-4-phenyloxazolidine-2-thione was treated with titanium tetrachloride, triethylamine, and 2-naphthaldehyde to form the corresponding non-Evans asymmetric aldol adduct in 35.5% yield in greater than 95% diastereoselectivity as determined by the use of nuclear magnetic resonance spectroscopy. The adduct was then hydrolyzed to liberate the necessary beta-hydroxycarboxylic acid for the ultimate formation of the Naphedrine derivative. This presentation will cover the efforts that have taken place thus far in our efforts to create these new synthetic Ephedra derivatives.

SPECTRAL LIBRARY IDENTIFICATION AND VALIDATION USING 3D-PRINTED CONE SPRAY IONIZATION (3D-PCSI-MS)

Presenter(s): Jones, Blaise (Undergraduate, Chemistry)

Mentor: Christopher Mulligan

Authorship: Blaise Jones, Madelynn Anderson, Christopher Mulligan

3D- printed cone spray ionization (PCSI) is looked at to identify common and emerging drugs of abuse. In 3D-PCSI-MS conical vessels are 3D-printed using a conductive polymer filament. This conductive cone can be used for direct analysis of samples by using Whatman filter paper folded into a similarly shaped insert. Then, an appropriate spray solvent is added directly by the operator. This technique was used to create a cutting-edge database that could directly address several areas of concern, as many new drugs have little to no mass spectral data published to guide scientists examining such samples. The database would also help users with little experience with mass spectrometry by providing a reference point when analyzing these species. The database consisted of a variety of analytical drug standards including trending synthetic opioids, nitazenes, stimulants, metabolites, cutting agents that were examined on a portable and a lab scale MS system. That then went on into a blinded study that examined the use and reliability of drug identification utilizing the created spectral library, where each sample included either a negative control (or “blank”) or positive control containing between 1 to 3 drug species. Analytes examined in this work included common mixtures like ‘speedball’ and ‘pink cocaine’. The identification accuracy across all the user-blinded samples ran with 100% accuracy in detecting the presence or absence of any illicit substance. It shows the method is reproducible and users are able to detect drugs of abuse by using the library to assign their identity, often when in a mixture with multiple analytes. The database would also help users with little experience with mass spectrometry by providing a reference point when analyzing these species. Together, these results show 3D-PCSI can be reliably employed in rapid-on-site investigation paired with a spectral library to aid in evidence investigation.

BUILDING MATERIALS TOWARDS INTRAMOLECULAR [5+2] CYCLOADDITION

Presenter(s): Joseph, Echefulachi Prince (Graduate, Chemistry)
 Rittenhouse, Keith (Graduate, Chemistry)

Mentor: Andy Mitchell

This study focuses on developing precursors for intramolecular [5+2] cycloadditions, a key method for generating seven-membered rings common in natural and pharmaceutical compounds. The research involves synthesizing alkyl and amine derivatives from TBDPS-maltol bromide, optimizing their preparation, and demonstrating their potential to undergo intramolecular cyclizations. The successful synthesis of these precursors, despite varying yields, highlights the feasibility of using maltol-based compounds in complex polycyclic syntheses via cycloaddition pathways, paving the way for future cyclization studies.

SYNTHESIS AND CHARACTERIZATION OF ETHYNYL CYCLOOCTATETRAENE ANION RADICALS

Presenter(s): Knapp, Job (Graduate, Chemistry)

Mentor: Steven Peters

Co-Mentor: Lisa Szczepura

Authorship: Job Knapp, Lisa Szczepura, Steven Peters

There has been a significant amount of research concerning phenylacetylene derivatives recently. For example, there has been a significant amount of research looking into the functionality of this compound and its use in click chemistry regarding the formation of triazoles.¹ Our lab is interested in extending those studies with larger annulene rings, particularly the 8-member annulene ring (cyclooctatetraene) with an ethynyl group attached. Prior to exploring this interesting chemistry, the synthesis of ethynyl cyclooctatetraene must be conducted. The first step of the synthesis consists of brominating cyclooctatetraene followed quickly by a dehydrohalogenation to synthesize Bromo cyclooctatetraene (I) as seen in reaction 1. This product is then involved in a coupling reaction using a palladium catalyst to give the second intermediate (II). This will then undergo a retro alkylation to give us the final product (III).² Each reaction is monitored using nuclear magnetic resonance spectroscopy as well as gas chromatography mass spectrometry to ensure that the reactions take place and run to completion to maximize yield. The liquid product is then purified and enclosed in a glass apparatus where it is reduced using sodium metal to form the stable anion radical. This product is then studied using electron paramagnetic resonance spectroscopy. This lab plans to further characterize this species and related compounds including alkylating the alkyne functionality and performing click chemistry using a copper-catalyzed azide-alkyne cycloaddition to synthesize a triazole substituent in place of the alkynyl group.

EXPLORING MUTAGENESIS AS A METHOD TO ALTER HRP FOR ENHANCED ACTIVITY AND ADSORPTION TO GOLD NANOPARTICLES

Presenter(s): Kobulnicky, Trent (Undergraduate, Chemistry)
Bradshaw, J (Undergraduate, Chemistry)
Breausche, Faith (Graduate, Chemistry)

Mentor: Jeremy Driskell

Co-Mentor: Jon Friesen

Authorship: Trent Kobulnicky, J Bradshaw, Faith Breausche, Jon Friesen, Jeremy Driskell

Gold nanoparticle (AuNP) conjugation has been widely reported to advance bioanalytical methods and emerging biotechnologies. One prevalent technique involves conjugation of proteins to AuNPs through modification of nanoparticle surface chemistry. Conversely, this research aims to investigate the effects of protein modification, specifically through the addition of sulfhydryl groups, on protein-surface immobilization. Previous research in our lab demonstrated greater loading capacity, improved robustness, and increased stability of the model enzyme horseradish peroxidase (HRP) on AuNPs upon thiol installation. These results, however, were observed by chemical alteration of the enzyme with Traut's reagent, which limited thiolation to nonspecific lysine residues. Protein mutagenesis offers a more flexible and site-specific approach to further improve conjugation between thiolated HRP (THRP) and citrate-capped AuNPs. To do so, a recombinant pET45b(+) vector containing the HRP gene is expressed in Arctic Express E. coli cells for an increased yield of active enzyme. The resulting active HRP is purified with the addition of Mg²⁺ and ATP to remove latent chaperones Cpn10 and Cpn60. Kinetics of HRP and HRP-AuNP conjugates are quantified through analysis of catalytic activity with the substrate 2,2'-azinobis [3-ethylbenzothiazoline-6-sulfonic acid]-diammonium salt (one-step ABTS), providing information regarding efficiency, stability, and robustness. Moreover, effects of thiolation via HRP gene mutagenesis can be compared to native and chemically modified HRP/THRP. Mutagenesis allows for alteration of the HRP gene sequence to precisely exchange certain amino acids for cysteine (bearing a sulfhydryl group), thereby affecting the aforementioned characteristics of the mutated HRP-AuNP bioconjugate. Thus, comparison between the bioconjugates with chemically thiolated HRP and recombinant HRP is theorized to generate an optimized HRP-AuNP bioconjugate. Outcomes of this study stand to benefit emerging protein-AuNP technologies in biosensing, imaging, drug delivery, and immunoassays.

ENHANCED DLS BASED ASSAY FOR SARS-COV-2 USING MICROBIAL TRANSGLUTAMINASE-ORIENTED ANTIBODIES ON GOLD NANOPARTICLES

Presenter(s): Miller, Emily (Graduate, Chemistry)

Mentor: Jeremy Driskell

Authorship: Emily Miller, Faith Breausche, Emily Beitello, Jeremy Driskell

To help bolster the sensitivity of gold nanoparticles (AuNPs) in biosensors and immunoassays, antibody orientation onto AuNPs can be optimized to allow for more opportunities for binding of the antigen to occur. In our research group, microbial transglutaminase (mTG) is being explored to site specifically conjugate different linkers onto antibodies to allow for more controlled immobilization onto the AuNP surface through various immobilization strategies (i.e., biotin—streptavidin, alkyne—azide click chemistry, His-tag—Ni²⁺+NTA, and lipoic acid—unconjugated AuNP surface). Currently, as a result of the success shown from using mTG in conjunction with biotin-streptavidin immobilization chemistry to better orient antibodies onto AuNPs, we are exploring with the same immobilization chemistry to orient two matched pair anti-SARS-COV-2 antibodies onto streptavidin-coated AuNPs to create a sandwich complex upon capture of the SARS-COV-2 nucleocapsid protein (NP). This capture and formation of the sandwich complex of antibody conjugated AuNPs will continue to grow in the presence of NP, creating a cluster of aggregated AuNPs that grow in size as more AuNPs become bundled together. This change in size from a single AuNP conjugate to clusters of multiple AuNP conjugates can be detected using dynamic light scattering (DLS), which measures the Brownian motion of particles to determine their size. As increasing concentrations of NP are added to the antibody AuNP conjugates, the size should correspondingly increase until saturation, allowing for not only the detection, but also the quantitative analysis of NP. When considering the difference in antibody orientation described above, we expect a significant difference in size when comparing site specifically modified and randomly modified (NHS ester) antibodies conjugated to AuNPs and their ability to detect the NP. This is due to the site specifically modified antibodies having more binding sites accessible, which allows for more AuNP aggregation. This work can potentially demonstrate an important real-world application of modifying antibodies using mTG in an analytical immunoassay to increase sensitivity.

ENHANCED PHOTOLUMINESCENCE OF THIOLATE-STABILIZED GOLD NANOCCLUSERS VIA SYNTHETIC OPTIMIZATION

Presenter(s): Milligan, Garrett (Graduate, Chemistry)

Mentor: Jun-Hyun Kim

Authorship: Garrett Milligan, Ian Donaldson, Jun-Hyun Kim

The photoluminescence (PL) of gold nanoclusters (AuNCs) is mainly governed by their atomic level electronic configuration, which is highly sensitive to cluster size, ligand type (e.g., electron-donating or -withdrawing nature), and surface ligand packing density. These structural and electronic features can be precisely regulated by controlling key synthetic parameters including ligand-to-gold ratio, pH, temperature, and reaction time. Here, we have systematically investigated the influence of each parameter on the optical properties of thiolate-stabilized AuNCs and integrated the optimal synthetic conditions to maximize PL quantum yield (QY) and shorten synthesis time. This approach enables an optimized one-pot aqueous synthesis of 11-mercaptoundecanoic acid-stabilized AuNCs with a QY of 9.31%, which significantly exceeds previously reported values for similar systems. Such precise synthetic control allows the fabrication of AuNCs with high stability and enhanced PL, making them scalable and versatile materials for practical applications in bioimaging, sensing, and optoelectronic systems.

RAPID, DIRECT MONITORING OF 6PPD DEHYDROGENATION IN SOIL WITH 3D-PRINTED CONE SPRAY IONIZATION MASS SPECTROMETRY (3D-PCSI-MS)

Presenter(s): Nwaiwu, Kingsley (Graduate, Chemistry)

Mentor: Christopher Mulligan

Authorship: Kingsley Nwaiwu, Christopher Mulligan, Rosemary Addo, Patrick Fedick

N-(1,3-dimethylbutyl)-N-phenyl-p-phenylenediamine (6PPD) is a synthetic antioxidant widely used in tire manufacturing to prevent oxidative degradation, ozone cracking, and thermal aging. Mechanical tire abrasion releases 6PPD and its quinone derivative (6PPD-Q) into the environment via tire wear particles (TWPs), raising growing concerns for both human and aquatic health. Despite advances in analytical methods, characterizing the breakdown kinetics of 6PPD in complex matrices such as soil remains challenging. Improved understanding of these transformation pathways is critical for assessing environmental persistence and risk. Here, we investigate the use of 3D-printed cone spray ionization-mass spectrometry (3D-PCSI-MS), a rapid ambient ionization technique that enables direct chemical analysis of condensed-phase samples with minimal sample preparation, to allow for rapid, real-time monitoring of the dehydrogenation kinetics of 6PPD in soil. The transformation kinetics were evaluated by systematically varying soil residence time and environmental stressors prior to analysis. Replicate experiments were conducted to assess reproducibility and better elucidate dehydrogenation behavior. Measurements were performed on both a Thermo Q Exactive HRMS and MassTech MTE30 portable ion trap MS to demonstrate similar capability in field locales.

COORDINATION AND STUDY OF A NOVEL ACETYLENE-BASED LIGAND

Presenter(s): Sloan, Mia (Graduate, Chemistry)

Mentor: Lisa Szczepura

Authorship: Lisa Szczepura

Acetylenic ligands are of interest in organometallic chemistry because they can coordinate to transition metal centers through both sigma and pi bonds, which can lead to unusual structures and unique reactivity. Our lab has previously coordinated other acetylenic ligands to the transition metal cluster core $[\text{Re}_6\text{Se}_8]^{2+}$, but 2-alkynyl-3-methylpyridine is of unique interest due to the presence of a nitrogen atom in the aromatic ring and how it may impact reactivity. The 2-alkynyl-3-methylpyridine molecule was successfully synthesized and purified according to previously published literature. In addition, several test reactions have been carried out for the coordination of 2-alkynyl-3-methylpyridine to the rhenium selenide cluster core. ^1H and $^{31}\text{P}\{^1\text{H}\}$ NMR spectroscopy was used to verify purity and identify species throughout experimentation. This presentation will focus on our progress towards optimization and purification of $[\text{Re}_6\text{Se}_8(\text{PEt}_3)_5(\text{C}_8\text{H}_7\text{N})]^+$.

A NEW SYNTHETIC APPROACH TO THE CURTIUS REARRANGEMENT ENABLED BY MANDELIC ACID-DERIVED SUBSTRATES

Presenter(s): Wright, Daniel (Graduate, Chemistry)

Mentor: Shawn Raynard Hitchcock

The Curtius rearrangement represents a versatile and efficient method for converting carboxylic acids into valuable nitrogen-containing functional groups through an isocyanate intermediate. In this work, mandelic acid and a series of disubstituted mandelic acid derivatives were employed to prove efficacy of developed methodology. The synthetic pathway proceeds through sequential conversion of carboxylic acids to acyl hydrazides, followed by formation of acyl azides and subsequent thermal rearrangement to isocyanates. This study demonstrates the reliability of mandelic acid scaffolds for monitoring and validating each stage of the Curtius rearrangement while highlighting the influence of substitution patterns on reaction efficiency and intermediate stability. The results support the Curtius rearrangement as a robust and modular strategy for generating reactive isocyanate intermediates from structurally diverse precursors. Ongoing work aims to expand this methodology toward the controlled synthesis of carbamate derivatives, further increasing the synthetic utility of this transformation.

COMMUNICATION

“PEOPLE WILL ALWAYS TALK”: CULTURAL TENSIONS IN NIGERIAN WOMEN’S INTERPRETATIONS OF CELEBRITY BODY TRANSFORMATION POSTS ON INSTAGRAM

Presenter(s): Adeyemo, Grace (Graduate, Communication)

Mentor: Fernando Severino

This study examines how young Nigerian women interpret celebrity body transformation posts on Instagram and how cultural scripts shape these interpretations. Using seven focus groups with forty-four (44) participants, the analysis reveals that body transformation posts activate emotional, moral, and identity-based evaluations. Participants questioned celebrities’ motivations, scrutinized authenticity, and negotiated feelings of pressure, inspiration, and indifference. Their responses were deeply influenced by family socialization, intergenerational body talk, religious upbringing, romantic expectations, and tribal beauty norms. A central contribution is the identification of cultural tension as the defining feature of how Nigerian women make sense of transformation culture. Participants were caught between traditional beauty scripts and globalized social media ideals. This tension produced what this study terms beauty dissonance—a continual negotiation between local beauty ideals and global beauty standards. Overall, this study concludes that body transformation posts gain meaning only within a broader sociocultural ecosystem, offering a culturally grounded perspective on digital body image that challenges Western-centric assumptions and emphasizes the lived complexities of African youth navigating beauty cultures.

MEDIA AS PRE-ACCULTURATION: HOLLYWOOD PORTRAYALS OF U.S. COLLEGE LIFE AND INTERNATIONAL STUDENTS' CULTURAL ADJUSTMENT

Presenter(s): Ayinde, Kuburat Adeola (Graduate, Communication)

Mentor: John Baldwin

This study analyzes how international students form expectations about college life in the U.S through Hollywood portrayals and how these expectations are met upon arrival, shaping students' adjustment. Focus group findings suggest that international students expect an active social life, fun, close friendships, and an academic environment that values student opinions. While classroom and professor expectations were met, students noted that the social vibrancy shown in Hollywood movies reflects a narrowed view of college life in the U.S that aligns more closely with undergraduate experiences. The discrepancy between expectations and reality required international students to renegotiate their expectations upon arrival.

SEX SELLS AND SOCIAL CONTROVERSEY: A QUALITATIVE REDDIT ANALYSIS OF PUBLIC RECEPTION TO SYDNEY SWEENEY'S "GOOD GENES" AMERICAN EAGLE CAMPAIGN

Presenter(s): Gimm, Isabel (Graduate, Communication)

Mentor: John Baldwin

This study examines how Reddit users interpret and debate Sydney Sweeney's 2025 American Eagle "Good Jeans" campaign, a fashion advertisement that quickly became a site of cultural controversy. Using a qualitative thematic analysis of 132 comments across r/The10thDentist, r/AskFeminists, and r/advertising, the study identifies how users construct meaning through intersecting celebrity culture, gender and racial beauty norms, political identity, and skepticism toward advertising strategy. Findings reveal seven dominant themes, including minimization of offense, racialized and eugenics-related interpretations, misogynistic sexualization, political polarization, media literacy, confusion about advertisement intent, and comparison to earlier controversy. These interpretations align with scholarship on visual rhetoric, whiteness, and digital public discourse, illustrating how audiences actively negotiate the cultural significance of ambiguous advertising. The analysis demonstrates that meaning making is shaped not only by the advertisement itself, but by the ideological and historical contexts users bring to it, offering insight into how contemporary audiences interpret controversial celebrity campaigns.

PATRIARCHAL GENDER NORMS IN CONTEMPORARY ROMANCE NOVEL: THE LOVE HYPOTHESIS BY ALI HAZELWOOD

Presenter(s): Gross, Grace (Graduate, Communication)

Mentor: Lauren Bratslavsky

Romance novels are not just entertainment but influential texts that impact how people imagine, evaluate, and pursue real romantic relationships. Feminist scholars explain that feminism is a movement to end sexism, sexist exploitation, and oppression, and that there is no single feminism, but many different ones, and that feminist pleasure can exist within critique. Using a feminist lens, it becomes clear how romance novels reinforce and resist patriarchal ideologies at the same time. Romance novels, specifically the narrative tropes and how the characters interact, shape ideas about gender by reproducing traditional gender roles, while also giving women space to challenge, reinterpret, and find pleasure within those norms. Reading romance can act as escapism and a form of resistance, allowing women to reclaim emotional autonomy and satisfaction. Reading romance can act as escapism and a form of resistance, allowing women to reclaim emotional autonomy and satisfaction. The Love Hypothesis by Ali Hazelwood, a popular contemporary romance novel, reflects these tensions of sexism within the workplace and stereotypical romantic tropes. The novel follows Olive, a Ph.D. student in a male-dominated field, and Adam, a professor. The story reproduces heteronormativity, gender power imbalances, and professor/student dynamics rooted in structural patriarchy. Adam is depicted as towering, broody, and masculine, while Olive is portrayed as tiny and feminine. Yet the novel also addresses sexism in STEM, sexual harassment, and women navigating academia. The contradictions within the genre, as exemplified by this novel, reflect the complexity of contemporary gender representations, where enjoyment, pleasure, resistance, and the patriarchy exist together.

HOW COLLEGE STUDENTS AT A PUBLIC MIDWEST UNIVERSITY PERCEIVE AND JUSTIFY THE USE OF ARTIFICIAL INTELLIGENCE

Presenter(s): Howell, Ben (Graduate, Communication)
 Stulga, Nick (Graduate, Communication)

Mentor: John Baldwin

Artificial intelligence has become a relevant topic of conversation again with the launch of ChatGPT in 2022. Since then, college students have found a myriad of ways to experiment with AI technology in a personal and academic setting. Through a series of focus groups, we looked to capture the various perceptions of and usages of AI by college students. Students see AI as a normalized part of society, have ethical concerns about the proper use of the technology, and have developed social and academic usages for AI technology.

Key Words: artificial intelligence, large-language models, generative AI, ethics, normalization, socialization, academia, agency

INTOLERANCE TOWARD AFRICAN INTERNATIONAL STUDENTS IN U.S. HIGHER EDUCATION

Presenter(s): Kabaalu, Linda (Graduate, Communication)

Mentor: John Baldwin

African students arrive in the U.S. with strong academic aspirations and the potential to contribute meaningfully to campus communities. However, they frequently face discrimination, microaggressions, and implicit bias that negatively affect their sense of belonging and well-being. This case study explores how intolerance shapes these students' academic engagement, mental health, and university experience. The paper examines how discrimination, microaggressions, and social exclusion contribute to feelings of isolation, anxiety, reduced self-efficacy, and academic disengagement. The analysis highlights institutional and structural barriers, including limited access to culturally responsive mental health services, a lack of faculty representation, and complex bureaucratic processes, which intensify students' challenges. In response, the study proposes a culturally responsive solution framework that includes implementing cultural competency training for faculty and staff, expanding culturally sensitive mental health resources, increasing diversity among faculty and administrators, and establishing structured mentoring and peer support programs for African international students.

THE AESTHETIC OF DOMESTICITY: TRADITIONAL WIVES AND ENTREPRENEURIAL FEMINISM

Presenter(s): Noonan, Ilaria (Graduate, Communication)

Mentor: Lauren Bratslavsky

This study examines the reemergence of domesticity through the rise of 'tradwife' content on social media, situating the movement within second-wave feminist critiques, choice feminism, post-feminism, neoliberalism, and entrepreneurial feminism. While second-wave feminism challenged the confinement of women to the private sphere, contemporary tradwife culture reframes domesticity as an individual choice and marketable lifestyle. 'Tradwife' culture online emphasizes the hypocrisy of the content creators as they monetize domestic labor while framing it as non-work. Furthermore, the culture is in direct alignment with the resurgence of conservative, traditional rhetoric being circulated in online spaces. Using a qualitative content analysis followed by a thematic analysis of three Reddit forums focused on tradwife discourse, this study explores how users understand and negotiate gender, labor, and power. Findings suggest that 'tradwifery' reproduces and legitimizes neoliberal, post-feminist, and choice feminist ideologies by aestheticizing domestic labor, reinforcing traditional gender roles, and obscuring structural inequalities through rhetorics of choice and safety. Additionally, tradwife content functions as a form of entrepreneurial feminism, commodifying domesticity. Ultimately, this study argues that tradwife culture rebrands patriarchal domesticity in a palatable and profitable form within contemporary media.

POLITICAL COMMUNICATION AND ENVIRONMENTAL CAMPAIGNS: A FRAMING ANALYSIS OF SPEECHES ADDRESSING ILLEGAL MINING (GALAMSEY) IN GHANA

Presenter(s): Otoo, Elvis (Graduate, Communication)

Mentor: John Baldwin

Authorship: Elvis Otoo

Illegal small-scale mining, locally known as galamsey, remains one of Ghana's most persistent environmental and political challenges. This study examines how Ghanaian political leaders frame galamsey in their public speeches and how these framings shape public understanding and environmental governance. Using framing theory, agenda setting, political ecology, and critical discourse analysis, the study analyzed twenty-three verified speeches and media statements delivered by Presidents John Dramani Mahama and Nana Addo Dankwa Akufo Addo between 2016 and 2025. The analysis identified five recurring patterns, which are framing galamsey as a moral and national crisis, shifting blame onto socially convenient groups, oscillating between enforcement and livelihood narratives, using the issue as a symbolic capital during elections, and blending cultural and economic justifications to normalize continued exploitation. These findings show that political discourse produced moral urgency without generating sustained structural change. The study contributes to environmental communication by demonstrating that responses to galamsey must address not only policy failures but also the communicative strategies that shape public meaning and institutional action.

ADVANCING UNITED NATIONS SUSTAINABLE DEVELOPMENT GOAL 4 IN HIGHER EDUCATION: CANVAS AS AN EMERGING EDUCATIONAL MEDIA

Presenter(s): Otoo, Elvis (Graduate, Communication)
 Otoo, Elvis (Graduate, Communication)
 Pappoe, Deborah (Graduate, Communication)
 Ayinde Kubarat, Adeola (Graduate, Communication)

Mentor: John Hooker

Authorship: Elvis Otoo, Deborah Pappoe, Adeola Ayinde Kubarat

This study examines students' experiences with Canvas as a learning management system and its role in supporting quality education in higher education, with particular attention to Sustainable Development Goal 4 (SDG 4). Using an open-ended survey, the study explores how students perceive the impact of Canvas on learning quality, engagement, and accessibility, as well as the technological, pedagogical, and cultural challenges they encounter. Guided by the Technology Acceptance Model and Constructivist Learning Theory, the study analyzes students' narratives to understand how technology acceptance and learning processes shape educational experiences in digital environments. The findings aim to highlight both the potential and limitations of Canvas as a platform for promoting inclusive, equitable, and high-quality education, and to offer insights for improving digital learning practices in higher education.

SCHOLARSHIP SURVEY

Presenter(s): Pantano, Dominic (Graduate, Communication)

Mentor: Aimee Miller-Ott

This paper reviews the scholarship on workplace bullying in the field of communication. The phenomenon of workplace bullying is a prominent concern in organizational communication, drawing on aspects of management, power, and gossip within organizational contexts. Workplace bullying is characterized by persistent and targeted attacks across the macro, meso, and micro levels of communication. Many foundational scholars have brought workplace bullying to the attention of communication scholars. The drawbacks of bullying within the workplace are the effect it may have on the victim to become isolated and burnt out from their consistent treatment by others. This paper also extends to non-traditional workplaces, such as Greek life, which can elicit similar conditions for bullying to occur within the organization. This survey illustrates the progress made in defining workplace bullying and outlines avenues for ongoing research.

PERSUASION IN THE APOLOGY GAP: GENDER AND FACE-NEGOTIATION IN RELATIONAL REPAIR

Presenter(s): Pappoe, Deborah (Graduate, Communication)

Mentor: Stephen Hunt

This paper reviews the scholarship on workplace bullying in the field of communication. The phenomenon of workplace bullying is a prominent concern in organizational communication, drawing on aspects of management, power, and gossip within organizational contexts. Workplace bullying is characterized by persistent and targeted attacks across the macro, meso, and micro levels of communication. Many foundational scholars have brought workplace bullying to the attention of communication scholars. The drawbacks of bullying within the workplace are the effect it may have on the victim to become isolated and burnt out from their consistent treatment by others. This paper also extends to non-traditional workplaces, such as Greek life, which can elicit similar conditions for bullying to occur within the organization. This survey illustrates the progress made in defining workplace bullying and outlines avenues for ongoing research.

WHY DO WOMEN VOTE FOR THEM?: SOCIAL IDENTITY AND INTERGROUP PERSPECTIVES AS GUIDANCE FOR BRAZILIAN WOMEN'S POLITICAL SUPPORT FOR LEFT- AND RIGHT-WING PARTIES.

Presenter(s): Vicente Horst, Leticia (Graduate, Communication)

Mentor: John Baldwin

Drawing on Social Identity Theory and System Justification Theory, this study investigates why individuals choose particular parties, emphasizing that political decisions arise from identity-based evaluations. Brazil serves as the case study because of its highly polarized democratic context, in which women voters present distinct motivations for supporting left- or right-wing parties, related, in part to recent political decisions in Brazil that significantly affected women. Voting is fundamentally tied to self-identification with a political group: Individuals tend to support the party with which they perceive the greatest alignment, making the vote an act of recognition in overlapping identities. To explore this, I analyzed 903 Reddit comments to identify social perceptions of what it means to be a left-wing supporter, a right-wing supporter, and a Brazilian woman voter. Four themes emerged: (1) Religion appeared across both ideological groups. Christian fundamentalism, particularly evangelical discourse, was linked to right-wing identity, while religious plurality or absent orientations reflected the left. (2) Feminism referred to labels such as "feminist" and "anti-feminist," which functioned as identity markers. Left-wing supporters were frequently described as feminist, whereas right-wing supporters were characterized by anti-feminist positions. (3) Femininity and Sexuality encompassed stereotypes associated with womanhood, including expectations of motherhood and domestic aesthetics. Critics of these norms were more common among left-wing supporters, while right-wing discourse tended to affirm stereotypical femininity. (4) Identification and Academia referred to the accessibility of political discourse. Left-wing discourse was often perceived as academically dense and less accessible, whereas right-wing discourse was described as simpler, more relatable, and frequently grounded in religious language.

COMMUNICATION SCIENCES AND DISORDERS

USING REFLECTION TO STRENGTHEN CAREGIVER COACHING: AN ONLINE PROFESSIONAL DEVELOPMENT PROGRAM FOR EARLY INTERVENTION PROVIDERS

Presenter(s): Hanley, Rachael (Undergraduate, Communication Sciences and Disorders)
Beasley, Madeline (Undergraduate, Communication Sciences and Disorders)

Mentor: Ciera Lorio

Authorship: Rachael Hanley, Madeline Beasley

In early intervention (EI), family-focused care is a large focus, and caregiver coaching is a necessary tool used within the practice. This study focuses on expanding the use of caregiver coaching by enhancing it with a reflective conversation piece. The purpose of this study is to look at reflective conversation use during EI interactions and its role within the caregiver coaching structure. The aim is to support providers' reflective language use and to promote intentional coaching interactions with caregivers during active sessions. By doing this, the study intends to encourage caregivers to use reflective thinking inside and outside of sessions to support their children's progress.

The process for the EI providers participating in this study is to complete asynchronous online training modules and collect video recordings of EI sessions with a single consistent caregiver-child pair throughout the study. The providers have the choice of the pace at which they progress within a 6–8-week time frame. After completing each module, providers submit a video to the research team to analyze. The first step in the analysis process is to code reflective moments, then the research team looks at the individual reflective moments, coding each for a specific type of reflection. Coders train before looking at real data with a set of training videos and transcripts. First, they code training data jointly, followed by independent coding. Coders must achieve 80% reliability or higher before they can code videos and transcripts from the study. While coding study data, the research team regularly meets to discuss and clarify inconsistencies in coding. Thirty percent of videos and transcripts are double-coded by independent coders to measure coding reliability within the study; any disagreements in coding are reviewed, and final codes are identified collaboratively by the research team.

The results of the coding procedures will allow the research team to identify patterns of reflective conversation used across EI sessions and the types of reflection occurring during conversations between EI providers and caregivers. The data for this process is ongoing and will provide insight into how the providers respond to the training and how they apply it to reflective conversations during caregiver coaching interactions. Preliminary data will be shared during the poster presentation, as well as recruitment procedures and an outline of the EI provider training approach. We anticipate that the results of this study will contribute to the growing research on caregiver coaching in EI, specifically on reflective practices, and will improve professional development opportunities for EI providers and coaching practices for caregivers of infants and toddlers with disabilities.

PROFESSIONAL DEVELOPMENT AND ON-THE-JOB COACHING IN AAC FOR PARAEDUCATORS

Presenter(s): Shaffer, Lillian (Undergraduate, Communication Sciences and Disorders)

Mentor: Ciera Lorio

Authorship: Lillian Shaffer

Paraeducators play a critical role in supporting students who use augmentative and alternative communication (AAC) in educational settings, yet most educators have limited formal training in AAC devices and how children with complex communication needs use them. Because paraeducators frequently interact with these children, they must be given strategies to support the children's language and communication during classroom activities. This study, collaboratively designed by researchers and practicing clinicians, specifically focuses on paraeducators at an elementary school in southern Wisconsin. The speech-language pathologist at the school will coach the participants on strategies for modeling AAC during classroom activities. Before coaching sessions, paraeducators will complete multiple online, self-guided modules on AAC and AAC strategies. These modules contain images, information, video examples, and quizzes at the end of each module to assess the understanding of the paraeducator. Over 6-8 weeks, paraeducators will complete the modules and receive individualized coaching from the school-based speech-language pathologist. The goal is to determine how paraeducators respond to self-guided learning modules as well as coaching during the sessions with students who use AAC. The study uses a single case design, so the research team will track how paraeducators already use AAC modeling strategies before the training program and then monitor their use of strategies after completing the modules and coaching sessions. This study is currently in the recruitment phase, and modules and coaching procedures are being finalized.

This poster presentation will be from the student research assistant perspective. The presentation will include the student's experiences learning about AAC and reviewing and developing the AAC coaching modules used in the study. A discussion about progress made with recruitment and any other preliminary data will also be shared.

THE INFANT-TODDLER SHARED BOOK READING (ITSBR) STUDY: AN EXAMINATION OF PARENT/CHILD INTERACTIONS

Presenter(s): Testin, Michaelene (Graduate, Communication Sciences and Disorders)
Chojnowski, Natalia (Undergraduate, Communication Sciences and Disorders)
Bade, Ava (Undergraduate, Communication Sciences and Disorders)

Mentor: Ciera Lorio

Authorship: Michaelene Testin, Natalia Chojnowski, Ava Bade

Shared book reading is a well-established, evidence-based interactive literacy practice that supports the development of oral language and emergent literacy skills in infants and toddlers. Parent behaviors during these interactions play a critical role in shaping early language acquisition. The Research in Early Language and Literacy Acquisition (RELLA) Lab at Illinois State University investigates early language development through naturalistic observations of parent–infant and parent–toddler interactions, with particular attention to gesture use, early language development, and engagement behaviors. The Infant-Toddler Shared Book Reading (ITSBR) study contributes to this work by examining typical parent and child behaviors during play and shared book reading among children aged 6 to 36 months. Trained research assistants serve as reliable coders for the ITSBR study, systematically analyzing parent–child interactions captured on video. Videos were collected in family homes or online via Zoom. Video coding focuses on mutually exclusive parent and child behaviors, including verbal and nonverbal communicative acts that reflect engagement and communication during shared book reading and play. Data are coded and managed using Noldus Observer XT, which is observational coding software that supports detailed behavioral coding, event-sequence analysis, and reliability checking. A total of 96 videos have been collected through the ITSBR study, and so far, 51 videos have been coded for parent behaviors, and 63 videos have been coded for child behaviors during shared book-reading. There were 27 participant dyads in the study, 7 included fathers, resulting in a total of 24 videos of fathers reading with their infant/toddler. Of these 24 videos, 24 were coded for child behaviors and 4 have been coded for parent behaviors. The parent coding is currently in progress. This poster presentation focuses on a subset of videos from the ITSBR study that display book reading interactions between fathers and infants/toddlers. Student presenters will discuss the procedures used to collect study videos, the process of establishing coding reliability, current challenges faced when coding videos, and preliminary findings related to shared book reading with fathers and infants/toddlers.

CREATIVE TECHNOLOGIES

A REVIEW OF HOW AR AND VR TECHNOLOGY CONTRIBUTE TO ENHANCING EDUCATIONAL INCLUSION FOR STUDENTS WITH DISABILITIES: BENEFITS, LIMITATIONS, CHALLENGES, AND SUCCESS FACTORS

Presenter(s): Akter, Tonmoy (Graduate, Creative Technologies)

Mentor: Kristin Carlson

This paper represents a systematic review of the role of AR and VR technology in inclusive education for students with disabilities. Drawing upon insights from 17 studies and academics, this paper will investigate the benefits, limitations, and challenges of implementing immersive technology in the inclusive education environment. The findings disclose that AR and VR have considerable potential for personalized learning. It increases engagement and supports accessibility. Despite that, it has barriers such as high cost, limited infrastructure, lack of trained teachers, and ethical concerns persist. This study will also conclude with recommendations for successful integration, emphasizing inclusive design, Participants' collaboration, and policy support.

SIGNAL SPORTS CAPLAB

Presenter(s): Ampong, Deborah (Graduate, Creative Technologies)

Mentor: Kristin Carlson

Authorship: Deborah Ampong

Abstract: In the modern landscape of the NBA and NFL, the margin for error in roster construction has effectively vanished. With the introduction of the NBA's "Two-Apron" system and the NFL's escalating "Dead Money" charges, a single contract decision can inadvertently freeze a franchise's competitive window for years. Current front-office operations are often hampered by fragmented data silos and static spreadsheets that lack the real-time synchronization required for elite decision-making.

This presentation introduces Signal Sport, a professional-grade Roster & Salary Cap Simulator designed to bridge the gap between financial engineering and competitive strategy. Developed as a modular ecosystem, the platform enables analysts to simulate complex trades, negotiate multi-year contract restructures, and evaluate cap implications, all within a secure, team-private environment that respects the specific governance of each league.

The showcase features a high-fidelity prototype that demonstrates a real-time calculation engine capable of validating league-specific constraints, such as NBA trade-matching rules and NFL proration logic. Furthermore, the session will explore the platform's technical architecture, including its integration-ready design for 3D arena simulations and advanced analytics overlays. By transforming the "Wild West" of manual roster management into a unified "Single Source of Truth," Signal Sport provides the digital foundation for anticipatory design in professional sports operations.

FIRST NIGHT: A NARRATIVE GAME ABOUT SMALL TOWNS AND THE ECHO CHAMBERS THEY CREATE

Presenter(s): Higgins Aranda, Ellen (Graduate, Creative Technologies)

Mentor: Kristin Carlson

Small towns can create trends of similar thought patterns that can have negative impacts on those deemed as “different”. This is often due to the size and variety of the people in the area, as well as how much information can get in or out of the area, and what sources it derives from. I explore this topic in the development of a game that collects and reflects player choices, highlighting how people are influenced by external voices, and how to manage these challenges. The goal of this game is to encourage players to reflect on the biases they may personally have, and why they may have them. By creating a game that highlights areas of implicit bias and providing opportunities to change their actions, I aim to impact perceptions by encouraging more open and accepting thoughts.

HOW GAMIFIED INTERACTIVE TOOLS SUPPORT ENGAGEMENT IN CREATIVE OR DESIGN-BASED EDUCATION

Presenter(s): Igberaodion, Ejehiwease (Graduate, Creative Technologies)

Mentor: Kristin Carlson

This research examines the overlap of gamified interactive tools and design-based education. As digital environments increasingly disrupt student attention, educators face the challenge of sustaining deep engagement in creative work. This study investigates how specific game mechanics, such as reward points, feedback loops, progression systems, and non-linear challenges, can be adapted to enhance design education without compromising artistic autonomy. Through an analysis of existing literature on gamification and engagement theory, I identify design elements that encourage motivation while respecting the open-ended nature of the creative process. The resulting framework offers strategies for integrating gamified tools that support, rather than trivialize, the complexity of design learning.

RESISTANCE AS INTERACTION: BLENDING PHYSICAL EFFORT AND GAMEPLAY IN VIRTUAL REALITY

Presenter(s): Wanda, Devin (Undergraduate, Creative Technologies)

Mentor: Kristin Carlson

This project develops and evaluates a weighted virtual reality controller designed to increase muscle engagement during gameplay. A functional prototype will be constructed with adjustable resistance and integrated into a VR experience that requires repeated upper-body actions such as swinging, holding, and controlled movement. User testing sessions will measure duration of play, frequency of movement, perceived exertion, fatigue, and overall engagement to assess how added weight affects player behavior and experience. The study focuses on how physical resistance can be incorporated into interaction design without reducing enjoyment or immersion. Analysis will identify relationships between controller weight, player motivation, and sustained physical activity. The project aims to produce design guidelines for creating VR systems that combine meaningful physical effort with engaging gameplay without presenting the experience as traditional exercise.

CRIMINAL JUSTICE SCIENCES

STUDENT PERCEPTIONS OF THE EFFECTS OF NEGATIVE MEDIA PORTRAYALS OF HISPANIC IMMIGRANTS

Presenter(s): Cottrell, Alex (Graduate, Criminal Justice Sciences)

Mentor: Jessie Krienert

Negative media portrayals of Hispanic immigrants have become increasingly prevalent in news coverage, political discourse, and social media in the United States. Prior research suggests that sustained exposure to stigmatizing narratives may contribute to adverse psychological and physiological outcomes. The present study examines the perceived impacts of negative media portrayals of Hispanic immigrants among college students at Illinois State University. Using a mixed-methods survey design, the study combines closed-ended measures with open-ended responses to assess students' perceptions, emotional reactions, and self-reported effects associated with media exposure. Findings contribute to broader discussions of media effects, campus climate, and the potential consequences of immigration-related rhetoric for student well-being.

A REIMAGINATION OF LIFE COURSE CRIMINOLOGY

Presenter(s): Donovan, Lucas (Graduate, Criminal Justice Sciences)

Mentor: Joshua Stout

In their seminal work, criminologists John Laub and Robert Sampson provide a life course theory (LCT) presents an age-graded theory of criminality, arguing that criminal trajectories are influenced by turning points in individuals' lives. Specifically, social bonds created through marriage, military service, and stable employment are desistance events that may lead to individuals stop engaging in criminal behavior. Conversely, an absence of these turning points in one's life course and weakened social bonds may lead to continued engagement in antisocial behavior, defined as persistence. Utilizing Laub and Sampson's LCT, this paper examines the applicability of this framework to explain criminality in a post-covid world. The primary aim of this theoretical critique is to explore the effectiveness of LCT to explain changes in criminal behavior after a major, unprecedented shift in social environments around the world. I argue that the macro-level changes produced by the COVID-19 pandemic significantly impacted social bonds in such a way that LCT must be reexamined to effectively understand contemporary criminality. Specifically, key foundations of the theory, including desistance and persistence events in one's life course, must be placed in the context of a post-covid world due to changes in social environments that alter the importance of desistance events on deviant behavior and social bonding. Examples include marriage not being as much of a key indicator of conformity in a post-covid world due to increased social isolation. While these events have changed both during and after the world was officially locked down due to COVID-19, crime trends have not stayed as true to LCT's explanations as one might expect. This critique will explore those differences along with offering explanations. Key contributions of this research include establishing COVID-19 as such a disruptor to traditional desistance and persistence events that past assumptions about the LCT must be evaluated under a new lens. This work highlights that future research and applications of LCT will need to operate under a new understanding that places an emphasis on contextualizing macro-level social contexts.

EFFECTIVENESS OF STATE RESPONSES TO HOMELESSNESS

Presenter(s): Jones, Brenna (Graduate, Criminal Justice Sciences)

Mentor: Hailey Munir

On average, landlords across the country file 3.6 million eviction cases per year (Desmond et al. 2018). In response to this housing crisis, some states have made efforts to address evictions outside of the traditional judicial process or to provide aid to those facing eviction as they move through the judicial process. The policies and approaches that states have implemented to address the eviction crisis vary widely. This project seeks to identify the various approaches ten states have taken to address the eviction crisis and understand the efficacy of these varying approaches on eviction rates across these states.

A GENDERED COMPARISON OF INMATE HANDBOOKS

Presenter(s): Mielke, Grace (Graduate, Criminal Justice Sciences)

Mentor: Jessie Krienert

This study explores differences in state inmate handbooks for male and female correctional facilities. A qualitative analysis compares the content, tone, and presentation of these handbooks. The research identifies key differences that may reflect gender-based assumptions in correctional policies and practices. The findings help explain how correctional institutions communicate rules, expectations, and support resources to different inmate populations and may inform future discussions on equity and policy reform.

ECONOMICS

EFFECT OF SPORT GAMBLING LEGALIZATION ON MARITAL STATUS

Presenter(s): Gitonga, Hosea (Graduate, Economics)

Mentor: Harris Timothy

Authorship: Hosea Njogu

This paper examines the causal effect of sports gambling legalization on marital stability in the United States, utilizing data from the Current Population Survey Annual Social and Economic Supplement (CPS-ASEC) and the American Community Survey (ACS) spanning 2013 to 2024. The analysis exploits variation in the staggered implementation of state-level sports gambling laws and employs difference-in-differences and event-study methodologies, controlling for geographic and individual characteristics. It finds that legalization is associated with a modest yet statistically significant increase in divorce rates in both the CPS-ASEC and ACS. Offline legalization shows a larger, statistically significant effect, whereas online legalization shows a smaller, non-statistically significant effect. Heterogeneity analyses show statistically significant effects for men, individuals without children, employed individuals, and those with educational attainment above a high school diploma; income-related effects are most pronounced among individuals in the middle of the income distribution. These findings highlight that the expansion of sports gambling carries measurable social consequences for household stability that extend beyond its intended economic benefits.

GENDER DIFFERENCES IN FIELD SPECIALIZATION: RECENT EVIDENCE FROM NEW PHD ECONOMISTS (2025-2026)

Presenter(s): Jayne, Audrey (Undergraduate, Economics)

Mentor: Susan Chen

Despite some progress in the 1960s and 1970s, female representation in economics has stagnated in recent decades (Lundberg and Stearns, 2019). Moreover, the distribution of women across various fields in economics has historically been uneven. “Male” fields such as Macroeconomics, Monetary Economics, and Finance typically offer better employment prospects, due to lucrative options outside academia. However, the climate in these fields has been reported as less hospitable to women, as highlighted by the first AEA Professional Climate Survey (Allgood et al., 2019). In recent years, the economics profession has introduced several measures to promote a more female-friendly academic environment. For example, the AEA now offers childcare services and nursing rooms at conferences for female faculty members. Organizations such as the Committee on the Status of Women in the Economics Profession (CSWEP) facilitate mentorship and networking specifically for female economists at the national level. In 2023, the profession celebrated the first female solo Nobel Prize winner, Claudia Goldin. The existing literature on field specialization relies on data from older cohorts (e.g., Sullivan et al., 2018, on 2010-2011; Sierminska and Oaxaca, 2022, on 2009-2018; Fortin et al., 2021, on 2010-2017). This project aims to fill this gap in the literature and reassess whether progress has been made in field selection among new PhD economists in the Class of 2026.

NEGOTIATING LANGUAGE, IDENTITY, AND POWER ACROSS CONTEXTS: AN AUTOETHNOGRAPHIC REFLECTION

Presenter(s): Akter, Saima (Graduate, English)
Koly, Nowrin Akhter (Graduate, English)

Mentor: Lisya Seloni

Authorship: Nowrin Akhter Koly

This poster exhibits the lived experiences of transnational English teachers in the U.S. shape their linguistic identity as they navigate systems of linguistic power across national and institutional contexts. The authors delved into their personal history as translingual speakers of English in Bangladesh, where the language simultaneously serves as a cultural capital and a mechanism of exclusion while comparing their experiences of English used as a gatekeeping mechanism that reinforces racialized expectations of intelligibility and authority in the predominantly monolingual context—the U.S. These experiences reveal how multilingual educators must constantly negotiate belonging, credibility, and identity within structures shaped by colonial legacies and linguistic privilege. Through this autoethnographic analysis, the poster argues for sustainable pedagogical approaches that validate diverse Englishes, embrace translanguaging, and create space for students' full linguistic repertoires. By focusing on the lived experiences of the educators, this scholarship contributes to the ongoing conversations about culturally sustaining pedagogy and promotes equitable and inclusive language learning environments.

THE LANDSCAPE OF WITCHCRAFT, GENDER, AND LEGAL SYSTEMS: GEOGRAPHY'S CONTEXTUAL CONTRIBUTION TO NARRATIVE IN THE WITCH OF EDMONTON

Presenter(s): Munson, Kathrynne (Undergraduate, English)

Mentor: Tara Lyons

This research project will explore geographical locations referenced or visited within the 1602 play written by Thomas Dekker and William Rowley, *The Witch of Edmonton*. The research will show how these locations interact with gender, legal systems, and witchcraft. Taken as an example is Newgate— a jail in London where both the fictional Elizabeth Sawyer of Edmonton and her real-life namesake were housed awaiting their respective trials for witchcraft. A reader not familiar with Newgate's physical location and contextual history would not know that it housed and mistreated many women accused of witchcraft during the Early Modern period and that it was London's most populated jail during the reign of Elizabeth I. The moment when Elizabeth Sawyer is sent to Newgate in the story is received differently by contemporary readers than the characters of the story, whose familiarity with the prison leads them to draw different conclusions and assumptions surrounding the allegations against Sawyer. The physical spaces of Newgate prison, The Old Bailey Sessions House (where witchcraft trials were often held during the period in which the play was written) offer insight into the role of women in legal spaces. This project will explore the importance of studying the context and history of a text's geography, using *The Witch of Edmonton* as a case study.

INVESTIGATING THE EFFECTS OF COTTON–POLYESTER BLEND RATIOS ON WRINKLE RECOVERY IN WOVEN FABRICS

Presenter(s): Akuoko-Frimpong, Franklin (Graduate, Family and Consumer Sciences)

Mentor: Yu Ui-Jeen

Authorship: Franklin Akuoko-Frimpong, Yu Ui-Jeen

Wrinkle recovery is a critical performance attribute in woven apparel fabrics, directly influencing appearance retention, care requirements, and consumer satisfaction. This study examined the effect of cotton–polyester blend ratios on wrinkle recovery using the AATCC 128 Wrinkle Recovery of Fabrics: Appearance Method. Four plain fabric samples were evaluated: 100% cotton, 58% cotton/42% polyester, 65% polyester/35% cotton, and 100% polyester. Results showed that 100% cotton exhibited poor wrinkle recovery with a mean score of 2.3, and the 58% cotton/42% polyester blend performed even slightly worse with a mean of 1.9. In contrast, the 65% polyester/35% cotton blend showed moderate wrinkle recovery with a mean score of 3.3. The 100% polyester fabric demonstrated excellent wrinkle recovery, achieving the highest mean score of 4.6. Wrinkle recovery varied by fiber composition, with 100% cotton and the 58% cotton/42% polyester blend showing poor recovery, while recovery improved substantially as polyester content increased, reaching the highest level in 100% polyester. These results imply that polyester-rich fabrics are more suitable for applications requiring wrinkle resistance and ease of care, while low-to-moderate polyester blends may not guarantee a meaningful improvement over 100% cotton.

FAIR TRADE RETAIL IN ACTION: DECISION-MAKING, SOURCING, AND SUSTAINABILITY

Presenter(s): Schunke, Ellie (Graduate, Family and Consumer Sciences)

Mentor: Yoon Jin Ma

Research on fair trade spans a wide range of topics across diverse global contexts, including case studies, supply chain structures, fair trade business models, market growth, the history of the movement, and the products associated with fair trade. This particular study examines business practices and decision-making processes within fair trade retail, with a focus on how stores balance ethical commitments with financial sustainability. The research questions were developed to address this gap and to better understand how fair trade retailers navigate the practical realities of operating a store while maintaining strong ethical commitments. In particular, the questions emerged from a need to explore how stores balance mission-driven values with financial sustainability, manage risk, and build effective partnerships within the wholesale market. Through a series of semi-structured interviews with managerial figures from four fair trade retail stores in the Midwest, the research explores how these businesses operate while remaining true to their social and ethical missions. Key areas of investigation include fair trade commitment and sourcing practices, retail-wholesale relationships, inventory planning and risk management, pricing and profitability strategies, and merchandising, branding, and consumer behavior. These themes were selected because they represent critical decision points where ethical values and business ideas intersect. The study analyzes how stores determine ethical sourcing partners, manage wholesale purchasing, forecast and plan inventory, establish pricing structures, and communicate the fair trade mission to consumers. Attention is given to the challenges and opportunities fair trade retailers face when working with wholesalers, including minimum order quantities, payment terms, and flexibility for small or mission-driven businesses. Additionally, the research considers how visual merchandising and storytelling influence consumer engagement and purchasing behavior. The findings aim to support both new and existing fair trade retailers by offering practical insights that can inform business strategies and daily operations. The study contributes to understanding fair trade as a sustainable business model and offers guidance for ethical brands entering the wholesale market, with the goal of strengthening retailer-wholesaler relationships and expanding access to fair trade products.

MODELING THE IMPACT OF PROJECTED WATER DEMAND ON GROUNDWATER FLOW AND TRANSPORT IN THE MAHOMET AQUIFER

Presenter(s): Abugu, Christabel (Graduate, Geography, Geology, and the Environment)

Mentor: Wondwosen Seyoum

The Mahomet Aquifer serves as a vital water source for approximately 14 counties in east-central Illinois, supporting municipal, agricultural, and industrial needs. With projected changes in climate, population growth, and increasing water demand, assessing the long-term sustainability of this aquifer is crucial. Elevated pumping rates to meet rising water needs may lead to declining groundwater levels and increased risks of contaminant transport. Understanding these interactions is essential for effective groundwater management. This study seeks to address two key research questions: (1) How will projected changes in groundwater demand affect water levels in the Mahomet aquifer? (2) How do groundwater withdrawal rates impact contaminant transport within the aquifer? The research objectives are to: (1) develop and calibrate a numerical groundwater flow model using historical water demand and groundwater level data, (2) simulate projected groundwater conditions under various demand scenarios based on Shared Socioeconomic Pathway-based Forcing Scenarios (SSP-RCPs), (3) analyze trends in groundwater level variations due to projected changes in demand, and (4) employ a particle tracking model to evaluate the effects of groundwater withdrawals on contaminant transport pathways. To achieve these objectives, a three-dimensional numerical groundwater model will be developed using MODFLOW to evaluate the Mahomet Aquifer's response to projected water demand and climate change. Particle tracking will be employed using MODPATH to assess the migration pathways of contaminants under varying pumping conditions. The model will incorporate hydrogeological parameters such as recharge rates, aquifer layer properties, and boundary conditions to simulate groundwater flow dynamics and contaminant transport in both confined and unconfined sections of the aquifer. Model calibration and validation will be performed using historical water demand and groundwater level data before running scenario-based simulations to assess future groundwater sustainability. It is expected that under high-demand scenarios, significant water level declines will lead to increased stress on the aquifer. Additionally, as groundwater levels drop, contaminant migration is anticipated to intensify, particularly in areas with high withdrawal rates. These findings will provide insights into balancing groundwater extraction while mitigating contamination risks. By integrating hydrological modeling with climate and socioeconomic projections, this study will aid in developing adaptive management strategies to ensure the continued reliability and quality of the Mahomet Aquifer as a long-term water source for east-central Illinois.

THE IMPACTS OF TELECONNECTION PATTERNS ON LAKE MICHIGAN'S WATER TEMPERATURE

Presenter(s): Ambrose, Jenna (Graduate, Geography, Geology, and the Environment)

Mentor: Yiming Guo

Lake Michigan, one of the Laurentian Great Lakes, experiences subtle to extreme temperature fluctuations in water temperature due to teleconnection patterns acting over the course of multiple seasons, years, or decades. While local atmospheric forcing contributes to short-term variability, large-scale climate teleconnection patterns may exert additional influences. This water temperature variability impacts stratification dynamics, ice cover, biogeochemical processes, and ecosystem functioning. North Atlantic Oscillation (NAO), El Niño-Southern Oscillation (ENSO), and Pacific Decadal Oscillation (PDO) are three major modes of climate variability that operate over ocean bodies surrounding North America, mostly involving air circulation and air temperature alterations. Through their influence on jet stream position and intensity, Lake Michigan's thermal structure and long-term warming trends may face significant changes that can leave an impact on the overall health of the ecosystem. However, the extent and temporal characteristics of these relationships remain insufficiently quantified. By analyzing satellite-derived lake surface temperature data alongside teleconnection pattern indices, the relationships between large-scale climate variability and Lake Michigan's thermal behavior can be determined. By characterizing the strength, timing, and persistence of teleconnection influences, this study aims to improve understanding of climate-lake interactions and provide relevant insights to ecosystem resilience, water resource management, and regional climate assessment.

DETRITAL ZIRCON GEOCHRONOLOGY OF THE CENOMANIAN WINDROW FORMATION AT IRON HILL, NORTHEAST IOWA, USA

Presenter(s): Bradshaw, Jack (Undergraduate, Geography, Geology, and the Environment)

Mentor: David Malone

Authorship: Jack Bradshaw, David Malone, John Malone

The Windrow Formation is a widely distributed Cenomanian conglomerate and sandstone that occurs in unglaciated areas of Wisconsin, Minnesota, Iowa and Illinois. The Windrow Formation consists of the lower Iron Hill Member (Fe rich residuum) and upper East Bluff/Ostrander Member (gravel, sand, and clay) and is roughly correlative to the Nishnabotna Member of the Dakota Formation in western Iowa. At 1,345 ft (430 m), Iron Hill is the highest point in northeastern Iowa and is the type section for the Iron Hill Member of the Windrow Formation. At this locality, Cretaceous-aged strata unconformably overlie cherty massive dolomites of the Galena Group Dunleith Formation. The irregular erosional surface shows abundant dissolution cavities filled with limonite concretions or cellular masses and red/white plastic clay with residual chert and carbonate clasts. The Iron Hill Member attains a maximum thickness of 70 ft (22 m). Here we present detrital zircon U-Pb data (n=225) from the Iron Hill Member at the old Waukon Iron Mine just north of Waukon, Iowa (43.303542, -91.460967). Analyses were completed at the University of Arizona Laserchron Center. The age spectrum has a prominent peak of ~1050 Ma, which we interpret to sourcing from Grenville (Ottawan Phase) orogen of the northern Appalachian Mountains. Smaller populations of Taconic-Acadian (450 Ma age peak) and Pan-African (610 Ma age peak) and Pinware (1460 Ma age peak) also are present. Our data is consistent with the data from correlative strata to the west and further supports the model of Cenomanian sediment sourcing from the northern Appalachian Mountains. This long-standing, high topography shed sediment to the west from the late Mississippian through the early Cretaceous.

IMPROVED MAPPING OF SHALLOW GEOLOGY: GROUND-BASED GEOPHYSICS TO SUPPORT AIRBORNE ELECTROMAGNETICS

Presenter(s): Drager, Lillian (Undergraduate, Geography, Geology, and the Environment)

Mentor: David Malone

Authorship: Lani Kiene, Aiden Fanning, Caleb Ortman, Steven Young, Jason Thomason, Riley Balikian, Kisa Mwakanyamale-Gilkie, David Malone

Electrical resistivity tomography (ERT) and ambient seismic data, analyzed using the horizontal-vertical spectral ratio (HVSr) technique, were gathered to refine an existing interpretation of the bedrock surface topography and shallow geology in northern Illinois. Recently-acquired helicopter time-domain electromagnetic (HTEM) data give new insights into subsurface geologic features. The distribution of unconsolidated geological material and the relief of the local bedrock topography are important controls on the shallow groundwater flow system in the study area. Thus, we enhanced the interpretation of these HTEM data using ground-based geophysical data. HVSr data were acquired to refine bedrock topography, and the ERT data imaged materials above bedrock. We collected ~7 kilometers of ERT data across a local deeply incised bedrock valley and its tributaries. We also acquired closely-spaced (160 meters) HVSr soundings coincident with the ERT profiles. The interpretations help better define local bedrock tributary topography and better characterize the geometry of shallow sand and gravel aquifers in the valley itself. We calibrated these data with local water well records and geologic core descriptions to help ground-truth the newly acquired HTEM data. Collectively, ground-based geophysical data, coupled with geologic test-holes and HTEM data, greatly improved our understanding of local aquifers and water resources.

GROUND-BASED AND AIRBORNE GEOPHYSICS REVEAL NEW INSIGHTS INTO LOCAL BEDROCK TOPOGRAPHY

Presenter(s): Fanning, Aiden (Undergraduate, Geography, Geology, and the Environment)t

Mentor: David Malone

Authorship: Lani Kiene, Lillian Drager, Caleb Ortman, Steven Young, Jason Thomason, David Malone

We used 2-dimensional electrical resistivity tomography (ERT) and passive-seismic data processed using the horizontal-to-vertical spectral ratio (HVSr) technique to support a helicopter time-domain electromagnetic (HTEM) project in northern Illinois. The HTEM campaign is the first geophysical dataset to cover this study area with high resolution subsurface data. This region includes a deeply incised bedrock valley that plays an important role in groundwater resources in the region. HTEM data have revealed new topographic features that suggest changes to previous interpretations of bedrock topography. To corroborate features found in HTEM data, we collected 16 HVSr soundings and around 2800 meters of ERT data along a single profile across a new bedrock tributary reflected in the HTEM data. These surface-based geophysical datasets help us to better assess the utility and impact of airborne geophysical methods in near-surface geologic and hydrogeologic characterization of glacial environments.

THE END OF PALEOGENE WHITE RIVER GROUP DEPOSITION IN WYOMING AND NEBRASKA, USA: A DISTAL EFFECT OF THE EMPLACEMENT OF THE ~23 MA OF MARKAGUNT GRAVITY SLIDE

Presenter(s): Grobe, Megan (Undergraduate, Geography, Geology, and the Environment)

Mentor: David Malone

Authorship: Megan Grobe, David Malone, Joseph Moll, Tiffany Rivera, Robert Biek, David Hacker, William Griffith, Michael Braunagel

The late Paleogene White River Group is a post-Laramide stratigraphic succession that occurs in the Rocky Mountains and western Great Plains. It occurs within Laramide intermontane basins and atop some basement-cored uplifts. It consists of a light-colored tuffaceous sandstone, siltstone, mudstone, and conglomerate. Four samples of tuffaceous sandstone from the uppermost White River Group strata were sampled in eastern Wyoming and western Nebraska. Zircons extracted from these units ($n=722$) were analyzed for U/Pb dates by LA-ICPMS at the University of Arizona Laserchron Center. The maximum depositional ages of the samples range from 22.61 Ma to 23.40 Ma, which correlates to the emplacement of the Markagunt gravity slide in Utah's Marysvale volcanic field at $23.05 \pm 0.22 \pm 0.20$ Ma. The Marysvale volcanic field was part of the Nevadaplano, a longstanding highland that supplied sediment to the White River depositional system. The prominent age peaks are ~1660 Ma, ~1430 Ma, and ~1000 Ma, which were likely sourced from Proterozoic basement rocks of the Laramide uplifts of the southern Rocky Mountains. An additional age peak of ~169 Ma could have been derived from the Blue Mountains of Oregon or recycled from Sevier-Laramide synorogenic strata. There is a notable absence of Archean zircons, suggesting local central Rocky Mountain Laramide uplifts were not important sediment source areas. The temporal relationship between the cessation of White River Group sedimentation and the collapse and emplacement of the Markagunt gravity slide suggests that after collapse, the Marysvale volcanic field highlands were no longer prominent. This led to a change in the provenance and sediment characteristics in the distal depositional basin at the Oligocene-Miocene boundary.

DETRITAL ZIRCON GEOCHRONOLOGY OF THE PRECAMBRIAN KNIFE LAKE GROUP, MINNESOTA, USA AND ONTARIO, CANADA

Presenter(s): Harris-Bommarito, Amira (Undergraduate, Geography, Geology, and the Environment)

Mentor: David Malone

This study aims to constrain the provenance and depositional age of the Knife Lake Group in Minnesota, part of the Southern Superior Province, and reassess its tectonic evolution. Traditionally considered to be of Archean age (4.0–2.5 Ga), we investigate the possibility that these rocks are significantly younger—specifically Paleoproterozoic (2.4–2.23 Ga), correlating with the Huronian Supergroup. We propose that the Ogishkemuncie Sequence, a key component of the Knife Lake Group, postdates 2880 Ma and may have been deposited during rifting associated with the breakup of the Lauroscandia supercontinent. This reinterpretation suggests that deformation and greenschist-facies metamorphism could be Penokean in age (~1.9 Ga), aligning with contractional deformation observed farther south. The prevailing model, which compresses granite emplacement, weathering, sedimentation, and regional metamorphism into a geologically implausible 10-million-year span, is inconsistent with regional geologic processes. Instead, detrital zircon U-Pb age data, including previous K-S and MDS analyses, indicate that the Ogishkemuncie diamictites are statistically indistinguishable from Huronian quartzites in Ontario and Michigan and from the Snowy Pass Supergroup in Wyoming. This supports a shared provenance and depositional context along a rifted passive margin during the Paleoproterozoic. We interpret the Knife Lake Group as a marginal rift succession deposited during the Neoproterozoic–Paleoproterozoic transition, contemporaneous with the fragmentation of Lauroscandia and the formation of the Huronian passive margin. Moreover, zircon age spectra from six diamict samples from the Snowy Pass Supergroup (Wyoming) show unimodal age peaks near 2700 Ma and are statistically indistinguishable from Ogishkemuncie samples. MDS analysis further supports a common provenance, tightly clustering these units with sources in the Superior Province. This aids in refining the metamorphic and tectonic history of the Southern Superior Province and strengthens its correlation with broader Paleoproterozoic continental reconstructions.

SEDIMENTATION IN THE MACKINAW RIVER

Presenter(s): Hobson, Raegan (Graduate, Geography, Geology, and the Environment)

Mentor: Lisa Tranel

River channels change size and shape in response to their sediment and streamflow. The rates of erosion and deposition can cause a river to deviate from its equilibrium state, in which it maintains its longitudinal profile and shape over time. The purpose of our research is to understand erosion and sediment transport in the Mackinaw River system. Does sediment move on the channel bed in the Mackinaw River, and does the channel bed change shape with sediment transport?

Previous studies of sediment transport processes on similar river systems found that sediment transport processes, including bed scour and erosion, can significantly affect a river's conveyance, creating the need to assess the erodibility properties of the riverbed.

Understanding the Mackinaw River is essential for effective management of sediment and related habitats and to provide support for ongoing conservation and river management efforts. Sediment transport and deposition affect many aspects of the ecosystem; excessive sediment can lead to poor water quality, algal blooms, and deposition build-up. Insufficient sediment can lead to channel incision, bank erosion, and changes in the particle-size composition of the channel bed.

The research will be conducted on coarse sediment by placing radio-frequency identification (RFID) tags in 100 sediment samples to track movement, using an antenna to collect data from the tags. Another method we will use is cross-sections, which will show changes in the riverbank and channel bed over time.

Anticipated results based on the findings of Samuel Salven (2013) in his research on tracing stones through Fall Creek Gorge in Indiana, we expect the mass and distance of the sediment traveled in the Mackinaw River will be independent of each other, we also expect the cross sections to show little change in the channel bed, however, potentially greater change in the river banks due to suspended-sediment erosion and deposition.

GROUND-BASED GEOPHYSICS TO AMEND PREVIOUSLY INTERPRETED BURIED BEDROCK VALLEY GEOMETRY

Presenter(s): Kiene, Lani (Undergraduate, Geography, Geology, and the Environment)

Mentor: David Malone

Authorship: Lani Kiene, Aiden Fanning, Caleb Ortman, Lilly Drager, Steven Young, Riley Balikan, Jason Thomason, David Malone

Ground-based geophysics techniques, particularly 2-D electrical resistivity tomography (ERT) and ambient seismic horizontal-to-vertical spectral ratio (HVSr), verify newly acquired helicopter time-domain electromagnetic (HTEM) data intended to map aquifers in northern Illinois. We calibrate and interpret ERT and HVSr data based in part upon descriptions from nearby water well drillers and geologic core descriptions. These calibrations and new interpretations test previous interpretations of a local, deeply incised buried bedrock valley. Profile locations were chosen along the flanks of the main valley and its tributaries to better resolve the overall valley geometry. We collected 183 HVSr points and roughly a mile of ERT data to target these flanks. When possible, ERT and HVSr data were collected at the same site to more accurately establish the stratigraphy and bedrock depth at each location. We show general agreement among the geophysical and geological datasets and we interpret bedrock topography and Quaternary stratigraphy based on these and other datasets. These data have important implications on groundwater resource availability on a regional and local scale.

GEOLOGY OF THE KEKEKABIC TRAVERSE, BOUNDARY WATERS CANOE AREA WILDERNESS, MINNESOTA, USA

Presenter(s): Kietzman, Preston (Undergraduate, Geography, Geology, and the Environment)

Mentor: David Malone

Authorship: David Malone, John Craddock, Nigte Rivadeneyra-Braswell, Kara Fowler, Lucy Bruckner

The Kekekabic traverse, located in the Boundary Waters Canoe Area Wilderness (BWCAW) of northeastern Minnesota, contains a complex host of geologic oddities across a NNW to SSE traverse near the east end of the Kekekabic trail in Cook county. The Archean Saganaga Tonalite, part of the Wawa Terrane (2691 Ma), intrudes the Ely Greenstone (2691 Ma). The southern margin of the Saganaga tonalite includes a 1 km wide, vertical mylonitic shear zone. Ar-Ar radiometric age dating reveals the age of this mylonite to be 1.11 Ga. Deposited unconformably above the Saganaga Tonalite and Ely Greenstone shear zone is the Proterozoic Gunflint Formation, a banded iron formation (BIF). Gunflint Formation bedding along the traverse transitions from horizontal to vertical, indicating a local syncline that trends (N80°E). The SE limb of the syncline is in thrust contact with overturned Ely Greenstone best exposed atop Lookout Mountain. Farther SE, the overturned Ely Greenstone is unconformably overlain by the undeformed Gunflint Fm. which dips ~80° S. The tectonized Gunflint formation is ~100 m thick, the foliation dips steeply to the south with boudins and porphyroclasts as kinematic indicators, preserving E-W extension with top-to-the-north thrusting. Geochronological analyses using U-Pb zircon, U-Pb apatite, and Ar-Ar radiometric dating indicate that the tectonized Gunflint Formation is 1.11 Ga. The final unit exposed along the traverse is the Duluth Gabbro (1099 Ma), which dips to the south and has no fabric; it is younger than the tonalite-greenstone shear zone and the Gunflint Formation tectonite mylonites. The gabbro includes BIF xenoliths of various sizes as well as Fe-rich injectites. Therefore, a deformational event prior to the intrusion of the Duluth Gabbro occurred at 1110 Ma, a far-field shortening and metamorphic of the Grenville orogen 800 km to the east.

LINKING DIET AND GUT MICROBIOME DYNAMICS TO INVASION SUCCESS IN THE ROUND GOBY

Presenter(s): Moeller, Sydney (Undergraduate, Geography, Geology, and the Environment)
Burgoni, Joseph (Undergraduate, Biological Sciences)
Golz, Jady (Undergraduate, Biological Sciences)

Mentor: Kara Andres

Authorship: Sydney Moeller, Jady Golz, Joseph Burgoni, Katelin Meek, Gwen Church, Daniah Corp, Jenna Benson, Clinton Warren, Kara Andres

The round goby (*Neogobius melanostomus*) is an invasive benthic fish native to the Black, Azov, and Caspian Sea basins of Eurasia. Initially introduced to the Great Lakes in the 1990s, it has spread rapidly throughout the region into inland river systems, disrupting food webs, competing with native species, and altering benthic ecosystems. To better understand how dietary and gut microbiome dynamics contribute to ecological impacts and invasion success, this study investigates the relationship between diet composition and gut microbiome structure in round gobies across their invasion front using diet and microbiome metabarcoding of gut contents. Round gobies were collected from multiple sites across southern Lake Michigan (initial invasion region) and the Illinois River (invasion front) using electrofishing and netting. Gut contents were removed from the goby and will be analyzed to quantify prey composition and dietary diversity using diet metabarcoding of the COI gene region. The 16S gene region of gut contents will also be analyzed to characterize microbial community composition and assess relationships between diet and microbiome structure. This research aims to provide insight into the ecological mechanisms underlying round goby invasion success and to improve understanding of how diet and host-microbiome interactions facilitate invasive species establishment and spread across novel environments.

CHARACTERIZATION OF AMBIENT SEISMIC DATA TO REFINE TOPOGRAPHY OF AN INCISED BEDROCK VALLEY

Presenter(s): Ortman, Caleb (Undergraduate, Geography, Geology, and the Environment)

Mentor: David Malone

Authorship: Caleb Ortman, Lillian Drager, Aiden Fanning, Lani Kiene, Steven Young, Riley Balikian, Jason Thomason, Kisa Mwakanyamale-Gilkie, David Malone

Ambient seismic data, using horizontal-to-vertical spectral ratio (HVSr) methods, have been collected to characterize bedrock depths and geometries in northern Illinois since 2021. Within the last year, we have collected over 300 points of HVSr data on a variety of instruments along a deeply incised bedrock valley and its tributaries. These HVSr soundings have been utilized to redefine interpretations of this valley with important implications for local and regional groundwater resources. In addition to HVSr data, other ground-based and geophysical measurements have been used to refine bedrock depth interpretations. As a part of this campaign, several HVSr soundings were acquired near locations where bedrock depth is known (e.g., boreholes) and were used to develop a highly localized equation to transform frequency data to bedrock depth. The density of soundings and the relationship developed from these localized calibration points have produced more accurate bedrock characterizations than those generated from regional calibration equations. This enables more accurate and higher-quality interpretations of bedrock topography that account for local geology and lithology. Continued refinement of bedrock topography in this region using HVSr and other geophysical techniques can contribute to enhanced groundwater resource management in northern Illinois.

ASSESSING GLACIAL MASS CHANGE AND ITS IMPACT ON WATER RESOURCES IN PARTS OF HIMALAYAS USING REMOTE SENSING

Presenter(s): Panta, Kriti (Graduate, Geography, Geology, and the Environment)

Mentor: Wondwosen Seyoum

Glaciers in Nepal's Himalayan region are retreating rapidly due to climate warming, altering water availability for downstream populations. This study focuses on the Langtang and Kanchenjunga areas, in Nepal, where glacier-fed rivers are critical for agriculture, hydropower, and drinking water supplies. Using GRACE and GRACE-FO satellite gravimetry data, combined with GLDAS hydrological outputs and in situ streamflow records, this research quantifies glacier mass loss and its impact on regional hydrology. Glacier Storage Anomalies are derived by decomposing Terrestrial Water Storage Anomalies, allowing assessment of seasonal and decadal trends. Temporal decomposition and regression modeling are applied to identify statistically significant changes. Additionally, correlation analyses between satellite-derived indicators and river discharge datasets reveal how glacier melt contributes to seasonal flow patterns. Results reveal significant seasonal and interannual variability in glacier-fed river discharge, with critical implications for dry-season water availability. This work contributes to understanding glacier and hydrology interactions in the eastern Himalayas and supports sustainable water resource planning under changing climatic conditions.

DEFORMATION OF THE ~1100 MA DULUTH GABBRO COMPLEX, NORTHEASTERN MINNESOTA, USA

Presenter(s): Rivadeneyra-Braswell, Nicté (Undergraduate, Geography, Geology, and the Environment)

Mentor: David Malone

Authorship: Nicté Rivadeneyra-Braswell, Kara Fowler, David Malone, John Craddock, Julie Bowles,

The ~1100 Ma Duluth Gabbro is a Mesoproterozoic layered mafic intrusion located in the northern Lake Superior region; it is part of the failed midcontinent Keweenaw Rift system. The Duluth Gabbro intrudes Animikie Group metasediments (1900-1850 Ma) including the Gunflint banded iron formation. The lower boundary of the Duluth Gabbro is traditionally viewed as intrusive as it is concordant and rests above the Animikie Group. Recent field observations and strain analysis reveal that this contact is deformed through shearing, which implies that the lower contact is better interpreted as a thrust fault. To investigate the deformational history of the Duluth Gabbro, alternating field (AF) demagnetization was performed on 8 samples of Duluth Gabbro to isolate characteristic remnant magnetization directions and calculate paleopole orientations. Additionally, anisotropy of magnetic susceptibility (AMS) was performed on 8 samples to determine flow directions. Our results indicate that paleopoles and AMS fabrics have variable orientations, suggesting that the Gabbro experienced extensive and variable regional deformation. The paleopole patterns found in this study suggest that deformation has occurred as a far-field result of the Grenville Orogeny. The Grenville orogen (1300-980 Ma) initiated the Keweenaw rift from 1141–1085 Ma, which was coeval with rift magmatism and Gabbro intrusion. It is also admissible that this deformation occurred after the Grenville orogeny, perhaps as the result of Paleozoic far-field strain that was transmitted to the Laurentian craton during the assembly of Pangea.

PROMOTING STUDENT SUCCESS THROUGH STUDENT-LED PROFESSIONAL DEVELOPMENT WORKSHOPS

Presenter(s): Swinford, Rylie (Undergraduate, Geography, Geology, and the Environment)

Mentor: Matthew Hagaman

The ISU STEM Ambassadors are a group of seven undergraduate researchers working to improve the introductory STEM experience for all students at ISU. In Spring 2024 and 2025, the STEM Ambassadors interviewed first-and-second year students asking for their advice to future students, instructors, advisors, and administrators. In Fall 2024, the STEM Ambassadors conducted surveys with both ISU students and faculty members to capture perceptions of student-faculty connections. Multiple themes emerged from these interviews and surveys, including students' struggles when navigating different life transitions, making connections on campus, and a desire for faculty to meet students where they are in their current knowledge.

Based on these themes, the STEM Ambassadors began creating professional development workshops where faculty could reflect on student experiences with support and data from student researchers. During the process of developing the workshops, ISU's STEM Ambassadors collaborated with SIUE's STEM Ambassadors developing similar workshops to provide and receive feedback. In Spring 2026, the STEM Ambassadors led a three-part PD workshop series covering the following topics: Supporting Students through Successful Life Transitions in the Classroom & Beyond, Promoting Student Success through Faculty–Student Connections, and Small Steps to Set Students Up for Success. Each session concluded with a question-and-answer section, allowing faculty to ask specific questions to students. Participating faculty expressed appreciation for the deep and meaningful insight they received from the sessions.

During the PD sessions, faculty filled out notecards describing practices they are planning to implement into their classrooms, ideas they have that may be useful for other faculty, and why those ideas hold importance. After combining suggestions from faculty with those discussed by students in interviews and surveys, a list of best practices was curated for each workshop topic. These best practices are strategies that can be implemented into classes to promote student success; such as consistently collecting feedback, encouraging collaboration, and providing resources and support.

Throughout their three years of research, the STEM Ambassadors have had many rich conversations with students. When combined with their own experiences as students, the STEM Ambassadors have gained an insight into the struggles students face on campus. This understanding has allowed for rich conversations with faculty, who are passionate about helping their students succeed at ISU and beyond.

HIGH-RESOLUTION MAPPING OF SOIL MOISTURE VARIATION USING UAS THERMAL AND MULTISPECTRAL IMAGERY

Presenter(s): Timah, Jackline (Graduate, Geography, Geology, and the Environment)

Mentor: Seyoum Wondwosen

Traditional soil moisture monitoring approaches, including in situ sensors and satellite-based observations, are constrained by either sparse spatial coverage or coarse spatial resolution, limiting their ability to resolve fine-scale variability in agricultural landscapes. This study investigates the use of unmanned aerial systems (UAS) equipped with thermal and multispectral sensors to generate high-resolution soil moisture maps within saturated riparian buffers (SRBs) in central Illinois. The primary objective is to evaluate how spatial variability in soil moisture influences nutrient cycling, water quality, and climate-relevant surface processes in agricultural riparian systems.

The research addresses two key questions: (1) how reliably UAS-derived land surface characteristics such as vegetation indices, land surface temperature, and terrain attributes represent soil moisture variability, and (2) which of these characteristics provides the strongest predictive relationship with soil moisture at fine spatial scales. It is hypothesized that the reliability of UAS-based thermal indicators decreases during periods of low land surface temperature due to reduced thermal contrast and that vegetation cover exerts a dominant control on soil moisture variability, with sparsely vegetated areas exhibiting greater variability than densely vegetated zones (Bertalan et al., 2022; Wienhold et al., 2024).

UAS imagery and concurrent in situ soil moisture measurements will be collected at the T-3 site in central Illinois and analyzed using machine-learning techniques to quantify relationships between surface characteristics and measured soil moisture. By integrating ground-based observations with high-resolution UAS data, this study bridges the scale gap between point measurements and satellite products commonly used in hydroclimatic studies (Brocca et al., 2017). The results will improve understanding of soil moisture dynamics in SRBs, support more effective nutrient management and water quality protection in agricultural systems, and advance the application of UAS-based remote sensing for hydrogeologic and climate-related research.

THE ASSOCIATION BETWEEN HEALTHCARE ACCESS AND BIRTH OUTCOMES: EXAMINING THE ROLE OF PRIMARY CARE AVAILABILITY AND INSURANCE COVERAGE AMONG RACES IN ILLINOIS

Presenter(s): Adjei, Jenell (Undergraduate , Health Sciences)
 Martin, Will (Undergraduate, Health Sciences)

Mentor: Jennifer Peterson

While access to quality healthcare is closely tied to positive health outcomes, there are substantial disparities in healthcare access, health insurance coverage, and birth outcomes across racial groups within the United States of America. Birth outcomes including low birthweight, preterm birth, and infant mortality serve as critical indicators of population health. They are significantly influenced by prenatal care access and quality. The state of Illinois provides an ideal population for examining racial and ethnic variations in birth outcomes. The state experiences pronounced disparities in maternal and infant health across racial and ethnic populations. Recent 2024-2025 data from the March of Dimes Report Card and the Illinois Department of Healthcare and Family Services Perinatal Report reveal that while Illinois has made progress in some perinatal health indicators, these improvements are not equitably distributed across racial and ethnic groups. Black infants in Illinois experience infant mortality rates 2.2 times higher than the state average, and low birthweight rates among Black mothers have increased rather than decreased over recent years, suggesting that this progress has not translated into equivalent improvements in birth outcomes for Black populations. This research study was designed to examine whether greater access to healthcare and higher insurance coverage are associated with improved birth outcomes among different racial and ethnic groups across Illinois counties. The central hypothesis guiding this analysis is that healthcare access and insurance coverage is lower among certain populations and, therefore, correlated with worse birth outcomes. Black and Hispanic populations experience poorer birth outcomes compared to White populations, reflecting the influence of structural racism, healthcare discrimination, and broader social determinants of health that operate independently of healthcare access indicators alone.

SOCIAL DETERMINANTS OF OBESITY IN CHICAGO SUBURBS

Presenter(s): Espitia, Alondra (Undergraduate, Health Sciences)
 Carroll, Bella (Undergraduate, Health Sciences)

Mentor: Jennifer Peterson

Authorship: Alondra Espitia, Bella Carrol

In recent years, there has been an increased emphasis on the role social determinants of health play in both individual and public health. Social determinants of health are defined as “the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risk.” (Healthy People 2030). It is known that many of these factors can contribute to individuals’ risk of various conditions and diseases, including obesity. This study examines some of these social determinants related to the rates of obesity in various neighborhoods in Chicago. The determinants analyzed in this study include poverty rates, educational attainment, the availability of the SNAP program, and the availability of healthy food options. The study considers levels of physical activity among adults, as regular physical activity plays a critical role in maintaining a healthy weight. In addition, ethnicity and gender will be explored to better understand disparities in obesity rates across these communities.

BLOOMINGTON-NORMAL COMMUNITY AIR QUALITY RESEARCH AND EDUCATION (BN-CARE)

Presenter(s): Gorsage, Abbie (Undergraduate, Health Sciences)
 Ennis, Amelia (Undergraduate, Health Sciences)

Mentor: Liangcheng Yang

Co-Mentor: Alicia, Wodika

There is a gap in air quality monitoring in the Bloomington-Normal area. Through the Ecology Action Center (EAC), a community air quality monitoring program to promote environmental equity for environmental justice areas in Bloomington-Normal was created to close this gap. These environmental justice areas are determined by the U.S. Environmental Protection Agency (EPA). Three stationary air quality monitors were installed in these areas to measure PM 2.5, ozone, NO₂ and VOCs. Data will be collected and shared with the community through a website and app sharing real-time local air quality. Data will be collected for three years with the goal of reducing exposure to unhealthy air pollution and collaborating with local businesses and agencies to discuss emission control strategies to improve the air quality in Bloomington-Normal.

SUSTAINABLE AMMONIA RECOVERY USING WASTE GYPSUM

Presenter(s): Sanburg, Riley (Undergraduate, Health Sciences)
Blair, Audrey (Undergraduate, Health Sciences)

Mentor: Guang Jin

Authorship: Riley Sanburg, Audrey Blair

Wastewater contains high concentrations of ammonia, if not properly treated. Ammonia emission from wastewater leads to several environmental and public health issues. In this study, we investigate an innovative process to capture ammonia from wastewater and convert it into ammonium sulfate fertilizer using recycled drywall instead of concentrated sulfuric acid which is currently practiced and hazardous. Ammonium sulfate is a widely used agricultural fertilizer, meaning this process recovers a valuable product. Drywall is primarily composed of calcium sulfate, along with small amounts of other trace materials and metals. The experimental set up utilizes a two-stage process with an acid trap on the terminal side to enhance capturing of ammonium sulfate, a synthetic wastewater is used to minimize laboratory biohazard. Key operating parameters in the system include ammonia stripping flow rate, CO_2 flowrate, and mixed air flowrate. All of which influences the efficiency of ammonium sulfate formation and capturing of ammonia stripped from the synthetic wastewater. Descriptive statistics will be used to evaluate trends and quantify the impact of operating variables on ammonium sulfate production and ammonia recovery rate. By using recycled drywall in lieu of concentrated sulfuric acid, this research investigates a more sustainable approach that diverts construction waste from landfills while still achieving effective ammonia capture. This method supports both wastewater treatment and resource recovery, demonstrating multiple environmental benefits: improving water quality, recycling of drywall, and producing a useful fertilizer product.

HISTORY

MORE THAN A HOME: VILLA WINE PRESSES AS SITES OF THEATER AND WORSHIP IN LATE ANTIQUE ITALY

Presenter(s): Chase, Lucas (Undergraduate, History)

Mentor: Kathryn Jasper

This poster follows the discovery of peculiar architecture from a wine press at the Northwest Bolsena Archeological Project in Lazio, Italy. Multiple large stone bricks and a column were found, needing explanation. Other sites and some written histories suggest that presses at villas were often used for “agricultural theater,” and were often places of worship for the workers there.

IMPERIAL FOOTPRINTS: TRACKING BYZANTINE CAMPAIGNS ACROSS ITALY

Presenter(s): O'Donnell, Tess (Undergraduate, History)
O'Connor, Caitlin (Undergraduate, History)
Jandura, Jei (Undergraduate, History)

Mentor: Kathryn Jasper

This project explores the potential of a digital approach to the study of Roman and Late Antique Italy. We seek to answer these questions: How did the geographic distribution of Byzantine military campaigns in Italy shift over time, and what patterns emerge when these movements are visualized spatially? To what extent did Roman road networks, ports, and fortifications influence the pace and direction of the Byzantine reconquest? Our approach to answering these questions involves an interdisciplinary approach. When reviewing sources, we will identify the authors, audience, and purpose; evaluate bias; establish narratives; identify missing data; and determine what we can learn from the data. Also, finding sources that will help with the research or are relevant to the question. After reviewing the sources, we identified information that will help our project. Like names of places, Events, Byzantines, and geography. Involve Digital work with ARCGIS. The goal of my project is to [We want to bring together information from written sources and material evidence, put it all on a map, and see the patterns that aren't obvious from reading just the sources alone. Hopefully, we can show where, when, and how the Byzantines expanded their power and how geography and local conditions were shaped.

UNEARTH THE UNTOLD: ROMAN VILLAS

Presenter(s): Torkelson, Hannah (Undergraduate, History)
 Barbosa, Alexis (Undergraduate, History)

Mentor: Kathryn Jasper

Through archaeological excavation, Imperial - era villas have been discovered across Italy. Site locations contain an untold history that is untraced. Through geographic mapping, we seek to understand the thread of connection between Roman Villas and their location, origin, and occupants.

WIKIPEDIA EDITING: AN EXPERIMENT IN PUBLIC HISTORY

Presenter(s): Tuttle, Sierra (Undergraduate, History)

Mentor: Kathryn Jasper

In a digital age, ordinary people get their information from many different sources, not all reliable. One of the largest places people get their history knowledge is from the internet, especially Wikipedia. Wikipedia is an online encyclopedia created and edited by volunteers around the world. Their goal is to create a free encyclopedia, the largest encyclopedia in history, that is a reliable resource which will increase the world's public knowledge. Wikipedia provides a space for students to have real-world applications to their research and provides an arena for developing critical thinking, and the evaluation and interpretation of evidence.

IMPACTS OF AI ON UNIVERSITY STUDENTS

Presenter(s): Ali, Maham (Graduate, Information Technology)

Mentor: Erin Franken

Artificial intelligence (AI) has become a widely used academic tool among university students, providing instant writing assistance, clearer explanations, and automated feedback through platforms such as ChatGPT, Bing Copilot, and Grammarly. While these tools offer substantial benefits, they also pose risks when used excessively. Research consistently shows that AI can support writing clarity, comprehension, and accessibility, but overreliance may weaken critical thinking, creativity, and long-term learning (Akgun & Greenhow, 2022; Sullivan & Hayes, 2024). This paper examines these impacts and argues that balanced AI use, treating AI as a supportive tutor rather than a substitute for intellectual engagement, best supports academic success. By integrating existing research, this paper outlines the implications of AI adoption in universities and provides recommendations for responsible use that preserve students' academic integrity and long-term skill development. In addition to examining the benefits and risks of AI, this paper also highlights the growing need for students to develop strong self-regulation skills when using digital tools. As AI becomes more integrated into academic life, students must learn to reflect on their own learning habits and make intentional choices about when and how they rely on these systems. By strengthening awareness and maintaining active engagement with course material, students can ensure that AI remains a supportive resource rather than a barrier to personal growth. This balanced perspective underscores the importance of treating AI as an aid to learning, not a shortcut around it.

INDEPENDANT STUDY ON EMBEDDED CONTROL SYSTEMS: ALGORITHM & HARDWARE PERFORMANCE COMPARISON

Presenter(s): Clouse, Jake (Undergraduate, Information Technology)

Mentor: Mangolika Bhattacharya

Co-Mentor: Dean Plumadore

Authorship: Jake Clouse

Control algorithms that maintain a system in a steady state are essential in fields ranging from robotics to industrial automation. These algorithms react to changing conditions and guide a system back to its desired target. This project focuses on three widely used approaches: PID Control, Fuzzy Logic, and Sliding Mode Control, each with distinct strategies and ideal use cases. PID Control uses a straightforward, mathematics-based method that continuously adjusts the system to drive it toward the steady state. Fuzzy Logic interprets the system's condition through "degrees of truth," allowing for more flexible, human-like decision-making. Sliding Mode Control is more reactive to inconsistent stimuli from a system. It reacts quickly using the current error and the current velocity. The goal of this study is to compare the performance of these algorithms when implemented in different programming languages, Python, C, and C++, on different hardware platforms. To evaluate these, we are constructing a DC-motor-powered mechanical arm equipped with encoders that precisely measure its angle. By comparing the arm's actual position to the desired position, we can observe how effectively each algorithm restores the system to its steady state. The mechanical arm provides an ideal test environment because it involves real-world challenges such as momentum, weight, and the potential for unsafe positions, especially when multiple degrees of freedom are involved. These constraints allow us to demonstrate how well each control algorithm responds to external stimuli and maintains stability across diverse implementations.

NETWORK TOPOLOGY EFFECTS ON NEURONAL SYNCHRONIZATION

Presenter(s): Jaswal, Twinkle (Graduate, Information Technology)

Mentor: Rosangela Follmann

Co-Mentor: Epaminondas Rosa

Authorship: Twinkle Jaswal

Neurons are the fundamental building blocks of the nervous system. Computational modeling of neurons can provide a powerful tool to study neurological processes, including neurological disorders. Epilepsy, for example, is a nervous system disorder characterized by abnormal and excessive neuronal synchronization. It affects around 50 million people worldwide and can have devastating disruptions in their lives. Despite advancements in diagnosis and treatment, no definitive cure exists. Computational studies of neuron network models provide valuable insight into how pathological synchronization can emerge under different physiological and environmental conditions. Previously, we developed a temperature-dependent neuron network model to investigate stimulus-driven seizure activity. In this work, we apply the same model to networks with different connectivity topologies in order to examine the robustness of the observed seizure-like dynamics. Using the Huber-Braun neuron model, based on the Hodgkin-Huxley equations, we simulate networks of electrically coupled neurons arranged in multiple network structures. By comparing neuronal synchronization across topologies under identical stimulus conditions, we assess whether similar patterns of seizure onset persist despite changes in network organization. Our findings suggest that both intrinsic neuronal properties and structural connectivity are important.

AN EFFICIENT MACHINE LEARNING MODEL TO DETECT ABNORMAL BRAIN ACTIVITY

Presenter(s): Mate, Sam (Undergraduate, Information Technology)

Mentor: Rosangela Follmann

Co-Mentor: Epaminondas Rosa

Authorship: Sam Mate, Matei Ionescu, Epaminondas Rosa, Rosangela Follmann

Machine learning is a segment of artificial intelligence that uses data for learning and performing tasks without knowledge of the mechanisms behind those tasks. Applications of machine learning have become widespread, permeating our day-to-day lives through many services we use, as well as in health diagnostics. One of the main drawbacks of current machine learning algorithms is their high demand for computing resources. In this work, we test spiking neural networks (SNN) as an optimal architecture to predict abnormal brain activity associated with epileptic seizures. SNNs are a form of intelligent system that directly relates to the biological neuronal network of the human brain. SNNs use models of neurons, which communicate using discrete electrical signals that mimic the action potential of human biological neurons. This spiking behavior has also been shown to allow SNNs to use less energy than other traditional artificial neural networks for the same task.

As neurological disorders are associated with abnormal brain activity, here we implement and train an SNN model with electroencephalogram (EEG) recordings from patients with epilepsy. The goal of the model is to efficiently detect abnormal patterns in brain electrical activity associated with a pre-seizure state. Having a better understanding of such models can help the medical field by serving as an early warning system for those suffering from a variety of neurological pathologies that give rise to seizures.

CURRICULUM-TRAINED PPO AGENTS UNDER TEMPORAL SHIFT: ZERO-SHOT TRANSFER FROM STATIC TO DYNAMIC OBSTACLES

Presenter(s): Reppen, Andrew (Undergraduate, Information Technology)

Mentor: Qi Zhang

Authorship: Andrew Reppen, Qi Zhang

Learning-based methods are widely used to train autonomous agents that operate in complex and interactive environments. In game artificial intelligence, agents must not only learn effective control policies but also remain robust to changes in environmental dynamics. While deep reinforcement learning enables the emergence of sophisticated behaviors, policies trained under static assumptions often overfit to fixed configurations and degrade when temporal properties of the environment change. In this work, we study the zero-shot generalization of Proximal Policy Optimization (PPO) agents trained in static environments when deployed in previously unseen dynamic obstacle scenarios. We adopt a structured, phased curriculum learning strategy that emphasizes the stabilization of core skills, including navigation, spatial alignment, and projectile aiming, before introducing spatial constraints. Generalization is evaluated through a controlled temporal shift in which static interior walls are replaced with moving obstacles at test time, without any additional training or fine-tuning. Our ablation results show that curriculum-driven training supports the reliable acquisition of robust behavioral primitives and strong performance in static settings. However, a clear performance gap emerges when agents encounter untrained temporal variability, manifested as lower task success rates and increased collision frequency. These findings provide a direct assessment of how foundational skill acquisition both supports and limits zero-shot transfer under dynamic environmental conditions, highlighting the challenges of deploying reinforcement learning agents in truly dynamic game environments.

THE EFFECTS OF TEMPERATURE ON CHEMICAL AND ELECTRICAL SYNAPSES ON NEURONAL ACTIVITY

Presenter(s): Rosenberg, Aaron (Undergraduate, Information Technology)

Mentor: Rosangela Follmann

Co-Mentor: Epaminondas Rosa

Authorship: Aaron Rosenberg, Twinkle Jaswal, Epaminondas Rosa, Rosangela Follmann

Neuronal synchronization plays an important role in many aspects of brain function, including memory consolidation and transitions between sleep cycles, for example. However, when abnormal brain activity takes place, yielding undesirable synchronization, brain disorders like Parkinson's and epilepsy may occur. The research work planned to be done in this study is intended to help understand how abnormal synchronization can elicit epileptic seizures. Epileptic seizures are characterized by the propagation of waves of hyper-synchronous neuronal activity across the brain. Seizure interventions are typically applied at the seizure initiation zone to avoid the spread of synchronous activity. Such interventions will affect synaptic transmission, the means by which neurons communicate with each other. Neurons communicate with each other through both electrical and chemical synapses. Chemical synapses use neurotransmitters to relay the signal from the pre-synaptic to the post-synaptic neuron using a diffusive mechanism, which makes it a slower process compared to electrical synapses. Electrical synapses allow ions to flow directly between neurons through gap junctions, enabling fast communication and contributing to synchronous activity in the brain.

Here, we use the Huber-Braun neuronal model equations to mimic the behavior of the individual neurons that are coupled to each other in a network with chemical and electrical synapses. We want to understand how different temperatures can affect the network output in terms of synchronization. Also, this mode allows for emulating the action of drugs in the synaptic clefts of the network in this way studying potential excitatory and inhibitory effects that may be able to stop an ongoing seizure or prevent a seizure from happening. This study can provide insights into the combined actions of temperature and medication to treat epileptic seizures.

INDEPENDENT STUDY INTO SMART CITIES USING DIGITAL TWIN AND LORAWAN NETWORKS

Presenter(s): Sharkey, Scott (Undergraduate, Information Technology)

Mentor: Mangolika Bhattacharya

Authorship: Scott Sharkey, Mangolika Bhattacharya

As Smart Cities evolve into highly interconnected urban ecosystems, their dependence on robust communication infrastructures becomes increasingly critical; particularly during disasters, when traditional networks are most vulnerable to failure. Cellular and broadband systems often degrade under physical damage, power loss, or network congestion, creating dangerous communication gaps for emergency responders and affected populations. This study explores whether LoRaWAN and multihop LoRaWAN architectures can serve as resilient, low power alternatives capable of sustaining essential communication in such scenarios.

Using a digital twin-based simulation framework, the project models urban communication scenarios in which conventional infrastructure is compromised. The simulated environment incorporates parameters and behavioral patterns reported in prior LoRaWAN studies, enabling controlled exploration of coverage, reliability, latency, and routing performance across free space, obstructed, and underground conditions. This approach allows for systematic testing of multihop strategies and gateway configurations without requiring physical network deployment. Preliminary results suggest that multihop LoRaWAN networks can significantly extend communication reach and maintain functional connectivity when conventional systems collapse. The findings highlight the importance of node placement, gateway redundancy, and adaptive routing in achieving disaster proof communication layers. While LoRaWAN is not intended to replace high bandwidth systems, its independence from commercial infrastructure and its low power, long range characteristics position it as a valuable complementary technology for emergency focused Smart City design.

By synthesizing prior research and applying digital twin modeling, this study provides conceptual and design oriented insights for researchers, emergency planners, and Smart City developers seeking to integrate LPWAN based solutions into resilient urban communication frameworks. The work demonstrates how simulation driven analysis can inform the development of disaster resilient Smart Cities without requiring real world network deployment.

EXTENDING SIMPLE SYMMETRIC MULTI-LATIN SQUARES

Presenter(s): Tiffany, Joshua (Undergraduate, Information Technology)
Despe, Tyler (Undergraduate, Sociology/Anthropology)
Pickley, Cole (Undergraduate, Information Technology)

Mentor: Amin Bahmanian

Authorship: Amin Bahmanian, Tyler Despe, Cole Pickley, Joshua Tiffany

Latin squares are $n \times n$ arrays where a set of n distinct symbols occurs exactly one time in each row and column. The most well-known example of a Latin square is the sudoku puzzle, which is a 9×9 Latin square made up of a 3×3 grid of 3×3 squares that must each contain the full set of symbols. Latin squares are commonly studied in discrete mathematics, but they have applications outside of mathematics as well. Latin squares are used in a variety of fields including agriculture, cryptography, psychology, and medical experiments. One special type of Latin square is the multi-Latin square, where each cell of the square can contain multiple elements. We focus on simple multi-Latin squares, where each cell of the Latin square cannot include the same element more than once. Additionally, the squares we are working with have the property of symmetry, meaning that every cell (i, j) contains the same elements as the cell (j, i) . In this work, we show progress toward a solution to the following unsolved problem: Find conditions for a symmetric $r \times r$ (ρ, λ) -latin square with a full prescribed diagonal tail to be extended to a symmetric $n \times n$ multi-latin square.

APPLICATION OF AI IN RSOS AND THE EXPERIENCE HAD WITH IT

Presenter(s): Timm, Michael (Undergraduate, Information Technology)
Kante, Chaitanya (Graduate, Information Technology)

Mentor: Daniel Freburg

Co-Mentor: Mangolika Bhattacharya

This research report describes the creation and implementation of AI workshops within Registered Student Organizations (RSOs), student-led groups with faculty advisors that operate outside formal academic evaluation structures. Because RSOs are free from grading and academic dishonesty concerns, they provide an ideal environment for students to explore ethical AI use and develop practical AI skills without fear of violating course policies. RSOs are centered around shared interests or identities (e.g., Women in Tech, Hispanic Club), making them an accessible and inclusive platform for engaging IT majors, non-IT majors, and minority or marginalized students. The authors developed hands-on AI workshops and invited RSOs to participate in practical AI activities.

Students were surveyed to assess their perceptions of using AI in a setting free from academic evaluation concerns. To evaluate student acceptance and perceived impact, the study combined the Technology Acceptance Model (TAM) and the Expectations-Confirmation Model (ECM) to design this survey in a way that can aid in examining whether AI engagement within RSOs enhanced students' college experiences. The findings aim to assist higher education institutions in creating inclusive learning environments that support improved student experiences and strengthen institutional reputation.

HEART RATE VARIABILITY, PERCEIVED STRESS, AND ACADEMIC PERFORMANCE

Presenter(s): Boley, Maddie (Graduate, Kinesiology & Recreation)
Vondriska, Matthew (Graduate, Kinesiology & Recreation)
Tyler, Chloe (Undergraduate, Kinesiology & Recreation)

Mentor: Karen Dennis

Authorship: Maddie Boley, Matthew Vondriska, Chloe Tyler

Stress is a phenomenon we all experience. Throughout different stages of life, we experience events or stressors that elicit a stress response. Attending university or college is a time of major life changes for students that can result in an increased perception of stress.

Stress is a phenomenon that has been shown to influence heart rate variability (HRV) (Taelman et al., 2009). An important aspect of overall health, HRV is described as the time interval between heartbeats that can be used as an indicator of physiological resiliency and behavior flexibility that reflects the capacity to adapt to stress and environmental demands. During stressful events, the sympathetic nervous system is aroused. Physiologically, stress appears in the form of lowered HRV, with decreased parasympathetic (PS) activity, increased sympathetic (S) activity, and increased levels of cortisol. Alternatively, shifting the autonomic balance towards increased PS activity can be achieved through stress management training and practice. Rhythmic breathing and active self-generating positive emotion training may shift the ANS balance towards increased PS (Culbert, 2014).

Thus, while everyone experiences stress, the degree of the physical response to stress each person experiences are different due to differing individual characteristics. One of the ways to assess stress is by questionnaires (Yoo et al., 2021). HRV is method of assessing physiological signs of stress.

The relationship between stress and academic achievement in previous studies has shown mixed results, with some studies reporting negative correlations, some reporting positive correlations, and some reporting no relationship, and some reporting an inverted-U relationship between stress and performance (Yoo et al, 2021).

PURPOSE

The purpose of this study was to examine the relationship between academic performance, HRV, and perceived stress in university students enrolled in a personal health/wellness course.

METHODS

Students enrolled in a 16-week personal health/wellness course reported on their academic performance and underwent measures to assess physical fitness, heart rate variability (HRV), and stress index. Students enrolled in KNR 113 Personal Fitness at Illinois State University during the fall of 2023 through the fall of 2025 were subjects for the study. Throughout the 16-weeks, students participated in physical activities that targeted improving fitness, which was assessed through pre- and post-testing. HRV measurements were gathered at both pre- and post-testing using the HeartMath emWave Pro software measured by a pulse plethysmograph ear sensor along with physical fitness data (ht, wt, body comp., VO₂ (1-mile walk test)) and SI (State-Trait Anxiety Inventory for Adults, Polar Tri-Fit software). Weekly "Release It" assignments were given through the HeartMath Institute website to focus on teaching students how to implement breathing techniques, attitude, and heart-brain connection in their own lives. Pre-testing HRV data was used to eliminate any potential influence from the weekly "Release It" assignments. Pearson Correlation Coefficients were completed using SPSS statistical software between GPA, Stress Index, R-R Interval, HRV (standard deviation of the mean R-R intervals (SDANN)), and Coherence, (heart, brain, ANS synchronization).

BIOMECHANICAL AND EMG ANALYSIS OF A 180° CUT IN A FEMALE ATHLETE POST-ACLR

Presenter(s): DeSchryver, Elyse (Graduate, Kinesiology & Recreation)

Mentor: Michael Torry

Authorship: Elyse DeSchryver, Michael Torry

Introduction: Anterior cruciate ligament (ACL) injuries are common in cutting sports, and athletes after ACL reconstruction (ACLR) often retain biomechanical deficits that increase re-injury risk. The hamstrings-to-quadriceps ratio (H:Q) is critical for knee stability. Hamstrings contraction pulls the tibia posteriorly and protects, whereas quadriceps contraction increases anterior tibial movement and stresses the ACL. The gluteus medius (GM) and adductors (ADD) modulate knee valgus, a known ACL risk factor and VMO weakness is frequently observed after ACLR. Few investigations have examined 180° cutting in female athletes post ACLR.

Purpose & Hypotheses: Compare knee kinematics, kinetics, and surface EMG of VMO, GM, and ADD between the involved (reconstructed) and uninvolved (non-injured) limbs of a female collegiate athlete during a 180° cut. It was hypothesized that the reconstructed limb would exhibit (1) lower vertical ground reaction forces (vGRF), (2) lower knee joint moments, (3) decreased knee flexion, (4) decreased VMO activation, (5) increased GM activation, and (6) decreased ADD activation.

Methods: An NCAA DivisionI female athlete, 2.5 years post-ACLR with hamstring graft, performed three 180° cuts per limb. Kinematics were captured with a 10-camera Vicon system (250Hz, Plug-in Gait marker configuration), kinetics with an AMTI force plate (1,000Hz), and EMG (VMO, GM, ADD) at 1,000Hz. Trials were paced by a 180 BPM metronome; approach velocities differed by ≈8% and exit velocities by ≈0.2%.

Results: Contrary to the first hypothesis, the involved limb produced higher vGRF in both braking (17.28 N/kg) and propulsion (17.28 N/kg) phases than the uninvolved limb (16.87 and 14.76 N/kg), indicating a stiffer, protective landing. Knee flexion was reduced on the involved limb (braking 61° vs 71°; propulsion 16° vs 23°). External extension torque during braking was less negative (-528 vs -865 N·mm/kg), yielding a lower estimated hamstring force (925 N vs 1513 N) and a dynamic H:Q ratio of 0.26 versus 0.44, due to comparable quadriceps forces. EMG showed VMO inhibition (167 % MVC vs 497 % MVC), decreased ADD activation (70 % MVC vs 99 % MVC), and increased GM activation (92 % MVC vs 67 % MVC) on the involved limb.

Conclusions: The ACLR limb demonstrates a reduced dynamic H:Q ratio, suggesting less posterior tibial movement, and protective hip abductor activation to limit knee collapse, resulting in a stiffer cut with higher GRFs and lower knee angle. Targeted rehabilitation focusing on hamstrings strengthening and VMO reactivation is recommended to restore a balanced H:Q ratio and improve knee stability during high-demand cutting tasks.

COMPARATIVE ANALYSIS OF DEXA DERIVED BODY COMPOSITION PROFILES IN FEMALE DIVISION I COLLEGIATE ATHLETES

Presenter(s): Dietmeier, Keelin (Undergraduate, Kinesiology & Recreation)

Mentor: Michael Torry

Authorship: Evan Semonis, Ella Tilkes, Ella Stumpf, Cheyenne Moser, Dylan Remark, Samantha McDonald, Chris Carter, Karan Rai, Michael Torry

Accurate assessment of body composition (BC) in athletes plays a critical role in injury prevention and optimizing sport performance. The distribution of fat mass (FM), lean mass (LM), and bone mineral density (BMD) is used to better understand sport-specific physiological profiles.

PURPOSE: The purpose of this study was to examine sport-specific differences FM, LM, and BMD in female Division I collegiate athletes using DEXA.

METHOD: In total, 59 female athletes competed in track (N = 16, Age: 20.0 years $\pm$ 1.4, Height: 172.2 cm $\pm$ 5.1, Weight: 59.7 kg $\pm$ 6.1), soccer (N = 12, Age: 20.6 years $\pm$ 1.3, Height: 165.9 cm $\pm$ 4.9, Weight: 63.7 kg $\pm$ 6.4), basketball (N = 20, Age: 20.1 years $\pm$ 1.6, Height: 177.2 cm $\pm$ 6.4, Weight: 73.2 kg $\pm$ 10.8), and gymnastics (N = 11, Age: 20.9 years $\pm$ 1.2, Height: 164.0 cm $\pm$ 5.3, Weight: 59.0 kg $\pm$ 7.6) volunteered for this study. All athletes in their respective off seasons were tested in the morning following pre-testing guidelines. DEXA directly measured FM (kg), LM (kg), and BMD (g/cm²). A MANOVA was used to quantify differences in BC (LM, FM, and BMD) among sports. For multiple comparisons we used the Bonferroni correction factor resulting in an adjusted p-value of $p < .0125$. **RESULTS:** The mean BC values for track were FM: 16.1 kg $\pm$ 3.4, LM: 41.8 kg $\pm$ 4.0, BMD: 1.18 g/cm² $\pm$ 0.07. The mean BC values for soccer were FM: 17.9 kg $\pm$ 4.4, LM: 43.9 kg $\pm$ 3.4, BMD: 1.20 g/cm² $\pm$.09. The mean BC values for basketball were FM: 24.3 kg $\pm$ 6.2, LM: 46.9 kg $\pm$ 5.4, BMD: 1.24 g/cm² $\pm$ 0.09. The mean BC values for gymnastics were FM: 16.9 kg $\pm$ 3.6, LM: 40.3 kg $\pm$ 5.0, BMD: 1.22 g/cm² $\pm$ 0.08. Bonferroni's post-hoc test indicated significant differences in FM between basketball and track (Diff = 8.1 kg $\pm$ 1.6, $p < 0.001$), basketball and soccer (Diff = 6.3 kg $\pm$ 1.7, $p = 0.004$), and basketball and gymnastics (Diff = 7.3 kg $\pm$ 1.8, $p < 0.001$). Significant differences were also found in LM between basketball and track (Diff = 5.1 kg $\pm$ 1.6, $p = 0.01$) and basketball and gymnastics (Diff = 6.6 kg $\pm$ 1.7, $p = 0.002$). There were no statistically significant differences for BMD between sports.

CONCLUSION: Our study showed significant differences in fat and lean mass in female collegiate athletes competing in track, soccer, basketball, and gymnastics. These findings suggest that female athletes elicit different body composition profiles depending on their sport.

BIOMECHANICAL ANALYSIS OF CONVENTIONAL VS. SUMO DEADLIFT

Presenter(s): Donahue, Michael (Undergraduate, Kinesiology & Recreation)

Mentor: Michael Torry

Introduction: This study compares biomechanical differences between the conventional deadlift (CDL) and sumo deadlift (SDL) to clarify how each variation alters joint mechanics, muscle activation, and force production, and to inform exercise prescription for performance and rehabilitation. Deadlifts are widely used for strength development, but variation in stance width and trunk position changes mechanical demands, potentially affecting efficiency and injury risk.

Methods: A single male trained subject performed three trials each of CDL and SDL using a constant load of 185 lb. A three-dimensional motion capture system (Vicon), two AMTI force plates, and electromyography (EMG) recorded joint kinematics, ground reaction forces, and muscle activation. 41 reflective markers and Delsym EMG electrodes measured movement and activation of the rectus femoris, vastus medialis, biceps femoris, and gluteus maximus of the subject's dominant leg. Analysis focused on the concentric phase, particularly lift-off when peak forces occurred. Variables included vertical and mediolateral ground reaction force, trunk and joint angles, hip and knee moments, muscle activation relative to maximal voluntary contraction, hamstring-to-quadriceps coactivation ratio, and combined joint moments as an indicator of mechanical efficiency.

Results: Findings show that CDL produces greater vertical ground reaction force (-1264.7 N vs. -1162.5 N), while SDL produces greater mediolateral force (381.6 N vs. 238.6 N). Unexpectedly, CDL demonstrates greater hip and knee flexion, although SDL maintains a more upright trunk. CDL showed higher hip torque (2463.0 N·mm/kg vs. 2365.5 N·mm/kg), whereas SDL showed greater knee torque (832.7 N·mm/kg vs. 662.6 N·mm/kg). EMG data showed that the rectus femoris activated more in CDL, while the vastus medialis had more activation in SDL. For posterior chain muscles, the gluteus maximus was more active in CDL, while the biceps femoris exhibited greater activation in SDL. Contrary to my hypothesis, hamstring-to-quadriceps coactivation ratios are slightly higher in SDL (0.394 vs 0.337). Efficiency analysis indicates CDL requires less combined joint torque despite greater trunk flexion, suggesting anthropometric factors influence which variation is mechanically advantageous.

Conclusion: These findings indicate that neither deadlift variation is universally better; instead, selection depends on individual leverages, muscular bias, and training goals. Coaches and clinicians should individualize deadlift stance selection to maximize performance, reduce injury risk, and support rehabilitation outcomes within individualized scenarios.

BODY COMPOSITION AS A PREDICTOR OF FUNCTIONAL MOVEMENT SCREENING™ SCORES IN LOCAL POLICE OFFICERS

Presenter(s): Farm, Isabelle (Graduate, Kinesiology & Recreation)

Mentor: Marcel Lopes dos Santos

Authorship: Isabelle Farm, Taylor Parmentier, Gabriel Walker, Jordynn Griffin, Marianna Arias, Andrew Jagla, Christian Brilley, Mike Torry, Marcel Lopes dos Santos

The Functional Movement Screen (FMS) is a tool used to identify limitations in mobility and physical function that may contribute to potentially harmful movement patterns which can result in injury both on and off duty.

PURPOSE: To determine the extent to which body composition (BC) measures predict mFMS performance in male police officers. **METHODS:** 31 male police officers volunteered for the study, (age: 36.6 years $\pm$ 9.1, height: 180.7cm $\pm$ 6.4, weight: 97.0kg $\pm$ 15.2). Dual-Energy X-ray Absorptiometry (DEXA) scans assessed body composition variables of body mass index (BMI), body fat percentage (BF%), and lean mass index (LMI). A modified FMS (mFMS) was employed and included: deep squat, hurdle step, inline lunge, shoulder mobility, shoulder clearance, and active straight leg raise. Scores for each test ranged from 0-3, 0 indicated that pain was reported during that movement and a score of 3 was given if the participant executed the movement with perfect form and no pain. Pearson's correlations were conducted to assess linear relationships between the mFMS and DEXA dependent variables. Participants' scores were then categorized into high-risk (scores of 0-1 on any FMS test) and low risk (scores of 2-3 on any FMS test). Independent samples t-tests were used to compare these groups to BC measures between these groups.

RESULTS: Higher BMI was associated with lower overall mFMS scores ($r = -.462$, $p = .009$), as was BF% ($r = -.364$, $p = .044$), and LMI ($r = -.355$, $p = .050$). There was a reduction in shoulder mobility with higher BMI ($r = -.479$, $p = .006$) and higher BF% was associated with lower scores on the inline lunge ($r = -.382$, $p = .034$). The high-risk group had a significantly higher BF% (32.44% $\pm$ 4.5) compared to low-risk group (27.78% $\pm$ 6.2) ($t(29) = 2.35$, $p = .013$). No other differences were noted in the dependent variables between the high-risk versus low-risk groups (all $p \geq .059$).

CONCLUSION: Less favorable BC measures were associated with lower overall mFMS scores, particularly BF%. Greater BF% appears to contribute to limitations in mobility and could promote harmful movement patterns which may increase injury risk for on and off duty police officers.

POSTER CANCELLED

ISOKINETIC STRENGTH PREDICTS VERTICAL JUMP HEIGHT IN FEMALE BASKETBALL PLAYERS

Presenter(s): Hafsa, Hafsa (Graduate, Kinesiology & Recreation)

Mentor: Michael Torry

In basketball, vertical jump height (VJH) is a critical performance metric. Although jump ability has been associated with rectus femoris muscle cross-sectional area (CSA), the demands of basketball athletes VJH may be best represented by knee strength.

PURPOSE: To investigate the relationship between, muscle CSA, VJH and isokinetic extensor strength in collegiate female basketball athletes. **METHODS:** Eleven female collegiate basketball athletes (aged 19.55 ± 1.57 , height $176 \text{ cm} \pm 5.7$ and weight $75 \text{ kg} \pm 10.8$) volunteered and were tested in a single session. Ultrasound was used to evaluate the CSA of the lower-mid third rectus femoris. VJH was evaluated via force plates. Knee extensor torque, work and power were evaluated through isokinetic testing using the modified Thorstensson protocol with 30 repetitions on a dynamometer at $180^\circ/\text{second}$. All tests were performed on the dominant limb. Spearman's correlations were used to determine relationships ($\alpha \leq .05$) between the VJH, CSA of rectus femoris and Knee strength

RESULTS: Positive correlations between VJH and work in the first three repetitions ($p = .008$, $\rho = .749$), average power ($p = .009$, $\rho = .744$), total work relative to body weight ($p = .019$, $\rho = .690$), peak power ($p = .014$, $\rho = .712$), average torque ($p = .022$, $\rho = .679$), and peak torque ($p = .014$, $\rho = .712$). No significant relationships were found between VJH and rectus femoris CSA ($p = .300$, $\rho = .344$).

CONCLUSION: Isokinetic torque, work, and power during knee extension were strong predictors of VJH with work performed in first three repetitions noted as highest predictor of VJH; rectus femoris CSA was not associated with the VJH.

SIGNIFICANCE: These findings indicate significant relationships between isokinetic work, torque, power, and VJH, suggesting that greater muscular work is associated with better vertical jump outcomes in collegiate female basketball athletes. These insights may inform targeted training and rehabilitation strategies.

EXAMINATION OF PROMOTIONAL GENDERED SPENDING IN DIVISION I BASKETBALL

Presenter(s): Lutt, Madelynn (Graduate, Kinesiology & Recreation)

Mentor: Liz Sattler

Co-Mentor: Eric Kramer

Authorship: Eric Kramer, Liz Sattler, Madelynn Lutt

Women's sports have recently risen in popularity including attendance and viewership numbers. This influx has led an increase into growth of investment within the women's sports leagues and teams (Smith, 2024). This increase in investment has been more visible in the professional sports front where corporate partnerships and broadcasting deals have been well covered in the media. Individual female athletes are now being seen as ideal brand partners due to their reach and influence in social media and the new markets they can introduce brands to (Hinchliffe & Abrams, 2024). The 2024 Women's Basketball National Championship had more viewers than the men's final for the first time in the history of both tournaments. However, despite this new interest and claimed improvements, there is still uncertainty over gender equity practices of the National Collegiate Athletic Association (NCAA) and Division I athletic departments, particularly when it comes to fair support on marketing and publicity (Armour et al., 2022; Surendran & Lavigne, 2024). These monetary differences have only been increased with recent developments from the Department of Education excluding name, image, and likeness agreements between schools and college athletes from Title IX financial assistance proportionality calculations. The anticipated \$20.5 million annual revenue share from the House vs. NCAA (2025) settlement will also not be proportionally distributed by gender. It is estimated that most athletic departments will distribute approximately \$1 million, to female athletes, while male athletes will receive the remaining \$19.5 million annually (Lavigne, 2025). Despite the progress of Title IX over the past 53 years, DOE's recent guidance highlights the significant inequities that still exist in college athletics. As recently as 2022, it was found that the vast majority (nearly 90%) of colleges and Universities are still not offering athletic opportunities proportionate to their enrollment (Armour et al., 2022), as is expected under Title IX. Additionally, schools are falling short of the equitable benefits and treatment prong of Title IX, with over \$1 billion being spent on men's travel, equipment, and recruiting annually and just \$576 million on women's sports in the same categories.

ARE PREDICTIVE WALKING AND CYCLING EQUATIONS A VALID MEASURE OF EXERCISE INTENSITY IN PREGNANT WOMEN?

Presenter(s): Moser, Cheyenne (Undergraduate, Kinesiology & Recreation)

Mentor: Samantha McDonald

Co-Mentor: Michael Torry

Authorship: Cheyenne Moser, Samantha McDonald, Evan Semonis, Diego Soto, Gia Positano, Mia Manisco, Linda May

Exercise intensity predictive equations, specifically for cycling and walking, were developed from non-pregnant populations. Marked physiological changes in pregnancy question their validity as an accurate measure of intensity.

PURPOSE: To evaluate the differences in relative oxygen consumption (VO_2) measured via indirect calorimetry and estimated via predictive equations among a sample of pregnant women.

METHODS: Five pregnant women participated in this study and were, on average, 30.2 ± 5.0 yrs old, 20 to 25 weeks pregnant and exhibited a body mass index of $26.8 \pm 5.4 \text{ kg/m}^2$. The participants performed two, 20-minute bouts of stationary cycling and treadmill walking on different days, separated by at least 24 hours. Exercise was performed at a light intensity (20% to 39% $\text{VO}_{2\text{peak}}$) for 10 minutes and moderate intensity (40% to 59% $\text{VO}_{2\text{peak}}$) for 10 minutes. Relative VO_2 was continuously measured via indirect calorimetry. Independent t-tests, assuming unequal variances, evaluating the mean differences in average relative VO_2 values measured and predicted were performed with a significance level of $p < 0.05$.

RESULTS: Significant differences between measured and predicted VO_2 values were observed for the cycling trial; both light $25.4 \text{ vs } 15.8 \text{ ml O}_2 \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ ($p=0.002$) and moderate $27.7 \text{ vs } 17.0 \text{ ml O}_2 \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ ($p=0.001$) intensities. For the treadmill walking trial, differences between measured and predicted VO_2 values (light: $20.1 \text{ vs } 13.5 \text{ ml O}_2 \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$, $p=0.13$; moderate: $24.4 \text{ vs } 16.7 \text{ ml O}_2 \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$, $p=0.11$) did not reach statistical significance.

CONCLUSION: This study demonstrated that cycling predictive equations may underestimate exercise intensity in pregnant women, reflected by lower VO_2 values observed at the mid- and endpoints of the trial. For walking, however, significant differences were not shown despite the exhibiting similar magnitudes of VO_2 values relative to the cycling trial.

VALIDITY AND RELIABILITY OF A LINEAR POSITION TRANSDUCER AND FORCE PLATFORM DURING THE 30-S BOSCO JUMP TEST

Presenter(s): Parmentier, Taylor (Graduate, Kinesiology & Recreation)

Mentor: Marcel Lopes dos Santos

The Bosco 30-s repeated vertical jump test (BJT) is commonly used to assess lower-body power and fatigue. Field-based systems such as linear position transducers are frequently used as practical alternatives to laboratory-grade force platforms; however, their reliability and agreement during time-interval performance analyses remain unclear.

PURPOSE: The purpose of this study was to examine the test–retest reliability of a linear position transducer (TENDO Unit) and force platform (Hawkin Dynamics) measures and to determine agreement between devices across 7.5-s intervals and mean power output during the 30-s BJT.

METHODS: Twenty-one physically active college students (age 20.4 ± 1.0 yrs, height 1.7 ± 0.1 m, body mass 82.5 ± 18.1 kg, body fat $19.8 \pm 7.7\%$, skeletal muscle mass 35.6 ± 15.6 kg). Prior to the BJT, bioelectrical impedance analysis was used to measure body composition (InBody BWA, Co. Ltd., Seoul, Korea) and a dynamic warmup was completed. Participants performed two 30-s BJT separated by a retest session. Power output was calculated for 0–7.5 s, 7.5–15 s, 15–22.5 s, 22.5–30 s, and mean power output. Test–retest reliability was assessed using intraclass correlation coefficients (ICC), coefficient of variation (CV), and typical error (TE). Between-device agreement was examined using TE, CV, and paired comparisons.

RESULTS: The TENDO Unit demonstrated excellent reliability across all intervals (ICC = 0.96–0.99; CV = 3.8–7.8%). In contrast, force platform reliability ranged from moderate to excellent (ICC = 0.66–0.94; CV = 9.2–27.2%), with reliability decreasing in later fatigue intervals. Between-device comparisons revealed significantly higher TENDO Unit values during the 0–7.5 s and 7.5–15 s intervals ($p < 0.03$) and for mean power output during the test session ($p = 0.001$). Between-device variability increased progressively across time intervals, with CV values reaching 25–29% in the final 7.5-s segment.

CONCLUSION: The TENDO Unit offers a practical, lower-cost alternative to force platforms for measuring mean power output during the BJT by demonstrating consistently high reliability across all intervals, whereas force platform reliability declined during later fatigue stages. Although mean power output showed moderate agreement between devices, systematic differences and increasing variability across time intervals suggest that linear position transducer and force platform measurements are not directly interchangeable, particularly when assessing fatigue-related interval metrics.

FUNDING: This research was supported by a University Research Grant (URG) from the College of Applied Sciences and Technology (CAST), Illinois State University.

PREDICTING ARMY THREE-REPETITION MAXIMUM DEADLIFT PERFORMANCE USING THE LOAD-VELOCITY PROFILE

Presenter(s): Rekart, Dylan (Graduate, Kinesiology & Recreation)

Mentor: Marcel Lopes dos Santos

Co-Mentor: Michael Torry

Authorship: Dylan Rekart, Gabriel Walker, Evan Semonis, Kelly Laurson, Michael Torry, Samantha McDonald, Marcel Lopes dos Santos

Accurate assessment of strength is critical for optimizing combat readiness and reducing injury risk in tactical populations. One of the events included in the Army Fitness Test (AFT) is the three-repetition maximum deadlift (MDL). Since maximal strength assessments are very taxing on personnel, they should not be performed regularly. The load-velocity profile (LVP) has been shown to accurately predict 1RM in athletic populations. Therefore, the LVP may provide a practical alternative for estimating MDL performance. PURPOSE: To assess the accuracy of LVP in predicting MDL performance.

METHODS: Twenty-five males (age = 21 ± 1.3 years, height 177 ± 5.5 cm, body mass = 90 ± 13.3 kg) completed a standardized progressive loading test lifting a hexagonal barbell at maximum intended velocity to determine their MDL. Linear regression analysis was conducted to predict MDL performance based on barbell mean velocity (MV). The goodness of fit of the linear regression was assessed by the coefficient of determination (r^2). Statistical significance α -level was set at $p \leq 0.05$.

RESULTS: A very strong relationship between MV and load was found ($r^2 = 0.83$, SEE = 12.2 %) and a predictive equation was yielded: MDL Relative Load = $123.939 - 67.884(MV)$. CONCLUSION: There is a strong relationship between MV and MDL relative load, which supports the use of the LVP as a reliable and practical tool for estimating MDL strength. This method allows for regular monitoring without the need for maximal testing, providing a safe and efficient approach to track training progress prior to the AFT.

FUNDING: Supported by the College of Applied Science and Technology of Illinois State University.

PREGNANCY RELATED ADAPTATIONS IN LOWER LIMB JOINT MECHANICS DURING WALKING

Presenter(s): Semonis, Evan (Graduate, Kinesiology & Recreation)

Mentor: Michael Torry

Co-Mentor: Samantha McDonald

Authorship: Evan Semonis, Choima Ezeajughi, Samantha McDonald, Gabriel Walker, Ella Stumpf, Kyra Stoller, Daniel Dodd, Noelle Selkow, Michael Torry

Several anatomical changes occur throughout pregnancy preparing for childbirth. Changes in hormones, COM distribution, etc. likely result in biomechanical adjustments, like kinematic and kinetic parameters of gait to maintain stability and mobility while walking. PURPOSE: The purpose of this study was to analyze the sagittal plane torques at the hip, knee, and ankle as pregnancy progresses.

METHODS: Five pregnant women (age: 30.6 ± 2.19 years; height: 1.61 ± 0.01 m) participated in this study. Gait data were collected over two testing sessions, with the first session (S1) at 18.4 ± 5.3 weeks of gestation (weight: 62.1 ± 10.9 kg; BMI: 23.9 ± 4.2 kg/m²), and the second session (S2) at 30.4 ± 5.4 weeks of gestation (weight: 71.1 ± 8.9 kg; BMI: 27.3 ± 3.3 kg/m²). At S1, participants were instructed to walk five times at a self-selected pace (mean pace: 1.4 ± 0.1 m/s). At S2, subjects walked at a controlled pace within $\pm 2.5\%$ of the original mean pace for five trials. Kinematic data were sampled at 200 Hz using 41-markers with simultaneous ground reaction forces collected at 1000 Hz. Differences between peak braking (BR) and propulsive (PR) torque at the hip, knee, and ankle were evaluated with paired t-tests ($\alpha \leq 0.05$).

RESULTS: Subjects gained 9.0 ± 14.07 kg between sessions and walking speeds for S2 were 1.4 ± 0.1 m/s, matching the S1 speeds. There were differences observed in the peak hip torque from S1 (BR: -34.3 ± 4.9 Nm, PR: 70.1 ± 30.4 Nm) to S2 (BR: -32.0 ± 4.4 Nm, PR: 71.7 ± 28.2 Nm) during the braking (-1.6 ± 6.6 Nm, $p = 0.629$) and propulsive (-2.2 ± 1.0 Nm, $p = 0.006$) phases. There were no significant differences in the peak knee torque from S1 (BR: -22.2 ± 16.7 Nm, PR: 29.7 ± 21.4 Nm) to S2 (BR: -23.8 ± 11.4 Nm, PR: 34.6 ± 20.2 Nm) during the braking and propulsive phases. There were no significant differences in the peak ankle torque from S1 (BR: -82.0 ± 13.4 Nm, PR: 13.4 ± 5.9 Nm) to S2 (BR: -91.1 ± 13.2 Nm, PR: 14.9 ± 7.9 Nm).

CONCLUSION: The increase in body weight during pregnancy caused an increase in peak braking and propulsion torque at the hip but not at the knee or ankle suggesting the hip compensates to maintain gait when walking speed is held constant.

EVALUATING DIFFERENCES IN SKELETAL MUSCLE STRENGTH AND FATIGUE IN THE SECOND AND THIRD TRIMESTER OF PREGNANCY IN RESPONSE TO A 10-WEEK EXERCISE TRAINING INTERVENTION

Presenter(s): Stumpf, Ella (Undergraduate, Kinesiology & Recreation)

Mentor: Samantha McDonald

Authorship: Samantha McDonald, Evan Semonis, Michael Torry

Pregnant women subjectively report high levels of overall fatigue that precipitously increase in the second and third trimester of pregnancy. Potential drivers of increased overall fatigue may be increased skeletal muscle (SKM) fatigue. Prenatal exercise may attenuate SKM fatigue. Potential drivers of overall fatigue may be decreased skeletal muscle strength and increased fatigue.

PURPOSE: The purpose of this study was to evaluate differences in skeletal muscle strength and fatigue in the second and third trimester of pregnancy in response to a 10-week exercise training intervention.

METHODS: Four pregnant women (Age: 31.8 years $\pm$ 1.7, Height: 1.61 cm $\pm$ 0.01) participated in this study. Participants completed two study visits; one in the 2nd trimester (Mean Weeks of Gestation: 18.8 weeks $\pm$ 6.0, Weight: 64.0 kg $\pm$ 11.7), and one in the 3rd trimester (Mean Weeks of Gestation: 29.3 weeks $\pm$ 5.5, Weight: 69.5 kg $\pm$ 9.5). At each visit, the subjects performed a maximal, seated isokinetic Thorstensson Protocol on a leg dynamometer at 180°/s for a maximum of 50 reps or until volitional fatigue. Differences in variables of quadricep extensor (QExt) torque, QExt fatigue, and QExt fatigue change % between gestational time points and after exercise training were evaluated with paired t-tests ($p < 0.05$).

RESULTS: There were no significant differences observed in the mean peak QExt torque from the 2nd (56.97 nm $\pm$ 14.99) to the 3rd trimester (62.46 nm $\pm$ 18.12). The mean peak QExt torque change between Session 1 (S1) and Session 2 (S2) was 5.49 nm, $\pm$ 4.69, range; 2.03nm-2.4nm, $p=0.10$). There were no differences observed in the mean QExt fatigue from the 2nd (30.04 nm $\pm$ 16.16) to the 3rd trimester (33.96 nm $\pm$ 18.24). The mean QExt fatigue change between S1 and S2 was 3.9nm, $\pm$ 8.35, range; -4.47nm-13.4nm, $p=0.42$. There were no differences observed in the mean QExt fatigue change % from the 2nd (50.17% $\pm$ 17.91%) to the 3rd trimester (51.46% $\pm$ 15.09%). The mean QExt fatigue change % between S1 and S2 was 1.29%, $\pm$ 12.22%, range; 12.81%-14.62%, $p=0.85$

CONCLUSION: A 10-week exercise program maintained QExt strength and fatigue in pregnancy from the 2nd to 3rd trimester.

RESPONSIVENESS OF DEXA AND ADP IN DETECTING BODY COMPOSITION CHANGES IN DIVISION I COLLEGIATE ATHLETES

Presenter(s): Velazquez, Agustin (Graduate, Kinesiology & Recreation)

Mentor: Michael Torry

Co-Mentor: Samantha McDonald

Authorship: Agustin Velazquez, Evan R. Semonis, Samantha McDonald, Keelin J. Dietmier, Kelly Laurson, Karan Rai, Michael Torry

Dual-energy X-ray absorptiometry (DXA), and Air displacement plethysmography (ADP) are two modalities that are commonly used to assess body composition (BC). Previous literature shows that ADP and DXA have a large variance in their BC analysis. The variability may mask our ability to detect minute changes over the course of a season. Purpose: To determine the relationship between ADP and DXA, and to compare the responsiveness of DXA and ADP to detect changes of BC in athletes. Methods: In total, N = 51 (males = 46, females = 5) NCAA athletes mean age: 20.41 ± 1.403 , hgt. : $72.73 \text{ in.} \pm 2.554$, wgt. : 204.04 ± 28.292 volunteered in this study. All athletes - in their respective off-seasons - underwent two, sequential BC tests, ADP and DEXA. Athletes were fasted, hydrated, and tested in the morning between 0600-0900 AM, and before any exercise training. The ADP quantified FFM and FM using sex-, age-, race/ethnicity - specific SIRI predictive equations while the DEXA directly estimated FFM (Σ bone mineral content + SKM) and FM. Change scores were calculated for DXA and ADP and correlated in pairs. The pre- and post- season mean changes within ADP and DXA were compared using paired t-tests ($\alpha \leq .05$). Standardized response mean (SRM) was used to determine the responsiveness of each measurement tool pre- and post- season. RESULTS: There were low correlations of; fat%, FM, and FFM changes between DXA and ADP (all $r \leq 0.22$). Differences between DXA vs. ADP for %fat were observed (0.69 ± 0.23 vs. -0.45 ± 0.34 , $p = 0.01$, respectively). DXA vs. ADP for FM (707.79 ± 221.79 vs. -609.65 ± 371.00 (g), $p = 0.003$, respectively), as well as FFM changes were observed (-730.60 ± 300.50 vs. 627.18 ± 411.86 (g), $p = 0.004$, respectively). Larger SRM values were observed for all dependent variables for DXA relative to ADP (%fat 0.43 vs. 0.18, FFM 0.34 vs. 0.21, FM 0.45 vs. 0.23). Conclusion: Our study demonstrated weak correlations for all BC metrics between DXA and ADP, indicating these methodologies are dissimilar and not interchangeable. The mean value changes in BC variables showed opposite trends, reinforcing this result. DXA's SRM values were higher for every variable: FM, FFM, and %fat suggesting greater responsiveness to the change in variables over the season.

LANGUAGES, LITERATURES AND CULTURES

LINGUISTIC VARIETIES AND SOCIOPOLITICAL IDENTITIES IN SPAIN: A COMPARATIVE STUDIES OF PHONETICS AND PHONOLOGY IN RURAL AND URBAN SPEECH

Presenter(s): Garcia Sanz, Elena (Graduate, Languages, Literatures and Cultures)

Mentor: Benjamin Schmeiser

Authorship: Elena García Sanz

This study aims to examine the distinctions between phonetics and phonology within rural and urban varieties of Spanish focusing on the peninsular region of Spain, highlighting their sociolinguistic and political significance. Phonetics, concerned with the physical production of speech sounds, reveals observable differences such as pronunciation, intonation, and speech clarity between rural and urban speakers. Phonology, on the other hand, pertains to the abstract, functional system of sound patterns and contrasts that linguistic identity and social meaning. The rural-urban divide often manifests in phonological features, such as the preservation of certain regional pronunciations or the adoption of standardized urban norms. These linguistic variations carry sociopolitical implications, influencing issues of identity, social mobility, and regional belonging. Urban speech patterns frequently align with socio-economic power structures and national integration efforts, serving as the so called “cuna del lenguaje español”, while rural patterns may serve as markers of local identity and resistance. Understanding these differences emphasises the complex interaction between language, social stratification, and political identity in the diverse landscape of the peninsular Spanish-speaking communities.

MATHEMATICS

DETERMINING DISTANCE FROM A POINT TO THE SUPER-ELIPSE TO STUDY ENERGY DECAY ON THE DAMPED WAVE EQUATION

Presenter(s): Achammer, Benjamin (Undergraduate, Mathematics)

Mentor: Perry Kleinhenz

Authorship: Benjamin Achammer, Perry Kleinhenz

A super-ellipse, sometimes called a “squircle,” is a square with rounded edges, akin to the shape of a phone-app. Whereas finding the distance from a point to a square or circle are relatively simple computations, determining the distance of a point to the super-ellipse is different, and there is no straightforward way to find a closed form for it. Instead, we try to find a function that is comparable to the distance function. Finding this comparable distance function allows us to study energy decay for the damped wave equation, where the damping is dependent on the distance to the super-ellipse.

HAIL PARAMETRIC REINSURANCE FOR CATASTROPHE COVERAGE

Presenter(s): Ali, Sadira (Undergraduate, Mathematics)
 Dale, Aubry (Undergraduate, Mathematics)
 Leese, Ben (Undergraduate, , Risk, Management, and Insurance)

Mentor: Jim Jones

Homeowners across the Midwest, specifically in Iowa, are experiencing an increase in frequency and severity of hailstorms. These events create a significant financial strain for mutual insurance companies, which are insurance companies that are owned by their policyholders and commonly provide homeowners' coverage in rural and regional markets. Due to hail-related losses rising, insurers are facing higher costs for reinsurance, which is insurance purchased by insurance companies to protect against large or catastrophic losses. In the past five years, reinsurance providers have increased coverage thresholds, making catastrophe protection less accessible for these smaller insurers.

This project introduces GAP (Gap Alleviation Parametric), an alternative risk financing tool designed to address this growing protection gap mutuals are facing. GAP uses parametric insurance, a coverage structure that triggers payments based on the occurrence of a specified trigger, which is a predefined, measurable event, rather than on the assessment of individual property damage. Following this design, payouts occur automatically when the designated trigger is met, being the second occurrence of a hailstorm in a given county with hail size greater than or equal to one and one half inches. This structure is different than the traditional indemnity-based insurance, like a personal homeowners' policy, which requires detailed loss evaluations before payments are made.

The parametric structure provides advantages. First, it enables faster payments by removing the lengthy claims adjustment processes. Second, it reduces the administrative and operational costs associated with damage inspections and loss estimation. Third, it provides greater transparency and predictability of payments, as said payouts are fixed and rely on objective weather data rather than subjective damage assessments. These features make parametric coverage suitable for helping mutual insurance companies manage their newfound gap in coverage.

GAP is designed to help mutual companies manage catastrophe exposure more efficiently while supporting market stability. By providing a supplemental layer of protection tied to measurable hail events, the product helps insurers respond to the increasing loss volatility. Improved financial stability at the insurer level ultimately benefits policyholders by promoting continued availability and affordability of homeowners' insurance in hail-prone regions.

DATA-DRIVEN PARTITIONING IN DISTRIBUTED OPTIMIZATION FOR NETWORKED SYSTEMS

Presenter(s): Azameti, Prosper (Graduate, Mathematics)

Mentor: Mehdi Karimi

Authorship: Prosper Azameti, Mehdi Karimi

The Optimal Power Flow (OPF) problem determines the most economical generation dispatch in a power system while satisfying physical and operational constraints. For large-scale networks, centralized OPF becomes computationally expensive, motivating the use of distributed optimization (DO) methods such as ADMM. In distributed OPF, the network is partitioned into smaller areas that solve local subproblems and coordinate until convergence. However, the convergence speed of distributed OPF depends strongly on how the network is partitioned.

Traditional partitioning techniques, such as METIS or radial decomposition, focus on minimizing edge cuts or balancing region sizes but do not consider operating-point dependent characteristics such as load levels, generator limits, or congestion patterns. As a result, they do not directly optimize convergence performance.

This project proposes a data-driven partitioning strategy using Graph Neural Networks (GNNs). Power networks are represented as graphs, where buses are nodes with electrical and operational features, and transmission lines are edges with physical parameters. Multiple operating scenarios are generated from standard MATPOWER test cases by perturbing loads, generation limits, and line capacities. For each scenario, heuristic partitions are computed and used to construct a supervised learning dataset.

The GNN is trained to predict high-quality partitions and evaluated by comparing the convergence behavior of distributed OPF under learned partitions versus METIS. Preliminary experiments show that the proposed approach successfully reproduces high-quality baseline partitions and provides a foundation for learning partitions that directly improve convergence performance.

A THEORETICAL ANALYSIS OF FILTERING AND SMOOTHING TECHNIQUES IN STOCHASTIC TIME SERIES

Presenter(s): Azeez, Kaosarat Bola (Graduate, Mathematics)

Mentor: Sunil Chebolu

Polynomial-reproducing filters are fundamental tools for smoothing and trend extraction in noisy time series, particularly when the goal is to reduce short-run variation without distorting underlying low-degree trends. This work develops a generalized polynomial reproduction theorem guaranteeing the existence of $(2k + 1)$ -point symmetric linear filters that pass polynomial trends up to a degree $(k - 1)$ without distortion at the window center. Building on this result, the framework is then specialized to obtain explicit coefficient vectors for widely used smoothers, including 5-point and 7-point Savitzky–Golay filters and the Spencer 15-point moving average. Our main contribution is a detailed, step-by-step derivation of these classical weighted linear filters, particularly the Spencer 15-point filter, whose complete explicit derivation is often challenging to find in a single, self-contained treatment. For each filter, reproduction properties are verified analytically, and practical smoothing behavior is compared using theoretical metrics (such as reproduction order) together with numerical experiments. Finally, we apply the methods on a real-world time series in finance and signal processing, which highlight the trade-offs between responsiveness and noise and address endpoint handling to finite-window smoothing.

Overall, the work clarifies how polynomial reproduction, symmetry, and window length jointly determines filter performance and provides a coherent pathway from general existence results to explicit, implementable smoothing rules used in practice.

SPECTRAL ANALYSIS OF STATIONARY TIME SERIES

Presenter(s): Yindo, Gifty (Graduate, Mathematics)

Mentor: Sunil Chebolu

Spectral analysis offers an alternative and complementary perspective by representing a stationary time series in the frequency domain. While the traditional time domain analysis relies on autocovariances to describe dependence, frequency domain approaches offer complementary insight, particularly for identifying cyclical behaviors. This project studies the theoretical foundations and practical implementation of spectral analysis for weak stationary processes. We explore the relationship between the autocovariance function and the spectral density, showing how frequency domain representations provide an alternative characterization of second-order structure. Key properties of stationary processes are discussed to motivate the use of spectral methods, and standard models such as ARMA processes are used to illustrate these ideas.

To demonstrate practical relevance, spectral density estimation techniques, including the periodogram and smoothing methods, are applied to real data. The results illustrate how spectral analysis can reveal dominant frequencies and structural features that may not be easily detected in the time domain. This work bridges theoretical development and application, emphasizing the role of spectral methods in modern time series analysis.

MECHANICAL ENGINEERING

FROM GEOMETRY TO SAFETY: DESIGNING MECHANICAL COMPONENTS TO MINIMIZE STRESS CONCENTRATION

Presenter(s): Kerr, Isaiah (Undergraduate, Mechanical Engineering)

Mentor: Hafizur Rahman

A primary cause of structural failure in machine components is the development of localized high stresses at geometric discontinuities, commonly referred to as stress concentration. Understanding and mitigating stress concentration is critical in the design and manufacturing of reliable engineering components. In our recent Firebird-funded project, we have systematically investigated how small geometric modifications significantly influence stress distribution in notched beams. Preliminary computational analysis showed that replacing sharp notch edges with fillets or implementing a patterned notch configuration instead of a single notch, can reduce stress concentration by approximately 15%. Further, introducing curved edges within a patterned notch system reduced peak stress even more significantly compared to the sharp-edged configurations. These findings suggest that careful geometric design; particularly the use of curvature at stress risers can substantially enhance structural performance and delay failure under applied loads. To validate the simulations with real experimentation, we fabricated our CAD models using fused deposition modeling technique with PLA filament and are conducting tensile testing to observe fracture initiation and load-bearing capacity. Here, sharp-edged specimens would likely fail at lower applied loads compared to curved or patterned designs. This work demonstrates how thoughtful geometric optimization can improve strength-to-weight efficiency in manufactured components while enhancing structural reliability and safety without requiring additional material.

DESIGN OF AN AUTONOMOUS MOBILE ROBOT FOR BUILDING INSPECTION

Presenter(s): Westerhold, Adam (Undergraduate, Mechanical Engineering)
 Weber, Connor (Undergraduate, Information Technology)
 Huffman, Chandler (Undergraduate, Technology)
 Kelly, Mahari (Undergraduate, Technology)
 Akanbi, Sarah (Undergraduate, Information Technology)
 Medina, Nick (Undergraduate, Technology)

Mentor: Jeritt Williams

Co-Mentor: Xi Hu

Autonomous mobile robots (AMRs) have offered a versatile platform for the implementation of sensors to perform many tasks in fields such as warehouse efficiency, autonomous public transport, and even search and rescue operations. However, the use of AMRs is still relatively underexplored in construction management. To address this issue, an interdisciplinary team of students from Illinois State University's Construction Management, Engineering Technology, Computer Science, and Mechanical Engineering undergraduate programs have developed an AMR which utilizes LiDAR and thermal imaging technologies to accurately inspect buildings for thermal leakage utilizing a mobile robot platform, this will produce a meaningful dataset for key stakeholders managing building performance. Our primary focus will be on data collection; a process that, when conducted manually (as is often done today), is tediously time-consuming, error-prone, and cost-prohibitive.

The presentation will elaborate on the robot's construction and design. The purpose of the robot is to improve energy efficiency in buildings as According to the U.S. Department of Energy, buildings in the U.S. consume 40% of the nation's energy. Approximately one-third or more of this energy is wasted, often through poor building performance such as heat loss. This can cost an estimated \$150 billion or more annually. Poor building design and construction can lead to higher maintenance costs over the life of a building.

The unique focus of this project is on thermal inspection of building envelopes to promote energy efficiency, sustainability, and improve construction planning and processes. When collecting data on building performance, particularly heat loss, several challenges can compromise the accuracy and reliability of the data. These issues lead to a significant discrepancy, known as the "building energy performance gap," between a building's theoretical energy efficiency and actual, in-use performance . This project aims to design a system that can autonomously maneuver and collect accurate building performance data, while providing a platform for future systems integration and advanced analysis capabilities.

MUSIC

MUSIC AND EMOTION ACROSS CULTURES

Presenter(s): Karafotias, Alexandra (Graduate, Music)

Mentor: Allison Alcorn

The emotions music evokes from the listener depends on the cultural background in which individuals are raised and educated. Musical traditions, tonal systems, and expressive ideas learned in one's home environment shapes how emotions in music are interpreted and understood. In Western music, major and minor tonal centers are typical, both evoking happy and sad emotional tendencies respectively. In non-Western music with its more complex tonal centers, emotional interpretation varies depending on the listener's cultural background. The musical piece may have different meanings and emotions attached to it, but the composers' true message might disappear with that cultural difference.

Tests done for this research project consisted of fourteen Westerners and fourteen Korean nationals, all listening to the same five musical excerpts. Many of the Westerners were musicians whereas the Korean participants did not have much musical background. The age differences were very broad, Westerner's averaging around 20-28 and Koreans averaging 35 and above. Each of these excerpts were drastically different in style and sound, creating different emotional reactions for each listener. The participants followed a circle of emotions created by Kate Hevner (1937) to identify their emotional response to the music. The circle consisted of numbered categories starting from 1 to 8, each number having a range of emotions and adjectives. Due to some English words not having a direct translation to Korean, the Korean circle of emotions has fewer adjectives under each number. Each excerpt was about 30 seconds, and the participants were not given the name. 3 songs were Western music and 2 were Korean folk songs. As the participants listened to the excerpts, they were to assign a number from the emotions circle to the song through an online form.

The results are fascinating. Western listeners found unfamiliar music more sacred and serious whereas the Koreans, the music being their native songs, had completely different reactions to their mother sound. Some excerpts had the participants on opposite sides of the circle, and some fell within the same range of emotions, suggesting that at least some tonalities and genres of music may be universal in language and emotional response.

INTEGRATING OLD-TIME FIDDLE AND FOLK MUSIC TRADITIONS INTO A HETEROGENEOUS STRING CLASS CURRICULUM

Presenter(s): Stowell, Julia (Graduate, Music)

Mentor: Katherine Lewis

Traditional heterogeneous string classrooms and curriculums are designed to create a comprehensive orchestral experience for school age students. Orchestral training is valuable for developing technical skills in school settings but is challenging to continue after graduation due to the large ensemble needed to perform orchestral repertoire. After students graduate, community and folk ensembles become more readily accessible than orchestral playing. Many teachers are eager to prepare their students for other styles of ensemble playing but lack the curricular support to effectively implement these styles within the constraints of a traditional class setting.

The goal of this project was to create a curriculum supplement that enhances and expands the popular standard string curriculum, Sound Innovations for String Orchestra, to include authentic fiddle tunes, performance practice instruction, and orchestral arrangements that equip students to play fiddle music outside of school without compromising the orchestral practice that is currently central to the heterogeneous class setting.

NURSING

FARMERS' ENGAGEMENT WITH HEALTH CARE: ACCESS AND BARRIERS

Presenter(s): Immordino, Sarah (Undergraduate, Nursing)

Mentor: Maria Boerngen

The National Safety Council consistently rates agriculture as one of the most dangerous occupations in the United States, but farmers continue to remain a hard-to-reach population in healthcare. Facing difficulties including long distances and travel time to appointments, shortages of rural healthcare providers, and providers not understanding the unique challenges farmers face, low engagement with routine care services or preventative treatment puts farmers at increased risk for a multitude of afflictions. Experiencing disproportionate rates of suicide, illness, injury, and premature mortality compared to their non-farming counterparts, farmers are a population in need of programs and initiatives to improve overall health, yet they continue to remain an underserved population. The objectives of this mixed-methods research are to discover farmers' perceptions of the healthcare system and identify barriers that discourage farmers' utilization of health care services. Measuring farmers' perspectives through a survey and a focus group will help identify areas of improvement in the health care system necessary for increasing farmers' access to and engagement with health care services. Our findings may contribute to the development and implementation of public health initiatives to better the health of both farmers and those in rural communities.

IN-HOME FALLS RISK ASSESSMENT AND CARDIOMETABOLIC FACTORS AMONG INDEPENDENT OLDER ADULTS IN A LOCAL COMMUNITY

Presenter(s): Rejniak, Olivia (Undergraduate, Nursing)
 Guerrero, Matilda (Undergraduate, Biological Sciences)

Mentor: Susana Calderon

Authorship: Susana Calderon, Catalina Ford

Objective

To address the growing public health burden of falls among older adults by conducting targeted in-home fall risk assessments in high-incidence areas of Bloomington, Illinois.

Introduction

Falls remain a leading cause of injury, hospitalization, and mortality among adults aged 65 and older. The U.S. older adult population is projected to increase from 57.8 million to 88.8 million by 2060 (1). In Illinois, adults aged 60 and older represent 22% of the population (2), with over 2.1 million falls reported in 2022 (3). Locally, the Bloomington–Normal Fire Department responded to 2,568 at-home fall calls in 2024 (4). Falls are multifactorial and influenced by biological, behavioral, environmental, and socioeconomic factors. Chronic conditions such as hypertension and cardiovascular disease may elevate fall risk through dizziness and impaired mobility (5-6). National frameworks, including the WHO Risk Factor Model for Falls and the CDC STEADI initiative, emphasize early detection of modifiable risks (7). However, systematic in-home assessments remain underutilized in high-risk communities.

Methods

This cross-sectional pilot study, guided by WHO and CDC STEADI frameworks, included 18 independently living older adults identified through Fire Department heat mapping. Nursing students conducted in-home assessments using the FRAT and Qualtrics-based data collection. Measures included Timed Up-and-Go (TUG), chair stands, balance testing, blood pressure, oxygen saturation, and environmental safety screening. Students completed structured training with simulation, supervised visits, and faculty debriefing.

Results

80% of participants were classified as low fall risk. TUG times ranged from 10 to 22 seconds. Participants with TUG times greater than 15 seconds demonstrated fewer chair stands and poorer balance, aligning with higher fall risk classifications. Most blood pressure readings were normal; three participants had systolic readings above 140 mmHg. Oxygen saturation levels were within normal limits. Environmental hazards were minimal but included poor lighting, throw rugs, and clutter. Approximately half of participants reported suboptimal nutrition, and one-third reported continence.

Conclusion

Targeted in-home fall risk assessments are feasible and valuable in high-incidence communities. While most participants were low risk, those identified as higher risk exhibited multifactorial vulnerabilities, including impaired mobility and elevated blood pressure. Community-based nursing partnerships can enhance early identification of modifiable risk factors and support fall prevention efforts. Future research should include larger samples and integrate cardiovascular risk management into fall prevention strategies.

PHYSICS

A GEOMETRIC PATH TO LORENTZ SPINORS

Presenter(s): Gunther, Zachary (Undergraduate, Physics)

Mentor: Neil Christensen

Geometric algebra provides a natural extension of vector geometry that unifies rotations, boosts, and spinors within a single geometric framework. Starting from rotations in physical space, rotors emerge as the fundamental objects encoding orientation and transformation. This structure extends seamlessly to spacetime, where Lorentz boosts appear on equal geometric footing with spatial rotations. Within this language, spinors arise as concrete geometric entities associated with mass and motion rather than abstract algebraic constructs. The Lorentz spinor is introduced to establish the geometric foundation for a constructive formulation of relativistic quantum theory and, ultimately, particle physics.

RAPID COOLING INDUCES SPIKE BLOCK THROUGH IONIC CURRENT MODULATION

Presenter(s): Lamphere, Daniel (Graduate, Physics)

Mentor: Allison Harris

Co-Mentor: Wolfgang Stein

Spreading Depolarization (SD) is a slow propagation of neuronal inactivity that spreads across large brain regions. This phenomenon is implicated in several neurological diseases including migraine, ischemia, traumatic brain injury, and stroke. SD is not limited to mammalian brains but can be induced in invertebrate model systems as well. In particular, it has been shown that SD can be initiated in fruit flies, *Drosophila melanogaster*, via cooling to near freezing temperatures. However, the exact neuronal mechanisms that lead to SD through cooling are unknown. Ionic currents, which characterize electrical dynamics of neurons, depend on temperature, and thus may play a critical role in SD initiation. Our research investigates how cooling induces SD, focusing on the single cell mechanism of spike block that occurs during SD. Spike block is neuronal inactivity resulting from a continued elevation of the neuronal membrane potential. We hypothesize that temperature-induced changes in ionic currents via cooling are primarily responsible for spike block initiation in *Drosophila* neurons.

To determine how temperature effects on ionic currents influence spike block initiation, we developed a single cell model that simulated neuronal activity. Temperature dependence was included in the three primary ionic currents for the sodium, potassium, and leak channels, and simulations were performed for fixed temperatures between 25° and 0° C. Analysis of the neuronal firing pattern was used to determine if spike block occurred. Additionally, a range of capacitances and injected currents were investigated to determine how neuronal properties contribute to spike block initiation. We predicted that temperature-induced changes to ionic currents will elicit spike block and that increased excitability through larger injected current or smaller capacitance will lower the threshold to spike block initiation.

Preliminary results show that cooling-induced changes to ionic currents are sufficient to induce spike block. The range of temperatures that induce spike block increased as injected current increased, which supports the idea that increased excitability makes spike block more likely. Surprisingly, cells with a smaller capacitance required a colder temperature to induce spike block, in contrast to our prediction. These conflicting results indicate that while excitability plays a role in spike block initiation, it may not be the primary contributor. Future work will focus on temperature-induced effects on individual currents to further elucidate what role each current has in inducing spike block, and by extension SD.

THERMAL DECOMPOSITION-ASSISTED THZ SPECTROSCOPY FOR AEROSOL DETECTION

Presenter(s): West, Carter (Graduate, Physics)

Mentor: Ivan Medvedev

Authorship: Carter West, Eden Winters, Daniel Tyree, Michael Brothers, Ivan Medvedev

THz (Terahertz) spectroscopic sensing of volatile gases provides a rapid, accurate, and sensitive method for assessing the contents of a gas mixture. However, it is limited to detection of lighter volatiles. Thus, to extend the sensing to aerosols in ambient air, the aerosols must be modified to form molecules detectable by THz absorption spectroscopy. This project focuses on thermal decomposition of acetaminophen, the active ingredient in many common fever and pain relief medications. We are studying this molecule as it is safe, accessible and it is easy to decompose upon heating. By controlling the temperature of the sample, we can analyze the measured THz spectra using molecular spectroscopic facility at the ISU Physics Department. The system can record the THz spectrum of a sample in gas-phase between 0.207 and 0.320 THz. Analysis of the spectral changes as a function of temperature enables identification of molecular fragments produced during thermal breakdown.

By identifying characteristic decomposition products, this work establishes a framework for indirect THz detection of heavier aerosol species in ambient air.

TERAHERTZ LABORATORY MEASUREMENTS OF THE ROTATIONAL SPECTRUM OF PROPIONYL CHLORIDE

Presenter(s): Winters, Eden (Graduate, Physics)

Mentor: Ivan Medvedev

Authorship: Eden Winters, Carter West, Daniel Tyree, Michael Brothers, Ivan Medvedev

Propionyl chloride is a chemical byproduct of industrial processes such as pharmaceutical and agrochemical production. As such, it is important that regulatory agencies and public health efforts are able to accurately identify this compound in the environment. One way to identify individuals is through the use of rotational spectroscopy, where we study the characteristic 'fingerprints' of spectral frequencies that are caused by molecular rotation. In order to measure this chemical, we constructed a system designed to perform measurements in the 2.07-3.2 terahertz region of the electromagnetic spectrum. This system was designed to be sensitive enough for precise measurements of molecular spectra. We successfully gained measurements of propionyl chloride by taking gas phase measurements of it.

This project demonstrates the ability of our system to measure microwave spectra with high sensitivity. Our results will help expand existing spectral databases and provide tools for future laboratory and environmental sensing studies. Overall, this work highlights how experimental spectroscopy supports both fundamental molecular science and practical chemical monitoring.

PERCEIVED INCLUSIVITY AND VOLUNTEER INTENTIONS: AN INTEGRATED TPB-SDT APPROACH TO COMMUNITY ENVIRONMENTAL PROGRAMMING

Presenter(s): Bhuiyan, Md. Ikram Hossain (Graduate, Politics and Government)

Mentor: Mike Hendricks

Introduction and Objectives

Formal volunteer participation represents a critical resource for nonprofit organizations, yet national rates have plummeted to 23.2%, the lowest level recorded in nearly two decades. While individual-level demographics and prosocial orientations are established predictors, they explain only 15-20% of the variance in volunteering behavior, suggesting that organizational design features exert a substantial, under-researched influence on recruitment. This study addresses this scholarly gap by asking: "To what extent do individual perceptions of inclusivity in community programs influence volunteer intentions?" Utilizing an integrated theoretical framework, the research hypothesizes that perceived inclusivity, comprised of accessibility, a welcoming atmosphere, community-responsive design, and engaging opportunities, will significantly and positively predict volunteer intentions among diverse urban populations.

Method

The study employs a vignette-based cross-sectional survey design (Target N = 400) to maintain experimental control while isolating individual differences in perception from program quality. Participants from four historically underserved Chicago neighborhoods, McKinley Park, Bridgeport, Armour Square, and the Lower West Side, evaluate a realistic program description based on "Floating Gardens" and "Free Kayak Days." These initiatives utilize blue-green infrastructure to improve air and water quality, reduce urban heat, and manage stormwater discharge. The methodology uniquely integrates the Theory of Planned Behavior (TPB) with Self-Determination Theory (SDT). While TPB specifies the cognitive antecedents of intention, SDT illuminates the motivational substrate by explaining how inclusive features satisfy innate psychological needs for autonomy, competence, and relatedness. To maximize predictive validity, the study applies the Principle of compatibility, measuring specific intentions toward inclusive programs rather than general volunteering.

Expected Results and Conclusion

The integrated model predicts that inclusive program features satisfy basic psychological needs, generating autonomous motivation that translates into favorable attitudes and enhanced perceived behavioral control. Specifically, features like multilingual staff and community-led design are theorized to strengthen subjective norms by signaling social approval within marginalized communities. By empirically testing these pathways, this research provides a 360-degree perspective on how evidence-based program design can mitigate systemic barriers to participation. These findings offer actionable, theoretically grounded strategies for community organizations and policymakers to foster more equitable and sustained volunteer engagement in critical environmental initiatives.

UNDERSTANDING EDUCATOR BURNOUT THROUGH EDUCATORS' OPEN-ENDED SURVEY RESPONSES

Presenter(s): Baldwin, Hannah (Graduate, Psychology)

Mentor: Adena Meyers

Authorship: Hannah Baldwin, Adena Meyers

Educator burnout has been shown to be negatively related to student academic and social-emotional outcomes and positively related to teacher turnover (Fatahi & Warner-Griffin, 2024; Sandilos et al., 2024). To address these issues, it is important to understand why teachers are experiencing burnout or leaving the field. This understanding is achieved by investigating relevant and reoccurring themes within the open-ended qualitative data collected in a districtwide educator survey and applying them to prevalent educator burnout models. The purpose of this poster is to examine educators' experiences in their schools and how these experiences can lead to burnout. Five themes emerged from the data: administration/district factors, the importance of being heard/supported, stress related to time/time management, challenges related to student behavior management, and training/program ideas. Training/program ideas were further grouped into five sub-categories of: physical wellness, financial compensation/benefits, diversity, social events/groups, and teaching strategies. The job demands and resources model (Demerouti et al., 2001) explains how high job demands (time/time management and student behavior themes) or a lack of job resources (administration/district, being heard/supported, and training/program ideas themes) can contribute to teacher burnout. Sense of Community models emphasize how having a strong sense of community can mitigate stress and burnout. One model divides teachers' sense-of-community into "Teacher Collegiality" (being heard/supported, social events/groups, and teaching strategies) and "Teacher Influence" (administration/district) (McGinty & Rimm-Kaufman, 2008). Another model found that "School Organization" (administration/district) and "Time-Related" (time/time management) variables were the best predictors of a teacher's sense of community (Royal & Rossi, 1999). Time-related variables predict a better sense of community, as in having time to connect with those around you in school, which was identified in the theme of "being heard/supported", but job demands make it hard for teachers to find time to connect with colleagues. All themes related to sense-of-community were also identified as job resources, meaning that a teacher's sense-of-community could be viewed as a job resource that could help prevent burnout. Results show the importance of helping foster administrator-teacher relationships, to enhance "Teacher Influence" and teacher-teacher relationships, to enhance "Teacher Collegiality". Results also show that acknowledging teachers' perspectives and what aspects of their jobs may lead to burnout and turnover is critical to take the next steps toward increasing educators' wellness and improving school climate more broadly.

IS PERFECTIONISM RELATED TO STRESS

Presenter(s): Barnard, Bradley (Undergraduate, Psychology)

Mentor: Jackie Cerda-Smith

Authorship: Bradley Barnard, Jackie Cerda-Smith

Purpose: Perfectionism can stem from a variety of places and negatively impact a person's anxiety, stress, and self-concept, particularly during adolescence (Flett et al., 2016). Prior research suggests that adolescent girls may be especially prone to perfectionism and stress (Tan & Chun, 2013; Östberg et al., 2015). This study investigates whether perfectionism and gender predict stress in a non-clinical sample.

Procedure: Adolescents were recruited from a public high school in the Southeastern United States in February 2020. Participants ($N = 660$, $M = 15.96$, $SD = 1.24$) completed questionnaires regarding their perceived stress (Perceived Stress Scale; Cohen, 1983) and perfectionism (Perfectionistic Self-Presentation Scale; Hewitt et al., 2003). The perfectionism scale was comprised of three subscales: perfectionistic self-presentation (i.e., the external display of perfection), non-display of imperfection (i.e., the avoidance of revealing imperfection), and non-disclosure of imperfection (i.e., the evasion of verbally admitting imperfection). In terms of gender, 51.8% of participants were male and 48.2% were female. In terms of race and ethnicity, the final sample included 58.6% White, 7.1% Black, 5.6% Asian, 12.7% Latino/a/e/x, 14.8% Bi-/Multiracial, and 0.8% other/preferred not to say. The sample included all grade levels at our partner school (26.1% 9th graders, 27.0% 10th graders, 26.8% 11th graders, and 20.2% 12th graders).

Results: Results of a hierarchical regression revealed that non-display and non-disclosure of imperfection positively predicted perceived stress, whereas perfectionistic self-promotion was not a significant predictor (see Table 1). Over and above perfectionism, gender also predicted stress such that girls reported greater stress than boys. Combined, these variables explained 18% of the variance in participant's perceived stress ($R^2 = .18$).

Conclusions and implications: Our study demonstrates that adolescents who hide their imperfections tend to experience greater stress, which suggests a need for adults and adolescent peers to model ways to disclose and display their imperfections. Thus, stress may be a predictor or outcome of a perfectionist's maladaptive thinking. Adolescents need to know that everyone makes mistakes and that it is unhealthy to hide one's imperfections. Aligned with prior research (Östberg et al., 2015), we also found that girls in our sample reported greater stress than boys, when controlling for perfectionism. Taken together, our findings indicate that interventions designed to reduce adolescents' perfectionism might also result in healthier perceived stress levels, which may be especially effective for girls.

CULTURAL STRESS AND COPING UNDER IMMIGRATION ENFORCEMENT POLICIES

Presenter(s): Barrera, Kruz (Undergraduate, Psychology)

Mentor: Dan Lannin

Authorship: Kruz Barrera, Dan Lannin

Recent changes in immigration and customs enforcement (ICE) policies have heightened stress among U.S. citizens and residents, particularly marginalized communities and immigrants (Pilai et al., 2025; Lieberman et al., 2025). This stress is especially likely to have pernicious effects among those most aware and proximal to immigration enforcement efforts (Pinedo & Valdez, 2020; Lieberman et al., 2025). Coping strategies have been shown to influence a person's experience of cultural stress (Piña-Watson et al., 2019; Forster et al., 2022), with coping styles marked by optimistic action often being adaptive, whereas pessimistic passivity is less so (Stanislowski et al., 2025). Understanding how people cope with cultural stressors is important for developing and testing interventions to address their mental health. Therefore, the purpose of this research study is to investigate how awareness and experiences (both vicarious and direct) of immigration-related stress impact the mental health of different groups of college students and whether different coping styles mitigate stress caused by cultural stressors.

FIRST AND SECOND-GENERATION IMMIGRANTS EMERGING ADULTS CAREER ASPIRATIONS

Presenter(s): Botros, Laura (Graduate, Psychology)

Mentor: Jordan Arellanes

Co-Mentor: Laura Finan

Authorship: Laura Botros, Jordan Arellanes, Laura Finan

Despite first- and second-generation immigrants making up 19.6% of the U.S. workforce (U.S. Bureau of Labor Statistics, 2024), research exploring their career aspirations is scarce. Studies show that individual's cultural backgrounds significantly shape first- and second-generation immigrants' career aspirations, values, and professional goals (Kao, 2004; Polenova et al., 2017). The purpose of the study is to examine how which first- and second-generation immigrant emerging adults' cultural backgrounds inform their career aspirations. I utilized a qualitative approach by asking participants about their cultural background, career aspirations, and what influenced their career aspirations. Interviews and a cognitive map activity were conducted to investigate the research questions. The interviews were split into two parts, and the cognitive map activity was placed between them. The results revealed four major themes: family support, cultural expectations and pressures, community impact, and mobility. Findings showed that 11 out of 12 participants reported a connection to their cultural background, with culture playing a role in influencing their career aspirations. The study also demonstrated that cognitive mapping was an effective tool for uncovering both the "what" and "why" behind these influences. The current study extends research on first- and second-generations immigrants in the United States. From an organizational standpoint, these themes can help employers and organizations understand the motivations behind immigrants' career decisions and inform strategies for recruitment and engagement with their workforce. Future research should explore these themes more in depth and explore cases where culture had different or no influence on immigrant's career aspirations.

THE RIGHT PEOPLE OR THE RIGHT PLACE? COMPARING THE EFFECTS OF PERSON–GROUP AND PERSON–ORGANIZATION FIT ON EMPLOYEE BELONGING, ENGAGEMENT, AND TURNOVER INTENTIONS

Presenter(s): Charles, Michael (Graduate, Psychology)

Mentor: Kimberly Schneider

Authorship: Michael Charles, Kimberly Schneider

Employee engagement and retention are two of the most pressing challenges organizations face today, particularly in the healthcare sector. Research has extensively explored the alignment between individuals and their fit within the broader organization, but has ultimately overlooked individuals' perceived fit in their immediate workgroup. Thus, the present study aims to compare the effects of Person-Group (P-G) fit and Person-Organization (P-O) fit on employees' sense of belonging, and to examine whether belonging mediates their relationships with engagement and turnover intentions. Understanding which form is most influential bears the potential to empower organizations to design better interventions to foster belonging, increase engagement, and reduce turnover.

A cross-sectional survey will be administered to approximately 200-300 employees at a large Midwestern healthcare organization. Participants will complete validated scales assessing P-G fit, P-O fit, belonging, engagement, turnover intentions, and demographic variables. Data will be collected via Qualtrics and analyzed in R, using regression and mediation models.

Data collection is planned for late November 2025, following the final IRB approval, and is anticipated to conclude late December 2025. Data analysis will be completed by February 2026. We anticipate that P-G fit will predict belonging more strongly than P-O fit, suggesting that team-level alignment has a greater impact on employees' connection to their workplace than organizational-level alignment. Belonging is expected to positively predict employee engagement and negatively predict turnover intentions, supporting its mediating role between fit and these outcomes.

Ultimately, the present study seeks to contribute both theoretical and practical insights into the mechanisms that drive engagement and retention in healthcare systems. Findings will fill gaps in the literature, as P-G fit is largely under-researched, and also provide practitioner-oriented insights to inform belonging initiatives and thereby reduce turnover and increase engagement.

THE ROLE OF RACIAL SOCIALIZATION ON THE PERCEPTIONS OF MICROAGGRESSIONS

Presenter(s): Coleman, Alia (Graduate, Psychology)
Goodwin, Randi (Graduate, Psychology)

Mentor: Brea Banks

Microaggressions are everyday indignities often based on stereotypes that are enacted against individuals holding marginalized identities (Sue et al., 2007). Research suggests that one's interpretation of microaggressions as offensive varies given multiple factors including the centrality of one's identity and socialization to oppression (Patel, 2015). Although these identity-based transgressions can be based on any minoritized identity one holds, I am most interested in racialized people's experiences with racial microaggressions. Examples of racial microaggressions include microinvalidations (e.g., an Asian American person being asked where are they really from), microinsults (e.g., questioning a person holding a marginalized identity's qualification for their job) and microassaults (e.g., use of racial slurs; Sue, et al, 2007). Some research has explored how people interpret the offensiveness or acceptability of microaggressions (e.g., Banks & Horton, 2022; Mekawi & Todd, 2018), but none to date have examined the role of racial socialization (i.e., the degree to which one has explicitly been taught about race and racial issues from family members and others such as friends and teachers). I aim to explore the relation between one's interpretation of microaggressions as acceptable and prior experiences with racial socialization. I predict that racial socialization will positively be associated with participants' interpretation of microaggressions as problematic. In other words, I expect that those participants who are more likely to report being socialized about race and racism in their youth will be more likely to rate racial microaggressions as offensive, whereas those participants who report less experience with racial socialization will be less likely to interpret these transgressions offensive. I am also interested in exploring the role of theory of mind on the above relation. Specifically, I predict that theory of mind or one's ability to recognize that other's may have different perspective than their own, will mediate or explain why racial socialization positively predicts acceptability ratings.

TELEINTERVENTION WITH CAREGIVER COLLABORATION TO SUPPORT ACADEMIC GROWTH IN AUTISM

Presenter(s): Cremer, Hannah (Graduate, Psychology)

Mentor: Nicole Moore

School psychologists play a critical role in supporting students with diverse needs by implementing individualized interventions and collaborating with families across various settings. According to NASP (2019), effective school-family partnerships are essential to student success, leading to improved academic outcomes and engagement. School psychologists help recognize and address concerns and goals across different context, enhancing intervention efforts to better meet students' academic needs. The rise of telehealth and remote learning environments highlights the value of caregiver involvement, especially for students with autism who benefit from routine and individualized support. During the COVID-19 pandemic, educators identified the importance of caregiver involvement in implementing interventions and monitoring student progress at home (Hurwitz et al., 2022). As telehealth becomes more integrated in service delivery models, teleintervention offers the opportunity for school psychologists to collaborate with caregivers and support student learning in equitable, individualized ways. Educational and therapeutic agencies have increased the use of telecommunications tools to deliver individualized services, such as teleintervention, which uses video conferencing to reduce access barriers and deliver consistent, individualized instruction (Bateman et al., 2023).

This project involved a single-subject academic intervention conducted through an autism clinic with a junior high aged student with autism. Teleintervention sessions focused on academic goals identified in collaboration with the student's caregiver, emphasizing a family-centered, data-driven approach. Interventions are more effective when caregivers are taught how to implement interventions, reinforcing their role in their child's academic success (Bateman et al., 2023). Data-driven decision making is a multi-step process that enables educators to use performance data to make decisions that lead to more targeted and effective interventions (Reeves & Chiang, 2018). The student's progress was tracked using accuracy data, with mastery defined as 80% accuracy achieved across three consecutive sessions. The caregiver's input was continually integrated into goal development and decisions. This study highlights how teleintervention can promote academic growth and strengthen caregiver-school psychologist partnerships.

ADVERSE CHILDHOOD EXPERIENCES (ACES), GENDER ROLE NORMS, AND PERCEIVED STRESS AS PREDICTORS OF REPRODUCTIVE HEALTH OUTCOMES IN INDIVIDUALS EXPOSED TO INTIMATE PARTNER VIOLENCE (IPV)

Presenter(s): Curry, Ava (Undergraduate, Psychology)

Mentor: Kelly Clemens

Problem: Adverse childhood experiences (ACEs) are known to be associated with lifelong stress and may lead to poor relationships (Mosely-Johnson, 2022). Previous research has demonstrated that increased number of ACEs is associated with intimate partner violence (IPV; Kaufman-Parks et al., 2024). It is unknown, however, if endorsement of gender role norms attenuates the relationship between ACEs, stress, the likelihood of experiencing IPV, and the impact of these variables on reproductive health. This proposed study presents a methodological framework to examine how adverse childhood experiences (ACEs), perceived stress, and IPV contribute to reproductive health outcomes.

Method: The present study will be distributed online with a target sample size of 150 participants. Validated measures including the ACEs checklist, Conformity to Feminine Norms Inventory (CFNI), Perceived Stress Scale (PSS), Intimate Partner Sexual Violence Scale (IPSVS), and self-reported reproductive health items will be used. Planned analyses include hierarchical linear regressions to understand the relative influence of ACEs, stress, and IPV on reproductive health outcomes, and a moderated mediation model to test the interplay among variables.

Results: It is hypothesized that perceived stress will mediate the relationship between ACEs and reproductive health outcomes for individuals without an IPV history, and that stress and IPV will mediate the relationship between ACEs and reproductive health outcomes for those with IPV history. Further, it is hypothesized that the relationships between IPV and stress and ACEs and IPV will be stronger for those who endorse high gender role norms.

Conclusions and Implications: Findings are expected to contribute to a deeper understanding of how integrated factors shape reproductive health trajectories for individuals with histories of exposure to IPV. The inclusion of gender role norms may help to explain under what conditions IPV is related to history of ACEs and stress.

TRUST TO TRAUMA: HOW REPEATED EXPOSURE SHAPES STUDENTS' RECOGNITION OF EDUCATOR GROOMING

Presenter(s): Donnelly, Caitlyn (Graduate, Psychology)
Voksic, Ema (Graduate, Psychology)

Mentor: Jessie Krienert

Co-Mentor: Jeffrey Walsh

Authorship: Caitlyn Donnelly, Ema Voksic, Jessie Krienert, Jeffrey Walsh

Educator boundary violations, often involving sexual grooming through patterned processes to exert control over a student to facilitate sexual exploitation, are frequently framed as isolated incidents. This project examines educator boundary violations as a patterned, multi-domain process and explores how clustered exposure shapes students' recognition of misconduct and perceptions of institutional response. Drawing on data from an anonymous cross-sectional survey of 746 students at a large public Midwestern university, the analysis assesses exposure across six grooming-related domains: gaining access, building trust, isolation, desensitization, control, and assault. Exposure is categorized as limited (zero or one domain) or repeat (two or more domains) to capture qualitative differences in how boundary violations are encountered and understood.

The project documents the prevalence and clustering of boundary violations across domains and examines how exposure patterns are associated with recognition of grooming behaviors, perceptions of institutional response, reporting barriers, policy and training awareness, and peer disclosure of harm. Results indicate that boundary violations commonly span multiple domains rather than occurring as single events. Compared to respondents with limited exposure, those reporting repeat exposure differed consistently in how they recognized boundary violations, how they evaluated institutional responses, and how often they encountered peer disclosures of discomfort or harm related to educator behavior.

A focused multivariate analysis shows that institutional response concerns, policy and training awareness, peer disclosure of harm, and recognition timing distinguish repeat from limited exposure, even after accounting for demographic characteristics. Peer disclosure of harm demonstrates the strongest association with repeat exposure, underscoring the role of social context in shaping how educator misconduct is recognized and normalized.

Taken together, the findings suggest that educator boundary violations are best understood as cumulative and contextual processes. This perspective highlights implications for prevention and institutional accountability and raises questions about the effectiveness of approaches that focus primarily on isolated incidents.

USING AI AS A SIMULATION TOOL IN PEER MENTOR TRAINING

Presenter(s): Duncan, MacKenna (Graduate, Psychology)
Edwards, Tatiana (Graduate, Psychology)

Mentor: Julie Campbell

Co-Mentor: Dan Lannin

Authorship: MacKenna Duncan, Tatiana Edwards, Dan Lannin, Julie Campbell

Artificial intelligence (AI) chatbots have shown promise as a training tool to assist in training clinical counseling and medical students to interact with clients (Hagstrom & Maranzan, 2019; Cole et al., 2025). AI chatbots have been designed to complete verbal practice counseling sessions and have been shown to promote self-efficacy and lower anxiety in the students who have engaged with it. The purpose of this study is to apply a similar training mechanism using an AI chatbot with undergraduate students who are training to be peer mentors. A group of undergraduate students enrolled in a course focused on learning to be peer-mentors used chatbots to practice conversing with newly enrolled students as peer-mentors. This chatbot program allowed them to apply the skills they learned in their peer-mentor course to real life scenarios they might encounter as peer-mentors.

This study examined seven students who were enrolled in an eight-week course designed to train students to become peer mentors in a psychology program. An instructor met with students once per week for several hours to explore ideas related to peer-mentoring including cultural competence, building relationships, and campus resources. Students engaged with the AI chatbot during the final week of the course. The AI chatbot was designed to respond to questions related to being a psychology major at Illinois State University. The chatbot program was limited in answering or discussing questions related to suicide.

On week seven of the peer-mentoring course, students were asked to complete a 10-question survey focused on their confidence to complete tasks effectively during encounters with mentees. One example question on the survey was "How confident are you that you could.....help your mentee set realistic goals?" On week eight of the course, students interacted with a chatbot by engaging in conversations about scenarios that were provided to the students by the instructor. An example scenario was "A new student who says they feel lonely and isn't sure how to meet new people." Following the interaction with the chatbot, students again took the 10-question survey about their peer-mentoring confidence levels.

The results demonstrate that all the peer-mentor trainees have higher confidence scores on the survey following interaction with the AI chatbot. Future work will build on this study by implementing this training with peer mentors across other majors in the undergraduate programs to increase the sample size and power of the study.

INCREMENTAL VALIDITY OF COGNITIVE REFLECTION OVER GENERAL COGNITIVE ABILITY AND CONSCIENTIOUSNESS IN PREDICTING JOB PERFORMANCE

Presenter(s): Earll, Olivia (Graduate, Psychology)

Mentor: Dan Ispas

Co-Mentor: Alexandria Ilie

I investigate the incremental validity of cognitive reflection over general cognitive ability and conscientiousness in predicting job performance. Data from 238 Romanian employees and their supervisors will be used. We hypothesize that cognitive reflection will explain unique variance, offering a more in-depth understanding of performance predictors in a Romanian sample.

EFFECT OF REPEATED ADMINISTRATION OF THE SSRI ANTIDEPRESSANT CITALOPRAM ON SEROTONIN REUPTAKE TRANSPORTER DENSITY IN THE RAT BRAIN

Presenter(s): Faudoa, Marisol (Undergraduate, Psychology)

Mentor: Byron Heidenreich

Authorship: Marisol Faudoa, Byron Heidenreich

Major depressive disorder has been strongly associated with dysfunction in the brain chemical serotonin, which underlies communication between neurons. Selective serotonin reuptake inhibitors (SSRIs) remain a primary pharmacological treatment of depression. These drugs act by inhibiting the serotonin transporter (SERT), which stops the process by which serotonin is removed from the synapse or space between neurons. As a result, serotonin levels are elevated, increasing the availability of this molecule to mediate communication. In this study, we will examine the effects of repeated citalopram administration on SERT density in the pons of rat brains. Rats received injections of either saline or citalopram for XX days, after which brain tissue was processed using a peroxidase-based immunohistochemistry staining protocol to visualize SERT expression. We expect brains from citalopram-treated rats will exhibit increased SERT-associated staining in the dorsal raphe nucleus, an area of serotonin-containing cell bodies, relative to saline-treated controls. These findings would be consistent with previous literature demonstrating SSRI-induced alterations in serotonergic systems and support the utility of immunohistochemical approaches for examining antidepressant-related changes in the brain. This, in turn, may contribute to a better understanding of the neural effects of antidepressant treatment.

THE ROLE OF UNIVERSITY-BRANDED BEER IN COLLEGE STUDENTS' ALCOHOL COGNITIONS

Presenter(s): Feiger, Rachel (Undergraduate, Psychology)
Friesner, Morgan (Undergraduate, Psychology)

Mentor: Laura Finan

Authorship: Laura Finan, Rachel Feiger, Morgan Friesner

Purpose: Alcohol use is common among college students and is linked with deleterious effects on bio-psycho-social outcomes (NIAAA, 2025). A robust body of literature suggests that alcohol advertising in diverse forms (e.g., point of sale, in person, online, alcohol-branded products, sponsorship, etc.) is associated with actual alcohol use (Finan et al., 2020), alcohol cognitions and intentions (Henehan, 2020), and norm perceptions (Kenny, 2014) among young people. One noticeable gap in this literature is the examination of the role of this university co-branded alcohol marketing. A growing number of colleges are collaborating with breweries and distilleries to generate co-branded beer and spirits (Seavy, 2025). Although not a new phenomenon, the increase in these partnerships is alarming, given its potential effects on college students' alcohol use. Therefore, we aim to examine the ways in which university co-branded alcohol marketing is associated with college students drinking norm perceptions, drinking motives, and alcohol use expectancies.

Procedure: Data are currently being collected from college students at a large Mid-Western university. Participants are randomly assigned to one of three exposure conditions in a lab: (1) university co-branded beer condition, where participants are exposed to a magazine article with alcoholic beverages that adorn the university's logo; (2) general beer condition, where they are exposed to a generic magazine advertisement for alcohol; (3) control condition, where they are exposed to a non-alcohol related magazine article about the university. Participants sit at an empty desk with the magazine article while the researcher excuses themselves for three minutes. When the researcher returns, they turn on the previously off computer monitor and ask participants to respond to an online survey which assesses their (a) drinking motives (Drinking Motive Questionnaire-Revised; Kuntsche, 2006) (b) positive and negative drinking expectancies (Comprehensive Effects of Alcohol Questionnaire; Fromme, 1993), and (c) perceptions of campus alcohol norms (Campus Survey of Alcohol and Other Drug Norms, Core Institute, n.d.).

Results: Data collection is underway, and we plan to have this process complete by March 2026 (N=150). To address the proposed research question, we will use a one-way ANOVA to examine associations between the two alcohol marketing conditions and the control, controlling age and gender as covariates. Data cleaning and management will continue to occur throughout the data collection phase to ensure the project is completed in time for the conference.

Implications: Current study findings may inform prevention approaches and university practices about university co-branded alcohol marketing.

SECRET-KEEPING EXPERIENCES OF YOUNG ADULTS

Presenter(s): Griffith, Jacey (Graduate, Psychology)

Mentor: Gregory Braswell

In 2020, researchers Frijns et al. called for a new wave of secret-keeping research which prioritized the person-centric experience of youth keeping secrets. This study will add to that collection by comparing two kinds of secret-keeping which are not compared in existing research: secrets which are related to abuse, and secrets which are not. Researchers in the field of child welfare study only abuse-related secret-keeping, almost always qualitatively. Alternatively, researchers of non-abuse secret-keeping collect almost entirely quantitative data, neglecting questions about the actual experience of keeping a secret.

Through an online survey with a gift card incentive, approximately 95 undergraduate emerging adults will be asked to reflect on an important secret they have kept. They will quantitatively rank characteristics of that secret such as intrusiveness, importance, and valence, as well as the length of time the secret was kept. T-tests will be used to compare the results of participants who are keeping a secret related to abuse and those who are not. Furthermore, participants will be asked qualitative questions about the experience of keeping that secret, such as why they kept it, what they might say to someone struggling with a similar secret, and why it would be easier or harder to disclose that secret now that they have reached adulthood, which will be analyzed from a grounded theory to identify differences and similarities.

We expect to find that participants who have kept a secret related to abuse will characterize that secret as being more intrusive, intense, negative, and difficult to disclose than those who have not kept a secret related to abuse, that they will have kept their secrets for longer, and that their reasons for not disclosing their secret will be more consequential. However, we also predict that there will be similarities between both kinds of secret-keeping. For example, it is expected that the length a secret is kept will be more closely associated with the negative characteristics of that secret and the feelings of distress reported than merely whether the secret is abuse-related. These findings will shed light on whether the field of secret-keeping research can continue acting as though abuse-related and normative secret-keeping are truly different fields, or whether we can better understand how to help youth disclose when we incorporate these two domains. Data will be collected through February of 2026.

AI TUTORING IN PSYCHOPATHOLOGY: STUDENT USE AND ACADEMIC PERFORMANCE

Presenter(s): Grove, Mia (Undergraduate, Psychology)
Kennicott, Ashton (Undergraduate, Psychology)
Kough, Abby (Undergraduate, Psychology)
Hintz, Ashley (Graduate, Psychology)
Williams, Sarah (Graduate, Psychology)

Mentor: Dan Lannin

Authorship: Mia Grove, Ashton Kennicott, Abby Kough, Ashley Hintz, Sarah Williams, Dan Lannin

Purpose

Supporting diverse student learning needs is challenging due to limited resources and varying student backgrounds. AI tutors offer a scalable solution by providing personalized, adaptive instruction (Mohamed et al., 2024); however, concerns remain about their effectiveness, potential algorithmic bias, and whether they promote equity or deepen disparities (Farheen et al., 2025). This study examined whether an AI tutor improves learning outcomes or primarily attracts already-motivated students—a critical distinction for ensuring these tools close rather than widen achievement gaps.

Procedure

Undergraduates ($N = 150$) in a Psychopathology course received optional access to an AI tutoring chatbot trained on course materials. The chatbot answered questions, explained concepts, and generated practice materials. At semester's end, participants ($N = 112$, 74.6% response rate) completed surveys assessing chatbot use, perceived usefulness and ease of use, help-seeking preferences, and AI learning attitudes. Grades and attendance were tracked throughout.

Results

Of 112 students, 54% used the chatbot ($M = 46.6$ minutes, $SD = 29.5$). Users rated it significantly more useful ($M = 5.81$, $SD = 1.12$) and easier to use ($M = 6.30$, $SD = 0.92$) than non-users ($M_s = 4.63$ and 5.21), $t_s > 5.41$, $p_s .10$), with GPA remaining the strongest predictor of final grade ($\beta_s = .34-.56$, $p_s < .001$).

Conclusions

The present study found that the customized AI tutor was used by just over half of the students, and was rated as useful and easy to use. Although users earned higher scores, these differences disappeared after controlling for GPA and attendance. This suggests that motivation and individual differences, not the tool itself, drove performance. The relatively stronger association with diagnostic reasoning suggests AI tutors may support skill-based learning. AI tutors show promise as supplements to traditional support, but thoughtful integration is necessary to ensure equitable benefits.

REMEMBERING FOR YOURSELF VS. OTHERS: PROSPECTIVE MEMORY PERFORMANCE AND CULTURAL ORIENTATION

Presenter(s): Hishinuma, Sanako (Graduate, Psychology)
Brown, Dylan (Undergraduate, Psychology)

Mentor: Dawn McBride

Prospective Memory (PM) is the ability to remember to carry out planned actions in the future - it's how we "remember to remember" things we need to do later on. Collectivistic perspectives put an emphasis on interdependence and responsibility towards others, whereas individualistic perspectives prioritize personal goals and autonomy. The current study is looking at whether cultural perspectives, such as individualistic versus collectivistic, impact performance on different types of PM tasks. Thus, the primary objective of this study is to investigate the relationship between cultural orientation and PM performance on self- and experimenter-assigned tasks. These tasks will simulate assigned real-life responsibilities and tasks. These tasks will be completed after a delay of either 1 or 5 days. After the time to complete the tasks has passed, complete a brief survey assessing task completion, use of external reminders, and the perceived importance of the experimenter-assigned tasks. We hypothesized that people with higher collectivistic orientations will demonstrate better performance on experimenter-assigned PM tasks compared to more individualistic individuals. For the self-assigned tasks, we hypothesized that individuals with higher individualistic tendencies will perform better, if individualism promotes stronger personal goal pursuit. However, if personal goal completion is prioritized in a university setting regardless of cultural orientation, then there will be no difference in self-assigned task performance among individuals with varying levels of individualism and collectivism.

FISHING FOR FATHER RELATIONSHIPS: MOTIVATIONS, SUCCESSES, AND BARRIERS TO PARTICIPATE IN A COMMUNITY-BASED PROGRAM

Presenter(s): Hopwood, Hannah (Undergraduate, Psychology)
Proa, April (Undergraduate, Psychology)

Mentor: Jordan Arellanes

Authorship: Hannah Hopwood, April Proa, Jordan Arellanes

Fathers who participate in community programs experience a range of positive outcomes, including improved relationships with their children. However, many community programs struggle to gain fathers' attendance at local events. To counteract this, we utilized Community-Based Action Research in collaboration with local and state agencies to develop a father-specific community program that capitalized on the traditionally masculine parenting activity of fishing. The program educated families on the basics of fishing and then provided them with all the necessary materials. Over the course of three years of data collection, 48 fathers participated in interviews, designed to gain a deeper understanding of their motivations for attending, successful recruitment tactics, and the barriers they face in attending community programs. Transcripts underwent multiple rounds of inductive coding, and preliminary themes were shared with community members to ensure trustworthiness. The primary motivation for fathers to attend was to spend time with their children and to learn a skill that would support their relationship. Fathers felt welcomed by targeted marketing, but mothers often informed and encouraged fathers to attend. The primary barrier fathers faced was an unhealthy work/life balance and family dynamics. We offer practical suggestions for research and community programming that prioritize family relationships.

THE MODERATING ROLE OF RACIAL MICROAGGRESSIONS ON SOCIALIZATION AND RACIAL CENTRALITY AMONG BLACK YOUNG ADULTS

Presenter(s): Hughes, Tamia (Graduate, Psychology)

Mentor: Brea Banks

The goal of my project is to gain insight into microaggressions (i.e., brief verbal, behavioral, and environmental instances that communicate racial or derogatory insults toward people holding minoritized identities, intentionally, or unintentionally; Sue et al., 2007), experienced by Black undergraduate students during high school and to explore how exposure to these microaggressions impacts the development of their racial centrality as college students. My research will add significantly to microaggression literature, because little attention has been paid to how socialization impacts students who experience microaggressions. Further, my study will help explain how microaggressions experienced in high school may later impact racial centrality among Black undergraduate students.

HEY LOL: A CORPUS ANALYSIS OF EMERGING DISCOURSE MARKERS.

Presenter(s): Jodlowski, Vanessa (Graduate, Psychology)
Walsh, Victoria (Undergraduate, Psychology)
Burress, Brody (Undergraduate, Psychology)
Woolever, Marlie (Undergraduate, Psychology)
Alas, Carlos (Undergraduate, Psychology)
Aguzar, Kobe (Undergraduate, Psychology)

Mentor: Allison Nguyen

Authorship: Vanessa Jodlowski, Brody Burress, Madi Sapp, Marlie Woolever, Carlos Alas, Victoria Walsh, Allison Nguyen

Discourse markers are a unique component of spontaneous speech, notable for their use in facilitating a natural tone of conversation, organizing one's thoughts when communicating, and guiding the overall meaning and flow of the idea that is being conveyed to the listener (Fox Tree & Schrock, 1999). Recent research has suggested that common colloquial acronyms, lol and lmao, may function similarly (Markman, 2013). Findings from McSweeney (2018) showed that lol can provide information about the speaker's current conversational stance, or it can act as a marker of the speaker's acknowledgment of an idea presented by an interlocutor (Taglimonte & Denis, 2008). Nevertheless, there is not yet sufficient documentation within the English language regarding what meaning words like lol and lmao convey within written and spoken communication, along with how frequently they may occur. We conducted a corpus analysis of an internet chat corpus collected by Guydish and Fox Tree (2022), where 65 dyads of American English speaking participants at a North American university did a tangram matching task. We were interested in identifying and understanding where and how emerging discourse markers lol, lmao, and omg appear in modern conversation. We found that lol was the most commonly used emerging discourse marker, and most commonly appeared at the end of typed utterances. We also found that omg appeared more than lmao, and both omg and lmao appeared more at the beginning of typed utterances. Our results suggest that, while lol and lmao both mark laughter, they are not interchangeable – they differ in position and rates of use. Just like with other discourse markers, people deliberately select lol or lmao depending on what conversational effects they are aiming to achieve, with lol being the more general marker and lmao specifically marking laughter. This work provides a current idea of what the distribution of this new emerging class of discourse markers looks like.

POSTER CANCELLED

PERCEIVED SOCIAL NETWORK TYPES SHOW DIFFERENTIAL HELP-SEEKING PATTERNS

Presenter(s): Johnson, Kara (Undergraduate, Psychology)
Moreno, Brianna (Undergraduate, Psychology)
Barrera, Kruz (Undergraduate, Psychology)
Williams, Sarah (Graduate, Psychology)
Hintz, Ashley (Graduate, Psychology)

Mentor: Dan Lannin

Purpose

Despite available mental health services, many students delay or avoid seeking help. Social support facilitates help-seeking, whereas stigma deters it (Clement et al., 2015; Gulliver et al., 2010); however, less is known about how perceptions of relationship quality and fears of judgment within social networks influence help-seeking. Additionally, whether different social network contexts shape preferences for human versus AI-based support remains unexplored. This study used sociograms to identify distinct social network typologies and tested whether these patterns predict mental health and help-seeking. We hypothesized that students experiencing relational safety and disclosure comfort would show greater openness to help-seeking across modalities.

Procedure

Undergraduate participants (N = 276) completed an in-person sociogram task, mapping their closest friendships and annotating each friend based on emotional closeness, perceived support, conflict history, mental health disclosure, and perceived judgment. Participants then completed measures of distress disclosure, self-stigma, psychological distress, help-seeking attitudes and intentions, and therapy modality preferences (human, AI, hybrid, or no help).

Results

A two-stage cluster analysis (hierarchical Ward's method followed by K-means, $k = 3$) identified distinct social-network typologies. Three clusters emerged ($\eta^2 = .21$, $p < .001$), most strongly differentiated by perceived judgment and mental health disclosure within their social networks. The three clusters were:

- (1) Quietly Connected ($n = 152$), those with socially stable yet emotionally reserved social networks marked by low conflict, near-zero judgment, moderate closeness, but low disclosure.
- (2) Open & Supported ($n = 79$)—those with psychologically safe friendships marked by closeness, support, and disclosure with minimal judgment.
- (3) Conflictual & Judged ($n = 45$)—those whose relationships are marked by tension and ambivalence with elevated conflict, judgment, and moderate disclosure.

MANOVA revealed distinct psychological profiles across clusters. Open & Supported showed the most favorable help-seeking attitudes and intentions, whereas Conflictual & Judged exhibited the highest self-stigma and psychological distress. Open & Supported endorsed AI-human hybrid therapies most, while Conflictual & Judged showed the strongest preference for no help.

Conclusions

Students' perceptions of their social networks as judgmental or safe for disclosure predict help-seeking, distress, and treatment preferences. Those in affirming networks show openness to diverse treatment options, including AI-human hybrids. Conversely, those experiencing relational threat disengage from all help—even anonymous or technology-mediated options—suggesting social safety concerns override potential stigma-reduction benefits of AI. Interventions targeting relational trust and disclosure norms may be foundational to promoting help-seeking across modalities.

READY THROUGH RESEARCH (RTR)

Presenter(s): King, Oliver (Undergraduate, Psychology)
Washington, Thyme (Undergraduate, Psychology)
Beaune-Lala, Shannon (Undergraduate, Psychology)
Smith, Makayla (Undergraduate, Psychology)

Mentor: Jackie Cerda-Smith

Authorship: Oliver King, Thyme Washington, Shannon Beaune-Lala, Makayla Smith, Jackie Cerda-Smith

The Ready Through Research (RTR) program is a supplemental curriculum for high school psychology courses that positions adolescents as competent researchers within their school community (Winter & Cerda-Smith, 2023). RTR students are guided by research mentors (i.e., undergraduate and graduate students) to design, conduct, analyze, and present an original research project. RTR scaffolds research processes to enhance students' research skill self-efficacy and psychology interest (Cerda-Smith et al., 2025). Thus, data regarding variations in student RTR experiences and outcomes related to different programming iterations can provide insights into the best practices that support youth and novice researchers. The current study compares student outcomes across different versions of RTR to identify key factors that support research success and development. RTR participants include AP Psychology students at two schools in the Southeastern United States, CHS and RCHS. Traditional RTR programming, which occurred at CHS in 2022-2023 and RCHS in 2023-2025, involves class-based workshops throughout the academic year where students interact with research mentors to complete a research project. Groups create their own research questions, which they address with an experiment, survey, or interview study. RTR traditionally ends with groups presenting at their school's "RTR Research Expo". In 2023-2024, RTR programming at CHS halted after the first workshop, making this cohort a pseudo-control group. Then, in 2024-2025, CHS students only engaged in project-based workshops, which occurred in 2-3 weeks. This expedited program required groups to address two research questions via survey. They interacted with one mentor and presented to their classmates. Across all programming iterations, RTR participants were invited to take pre/post program surveys. Table 1 summarizes changes/stability in RTR programming and Tables 2 and 3 summarize student outcomes. The pattern of change/stability was similar for the control and expedited cohorts, which differed from the three traditional cohorts. Notably, students seem to benefit more from traditional programming (see Tables 2 and 3) in terms of greater interest, engagement, and perceived impacts. Notably, RCHS students during 2024-2025, demonstrated these benefits after doing the research project but not before. This study demonstrates that young, novice researchers benefit from engaging in research over longer periods, have research autonomy, interact with mentors, and present their findings to the larger community. Traditional RTR programming demonstrates that appropriately scaffolding research processes empowers youth to lead future research efforts.

THE EFFECT OF MOOD AND AROUSAL ON PRECASTINATION

Presenter(s): Krause, Erika (Graduate, Psychology)

Mentor: Dawn McBride

Precrastination is the tendency to complete a task as early as possible, even if it requires additional effort (Rosenbaum et. al., 2019). While still a topic with limited research, the existing literature theorizes that precrastination occurs due to the want to alleviate the cognitive load caused by having to remember to perform a task. While these studies have aimed to understand why precrastination occurs, studies on precrastination have yet to analyze a possible effect that mood states may have on our likelihood to precrastinate. Mood can influence cognition most when processing is controlled, but less when behavior is automatic (Forgas, 2008). A low-arousal positive mood state would be low-effort processing and therefore less likely to rely on automatic or habitual responses than a high-arousal positive mood, which relies on faster responding and, therefore, increased automatic premature task initiation. The current study aims to analyze the connection between mood states and precrastination, specifically looking at the effect of arousal on high valence emotional affect. In this study, the high valence-low arousal mood is “calm,” while the high valence-high arousal mood is “happiness.” Data will be collected through SONA, utilizing data provided by students enrolled in Illinois State University. Using the Qualtrics data software, participants will be asked basic demographic information and provided the Positive and Negative Affect Schedule (PANAS) short form by Edmund R. Thompson (2007) before and after showing mood clips verified by the Emotion Elicitation study conducted by Uhrig et.al. (2016). The PANAS short form will be used to assess the emotional state of participants in the moment before they view the film clips. Participants will be randomly assigned a clip that is a part of the calm condition or the happiness condition. After watching the assigned clip, participants will complete a scrambled version of the PANAS short form to assess their mood state after watching the clip and control for memorization of the emotions described on the form. Participants will then be asked to complete the bucket moving task, in which participants are provided with two buckets along a path, one closer to the starting point and one further away. They are asked to pick one of the two buckets to bring to the end of the path.

THE ROLE OF WORKSPACE FIT IN EMPLOYEE ATTITUDES

Presenter(s): Kuhn, Rory (Graduate, Psychology)
Downing, Connor (Undergraduate, Psychology)
McFadden, Emerson (Undergraduate, Psychology)

Mentor: Kimberly Schneider

Authorship: Connor Downing, Emerson McFadden, Rory Kuhn

Purpose: Prior to a planned redesign of a local social service agency's workplace, a survey was administered to assess various employee attitudes and their perceptions of upcoming architectural changes. The redesign was motivated by a shift toward hybrid work, requiring a layout that better supports employees who split their time between in-office and remote work. Here, we analyze a subset of survey data and explore employees' perceptions of their workspace and subsequent attitudes. These perceptions can be viewed through the lens of person-environment fit theory, which suggests that compatibility between individuals and their environments may be related to positive workplace attitudes (Zhang, 2025). Because work environments are designed to support people's daily activities and needs, understanding how well a workspace matches employee preferences is critical during organizational changes.

Project Methodology: Employees at a local social service organization completed an online survey assessing their perceptions about their work and workspaces, with 59 completed surveys. Participants rated both current and preferred workspaces across 15 characteristics. Perceived Fit scores were then generated and grouped into four dimensions focusing on comfort, location, being around people, and privacy. Average workspace 'fit' scores were correlated with job satisfaction, organizational commitment, and resistance to change.

Results: We analyzed the correlations between four dimensions of the workspace (location, people, comfort, and privacy) and the following job attitudes: job satisfaction, organizational commitment, and resistance to change. Results indicated that several workspace dimensions were positively associated with employee attitudes. Specifically, there was a significant positive relationship between fit regarding collaborating with coworkers and one's job satisfaction, $r(58) = .389$, $p = .003$, as well as organizational commitment, $r(58) = .337$, $p = .010$. Similarly, there was a significant positive relationship between comfort features and job satisfaction, $r(55) = .395$, $p = .003$, and organizational commitment, $r(55) = .399$, $p = .003$. Privacy features were also positively related to job satisfaction, $r(53) = .293$, $p = .033$, but were not significantly related to organizational commitment. Location features of one's workspace were not significantly related to general job satisfaction or organizational commitment. Additionally, none of the four workspace dimensions were significantly associated with resistance to organizational change. We plan to assess departmental differences in additional analyses.

Implications: The findings suggest that workspace features such as being around people, comfort, and access to privacy may be important considerations for organizations seeking to support employee job satisfaction and organizational commitment.

SOCIAL MEDIA, MASCULINE BODY IDEALS, AND THE DRIVE FOR MUSCULARITY: A SERIAL MEDIATION MODEL ACROSS SEXUAL IDENTITIES

Presenter(s): McDaniel, Sean (Graduate, Psychology)

Mentor: Suejung Han

Authorship: Sean McDaniel

Social media platforms increasingly expose men to idealized, hyper-muscular body images that reinforce unrealistic appearance standards and contribute to body dissatisfaction and muscularity-oriented concerns. Although prior research links social media use to men's drive for muscularity, few studies test integrated models that examine the psychological mechanisms underlying this association. The present study examines a proposed serial mediation model in which appearance-related social media influence predicts men's drive for muscularity through the internalization of masculine body ideals and engagement in body surveillance behaviors. Given evidence that gay and bisexual men experience heightened body image pressures due to community emphasis on muscular and lean ideals, this study also explores sexual identity as a potential moderator of these indirect pathways.

Adult men completed an online survey assessing appearance-related social media consciousness using the Appearance-Related Social Media Consciousness Scale; internalization of muscular ideals using the Sociocultural Attitudes Toward Appearance Questionnaire-4 Revised Male; body surveillance using the Male Body Checking Questionnaire; and drive for muscularity using the Drive for Muscularity Scale. Measures of general social media and dating application use were also included.

Preliminary Pearson correlation analyses indicate that general social media use is not significantly associated with exposure to body-ideal content but is positively associated with appearance-related social media consciousness. Exposure to body-ideal social media content is strongly associated with muscular ideal internalization and body checking behaviors. Muscular ideal internalization is positively associated with body checking, which, in turn, shows a strong association with drive for muscularity. Although the current sample size precludes formal path analysis and moderation testing by sexual identity, the observed associations align with the proposed serial mediation model and provide preliminary support for the hypothesized mechanisms. Data collection is ongoing, with path analysis planned upon completion. These findings highlight the central role of internalized masculine appearance ideals and body surveillance in linking social media influence to men's muscularity concerns and underscore the importance of sociocultural and identity-based factors in clinical interventions for male body image concerns.

THE DOUBLE PANDEMIC: COPING THROUGH ILLNESS AND RACISM

Presenter(s): Montegrande, Erica (Undergraduate, Psychology)

Mentor: Caitlin Mercier

Authorship: Erica Montegrande

While the COVID-19 pandemic heightened stress among marginalized communities, Black women faced unique adversities, including poor living conditions, lack of healthcare access, limited job opportunities, and being essential workers - all rooted in systemic racism and sexism. Due to structural barriers limiting access to adequate healthcare, Black women are charged with navigating on their own. Research documents that Black women cope with discrimination with strategies relevant to their experiences (e.g., sister groups and prayer, religion, and spirituality), but limited research has focused on how Black women cope during health pandemics. Using qualitative text responses of an archived dataset, the present study examined how 130 Black women navigated the COVID-19 pandemic on their own. Thematic analysis yielded four themes: 1) connecting in my communities, 2) focusing on work and hobbies, 3) promoting my wellness, and 4) isolation. Our findings suggest a need to increase research on coping strategies (e.g., communal connections, mental and physical health promotion) that address the racism and sexism Black women face during a pandemic. Policy makers and mental health practitioners must consider the structural barriers limiting access to adequate healthcare which enable the stigma and distrust in medical practitioners' Black women face.

GENDER DIFFERENCES IN POSTPARTUM DEPRESSION STIGMA

Presenter(s): Nord, Lauren (Undergraduate, Psychology)

Mentor: Suejung Han

Postpartum Depression (PPD) is a significant public-health concern that is under-reported and under-recognized. (Schofield et al., 2024) Despite affecting approximately 1 in 8 women (CDC,2020), there is still significant stigma surrounding PPD, creating a barrier to treatment and open discussion. Examining how it forms and differs across different groups is important for improving early detection, stigma reducing efforts, and increasing support.

College-aged adults are an important population for this research because attitudes, beliefs, and social norms surrounding mental health and parenthood are still developing during this stage. Many individuals in this age range are approaching future parenthood or will interact with peers who become parents, meaning their views may shape both personal and perceived stigma toward PPD. Studying stigma in this group provides insight into emerging adults' perceptions and helps identify opportunities for early prevention and stigma-reduction before beliefs become more rigid later in adulthood.

The present study asks, "Do levels of stigma toward postpartum depression differ between women and men among college-aged students?" Prior research suggests that men show higher mental-health stigma than women, and stigma toward PPD specifically may be influenced by gendered expectations about parenting roles (Griffiths et al., 2004, Thorsteinsson et al., 2018). However, gender difference in college students' stigma toward PPD has not been examined. The primary hypothesis is that college men will report higher levels of stigma toward PPD than college women. We aim to recruit college-aged students from the Illinois State University psychology participant pool (Sona). Participants will complete an online survey including demographic questions, a modified version of a validated Depression-Stigma Scale (DSS) with wording adapted to reference "postpartum" or "postnatal" depression (Griffiths et al., 2004, Thorsteinsson et al., 2018), and a set of researcher-developed vignettes describing individuals experiencing PPD symptoms. Vignettes will be drafted, reviewed, and revised by a psychologist to ensure content validity and clarity.

Findings from this study are expected to contribute to the growing literature on postpartum mental-health stigma by identifying whether gender differences emerge during early adulthood. Results may inform educational programming, campus mental-health initiatives, and early stigma reduction efforts aimed at promoting more accurate and inclusive understandings of postpartum depression.

APPROACHING DEATH ANXIETY: A PARADOXICAL APPROACH

Presenter(s): Orhan, Begüm (Graduate, Psychology)

Mentor: Suejung, Han

Authorship: Begüm Orhan, Suejung Han

Problem

Death anxiety (DA) represents a fundamental dimension of human experience and has been identified as a central determinant of mental health (Iverach et al., 2014). People often manage DA by using avoidant coping (Furer & Walker, 2008). However, avoidance has been shown to exacerbate distress rather than alleviate it (Hayes et al., 1996). Paradoxical interventions (PI), which involve deliberately increasing feared stimuli, have demonstrated therapeutic benefits across anxiety-related conditions (Ascher, 2002). Yet, few studies have applied the PIs to DA. This study first examined (a) whether avoidant coping strategies were associated with higher DA and then (b) whether PIs were efficacious in reducing DA.

Procedure

In study 1, 185 U.S. college students enrolled in a Midwestern university (mean age = 20.49; 25 men, 144 women, 5 non-binary) completed an online survey that included Templer Death Anxiety Scale (1970), COPE Inventory (Carver et al., 1989), Death Attitude Profile Revised (Wong et al., 1994), and Brief Experiential Avoidance Questionnaire (Gamez et al., 2014). Study 1 participants who reported high DA (i.e., cutoff score > 8) were recruited to participate in Study 2, a randomized controlled study for the efficacy of PIs for DA. Data collection is underway, and currently 25 students (6 men, 19 women) participated. The first author designed three brief (i.e., 15-min long) PIs for DA of movie clip viewing, reflective writing, or visualization. Control condition participants simply completed the post-survey. The post-survey included Templer Death Anxiety Scale (1970) and the Collett-Lester Fear of Death Scale (Lester & Abdel-Khalek, 2010).

Results

In Study 1, Pearson correlation analyses revealed that DA was significantly associated with various avoidant coping strategies including mental disengagement ($r = .36, p < .01$), denial ($r = .16, p < .05$), behavioral disengagement ($r = .22, p < .01$), and experiential avoidance ($r = .32, p < .01$), supporting the hypothesis. In Study 2, a preliminary repeated measures ANOVA revealed that the interaction effect between time and group was not significant, Wilks' $\lambda = .87, F(1, 20) = 2.97, p = .100$, nor the main effects of time or group. Data collection including one-month follow-up will continue till February 2026, and complete results will be presented at the symposium.

Conclusions/Implications

This study replicated the association between DA and avoidance coping, supporting the need for approach-oriented interventions such as PI. The current sample size for Study 2 did not allow for analyses with sufficient power.

EXPERIENCES OF LATINO IMMIGRANT FATHERS AND IMMIGRATION POLICIES

Presenter(s): Ramos, Britney (Graduate, Psychology)
Parker, Rea (Undergraduate, Psychology)
Marroquin, Julianna (Undergraduate, Psychology)

Mentor: Jordan Arellanes

Authorship: Rea Parker, Julianna Marroquin, Britney Ramos, Jordan Arellanes

Problem or Major Purpose

This study aims to fill gaps in the existing literature by exploring the desires and expectations that Latino immigrant fathers have for their youths' educational attainment, the specific roles they play, and how immigration policy may affect fathers' ability to contribute to their youths' educational success. Recent research suggests that Latino fathers stay engaged in their children's education, provide emotional support, and a stable home environment, even in the context of restrictive immigration policies, as shown through both qualitative studies and national data (Greder & Arellanes 2018; Pedroza & Losada, 2025; Rangel & Peck, 2022).

Procedure

The study was approved by the associated university's Institutional Review Board, and written informed consent was obtained from all participants. At the beginning of each interview, facilitators reviewed the interview's purpose, consent form, and procedures. A demographic survey was distributed to learn more about the father's family life and context. An audio recorder was used to capture all interview data. All participants immigrated to the US and had resided within the country for an average of 27 years (N=17, Range: 17–48). While many fathers were born in Mexico (76.5%, N=13), other fathers were born in Central America (Guatemala: 11.9%, N=2; Honduras: 5.8%, N=1; El Salvador: 5.8%, N=1). The participants averaged 46 years of age (Range: 35–70). Pseudonyms replaced the real names of fathers in this study to protect their anonymity.

Results

The findings revealed two themes, "Without proper immigration policies, youth will suffer" and "We live in the shadows and move forward". Despite multiple barriers, fathers continue to push forward and remain dedicated to creating a better life for their families.

Conclusion

This study provided useful insight into how immigrant families deal with many immigration issues, educational barriers, and a lack of information. The use of a strengths-based perspective in research is needed when describing the efforts of Latino families. This is important for the research's message, but it matches Latino fathers' message of their own lives. Regardless of fathers' challenges, they remained hopeful that their children would live a better life than their own. Fears related to immigration were not about what would happen to them but rather their lack of ability to continue to provide a strong foundation for the generational changes created through their efforts. Both qualitative and quantitative research on Latino immigrant fathers should match the participants' messaging.

FORGETTING COMPLEX INFORMATION: A MULTI DELAY MEMORY STUDY

Presenter(s): Sacco, Cameron (Graduate, Psychology)
Carey, Ethan (Undergraduate, Psychology)

Mentor: Dawn McBride

Authorship: Ethan Carey, Cameron Sacco, Dawn McBride

Forgetting is a natural occurrence within human memory, whether it be forgetting to complete a task or retaining information. The classic forgetting curve suggests that information is forgotten very quickly, and then forgetting slows as time passes. Recently, researchers have suggested that forgetting may follow a more linear function when the situation encoded is complex (e.g., a class lecture). The current study aims to examine the form of forgetting complex information via encoding while viewing three short videos similar to a topic lecture. Encoding is then followed by immediate retrieval of information from the videos as well as delayed retrieval 6 hours, 3 days, 1 week, and 2 weeks after encoding. This design enables analysis of forgetting rates, individual memory differences, and reminiscence effects with findings expected to reveal linear forgetting rates over long periods of time in everyday context.

ENHANCING READING SKILLS THROUGH COMBINED DIRECT INSTRUCTION AND REPEATED READING

Presenter(s): Shields, Kathleen (Graduate, Psychology)
 Guo, Stephanie (Graduate, Psychology)

Mentor: Gary Cates

Proficient reading skills are essential for academic success and shape a student's educational trajectory. However, only 60% of fourth-grade students performed at or above the National Assessment of Educational Progress (NAEP) Basic Level in reading in 2024, a two percent decline from 2022 (NAEP, 2024). Despite the ubiquitousness of reading interventions, not all strategies are created equally resulting in growing achievement gaps and lower reading proficiency rates (Petscher et al., 2020). As such, additional research is needed to examine the effectiveness of incorporating data-based decision making in designing reading interventions (Filderman et al., 2018; Scammacca et al., 2016). This study drew from the five essential components of reading – phonemic awareness, phonics, fluency, vocabulary, and comprehension – outlined by the National Reading Panel (2000). An individualized intervention, guided by evidence-based decision making, was designed based on student-specific reading concerns. The intervention incorporates evidence-based strategies, repeated reading and direct instruction in phonemic awareness, to improve basic reading skills and support passage comprehension (Therrien & Hughes, 2008; Main et al., 2020). In light of declining literacy rates, it is critical that school psychologists evaluate the effectiveness of data-based decision making and prioritize tailored approaches over generalized, commercial programs.

UNDERSTANDING TEACHER WELL-BEING THROUGH SURVEY RESPONSES: THE IMPACT OF SCHOOL CULTURE

Presenter(s): Sizemore, Morgan (Undergraduate, Psychology)

Mentor: Adena Meyers

Authorship: Morgan Sizemore, Adena Meyers, Emily Jones

School culture can be broadly defined as a school's unwritten rules, norms, and expectations (Cucchiara et al., 2025). In a literature review comprising 24 studies focusing on teacher wellness interventions, Sandilos et al. (2023) concluded that most interventions target individual-level factors of wellness, rather than focusing on contextual variables such as the professional environment that teachers work in. Many factors contribute to school culture, but organizational research suggests that values such as trust, support, and collaboration are key to creating an environment that increases teacher wellbeing (Cucchiara et al., 2025). This study measured perceptions of school culture and examined associations between school culture and teachers' reported burnout, turnover intentions, and interest in wellness programming.

In collaboration with local school district administrators, a team of university researchers created a survey to measure overall teacher well-being, perceptions regarding the teaching profession, and interest in various types of supportive programming. Ten schools participated, with 163 respondents. A 12-item subscale derived from the National Teacher and Principal Survey (NTPS) was used to measure school culture ($\alpha = .87$). A one-way ANOVA revealed significant between-school differences on this subscale [$F(9, 160) = 4.408, p < .001$]. Teacher burnout was measured using the Oldenburg Burnout Inventory with two subscales measuring exhaustion and disengagement. Turnover intentions and interest in programming were measured using a series of individual items.

Correlation analysis indicated that school culture was significantly negatively associated with turnover intentions, disengagement, and exhaustion. School culture was also significantly negatively associated with teachers' interest in school environment-based wellness programming.

It is important for school administrators to consider contextual factors that influence educators' work environments to better understand their wellness needs. Correlations revealed significant associations between school culture and turnover intentions, burnout, and interest in wellness programming, highlighting its contributions to understanding teachers' experiences and pointing to strategies for improving their career satisfaction. Through utilizing an environmental approach to wellness, school administrators can help create a more positive school culture and work environment for teachers in hopes of increasing teacher well-being.

HOME MATH ENVIRONMENT, PARENTAL MATH ATTITUDES, AND EARLY NUMERACY SKILLS IN EARLY CHILDHOOD

Presenter(s): Torres, Daisy (Undergraduate, Psychology)
 Dinger-Butera, Mackenzie (Undergraduate, Psychology)
 Farmer, Emily (Undergraduate, Psychology)
 Heft, Kendall (Undergraduate, Psychology)
 Nelson, Sophia (Undergraduate, Psychology)
 Perdew, William (Undergraduate, Psychology)
 Reinert, Danielle (Undergraduate, Psychology)
 Sanchez, Angelina (Undergraduate, Psychology)
 Zimmerman, Madeline (Undergraduate, Psychology)

Mentor: Alycia Hund

Authorship: Alycia Hund, Daisy Torres, Mackenzie Dinger-Butera, Emily Farmer, Kendall Heft, So-phia Nelson, William Perdew, Danielle Reinert, Angelina Sanchez

The present study focused on how home math activities and parents' attitudes and beliefs about mathematics relate to young children's math skills, specifically early numeracy. In addition, we examined whether these variables change with age during early childhood. Previous research has demonstrated that early numeracy skills are foundational for future mathematics achievement and that home math environments and parent attitudes are associated with children's math outcomes (e.g., Cheung et al., 2024; Davis-Kean et al., 2022). However, there is not much known about how these factors relate to early numeracy across the preschool years. This research aims to gain more knowledge regarding how early home math experiences and parent perspectives on math are related to foundational math development across the preschool years, a period where parents often focus on children's academic readiness prior to the start of formal schooling. To date, 26 children between the ages of 3 and 5 years participated along with one parent per participant. The children were asked to complete two tasks directly related to early numeracy: give-n and highest count. The give-n task measures number knowledge and quantity understanding by asking the child to place a specific number of ducks into a bowl, ranging from 1 to 10. The highest count task measures the ability to count by asking the child to count aloud as high as they can with a maximum of 120. Parents reported the frequency of home math activities along with their attitudes and beliefs towards mathematics in a questionnaire. We predict higher frequency in home math activities and more positive parent attitudes/beliefs about mathematics to correlate with higher performance on early numeracy tasks. We also predict that children's numeracy skills and frequency of home math activities will increase with age, while parents' attitudes and beliefs about mathematics will remain consistent across this age range. These findings will provide important insights into the development of numeracy skills during early childhood, setting the stage for math achievement across the school years and beyond.

STUDENT PARENT STRESS AND BURNOUT

Presenter(s): Verticchio, Mia (Undergraduate, Psychology)
Westphal, Amelia (Undergraduate, Psychology)

Mentor: Jackie Cerda-Smith

Authorship: Mia Verticchio, Amelia Westphal, Jackie Cerda-Smith

Purpose

Student parents experience unique stressors due to balancing academic demands, childcare responsibilities, and financial pressures (Ascend, 2021). Despite being an under-researched population in higher education, student parents may be at a heightened risk for perceived stress and academic burnout. The purpose of this study was to examine whether perceived stress and burnout among student parents differ based on the number of children they have and the age of those children.

Procedure

Undergraduate and graduate student parents were recruited from a large public university in the Southeastern U.S. in the spring of 2022. Participants completed the Perceived Stress Scale (Cohen, 1983) and the Maslach Burnout Inventory- Student Survey (Schaufeli et al., 2002), which included exhaustion (5 items), cynicism (4 items), and professional efficacy (6 items) subscales. Participants also reported the number and age of their children, which we re-coded into nominal variables representing parents who had 1, 2, or 3 or more kids and parents who had young kids, school-aged kids, or both young and school-aged kids. The final sample ($N = 74$, $M_{age} = 34.83$, $SD = 7.18$, range = 20 – 58) included mostly graduate students who identified as White and female. Participants reported having 1 to 4 kids including adopted and unborn children. Most participants had 1 or 2 kids and most parents reported having young children (0-4 years old, see Table 1 for full sample demographics).

Results

On average, student parents reported moderate stress and exhaustion, relatively low cynicism, and relatively high professional efficacy (see Table 2). A series of 3 (child number) $\times$ 3 (child age) ANOVAs revealed that student parents of 3 or 4 kids reported significantly lower exhaustion and greater professional efficacy than parents of one kid (see Tables 3, 4); however, the main effect of the number of children and interaction were not significant for exhaustion and professional efficacy. All main effects and interactions were not significant for stress and cynicism.

Conclusions and Implications

In our sample, Student parents with three or more children reported lower levels of burnout than student parents with one child. These findings suggest that certain parenting contexts may be associated with lower academic burnout. Future research should take a strength-based approach in understanding how parenting roles shape their academic motivation, stress, and burnout. Given that student parents are an under-researched and underserved community (Cerda-Smith, 2025), universities should implement targeted support systems for student parents, such as accessible and affordable childcare, flexible scheduling classes, or financial assistance programs to reduce academic stress and burnout. Addressing these challenges can further support their success in higher education.

JOB SATISFACTION AND CWB: THE ROLE OF CORE SELF-EVALUATIONS

Presenter(s): Wheeler, Katherine (Graduate, Psychology)
Charles, Michael (Graduate, Psychology)e

Mentor: Alexandra Ilie

Co-Mentor: Dan Ispas

Authorship: Dragos Iliescu

Purpose:

The link between job satisfaction and CWB has been well-established in the literature and supported by numerous meta-analyses and primary studies. The purpose of this study is to examine the potential moderating role played by core self-evaluations in this relationship. Core self-evaluations is a broad, latent, higher-order concept representing the fundamental evaluations that people make about themselves and the way they function in the environment (Judge, Van Vianen, & De Pater, 2004). Core self-evaluation is indicated by four traits: self-esteem, locus of control, neuroticism, and generalized self-efficacy (Judge, Locke, & Durham, 1997). Theoretically, according to conservation of resources theory (e.g., Hobfoll, 2002) we expect CSE to buffer the negative correlation between job satisfaction and CWB.

Procedure:

The participants were full-time employees (forty hours a week) with at least six months tenure from Romanian organizations. Core self-evaluations were measured using the twelve-item scale developed by Judge et al. (2003). Job satisfaction was assessed using the three-item scale developed by Cammann et al. (1979). Counterproductive work behaviors were measured with the Job Reactions Survey (Fox & Spector, 1999).

Results:

Descriptive statistics and correlations are presented in Table 1 and 2. To test our main hypothesis, we conducted moderated hierarchical regression. We entered job satisfaction in Step 1, core self-evaluations in Step 2 and the interaction term in Step 3. We conducted the analyses with both CWB-I (targeting individuals) and CWB-O (targeting organizations) as criteria. The results (presented in Table 3) show a significant interaction for CWB-I with a $\Delta R^2 = 0.07$, $F(1, 192) = 17.64$, $p < 0.001$. We conducted simple slope tests. The results show that there is a strong negative relationship between job satisfaction and CWB-I for those low in core self-evaluations: $\beta = -.35$; 95% CI = $(-.54, -.16)$, $p < 0.001$ and no relationship between job satisfaction and CWB-I for those high in core self-evaluations: $\beta = .15$; 95% CI = $(-.02, .33)$, $p = ns$. Figure 1 shows a plot of the interaction.

Conclusions:

We found support for the moderating role of CSE but only for CWB targeted at individuals. Individuals high in CSE do not appear to engage in CWB targeted at individuals as a response to being dissatisfied with their jobs. Future research should employ longitudinal designs and other-ratings of CSE as well as potentially investigate other forms of deviant behaviors in organizations.

SOCIAL WORK

ELDERLY FALL RISK CAPSTONE PROJECT: A QUALITATIVE DESCRIPTION OF FALL-RELATED RESOURCES PROVIDED TO RESIDENTS OF AN INDEPENDENT LIVING COMMUNITY

Presenter(s): Hamilton, Miranda (Graduate, Social Work)

Mentor: Susana Calderon

Co-Mentor: Gloria Arroyo Sugg

Authorship: Miranda Hamilton, Susana Calderon, Nina Ford

Falling, or unintentionally dropping to the ground or a lower level, is a serious and prevalent health concern for older adults in the United States. Over 14 million, or 1 in 4, older adults fall every year (CDC, 2024). Although some research exists on what fall risk factors exist for older adults, little is known about what resources are provided by communities to mitigate these risks. The purpose of this capstone project is to describe fall-related resources that may be provided by a social worker or other social service professional. To accomplish this, semi-structured interviews were conducted with three staff members at an independent living community in the Midwest. Interviews were structured around elucidating information about formal and informal resources provided by the facility. Interviews were transcribed and a deductive thematic analysis was completed, sorting interview content into the following themes: biological, socioeconomic, behavioral, and environmental resources. Several additional themes emerged from the interviews, including barriers to resources, resident values, resource needs, and fall-risk factors. This project was part of a main pilot study that employed an interdisciplinary collaboration between an independent living facility and social work, nursing, and emergency science professionals. In conclusion, this capstone project provides a qualitative description of what resources an independent living community may provide to mitigate its residents' fall risk. Falling, or unintentionally dropping to the ground or a lower level, is a serious and prevalent health concern for older adults in the United States. Over 14 million, or 1 in 4, older adults fall every year (CDC, 2024). Although some research exists on what fall risk factors exist for older adults, little is known about what resources are provided by communities to mitigate these risks. The purpose of this capstone project is to describe fall-related resources that may be provided by a social worker or other social service professional. To accomplish this, semi-structured interviews were conducted with three staff members at an independent living community in the Midwest. Interviews were structured around elucidating information about formal and informal resources provided by the facility. Interviews were transcribed and a deductive thematic analysis was completed, sorting interview content into the following themes: biological, socioeconomic, behavioral, and environmental resources. Several additional themes emerged from the interviews, including barriers to resources, resident values, resource needs, and fall-risk factors. This project was part of a main pilot study that employed an interdisciplinary collaboration between an independent living facility and social work, nursing, and emergency science professionals. In conclusion, this capstone project provides a qualitative description of what resources an independent living community may provide to mitigate its residents' fall risk.

SOCIOLOGY/ANTHROPOLOGY

SELF-ESTEEM AND GENDER SHAPE SOCIOSEXUALITY JUDGMENTS OF A TARGET

Presenter(s): Kuhn, Rory (Graduate, Sociology/Anthropology)
Walis, Emma (Graduate, Psychology)

Mentor: Susan Sprecher

Authorship: Rory Kuhn, Emma Walis, Susan Sprecher, Julie Verette-Lindenbaum

People form first impressions of others based on accessible cues (e.g., gender, appearance), which can lead to forming subsequent assumptions: Self-esteem is one of those cues. Previous research demonstrated that high self-esteem (HSE) targets are attributed more positive characteristics than targets with low self-esteem (LSE) (e.g., Cameron & White, 2025). Our study extends the prior research by examining whether the manipulated self-esteem level of a hypothetical target affects participants' impressions of the target's sexual attitudes and past behaviors, as well as dating desirability. We also consider the gender of the target and its influence on impressions formed (do people assume that men are more sexually unrestricted than women?), including how gender moderates the effect of the target's self-esteem on impressions formed.

N = 270 college students (M=19.72 years, 54.1% male, 71.1% White) participated in a between-subjects vignette experiment. Participants were randomly assigned to one of four vignettes about a young hypothetical adult (target) who had completed an online dating profile. Both the self-esteem (high vs. low) and gender (man vs. woman) of the target were manipulated. Self-esteem was manipulated via hypothetical responses to a self-esteem scale. After reading their assigned vignette, participants estimated the target's sociosexuality (i.e., degree of restrictedness vs. unrestrictedness in sexual attitudes and behaviors), physical attractiveness, likelihood of engaging in a hookup, and perceived desirability to online dating users.

A series of 2 (self-esteem of target) x 2 (gender of target) ANOVAs were conducted on the dependent variables. Results indicated that targets with HSE were perceived as more physically attractive, more desirable (for long-term and short-term relationships), more likely to engage in a hookup experience, and rated as having higher sociosexuality (for behaviors and attitudes toward casual sex) than targets with LSE. Further, female targets were rated as more physically attractive and more desirable for a long-term relationship, whereas male targets were perceived to be more likely to engage in a hookup experience and were rated higher in total sociosexuality (including attitudes toward casual sex and past behaviors).

Our findings demonstrate that people utilize self-esteem information to inform impressions about a variety of other traits, including sexual attitudes and behaviors. Consistent with implicit theories of self-esteem (Cameron et al., 2016; Cameron & White, 2025), HSE targets were presumed to be associated with positive characteristics. Additionally, our findings call into question prior claims of a double standard stereotype linking women's self-esteem with unrestricted sociosexuality (Krems et al., 2023).

HOW ARE VARIOUS INDIVIDUAL DIFFERENCE VARIABLES ASSOCIATED WITH SUBJECTIVE WELL-BEING AND HAPPINESS

Presenter(s): Little, Alexandria (Undergraduate, Sociology/Anthropology)
Rutherford, Sydney (Undergraduate, Psychology)
Giron, Peter (Undergraduate, Sociology/Anthropology)
Harshbarger, Rose (Undergraduate, Sociology/Anthropology)
Darr, Emma (Undergraduate, Sociology/Anthropology)
Duran, Nadia (Undergraduate, Sociology/Anthropology)
Garcia, Mirkan (Undergraduate, Sociology/Anthropology)
Karine, Kezimana (Undergraduate, Sociology/Anthropology)
Ford, Paris (Undergraduate, Psychology & Sociology)
Schwarzentraub, Cassie (Undergraduate, Sociology)
Schimpf, Erin (Undergraduate, Exercise Science)
Schulman, Henrik (Undergraduate, Sociology)

Mentor: Susan Sprecher

Subjective well-being (SWB) is often defined by an individual's self-evaluation of overall life satisfaction and emotional experiences (Diener et al., 2018; Lyubomirsky & Layous, 2025). Scholars have noted recent trends that indicate that Americans' happiness and subjective well-being have decreased, especially in young adults [ages 18-25] (Lyubomirsky & Layous, 2025; World Health Report, 2025). However, even within a country, there is considerable variation in well-being and happiness. Reported declines in SWB have prompted our interest in identifying the social and demographic factors that may contribute to variation in happiness and well-being. Previous research in this area across various disciplines (sociology, psychology, health science) has produced mixed results (Blanchflower & Oswald 2017, Charles et al., 2023) on the strength of associations between individual variables and happiness and SWB. Some factors, such as being married (Apostolou et al., 2024) or holding more conservative political views (Mandel & Omorogbe, 2014; Peltzman, 2023), have shown relatively consistent links to higher happiness, whereas other factors, particularly race and ethnicity, have produced less consistent and sometimes conflicting findings across studies (Lyubomirsky & Layous, 2025; Wadsworth & Pendergast, 2021). Building on this mixed literature, the current study sought to examine variation in well-being based on several socio-demographic variables (age, gender, ethnicity/race, relationship status, political orientation, religion). This study explores how different aspects of a person's identity and life circumstances relate to their overall happiness and well-being through a secondary data analysis. The sample analyzed consisted of 768 participants (31.3% men, 66.2% women, 1.8% non-binary). The participants were obtained from multiple sources, including classes at Illinois State University, a college in New York, and online sources (e.g., Prolific). SWB and Happiness were measured using self-report measures administered in a Qualtrics survey. Overall, the results reflected the complexity seen in earlier research. Many of the variables did not show a clear or significant relationship with happiness or well-being. However, meaningful differences in happiness were found across certain racial groups (e.g. Black participants reported higher happiness and well-being scores in comparison to White and Latino participants), as well as among participants who identified as independent in comparison to democratic- and republican-oriented participants. Altogether, these findings suggest that happiness and well-being are influenced by a combination of factors rather than any single demographic characteristic. The results highlight the importance of looking beyond broad categories and considering the nuanced, lived experiences of individuals when studying what contributes to happiness.

DESIRE AND ENERGY FOR MORE SOCIAL CONNECTIONS

Presenter(s): Woodruff, Ella (Undergraduate, Sociology/Anthropology)
Christian, Kate (Graduate, Sociology/Anthropology)
Dzogbo, Ben-Carl (Graduate, Sociology/Anthropology)
Griffith, Jacey (Graduate, Psychology)
Owusu, Emmanuel (Graduate, Psychology)
Sadeh, Noa (Graduate, Sociology/Anthropology)
Tchaikovsky, Nathalia (Graduate, Sociology/Anthropology)

Mentor: Susan Sprecher

Authorship: Susan Sprecher, Kate Christian, Ben-Carl Dzogbo, Jacey Griffith, Emmanuel Owusu,

Noa Sadeh, Nathalia Tchaikovsky, Ella Woodruff

Research has demonstrated the importance of social connections to people's well-being (Holt-Lunstad, 2024). Yet, data have demonstrated worldwide increases in loneliness (Holt-Lunstad). Although people generally have ample opportunities to develop social connections, it has been suggested that people are increasingly prioritizing work and solitude over socializing (Brockman, 2025). Furthermore, people often underestimate the positive impact of developing new social connections (Haslam, 2018).

The purpose of this study was to examine the degree to which people express desire to form new social connections (both casual connections and new friends). In addition, we examine people's perception of the degree to which they have the energy and time for forging new social ties – an understudied topic (Li et al., 2025).

People who report being lonely should particularly desire new social connections. From an evolutionary perspective, loneliness can be a signal that motivates people to seek connections, which would enhance their survival

(Cacioppo et al., 2006). Research has also shown that experimentally manipulated experiences of social exclusion are associated with greater interest in making new friends (Maner et al., 2007). However, lay people's accounts of strategies used to reduce loneliness suggest that attempting to form new connections is only somewhat effective (Ray & Rushing, 2025). Whether lonely people have greater desire and energy to seek more weak ties and friends, controlling for demographic variables (age, gender, relationship status), has not been considered.

In examining psychological predictors of desire and energy for new social connections, we also consider personality traits. Many personality traits, such as extroversion, have been found to be associated with dimensions of social interaction (Li et al., 2025). This study examines how extroversion and the other Big Five personality traits are associated with desire and energy for new social connections.

These issues were examined with data collected in fall of 2024 by Dr. Sprecher with a diverse sample, consisting of both students and internet samples (total N = 767; 66% women; mean age = 31). In preliminary analyses, results indicated that most of the participants desired new social connections and new friendships to at least some degree and believed they had moderate energy to form new connections. A self-description of loneliness was positively associated with desire for more casual connections ($r = .10$, $p = .007$) as well as with the desire to develop new friends ($r = .08$, $p = .02$). Other results will be presented in the poster.

TEACHING AND LEARNING

BEYOND THE GLASS

Presenter(s): Anderson, Jessica (Undergraduate, Teaching and Learning)

Mentor: Miranda Lin

Glass children are neurotypical children who grow up alongside a sibling with special needs. These children are referred to as glass, not because they are fragile, but because you see right through them (Cleveland Clinic, 2025). However, this is not society's fault, as there is no definition or medical diagnosis. In a recent study, 16 participants who had siblings with special needs were interviewed. Each participant reported that they were never asked how they were doing, and that they would have benefited from resources (Haney, Malovic, & Ntontis, 2022).

Research on this topic highlights the significance of these children who have been left in the dark without resources for too long (Loneragan, 2023). Previous research reveals patterns of danger in a child's psychological and emotional development when they have a sibling with special needs (Shivers, Deisenroth, & Taylor, 2013; Jacobs, 2025). Growing up, they are caretakers of siblings and parents, while trying to process their feelings of embarrassment, anger, guilt, sadness, and more.

This literature review will raise awareness that, like their siblings, glass children are at risk for Adverse Childhood Experiences (ACEs). In education courses, students with special needs and the resources available to families are often discussed. However, the neurotypical sibling's needs are never mentioned. Glass children appear invisible in literature and in the real world.

To ensure that glass children are seen, this literature review will explore resources and how teachers and parents can support these children. This research will expand awareness and provide strategies to ensure that all children are heard and valued, acknowledging their feelings, fears, and needs. These children must not be overlooked, as they require the same level of attention as their special needs siblings.

A LITERATURE REVIEW ON SCIENCE TEACHING SELF-EFFICACY OF ELEMENTARY TEACHERS

Presenter(s): McNulty, Brittany (Graduate, Teaching and Learning)

Mentor: Carolyn Hunt

Science teaching is often avoided or limited in elementary school classrooms in the United States. A teacher's self-efficacy, or belief in their ability to perform actions that lead to desired results, may influence how they design and carry out their lessons. Teachers with higher science teaching self-efficacy are more likely to incorporate student-centered, inquiry-based practices. Given the influence that teacher self-efficacy could have on student science learning, my literature review examines studies from the past five years that center on science teaching self-efficacy of elementary education teachers. Ten articles were collected and analyzed for the ways in which science teaching self-efficacy was studied and supported. Each study was unique in the ways it connected elementary teachers and their science teaching self-efficacy. Eight studies showed science teaching self-efficacy improving with support. Two separate studies looked for correlations between other factors that may influence science teaching self-efficacy. Not every study provided information on how teachers went on to teach science after these self-efficacy increases. Further research is necessary to determine what supports may enable elementary teachers to more effectively teach science and if teacher self-efficacy is a contributing factor.

UNDERSTANDING INTERCULTURALITY AND ENACTING CULTURALLY BASED PEDAGOGIES: A MIXED METHODS STUDY OF IN-SERVICE WORLD LANGUAGE EDUCATORS IN SECONDARY CLASSROOMS

Presenter(s): Sandy, Heather (Graduate, Teaching and Learning)

Mentor: Sue Hildebrandt

Co-Mentor: Erin Quast

This study explores the relationship between an understanding of interculturality and culturally based pedagogies among world language teachers. The study examines the relationship between language teachers' upbringing, their development of intercultural competence, and their self-efficacy in culturally responsive teaching practices. It addresses a practical knowledge gap concerning the intersection of interculturality and culturally based practices, specifically among secondary education teachers of Spanish and Mandarin Chinese in the United States.

The data sources focus on the qualitative aspects of interculturality, culturally based teaching practices, and world language pedagogy, with quantitative results to enhance qualitative data. The qualitative data collection includes three semi-structured interviews and three reflection journals. The quantitative data collection includes the Intercultural Development Inventory (IDI), the Culturally Responsive Teaching Self-Efficacy (CRTSE) scale, and the Culturally Responsive Classroom Management Self-Efficacy (CRCMSE) scale. There are seven participants in the study.

The results of the study demonstrate that some participants do not have a profound understanding of what it means to teach interculturality, particularly its reflective dimension, whereas others do. The study also establishes that teachers have diverse experiences that influence how they approach teaching interculturality in the classroom and culturally based pedagogies, including personal philosophies and mandates from the districts in which they teach.

Future implications include what is taught in world language methodology courses at the university level concerning the intersection of the two concepts and professional development opportunities for world language teachers. Future research in this area is needed, as there is a dearth of scholarship on the intersection of interculturality and culturally based pedagogies in the secondary world language classroom in the United States.

A REVIEW OF INSTITUTIONAL PRACTICES FOR DIGITAL EQUITY IN SCHOOLS

Presenter(s): Zaber, Md Mamunur Rashid (Graduate, Teaching and Learning)

Mentor: Carolyn Hunt

The rapid expansion of digital tools in education has reshaped everyday classroom practices, making questions of equity increasingly urgent. As schools adopt more technology-supported learning environments, institutional decisions and leadership practices play a major role in whether students benefit equitably from these changes. This literature review examines how schools have approached digital equity over the past decade, focusing on institutional practices, leadership roles, and teacher development. The review identifies consistent gaps in implementation, highlights areas where schools have made progress, and offers directions for future research.

TECHNOLOGY

IMPACT OF VIRTUAL REALITY INTERVENTION ON PRE-LICENSED TEEN DRIVERS FROM RURAL ILLINOIS

Presenter(s): Chen, Ching Lun (Graduate, Technology)

Mentor: Isaac Chang

Learning to drive is a significant milestone for teenagers. Still, growing up in rural towns like Roanoke, Illinois, the transition can be challenging, especially when they move from quiet country roads to bustling city streets. Rural driving environments typically involve low traffic volumes, few traffic signals, and limited exposure to complex intersections such as four-way stops and roundabouts. Many teen drivers have never encountered these traffic characteristics before they get on the roads in cities like Normal. This paper examines the use of virtual reality (VR) driving simulations as an intervention to support rural teenagers' adaptation to urban driving environments. It explores the impact on their driving performance in city settings.

Eight students from Roanoke-Benson High School, aged 16 to 17, were introduced to a VR urban driving environment before driving in a set route through Uptown Normal. The research investigated whether novice drivers from rural Illinois demonstrated improved driving performance after the VR simulation, providing insight into the potential of technology-based training to reduce the rural–urban driving experience gap. A mixed-methods approach was used to gather data, including driving coach assessments, coded video evaluations, and post-simulation participant surveys. The results showed that the VR exposure may increase participants' confidence level and familiarity with urban traffic features during their naturalistic, real-world driving sessions. There also seems to be a gender-based difference in risk-taking and caution. Although the study was limited by a small sample size and constraints in simulation realism, the findings demonstrate the potential of VR as a supplemental tool in driver education. Teen drivers could be more confident and better prepared for their road-driving sessions if a VR driving simulation were integrated into traditional driver education.

RESIDENTIAL SCALE PCM THERMAL BATTERY COMPARISON

Presenter(s): Galewsky, Isaac (Undergraduate, Technology)

Mentor: Jin Jo

Phase change material (PCM) thermal batteries offer a promising approach to low-temperature heat storage by exploiting latent heat to achieve high energy density and near-constant operating temperatures. Most small-scale PCM systems rely on solid–liquid transitions, such as paraffin melting, due to their simplicity and ease of operation. However, liquid–gas phase change systems, particularly those using water under reduced pressure, offer substantially higher latent energy storage per unit mass but are less commonly explored at bench scale.

This research experimentally compares two bench-scale PCM thermal batteries operating near 70 °C: a reduced-pressure liquid–gas system using water as the working fluid, and an atmospheric-pressure solid–liquid system using a paraffin-based PCM. Both systems are charged using a controlled electric resistance heater to ensure a known and repeatable thermal energy input. Temperature sensors record thermal behavior during charging and discharging cycles, allowing characterization of phase-change plateaus, thermal stability, and discharge duration under comparable conditions.

For the liquid–gas system, sub-atmospheric pressure is used to induce boiling and condensation of water near the target temperature range, enabling energy storage via the heat of vaporization. For the solid–liquid system, paraffin undergoes melting and solidification within the same temperature window. Experimental data will include known thermal energy input from the electric heater, temperature-time profiles, and the amount of usable thermal energy delivered during discharge for each system.

The results highlight differences in energy density, temperature stability, and practical usability between the two PCM approaches. While the reduced-pressure water system should possess higher latent thermal energy storage potential as well as improved maximum charge and discharge speeds, it introduces additional operational complexity compared to the atmospheric pressure paraffin-based system. This study provides a direct experimental comparison of liquid–gas and solid–liquid PCM thermal batteries and contributes practical insight into their suitability for residentially scaled low-temperature thermal energy storage applications.

REAL-TIME INTELLIGENT MONITORING AND WARNING SYSTEM FOR ENHANCING RAILWAY GRADE CROSSING SAFETY USING COMPUTER VISION AND DEEP LEARNING

Presenter(s): Shahare, Shubham Damodhar (Graduate, Technology)

Mentor: Xi Hu

Authorship: Shubham Damodhar Shahare, Xi Hu

Railway grade crossings are sensitive and high-risk locations where trains, vehicles, and pedestrians share the same space. Conflicts between these objects can lead to deadly incidents. Therefore, understanding and preventing railway crossing incidents is critical for transportation agencies and infrastructure users. Although cameras have been widely installed at railway crossings, they are often used for footage recording after an incident instead of helping prevent unsafe situations in real time. Besides, real-world conditions like shadows, varying light intensity, and heavy traffic make consistent monitoring even more difficult.

Thus, this study proposes a real-time intelligent monitoring and warning system that uses deep learning (DL) and computer vision to enhance railway grade crossing safety. The proposed system takes video streams from a fixed camera as input, and then automatically identifies various objects, including traffic lights, gate arms, vehicles, pedestrians, and trains, to perform rule-based detection of unsafe scenarios (e.g., pedestrians' intrusion into the railway tracks when gate arms are closed). When an unsafe scenario is detected, the system activates a warning sound through a speaker as an alert and encourages immediate corrective action.

This system will be developed and evaluated using real-world video footage of railway crossings collected in a college town in Normal, IL, including scenes with different traffic levels and visibility conditions. This study ultimately contributes to the domain of knowledge by developing an all-in-one pipeline with a well-trained DL model that can turn raw video into actionable measures in real time for preventing unsafe railway crossings, advancing grade crossing monitoring toward more proactive and actionable directions.

Keywords: railway grade crossings, computer vision, deep learning, real-time monitoring, safety warning system

SMALL MODELS, BIG INSIGHTS: CROSS-MODAL LEARNING FOR ACCESSIBLE DIAGNOSTICS

Presenter(s): VanDerBurg, Phillip (Undergraduate, Technology)

Mentor: Heba Elgazzar

Medical imaging is an important tool for diagnosing diseases, but high-quality imaging methods such as magnetic resonance imaging (MRI) are expensive and not always available. In contrast, lower-quality or portable imaging devices are more affordable and widely used, but they often provide less detailed information. This project explores cross-modal knowledge distillation, a machine learning technique where a large, accurate model (the teacher) trained on high-quality images helps train a smaller and faster model (the student) that works with lower-quality images. Instead of learning only from raw image data, the student also learns from the teacher's predictions, allowing it to capture more meaningful patterns.

In this study, a ResNet-18 model is used as the teacher and a lightweight convolutional neural network (CNN) is used as the student. Experiments are performed using the Brain Tumor MRI dataset, which classifies images into four categories: glioma, meningioma, pituitary tumor, and no tumor. High-resolution MRI images represent the high-quality data, while artificially degraded images—created by reducing resolution and adding blur and noise—simulate lower-quality imaging conditions. Results show that knowledge distillation allows the student model to achieve strong performance while remaining efficient, demonstrating a practical approach for medical image classification in resource-limited settings.

THEATRE, DANCE and FILM

PERFORMING RESISTANCE: ACTIVISM, ANTI-AUTHORITARIANISM, AND THEATRICALITY IN THE #ENDSARS PROTESTS

Presenter(s): Igwe, Fredrick, (Graduate, Theatre, Dance and Film)

Mentor: Le'Mil Eiland

This paper examines the #EndSARS protests - an anti-police brutality movement against SARS (Special Anti-Robbery Squad), a rogue police unit - of October 2020 as part of Nigeria's enduring genealogy of creative resistance against authoritarian power. While much scholarship has framed the protest primarily through digital activism, this study explores its performative dimensions. I examine #EndSARS as episodic scenes of resistance, shaped by Nigerian performance traditions. These performances, staged across cities in Nigeria and diaspora communities, used chants, songs, placards, and icons as theatrical devices that dramatized collective anger, voiced political critique, and demanded immediate action. By situating #EndSARS within Nigeria's historical continuum of creative dissent from pre-colonial protest performances to postcolonial political theatre, I identify a distinctly Nigerian poetics of anti-authoritarian performance, rooted in vocalization, decentralized staging, communality, and embodied presence. I contend that #EndSARS blurred the boundaries between activism and performance, transforming protest into a lived performance of resistance through which activism was rehearsed, staged, and collectively received by audiences.

Afternoon Session

AGRICULTURE

LOCAL HORSE BOARDING FACILITIES FOR CURRENT AND PROSPECTIVE ISU STUDENTS

Presenter(s): Black, Patricia (Undergraduate, Agriculture)

Mentor: Michelle Kibler

Many college students pursue higher education while still engaging in equestrian activities, recreationally or competitively. These students may consider nearby horse boarding facilities to meet their needs when selecting a university. There is limited information available to assist students in identifying suitable boarding options near their institution. This study aims to collect and analyze information on local horse boarding facilities in order to support current and future students at Illinois State University. With this information, students will be able to make informed decisions about each facility listed and their stated equine care and management offered. Additionally, findings from this study will provide benchmarks for the equine boarding industry in and around McLean County. Data on boarding prices, disciplines offered, facility location, available amenities and services, and training offered will be collected through in person and online surveys. Additionally, all collected information will be compiled into a comprehensive guide for students seeking horse boarding facilities. By gathering important information and highlighting local boarding facilities near Illinois State University, this guide will provide a broader understanding on the equine industry in McLean and nearby counties. While data collection is ongoing, it is expected that this study will reveal variations among local boarding facilities in terms of prices, disciplines offered, services, amenities, and lessons available. These findings are anticipated to assist students to be able to make more informed decisions regarding boarding facilities near Illinois State University, and provide summary information about the local equine industry in McLean and surrounding counties.

MICRONUTRIENT MOVEMENT IN COVER CROP PLOTS

Presenter(s): Plankenhorn, Jack (Undergraduate, Agriculture)

Mentor: Rob Rhykerd

Co-Mentor: Nicholas Heller

Authorship: Jack Plankenhorn, Keion Mackey, Nicholas Heller, John Sedbrook, Bill Perry, Rob Rhykerd

Winter cover crops coupled with best management practices may sequester atmospheric carbon dioxide in soil. However, traditional soil sampling techniques used to measure soil fertility, which homogenize the top 20-30 cm of soil, may not capture short-term changes near the soil surface. This study measured changes in selected macronutrients and micronutrients resulting from the adoption of winter cover crops in a corn-soybean rotation typical of the U.S. Midwest. A randomized complete block design was established at the Illinois State University Research Farm in Lexington, IL, in the fall of 2020. Winter cover crop treatments included a fallow control, pennycress, CoverCress™, cereal rye, and a pea, clover, radish, and oat mix. The summer cash crops were soybeans in 2021 and 2023, and corn in 2022 and 2024. Soil macronutrients and micronutrients were measured by a commercial laboratory from soil cores that were divided into segments of 0-2, 2-4, 4-6, 6-8, 8-10, 10-15, 15-20, 20-25, & 25-30 cm. Results will show the impact of cover crops on soil fertility. Long-term studies are needed to determine if changes in soil fertility management are necessary when adopting winter cover crops.

SEEING BEYOND OUR EYES: HOW HUMMINGBIRD VISION SHAPES FORAGING AND MATE CHOICE DECISIONS

Presenter(s): Arzani, Alicia (Graduate, Biological Sciences)

Mentor: Fernanda G. Duque

Authorship: Ann Frías-Romero, Jimmy Arias-Borja, Esteban Guevara, Fernanda G. Duque

Hummingbirds perceive a suite of colors beyond human vision. These different visual capabilities guide critical decisions, such as foraging and mate choice. While humans have three types of color-sensitive photoreceptors (cones), hummingbirds have four cones, including one sensitive to UV wavelengths. This tetrachromatic system allows discrimination of a broader range of colors and detection of signals invisible to human observers. Understanding how this expanded color vision influences ecological interactions requires examining color through hummingbird vision rather than human visual perception. For this project, we quantified the spectral reflectance of cloud-forest hummingbird-pollinated flowers within a plant-hummingbird pollination network in the Andes, measuring reflectance across four spectral ranges: UV (300–400 nm), blue (400–500 nm), green (500–600 nm), and red (600–700 nm). Although hummingbird-pollinated flowers are often described as red, tropical flowers include substantial variation in floral coloration. Linear mixed models revealed significant differences among plant species and spectral ranges, indicating that flowers differ not only in overall brightness but also in reflectance across the spectrum. Most flowers show strong red reflectance, while UV and blue reflectance vary across species. Because UV wavelengths may influence avian color processing for other ranges in the spectrum, variation in UV reflectance may alter how other colors are perceived, potentially generating distinct visual signals for hummingbirds. Using these reflectance data and hummingbird visual models, we aim to understand how flower colors facilitate foraging. Because visual perception is also involved in other critical life choices, investigating color reflectance and hummingbird visual perception may have broader implications for understanding how visual signals influence decision-making, including species recognition and mate choice. Moving forward, we will use this methodology to investigate how plumage reflectance in *Oreotrochilus chimborazo* facilitates subspecies recognition and multimodal courtship communication, potentially promoting subspecies boundaries. Together, this work highlights how tetrachromatic vision shapes decision-making in feeding and reproduction, emphasizing the role of sensory perception in ecology and evolution.

CHOLESTEROL PROTECTIVE EFFECT IN STAPHYLOCOCCUS AUREUS AGAINST FATTY ACIDS AND ANTIBIOTICS

Presenter(s): Barbour, Cait (Undergraduate, Biological Sciences)

Mentor: Jan-Ulrik Dahl

Authorship: Caitlyn Barbour, Sharanya Paul, Jan-Ulrik Dahl

As antibiotic resistance increases among bacteria, rendering many antibiotic families ineffective, it has become increasingly vital to identify alternatives to antibiotics and determine how bacteria can acquire resistance. *Staphylococcus aureus* causes a variety of infections of the skin, soft tissues, and internal organs. *S. aureus*, amongst other Gram-positive bacteria, has been included in this resistance to antibiotics. It is therefore important to understand factors that control antibiotic resistance in these pathogens. Cholesterol is a lipoprotein typically found in the cell membranes of eukaryotic organisms, where it provides structural support, whereas it is absent from bacterial membranes. Our lab has recently discovered that cholesterol from the environment can be taken up by *S. aureus* when the pathogen is exposed to antimicrobial fatty acids, thereby increasing cell membrane rigidity and resistance to fatty acids. However, whether cholesterol incorporation also protects against antibiotics remains unknown. The goals of the project were to assess the efficacy of added cholesterol in *S. aureus* when exposed to fatty acids and antibiotics. Cholesterol was added alongside daptomycin and several fatty acids, and the mixture was incubated with *S. aureus* in plate assays and survival experiments. *S. aureus* exposed to daptomycin co-incubated with cholesterol received no protection effect, whereas exposed to fatty acids, the bacteria received protection. The implications of *S. aureus* becoming more resistant to fatty acids in the presence of added cholesterol could provide further insight into the cell membranes of *S. aureus* and other Gram-positive bacteria, thereby aiding the development of effective medications for infections.

ARE HIGH-FREQUENCY VOCALIZATIONS EFFECTIVE AS AGGRESSIVE SIGNALS IN MEDIATING HETEROSPECIFIC INTERACTIONS IN HUMMINGBIRDS?

Presenter(s): Baruah, Padmanav (Graduate, Biological Sciences)

Mentor: Fernanda G. Duque

Authorship: Ann Frías-Romero, Jimmy Arias-Borja, Fernanda G. Duque

A few species of hummingbirds produce High-Frequency (HF) vocalizations with fundamental frequency above 8 kHz, which is well beyond the range most birds hear (1-5 kHz). Many HF vocalizing as well as non-HF vocalizing hummingbird species live in sympatry in the Andes. These hummingbirds often form dominance hierarchies that determine access to food sources. Hummingbirds often direct aggressive displays and vocalizations towards both conspecifics and heterospecifics, within such networks. However, the role of HF vocalizations in mediating hummingbird social interactions remains undetermined. We hypothesize that, generally, hummingbirds are sensitive to HF sounds, and thus, HF vocalizations are effective aggressive signals against both HF and non-HF vocalizers. To start testing our hypothesis, we collected time-calibrated video and audio recordings of natural hummingbird interactions from seven sites in Ecuador's cloud forests. We collected data in three two-hour windows during the day (6:30-8:30 AM, 10:30 AM-12:30 PM, 4:30-6:30 PM). We then scored the behavioral data for aggressive interactions (including chases and fights) and vocalizations (directed at various other species as well as undirected calls) for each hummingbird species in the region. Further, we extracted acoustic parameters (fundamental and peak frequencies) for each vocalization to determine whether call directionality influences their spectral properties. HF and non-HF vocalizing species chase both types of species, both with and without vocalizations. Further, HF vocalizers direct either HF or non-HF vocalizations in chases against both HF and non-HF vocalizers. Some non-HF vocalizers also produce directional calls with peak frequencies above 8 kHz, suggesting they emphasize higher frequencies relative to their non-directional calls. Preliminary results thus indicate that HF vocalizations may serve as robust territorial signals across hummingbird species. In our future analyses, we will further assess the proportions of each vocalization type used in undirected territorial contexts vs. directed aggression against various species, and whether these proportions change with hummingbird community structure.

EATING YOUR WAY IN: FATTY ACIDS SHAPE MSHA PILUS EXPRESSION IN VIBRIO CHOLERAЕ

Presenter(s): Basu, Debajyoti (Graduate, Biological Sciences)

Mentor: Kyle Floyd

Authorship: Anindita Saha, Joseph Alexander, Kyle Floyd

Vibrio cholerae is a facultative human pathogen and causative agent of the life-threatening disease cholera. Environmental survival of *V. cholerae* is enhanced by its ability to form biofilms, mediated by type IV mannose-sensitive hemagglutinin (MSHA) pili. However, during the transition to host infection, cell-surface presentation of MSHA triggers innate immune responses to induce bacterial clearance. Therefore, proper regulation of MSHA production is vital for facilitating *V. cholerae* host colonization. Recently, we identified the fatty-acid metabolism regulator, FadR, to be an enhancer of *msh* gene expression under environmental conditions, with a consensus binding sequence found in the second promoter region (P2) of the *msh-I* operon. Upon deletion of *fadR*, P2 promoter activity and cell-surface MSHA levels are significantly reduced compared to wild-type. Activity of FadR is negatively regulated by long-chain fatty acids (LCFAs), which are major components of the mammalian diet and are present in high concentrations in the GI tract. Therefore, we hypothesize that LCFAs serve as a host-derived signal to inactivate FadR and down-regulate MSHA production to promote *V. cholerae* infection. To test this hypothesis, we used transcriptional reporter assays, EMSAs, rapid attachment and biofilm assays, and direct pilus visualization with supplementation of varying LCFA concentrations. Addition of saturated LCFAs myristic (C14:0) and palmitic (C16:0) acids showed no reduction in P2 activity; while addition of unsaturated LCFAs oleic (C18:1), palmitoleic (C16:1), linoleic (C18:2), and α -linolenic (C18:3) acids significantly reduced P2 activity. Linoleic and α -linolenic acids have not been previously described as FadR ligands. Impacts on P2 activity were validated via EMSA, where all unsaturated LCFAs tested precluded FadR interactions with the P2 promoter. Unsaturated LCFA addition was also observed to significantly reduce cell-surface presentation of MSHA pili. Ongoing work is examining the impacts of LCFA supplementation on MSHA mediated surface attachment and biofilm formation. Our data show FadR as a novel regulator of *msh* gene expression, where mono- and poly-unsaturated LCFAs modulate FadR-mediated regulation of P2 promoter activity to regulate MSHA pilus production and aid in the transition of *V. cholerae* from the environment to the host.

APPLYING QUALITATIVE AND QUANTITATIVE ASSAYS TO THE STUDY OF GENE DRIVE IN A MODEL FUNGUS.

Presenter(s): Bhatt, Tapasvi (Undergraduate, Biological Sciences)
 Deschand, Jack (Undergraduate, Biological Sciences)
 Miller, Colin (Undergraduate, Biological Sciences)

Mentor: Tom Hammond

Authorship: Tapasvi Bhatt, Tom Hammond, Colin Miller, Nevyn Laframboise, Jack Deschand

Neurospora Spore killer-3 (Sk-3) is a 4 Mb selfish genetic element found on Chromosome III in some isolates of *N. crassa* and *N. intermedia*. In crosses between a strain that harbors Sk-3 and one that does not (denoted as Sk-S), only offspring that inherit Sk-3 survive. Offspring that fail to inherit Sk-3 are killed. Sk-3 is thought to require two genes to ensure this outcome: one gene produces a poison (the killer gene) and the other produces an antidote (the resistance gene). Although the identity of the killer gene is unknown, previous work has identified a 1.3 kb DNA interval called i350 that is required for Sk-3-based spore killing. While deletion of i350 eliminates spore killing in Sk-3 × Sk-S crosses, the reason why is unknown. In this study, we are examining how four DNA intervals (i382, i396, i398, and i405) influence both spore killing and gene drive by Sk-3. Our spore killing assay involves microscopic examination of spore sacs called asci to determine if spore killing has occurred, while our gene drive assay involves the isolation and genotyping of offspring to quantitatively measure the Sk-3 transmission rate. Our results should help identify the sequences that are critical for spore killing and gene drive by Sk-3.

TRAIT VARIATION OF ROUND GOBY ACROSS THE ILLINOIS RIVER INVASION FRONT

Presenter(s): Burgoni, Joseph (Undergraduate, Biological Sciences)
Corp, Daniah (Undergraduate, Biological Sciences)
Moeller, Sydney (Undergraduate, Geography, Geology, and the Environment)

Mentor: Kara Andres

Co-Mentor: Clinton Warren

Authorship: Joseph Burgoni, Daniah Corp, Sydney Moeller, Katelin Meek, Gwen Church, Jenna Benson, Jadyn Golz, Clinton Warren, Kara Andres

The round goby (*Neogobius melanostomus*) is an invasive fish species originally introduced to the Great Lakes and is now spreading into the Illinois River, raising concerns about its impacts to native freshwater communities as it invades new habitats in the Mississippi River watershed. As this species encounters novel environmental conditions along the river, changes in morphology, reproductive investment, and gene expression may help it persist and establish new populations. This study aims to address which traits are linked to the expansion of round goby along the Illinois River expansion front by exploring clinal patterns in body size, condition, and gene expression. We conducted field collections of round gobies from southern Great Lake Michigan and across multiple sites of the upper and lower Illinois River using electrofishing and netting, sampling both adults and juveniles. For each individual fish, we measured body size, body mass, and liver mass to calculate body and hepatic condition indices. Liver and gonadal tissues were preserved for RNA extraction to conduct later gene expression analyses. Based on patterns observed at other invasion fronts, we anticipate finding spatial variation in morphological traits and gene expression, including genes involved in environmental stress responses, such as temperature tolerance and immunity. By combining morphological data with molecular data, this project aims to clarify which traits support round goby persistence in new environments and lay the groundwork for understanding mechanisms that facilitate the continued spread of this invasive fish.

STRUCTURE-FUNCTION ANALYSIS OF A PHOSPHATE TRANSPORTER USING HOSTILE TAKEOVER PROTEIN TRAPPING

Presenter(s): Center, Bailey (Undergraduate, Biological Sciences)

Mentor: Kevin Edwards

Authorship: Bailey Center, Sumaiya Hasan, Kevin Edwards

Phosphate homeostasis is essential to cellular metabolism and signal transduction, yet the mechanisms underlying inorganic phosphate storage and regulation remain poorly understood. The PXo protein in *Drosophila* functions as a phosphate exporter that has recently been found to aid in the formation of multilamellar phosphate storage structures termed “PXo bodies” (Xu et al, 2023). Here we investigate the cellular localization and trafficking behavior of a PXo protein trap (Ve02) made using the Hostile takeover (Hto) protein trapping system. Ve02 has replaced residues 1-23 with the FLAG-mCherry tag and the N-terminal deletion has resulted in the loss of key conserved residues in the cytosolic phosphate sensing domain of the protein. Typically, Hto cannot make functional fusions with transmembrane proteins since an N-terminal signal peptide would be bypassed or capped by mCherry, but PXo is an 8-TM protein with an internal membrane insertion signal. Our predictive modeling has shown significant impacts to the proteins tertiary structure, however the structural changes have not affected Ve02’s ability to insert into the plasma membrane. Confocal imaging in the follicle cell epithelium has revealed polarized localization of Ve02 to apically biased vesicles and the basolateral plasma membrane. Currently, the understanding of PXo body biosynthesis suggests formation through de novo membrane synthesis that originates from the Golgi (Xu et al, 2023). However, a co-expression assay revealed strong colocalization of Ve02 with the early endosomal marker GFP-FYVE. The presence of Ve02 in early endosomes denotes a trafficking route that differs from the endogenous route defined in gut epithelial cells. This alternative routing reveals trafficking variations resulting from either the RFP tag and N-terminal truncation, or tissue specific differences in trafficking routes.

TEENAGE MUTANT FRUIT FLIES: IMAGING SPREADING DEPRESSION IN ADOLESCENT BRAINS

Presenter(s): Chaudhry, Habiba (Undergraduate, Biological Sciences)

Mentor: Wolfgang Stein

Co-Mentor: Allison Harris

Authorship: Habiba Chaudhry, Wolfgang Stein, Allison Harris

Spreading depression (SD) is a slowly propagating wave of neuronal inactivity that travels across large areas of the cortex in disorders such as ischemia, stroke, and traumatic brain injury. Accompanied by swelling of neurons and large changes in ion homeostasis, SD can have debilitating consequences even in otherwise healthy brains. Its effects are probably best known for causing visual auras that precede the headache pain in about 30% of all migraineurs. While SD propagation has been studied for decades, key questions about its initiation remain, including whether developing brains are more or less likely to experience SD. Adolescent brains experience extensive restructuring as the brain transitions from childhood to adulthood. We hypothesize that this dramatic rebuilding of the brain provides protection from the detrimental effects that lead to SD.

To test our hypothesis, we developed a high-throughput imaging approach that utilizes fruit fly (*Drosophila melanogaster*) brains to study SD and measure, in real-time, its unfolding across the entire nervous system. SD has been studied primarily in mammalian brains, but because these brains are complex and difficult to access experimentally, the triggers and control mechanisms of SD remain poorly understood. We have shown that SD occurs in adult and larval fruit flies with many of the same hallmarks as SD in mammals, while offering many experimental advantages.

Here we investigate SD during the pupal stage to determine whether SD susceptibility is stable across all life cycles or dynamically tuned by developmental processes. In flies, the pupal period is a time when most larval neurons die, remodel, or are replaced, and adult brains with new circuits and behaviors emerge. This developmental window represents one of the most extreme examples of transformation in a living nervous system, as the animal transitions from a crawling larva to a flying adult. Our preliminary data indicate that SD can be triggered in early and late-stage pupae. However, we also found that SD may not be present in mid-stage pupae, where the brain structures undergo their most extreme rewiring, supporting our hypothesis. We are currently extending our experiments to better understand at which pupal stage SD cannot be elicited and which stages of brain development influence SD initiation.

IMPACTS OF DUCHENNE MUSCULAR DYSTROPHY ON SMOOTH MUSCLE STRUCTURE AND FUNCTION

Presenters: Cheeseman, Erin, Undergraduate, Undergraduate, Physiology, Neuroscience and Behavior

Mentor: Dr. Andrés Vidal-Gadea

Authorship: Erin Cheeseman, Adina Fazyl, Grace Rusheinski, Dr. Andrés Vidal-Gadea

Duchenne muscular dystrophy (DMD) is caused by loss of dystrophin function. While many studies have examined how dystrophin loss affects cardiac and striated muscle, comparatively little is known about its effects on smooth muscle. The goal of this project was to determine how dystrophin loss alters smooth muscle function in *Caenorhabditis elegans* and to test whether commonly used corticosteroid treatments improve these phenotypes.

We exposed wild-type animals (N2) and a dystrophin-deficient strain (VG02) to agar plates containing vehicle (0.5% dimethyl sulfoxide, DMSO) or one of two corticosteroids (deflazacort, 0.25 mM, or prednisone, 0.37 mM). We then quantified smooth muscle behaviors, including contraction dynamics during the defecation motor program. Under these assay conditions, both corticosteroid treatments reduced smooth muscle performance relative to vehicle, indicating that these compounds did not improve, and in some cases worsened, smooth muscle function in both wild-type and dystrophin-deficient animals.

In parallel, we generated a rescue strain by reintroducing a dystrophin isoform (dys-1E) into the dystrophin-deficient background. Rescue animals showed improved smooth muscle function compared with dystrophic animals, supporting the conclusion that dystrophin is required for normal smooth muscle performance. Together, these results motivate continued work to define how dystrophin supports smooth muscle function and to identify treatments that preserve smooth muscle function without adverse side effects.

BIODIVERSITY MONITORING IN RESTORED WETLANDS USING ENVIRONMENTAL DNA

Presenter(s): Church, Gwen (Graduate, Biological Sciences)

Mentor: Kara Andres

Authorship: Gwendolyn Church, Kara Andres

The Illinois River floodplain is home to multiple managed and restored wetlands of ecological importance, including the Merwin Preserve at Spunky Bottoms and the Emiquon Preserve. Active restoration via a water control structure at Spunky Bottoms will commence this coming spring and environmental DNA (eDNA) samples will be collected before and after the completion of the structure to determine how the species' composition changes with active management efforts. We also plan to collect (eDNA) samples in multiple floodplain wetlands connected to the Illinois River over the next year to see how the aquatic biodiversity changes over time, different levels of management, and different levels of connectivity. Samples will be collected at Emiquon Preserve and other managed floodplain wetlands connected to the Illinois River which will allow for a comparison of the aquatic communities and species compositions. eDNA will be used because it is non-invasive, cost-effective, and efficient in sampling habitats that may be difficult to sample with traditional methods, allowing us to simultaneously detect species diversity and composition across multiple species groups including fishes and macroinvertebrates. This will provide data on the success of the restoration as well as whether native or invasive aquatic species are utilizing the wetland. This study will allow for a better understanding of how biodiversity responds to the restoration of degraded floodplain wetlands. eDNA metabarcoding has also been underutilized in floodplain wetlands and this study will provide further data on the effectiveness of eDNA sampling in Midwestern wetlands.

INTERACTIONS OF THE GUT MICROBIOTA AND NOVEL PATHOGEN EXPOSURE FOR BUMBLEBEE INFECTION RESISTANCE

Presenter(s): Emmert, Paul (Undergraduate, Biological Sciences)

Mentor: Ben Sadd

Authorship: Paul Emmert, Ravi Timsina, Ben Sadd

Pathogen spillover, the transmission of pathogens from native hosts to novel hosts, is of widespread consequence for human and ecosystem health. For example, pathogen spillover from commercial or managed bee species poses a major threat to key natural pollinators, such as native bumblebees. Yet, the robustness of barriers to spillover and the outcomes for host health of interactions of spillover and native pathogens are largely unknown. A stable host-associated gut microbiota may aid in pathogen defense, including in determining outcomes with spillover pathogens. This study examines how prior exposure to a potential spillover pathogen (the honeybee-associated *Lotmaria passim*) affects the ability of the bumble bee *Bombus impatiens* to resist a native pathogen (*Crithidia bombi*). This will be assessed in bees with and without their native beneficial gut microbiota, to assess how the microbiota influences infection outcomes. Individual aims address, i) how the spillover and native pathogens interact within bees with an established microbiota, and ii) how the interactions are affected by the presence of the bee's native microbiota, including the consequences of beneficial microbiota perturbation. This work will provide insights into how novel pathogens impact the ability of host bees to fight off their own pathogens, and the role of the microbiota in this interaction.

THE EFFECT OF STRESS ON FEMALE PREFERENCE AND PERCEPTION OF A SOCIALLY RELEVANT STIMULUS

Presenter(s): Enevold, Alyssa (Graduate, Biological Sciences)

Mentor: Fernanda G. Duque

Authorship: Alyssa Enevold, Fernanda Duque

Animals must adaptively respond to social cues for survival, but stress can alter how they perceive and respond to these stimuli. The stress hormone corticosterone (CORT) helps the body respond to stressors and serves as a measure of stress levels. Our study investigates the impact of stress on non-breeding female zebra finches (*Taeniopygia guttata*). Females underwent three different stress conditions (control, acute-AS, and chronic-CS) before being tested in a three-chamber setup. We measured circulating CORT as a proxy for stress levels by collecting blood samples on day zero and day ten of the experiment. In the apparatus, females were presented with a choice between a social stimulus and a non-social stimulus. Females also had the option to remain in a neutral zone (no stimulus). Social preference was assessed by the time spent near each stimulus. We also assessed movement by quantifying how many times they moved across stimuli, and grooming by quantifying the number of times they groomed with their bill or scratched with their feet. We found no significant differences in stress levels, preference, or grooming between the three treatments. However, we found that all groups preferred the social stimulus. The birds also moved the least to the non-social stimulus, suggesting avoidance of that stimulus. Interestingly, we also found a positive correlation between CORT levels and movement, indicating some anxiety-like behaviors in the animals. This research offers insight into how stress influences the perception of social cues, thereby affecting decision-making and social interactions.

GEOGRAPHIC VARIATION IN THE TIMING OF SONG IN THE GENUS MICROCERCULUS

Presenter(s): Geyer, Tara (Undergraduate, Biological Sciences)

Mentor: Carlos Rodriguez-Saltos

Geographic variation in birdsong presents opportunities for the study of cultural and biological evolution of this behavior. Though geographic variation has been extensively studied across songbirds, little is known about variation in note timing. We investigated variations in note timing across the genus *Microcerculus*. Using crowd-sourced databases, we obtained recordings across the entire geographic range of multiple *Microcerculus* species. By measuring inter-note interval durations, we classified songs into known timing variants or identified novel variants where necessary. We then tested whether these variants are separated across geographically distinct populations. This project will shed light on the evolution of timing in birdsong by studying a group of birds with wide variation in the timing of their songs.

DYNAMIC COMPARTMENTAL CALCIUM ANALYSIS IN DUCHENNE MUSCULAR DYSTROPHY

Presenter(s): Jones, Mackenzie (Graduate, Biological Sciences)

Mentor: Andres Vidal-Gadea

Duchenne muscular dystrophy (DMD) is a progressive, degenerative muscle disease caused by mutations in the gene encoding the dystrophin protein. Dystrophin is highly expressed in muscles, where it plays mechanical and signaling roles, serving as a force absorber and a mediator of important ion channels. DMD is characterized by muscle fiber damage, necrosis, and abnormally elevated calcium levels in the sarcoplasm and mitochondria. Within muscle cells, there are three main components in which calcium moves: the sarcoplasm, mitochondria, and the sarcoplasmic reticulum. While calcium dynamics and levels have been observed in the sarcoplasm and mitochondria, there is incomplete evidence on the degree to which calcium in the sarcoplasmic reticulum is affected, if at all. Here, we show that dystrophic *C. elegans* demonstrate increased calcium levels in the sarcoplasmic reticulum during muscle contraction and relaxation. Suggesting that there is disrupted calcium release from the sarcoplasmic reticulum as contraction begins. We also show that different dystrophic conditions vary in both calcium concentration and cycling within muscle compartments (sarcoplasm, mitochondria, sarcoplasmic reticulum). These results indicate that the sarcoplasmic reticulum is also impacted by dystrophin loss. Understanding how the absence of dystrophin contributes to abnormally elevated calcium levels and calcium cycling during movement across all primary muscle compartments informs the search for new treatment targets.

SYNTHESIS OF THE WESTERN FRAGMENT OF A STRUCTURALLY NOVEL 1,2,4-OXADIAZOLE BASED ANTI-BREAST CANCER AGENT—AN INNOVATIVE DRUG APPROACH TO BREAST CANCER THERAPIES

Presenter(s): Kimler, Addison (Undergraduate, Biological Sciences)

Mentor: Shawn Raynard Hitchcock

A structurally novel 1,2,4-oxadiazole based drug has been synthesized as an anti-cancer agent. This drug acts to restore the function of the Hippo Pathway which is a key regulatory pathway in normal cell proliferation, organ differentiation and tissue regeneration. The terminal step in the Hippo Pathway is to phosphorylate a protein referred to as YAP, which then is degraded to prevent tumorigenesis. A previous research group had synthesized the 1,2,4-oxadiazole based drug but the process was not optimal due to the use of very toxic reagents such as phosgene. Our research group became interested in developing a synthesis of the drug. The retrosynthetic approach involved envisioning two major fragments of the target molecule, a western fragment and an eastern fragment. This research poster describes the complete synthesis of the Western fragment of the drug. During the initial experimental phases of this project, environmentally friendly compounds were utilized. The first phase of this work employed the use of nicotinic acid in carbodiimide coupling reactions. However, these coupling reactions were not successful as determined by NMR spectroscopy. It was concluded that the material was a complex mixture of products and focus shifted to circumventing the use of nicotinic acid to its corresponding ester via the Fischer esterification. Thus, nicotinic acid was reacted with methanol in the presence of concentrated sulfuric acid to afford the desired ester, methyl nicotinate. This ester was then used in a nucleophilic acyl substitution reaction with p-toluidine as a test amine partner. Unfortunately, this coupling pathway did not work. Through NMR spectroscopic analysis, it was evident there was no product in solution. We then pursued a strategy using the highly activated acyl chloride by treating nicotinic acid with thionyl chloride followed by reaction with p-toluidine. While the reaction did not entirely give the product, it was clear that it had proven to be the most successful of the reactions. At this stage, we opted to pursue the purchase of the commercially available nicotinoyl chloride and couple it with the key amine fragment. This process proved to be successful in generating a key portion of the Western fragment. This poster will describe the research that was carried out in finally synthesizing and characterizing the Western fragment of a novel oxadiazole based anti-breast drug.

REEVALUATING ARACHIDONIC ACID'S ROLE IN EMBRYONIC DEVELOPMENT: EVIDENCE FOR CORTICOSTERONE-INDUCED AA TOXICITY

Presenter(s): Mabry-Mitchell, Sean (Undergraduate, Biological Sciences)

Mentor: Ryan Paitz

Arachidonic acid (AA) is a polyunsaturated fatty acid considered critical to cell signaling, membrane structure, and early embryonic development. Previous work in our lab showed that embryonic exposure to corticosterone reduces growth and increases mortality in developing chicken embryos. Corticosterone exposure also increases expression of enzymes involved in the processing of arachidonic acid, suggesting that AA signaling could mediate the negative developmental effects of stress hormones. The purpose of this study was to determine whether reducing AA synthesis would impair embryonic development, and to test the hypothesis that AA is necessary for early embryonic development. To test the initial hypothesis, embryos were injected with one of two pharmacological inhibitors targeting enzymes involved in AA production: a FADS2 inhibitor (SC 26196) and a cPLA2 inhibitor (AACOCF3). Eggs injected with either inhibitor were compared to oil only controls for survival and growth outcomes. Contrary to our predictions, neither inhibitor produced significant changes in embryonic growth or survival. These results indicate that reducing AA synthesis does not impair early development. Recent findings from our research group demonstrated that exogenous AA exposure decreases embryonic growth and survival, suggesting that elevated AA, not reduced AA, may be harmful. Based on these results, the working hypothesis was revised: corticosterone exposure may be lethal because it increases AA to toxic levels. The next phase of this project will test whether blocking AA synthesis with a FADS2 inhibitor can prevent the negative developmental effects of corticosterone exposure. If inhibiting AA production rescues embryos from corticosterone induced mortality, this would support a model in which stress induced increases in AA disrupt normal developmental processes. This research aims to clarify the mechanistic relationship between corticosterone, arachidonic acid metabolism, and embryonic viability. Understanding how stress hormones alter lipid signaling pathways may provide broader insight into how maternal stress affects offspring development across vertebrate species.

MONITORING SEASONAL MUSSEL AND FISH OCCUPANCY USING EDNA

Presenter(s): Meek, Katelin (Graduate, Biological Sciences)

Mentor: Kara Andres

Authorship: Katelin Meek, Kara Andres

Anthropogenic threats like climate change, habitat loss, invasive species, and pollution have all contributed to a significant global decline in biodiversity. Freshwater communities are especially vulnerable, with declines in freshwater species greater in magnitude than their terrestrial or marine counterparts. Within freshwater systems, mussel species are one of the most at-risk taxa, and in North America, nearly 70% of species are considered near threatened, vulnerable, or endangered. Due to this rapid decline, monitoring efforts are crucial because they allow for a better understanding of overall biodiversity and the distribution of threatened and endangered species. Environmental DNA (eDNA) has become an increasingly useful tool in monitoring efforts due to its ability to detect rare or endangered species. However, many factors influence the probability of detecting a species, including the shedding rates of eDNA due to differences in the biomass, activity level, and behavior of target species, all of which fluctuate seasonally. In mussels, this phenomenon is poorly understood, but shedding rates and subsequent detection probabilities are thought to be higher during spawning. In this study, I aim to determine how fish and mussel biodiversity and occupancy fluctuate over the course of a year. I plan to collect eDNA samples once per month at a number of targeted streams across a gradient of land use and habitat quality in Illinois. Through this, I hope to elucidate seasonal variation and the effect of abiotic and biotic factors on occupancy of mussel and fish species.

STUDYING MUSCULAR DYSTROPHY WITH NEMATODE WORMS

Presenter(s): Muthukumar, Avinaash (Undergraduate, Biological Sciences)

Mentor: Andres Vidal-Gadea

Authorship: Avinaash Muthukumar

Duchenne muscular dystrophy (DMD) is a condition that impairs muscle function in humans, and causes them a lot of suffering. DMD is caused by mutations in the x-area of the dystrophin gene, which can lead to conditions like cardiomyopathy, respiratory failure, hypoventilation, and even obesity. A unique fact about DMD mutations is that 65% of them are caused by deletions, with duplications only making up 6 to 10% and point mutations 20 to 35%. Most available treatments provide only minimal benefits and carry severe side effects. To help identify better treatments, I am working with dystrophic worms, and planning to replace their mutated dystrophin genes with healthy dystrophin isoforms using molecular cloning techniques. Once I have dystrophic animals rescued with these isoforms I will be able to test how each isoform version of the protein is able to improve the function and the structure of dystrophic muscle cells. This work will be useful in identifying versions of the protein that can be used to improve the muscles of dystrophic patients.

TARGETING INORGANIC POLYPHOSPHATE TO OVERCOME ANTIBIOTIC TOLERANCE IN BACTERIA

Presenter(s): Newton, Parker (Undergraduate, Biological Sciences)

Mentor: Jan Dahl

Co-Mentor: Julius Narh

Authorship: Parker Newton, Julius Narh, Jan Dahl

Antibiotic tolerance and resistance continue to compromise the effective treatment of urinary tract infections (UTIs) worldwide. Uropathogenic *Escherichia coli* (UPEC) and *Pseudomonas aeruginosa* are among the most prevalent etiological agents of these infections and exhibit pronounced tolerance to last-line antibiotics. Inorganic polyphosphate (polyP), an evolutionarily conserved biopolymer composed of linear chains of phosphate residues, has emerged as a critical regulator of bacterial stress adaptation, virulence, and antimicrobial survival. PolyP accumulation has been linked to enhanced biofilm formation, modulation of host immune responses, and increased tolerance to diverse antimicrobial stresses. However, its role in mediating tolerance to membrane-targeting antibiotics (MTAs) in uropathogens remains incompletely defined. Here, we investigated the contribution of polyP to the response of UPEC (CFT073) and *P. aeruginosa* (PA14) to the MTA polymyxin E (PME). Using growth-based susceptibility assays, we compared wild-type strains to isogenic polyP-deficient mutants. PolyP-deficient bacteria exhibited significantly increased sensitivity to PME relative to their wild-type counterparts, indicating that polyP may promote tolerance to membrane damage. Interestingly, we further demonstrated that pharmacological inhibition of polyP synthesis using our newly discovered polyphosphate kinase (Ppk) inhibitor trifluoperazine (TFP) sensitized wild-type strains towards PME to levels comparable to those observed in polyP-deficient mutants. Our findings emphasize and identify polyP as a key mediator of membrane stress tolerance in uropathogenic bacteria and highlight polyP metabolism as a promising therapeutic target for antibiotic potentiation and repurposing strategies against drug-tolerant pathogens.

EARLY LIFE PARASITISM AND DEVELOPMENTAL TRADE-OFFS IN EUROPEAN STARLINGS

Presenter(s): Ort, Peyton (Graduate, Biological Sciences)

Mentor: Joseph Casto

Authorship: Peyton Ort, Joseph Casto

Parasitism can force developing animals to trade off short-term survival against long-term health or reproduction. In birds, chronic immune activation against parasites—such as the production of reactive oxygen species—can impair growth. We investigated how the blood-feeding Northern fowl mite (*Ornithonyssus sylviarum*) influences the growth and immune-system development in nestling European starlings (*Sturnus vulgaris*). During the breeding season, nests were randomly assigned to either a control group or a miticide treatment group to reduce mite loads. We monitored nestling growth, collected blood samples at defined time intervals and quantified mite abundance before hatching, during rearing, and after fledging. Preliminary results show significant differences in mite-load between treatments and indicate that both mite load and nestling age predict hematocrit levels. Ongoing immunological assays will test whether nestlings facing high parasitic stress prioritize immune investment over growth, or if these nestlings compensate for lost resources by maintaining growth rates. These findings will improve our understanding of how early-life parasitism shapes developmental trade-offs in wild birds.

EXAMINING RESPONSES OF UROPATHOGENIC ESCHERCHIA COLI TO HYPOCHLOROUS ACID

Presenter(s): Scalf, Jacob (Undergraduate, Biological Sciences)

Mentor: Jan Dahl

Uropathogenic *Escherichia coli* (UPEC) is the most common cause of patients suffering from urinary tract infections (UTIs). Upon entry into the bladder environment, immune cells immediately attempt to annihilate the pathogen through the production of antimicrobial compounds, among which reactive chlorine species (RCS) are the most potent oxidants. One such neutrophil-generated RCS is hypochlorous acid (HOCl). HOCl damages bacterial cells in a variety of ways, including DNA damage, lipid peroxidation, and protein aggregation. To defend themselves against HOCl, UPEC have evolved specialized defense systems that become activated when they are confronted with a particular stress. One such defense mechanism, the swimming ability of UPEC upon HOCl exposure could be physiologically relevant, as UPEC appears to escape from neutrophil attacks quite efficiently and subsequently forms intracellular biofilms.

I began by assessing the swimming behavior of HOCl-treated UPEC with defects in genes that were highly upregulated in our previously published RNAseq of HOCl-treated UPEC cells: *rcrA* is part of *rcrARB* operon, however, the genes specific function remains unknown; *ycfR* appears to be involved in biofilm formation. I compared the swimming behavior of these strains and their double mutant $\Delta rcrA \Delta ycfR$ to the parental wildtype CFT073. Preliminary data shows a reduction in growth potential for all mutants when compared to the wildtype, with the double mutant showing the greatest reduction when exposed to HOCl. Next, I compared the strains regarding their ability to form biofilms (bacterial communities) in 3 different biofilm promoting media. Biofilm formations were determined in the presence and absence of HOCl to exclude any HOCl-unspecific effects. So far, we have found that when all deletion strains were compared to wild type, the *rcrA* deletion strain appears to form biofilms better than its *ycfR* and double mutant counterparts. Moreover, I assessed the growth behavior of strains with defects in genes involved in the maintenance of redox homeostasis (i.e.; $\Delta dsbC$, $\Delta gorA$, $\Delta cydC$, $\Delta cydD$, and $\Delta trxA$) in the presence and absence of HOCl to determine their impact during HOCl stress. Finally, I studied whether “priming” of UPEC with low doses of HOCl affects their subsequent sensitivity to antibiotics. I treated UPEC with sublethal concentrations of Antibiotics or HOCl before exposing the bacteria to previously lethal stress concentrations to examine whether the pre-exposure activated responses that protected the bacteria from more lethal doses. Throughout testing, however, priming has yet to be observed.

VARIATION IN BEAK MOVEMENTS DURING BIRDSONG

Presenter(s): Scott, Jadyn (Graduate, Biological Sciences)

Mentor: Carlos Rodriguez-Saltos

Authorship: Jadyn Scott, Carlos Rodriguez-Saltos

Birdsong is produced through the coordinated movements of multiple moving structures, including the head, neck, and beak. Although beak movements are known to influence song acoustics in some species, this relationship is variable, and the evolutionary and functional drivers of this variation remain poorly understood. In this study, we quantify species- and individual-level differences in beak use during song and test how the relationship between these movements, peak frequency, and bandwidth change across different note types. Using Macauley Library's publicly available videos taken from the field, we trained machine learning models with DeepLabCut to track beak movements during song across several songbird species, with a focus on New World sparrows. By integrating kinematic and acoustic measurements from wild individuals, this work provides new insight into the biomechanical and evolutionary factors underlying variation in song production.

IDENTIFICATION AND FUNCTIONAL CHARACTERIZATION OF A TACHYKININ RECEPTOR SUPPORTING TEMPERATURE ROBUSTNESS IN CRAB MOTOR CIRCUITS

Presenter(s): Seymour, Mackenzie (Graduate, Biological Sciences)

Mentor: Wolfgang Stein

Authorship: Mackenzie Seymour, Lily Whittington, Kristen Lane, Wolfgang Stein

Hyperthermia can dramatically impair the functioning of the nervous system. Investigating how temperature changes affect the brain and the long-term ramifications of acclimation to hyperthermia is thus crucial to our understanding of neuronal pathologies and associated behavioral consequences. Some poikilothermic neural circuits remain functional across a wide temperature range, making them ideal models to study the effects of acute and long-term hyperthermia. Their temperature robustness is partly mediated through neuromodulators, chemicals that are released in the brain in response to rising temperatures. In crustacean neurons, a family of neuropeptides known as tachykinin-related peptides (TRPs) has been shown to enhance temperature robustness by increasing the excitation/inhibition ratio, yet the receptors that mediate this effect are currently unknown. Here, we identify and functionally characterize a TRP receptor in the green crab (*Carcinus maenas*), a species with well-described temperature-robust motor circuits. Bioinformatic analysis revealed a putative TRP receptor sequence with significant alignment to other known invertebrate tachykinin receptors (E-value $1e-71$ to the common octopus). Using RT-PCR, we confirmed expression of the receptor transcript in the brain and stomatogastric ganglion (a region possessing temperature-robust motor neurons). To functionally characterize this putative receptor, we injected *Xenopus laevis* oocytes with receptor mRNA. Receptor-expressing oocytes are tested for responsiveness to a superfused synthetic crustacean TRP using two-voltage clamp electrophysiology. Our data show that oocytes expressing the candidate receptor exhibit a peptide-induced ionic current in response to crustacean TRP application, and that these currents increase in a concentration-dependent manner, which is consistent with functional ligand-receptor binding. These findings uncover a key molecular mechanism contributing to temperature robustness in invertebrate neural circuits and offer new insight into how nervous systems adapt to environmental temperature changes.

LOCATING THE SK-3 SPORE-KILLING GENE: A MEIOTIC DRIVE FACTOR IN NEUROSPORA CRASSA

Presenter(s): Spriggs, Alexandra (Undergraduate, Biological Sciences)
Williams, Reagan (Undergraduate, Biological Sciences)
Padula, Valerie (Undergraduate, Biological Sciences)
Wells, Erika (Undergraduate, Biological Sciences)

Mentor: Tom Hammond

Authorship: Alexandra Spriggs, Reagan Williams, Valerie Padula, Erika Wells, Tom Hammond

The fungus *Neurospora crassa* is a model organism widely used to study eukaryotic genetics. Some isolates of *N. crassa* carry the Sk-3 meiotic drive element. Sk-3 is a complex meiotic drive element thought to contain a spore killing gene (*rflk*) and a resistance gene (*rsk*). The resistance gene has been located, but the killing gene has yet to be identified. The spore killing gene and resistance gene work together to bias inheritance of the entire Sk-3 meiotic drive element to the next generation by killing all offspring that fail to inherit the element. In this study, we aim to narrow down the location of the killing gene. To refine the location of the killing gene, we are examining four DNA intervals (i401, i404, i406, and i408) in qualitative spore killing assays and/or quantitative gene drive assays. Our findings will be used to refine the location of the killing gene, after which it will become easier to study how Sk-3 evolved and how it kills spores.

THE INFLUENCE OF DIETARY ADAPTATION ON PERSISTENT VIRAL INFECTIONS IN DECORATED CRICKET (*Gryllobates sigillatus*) POPULATIONS

Presenter(s): Stanley, Kate (Undergraduate, Biological Sciences)

Mentor: Ben Sadd

Co-Mentor: Scott Sakaluk

Authorship: Ben Sadd, Scott Sakaluk, Sydney Szwed

This study investigates long-term dietary adaptation through selective breeding of *Gryllobates sigillatus* on different nutritional diets and the effects of immune function and pathogen resistance due to increasing popularity in insect farming. Due to rising demand for sustainable protein sources, this study aims to understand how dietary histories influence disease resistance by optimizing insect health through diet and nutritional quality, specifically in context of dense farming environments where use of antibiotics is undesirable. To observe how these effects evolve over time, lab populations were maintained for 60 generations on one of four diets: high protein, low protein, high carbohydrate, or low carbohydrates. Following this selection process, all populations were switched to ancestral diets for two generations. The “common garden” approach isolates plasticity by minimizing environmental influences. This research offers a critical insight for improving farmed insect populations by examining both baseline immunity and pathogen survival across evolved diet lines

HOW DOES THE NERVOUS SYSTEM ACCLIMATE TO WARMER TEMPERATURE HABITATS?

Presenter(s): Steiger, Charlotte (Graduate, Biological Sciences)

Mentor: Wolfgang Stein

Authorship: Charlotte Steiger, Wolfgang Stein

Rapidly changing environmental temperatures are a major challenge to the functioning of the nervous system in poikilothermic ('cold-blooded') animals because they alter the fundamental properties of neuronal communication, including ion flow across neuronal membranes and neuronal excitability. Nevertheless, some animal species can sustain neuronal activity across a wide range of temperatures, enabling them to function in, and acclimate to, new temperature environments. However, the neuronal mechanisms and the time course by which neuronal activity acclimates to different temperatures remain unknown. To study acclimation time course and neuronal acclimation mechanisms, we use the stomatogastric nervous system in Green crabs (*Carcinus maenas*), a champion species for studying environmental resilience. Green crabs withstand dramatic temperature variations in their native North Sea habitat, and they have invaded diverse temperature territories on all continents except Antarctica. We thus hypothesized that neurons in this species show a broad temperature robustness that can vary with temperature acclimation, and that acclimation involves changes to the excitability of the neurons. We are testing this hypothesis by acclimating adult green crabs to 10°C and 20°C for 2 months and comparing their neuronal responses to a temperature challenge. Our data suggest that after long-term warm acclimation, neuronal activity remained regular at higher temperatures than in cold acclimated animals, suggesting that acclimation to new temperature habitats shifts neuronal responses to better fit the new temperature conditions. In addition, we are characterizing changes to neuronal excitability and synaptic responses before and after temperature acclimation using intracellular recordings from the main pacemaker neuron that drives the neuronal activity in this system. My preliminary data suggest that while membrane excitation is altered with higher temperature, this shift is independent of the acclimation status. I am currently analyzing whether temperature robustness is specific to individual neurons or if it relies on the synaptic inputs from other neurons in the circuit.

STRENGTHENING CIVIC ENGAGEMENT IN STEM STUDENTS THROUGH POSTER PRESENTATIONS

Presenter(s): Steilmann, Paula (Graduate, Biological Sciences)
 Soyebi, Blessing (Graduate, Biological Sciences)

Mentor: Rebekka Darner

Authorship: Paula Steilmann, Blessing Soyebi, Katherine Evans, Rebekka Darner

Promoting civic engagement in STEM (Science, Technology, Engineering, and Mathematics) is essential to preparing professionals capable of connecting scientific knowledge to the needs of society. In a general education course focused on civic engagement, first-year STEM students developed and presented posters on civic action at a local symposium. This study examines how the experience of publicly presenting their civic aspirations influenced students' motivation and commitment to civic action. Using a mixed-methods approach, we analyzed pre- and post-symposium materials, including reflections on ethical reasoning, research posters, civic action plans, and post-event reflections. Lexical analysis revealed a shift from value-based language (e.g., compassion, justice, impact) to action-oriented language (e.g., volunteering, collaboration, leadership). Thematic analysis demonstrated a transition from ethical awareness and identity-informed motivation to intentional civic action and institutional engagement. The Wilcoxon test indicated a significant increase in the number of intentions to carry out concrete civic actions proposed after the symposium ($p = 0.018$). Furthermore, all participants reported greater motivation and clarity on how to begin pursuing their civic goals. The results suggest that poster presentations function not only as learning products but also as high-impact pedagogical interventions that support the transformation of ethical reflection into effective civic action in STEM education.

TO DRIVE OR NOT TO DRIVE: INVESTIGATING THE INFLUENCE OF FOUR DNA INTERVALS ON A FUNGAL GENE DRIVER.

Presenter(s): Tobin, Ellana (Undergraduate, Biological Sciences)
Kovalaske, Anita (Undergraduate, Biological Sciences)
Stearns, Josh (Undergraduate, Biological Sciences)
Seyl, Lana (Undergraduate, Biological Sciences)

Mentor: Tom Hammond

Authorship: Ellana Tobin, Anita Kovalaske, Josh Stearns, Lana Seyl

Neurospora crassa is a useful model organism for genetic research due to its haploid life cycle and its ability to produce large numbers of sexual spores called ascospores. The haploid ascospores form within asci, which typically contain eight ascospores at maturity.

Selfish genetics elements known as meiotic gene drivers have been discovered in *Neurospora* fungi. Meiotic gene drivers possess mechanisms that ensure their transmission to offspring, suggesting that it may be possible to use meiotic gene drivers to control pathogenic fungi in agricultural settings. There are two known gene drivers in *N. crassa*: Spore killers-2 (Sk-2) and Spore killer-3 (Sk-3). Spore killing occurs when a killer strain mates with a sensitive strain, resulting in the abortion of offspring that do not inherit the killer's genetic encoding. In these crosses, the viable ascospore, which bear the killer genes, are black, while the aborted inviable ascospores lack the killer genes and are white. Offspring inheriting the killer's genes also inherit a gene that provides resistance to killer. This resistance gene makes an antidote to the killer, allowing these offspring to survive.

The goals of this study are to 1) refine the location of a gene that controls killing by the Sk-3 spore killer and 2) to investigate how DNA interval deletions near this killer gene impact its function. We are specifically investigating how deletions of four DNA intervals, defined as i395, i399, i400, and i402, influence spore killing in crosses where a genomic defense process called MSUD is active and in crosses where the same genomic defense process is inactive. MSUD is thought to protect *N. crassa* from selfish genetic elements like Sk-3, and thus our results should help identify the gene required for killing and help determine how Sk-3 has evolved despite the existence of a defense mechanism that is supposed to prevent its evolution.

INVESTIGATING THE IMPACT OF CORTICOSTEROIDS ON SMOOTH MUSCLE IN DUCHENNE MUSCULAR DYSTROPHY

Presenter(s): Wilderman, Rene (Undergraduate, Biological Sciences)

Mentor: Andres Vidal-Gadea

Authorship: Rene Wilderman, Mackenzie Jones, Andres Vidal-Gadea

The dystrophin protein is vital to muscle function by providing structural stability and protection from mechanical stress related to muscle contraction. Duchenne Muscular Dystrophy (DMD) is caused by mutations in the dystrophin gene and lead to progressive muscle degeneration, loss of ambulation, and premature death. While dystrophin's role in striated muscle has been extensively studied, the protein is present in many tissues including smooth and cardiac muscle important for respiratory, cardiac, and gastrointestinal processes. Additionally, the typical treatments of DMD include the use of corticosteroids which have been seen to improve striated muscle structure and function but are also associated with adverse effects on the gastrointestinal system, a smooth muscle system. These associated symptoms raise concerns regarding the treatments having an overarching negative impact on patient quality of life despite improvements seen in locomotor function.

Caenorhabditis elegans (*C. elegans*) is a strong system to study dystrophin function as it resembles humans in the structure, function, and expression pattern for dystrophin including the many versions (isoforms) of the protein. As in humans, we have recently established that a shorter dystrophin isoform (dys-1 E) is expressed in smooth muscle including uterine muscles, which display structural and egg laying deficits in dystrophic animals.

Here I investigated the impact of different corticosteroids treatments on smooth muscle function by measuring egg-laying behavior in *C. elegans* and comparing uterine muscle health in treated and untreated dystrophic animals. I treated dystrophic worms with therapeutic doses of a vehicle control (DMSO), or with the three corticosteroids used in standard patient care. Analysis of the structure and function of dystrophic animals treated with corticosteroid vs vehicle controls show that while these drugs improve striated muscle function, they have a negative effect in smooth muscles. My findings emphasize the importance of evaluating DMD therapies across multiple muscle types to better understand their tradeoffs and ultimately optimize patient quality of life by developing strategies that target the whole individual rather than an isolated system.

PROOF OF CONCEPT STUDIES IN THE USE OF ALPHA-METHOXYESTERS AS SYNTHETIC REAGENTS IN THE CURTIUS-WEERMAN REARRANGEMENT TO YIELD ACCESS TO O-METHYLCARBINOLAMIDES

Presenter(s): Abraham, Ellee (Undergraduate, Chemistry)

Mentor: Shawn Raynard Hitchcock

Authorship: Ellee Abraham, Daniel Wright, Shawn Raynard Hitchcock

The Weerman reaction, also known as the Weerman degradation, was initially reported in 1910 as a reaction primarily rooted in carbohydrate chemistry. The overall reaction involves the treatment of α -hydroxyamides with sodium hypochlorite to cause a Hofmann rearrangement to occur with the concomitant decomposition of the isocyanate intermediate to afford a dehomologated carbohydrate. This reaction has seen limited utility in synthetic organic chemistry as it was initially focused on tailored uses in carbohydrate chemistry. In an expansion of the Weerman's original work, Ault, Haworth, and Hirst conducted studies on O-methylmandelamide and discovered that the isocyanate could be captured as the carbamate and that the carbamate readily underwent decomposition in water to yield benzaldehyde which was isolated as the benzaldehyde semicarbazone in 47% yield. Weerman reaction, also known as the Weerman degradation, was initially reported in 1910 as a reaction primarily rooted in carbohydrate chemistry. The overall reaction involves the treatment of α -hydroxyamides with sodium hypochlorite to cause a Hofmann rearrangement to occur with the concomitant decomposition of the isocyanate intermediate to afford a dehomologated carbohydrate. This reaction has seen limited utility in synthetic organic chemistry as it was initially focused on tailored uses in carbohydrate chemistry. In an expansion of the Weerman's original work, Ault, Haworth, and Hirst conducted studies on O-methylmandelamide and discovered that the isocyanate could be captured as the carbamate and that the carbamate readily underwent decomposition in water to yield benzaldehyde which was isolated as the benzaldehyde semicarbazone in 47% yield. Our chemistry is focused on improving all of the previous work and expanding the utility of the Curtius-Weerman reaction into the domain of synthesizing carbinolamides via alpha-methoxyesters. This poster will describe the work that has been done in this area to further develop the process of using the Curtius rearrangement beyond its original design.

POSTER CANCELLED

THE CURTIUS-WEERMAN REACTION: THE FORMATION OF DEHOMOLOGATED KETONES FROM ALPHA-SUBSTITUTED MANDELIC ACID DERIVATIVES AS A PATHWAY TOWARDS SUBSTITUTED CARBINOL UREAS AND CARBAMATES

Presenter(s): Beltramini, Aidan (Undergraduate, Chemistry)

Mentor: Shawn Raynard Hitchcock

Co-Mentor: Daniel Wright

Authorship: Aidan Beltramini, Daniel Wright, Shawn R. Hitchcock

The Curtius rearrangement is a well-known organic rearrangement that involves synthetic preparation and successive thermal decomposition of acyl azides into their corresponding isocyanates. These isocyanates are typically converted to the corresponding amines, carbamates, or substituted urea derivatives by reaction with either water, alcohol, or amines, respectively. The Curtius rearrangement has been applied in the synthesis of important medicinal agents such as Tamiflu, but in terms of its pathways there has not been much recent development.

The related lesser known Weerman degradation of simple sugars was discovered in 1910 using the Hofmann rearrangement to achieve converting alpha-hydroxy amides into dehomologated (loss of carbon from the substrate) aldehydes. The usefulness of the Weerman degradation has been limited due to low isolated yield of product. Our research group became interested in investigating these reactions and pursuing research to improve the reactions and to explore their uses beyond generating dehomologated aldehydes.

We believe that the Curtius rearrangement would be a more effective tool for triggering the rearrangement and cleanly generating the isocyanate intermediate and its associated products due to its milder conditions. We were able to achieve this key intermediate through a stepwise acyl azide formation from a carboxylic acid, without using the commonly seen diphenyl phosphoryl azide (DPPA). The future goals of this research group include expanding upon the utility of the Curtius rearrangement to push the Weerman degradation to the formation of carbinolamides, carbinol carbamates, and ureas.

Keywords: Curtius rearrangement, Weerman degradation, acyl azide, dehomologated ketone

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A NEW DIRECTION FOR AN OLD REACTION: THE CURTIUS REARRANGEMENT AS A TOOL FOR THE SYNTHESIS OF CARBINOL CARBAMATES, INTERMEDIATES IN PHARMACEUTICAL DRUG SYNTHESIS

Presenter(s): Cameron, DeVon (Undergraduate, Chemistry)

Mentor: Cameron DeVon

Authorship: Houston Jaron, Godson Heemson, Aidan Beltramini, Daniel Wright

The Curtius rearrangement is a versatile reaction first reported in 1885 in which a carboxylic acid is transformed into an isocyanate through an acyl azide intermediate under relatively mild conditions. Conventionally, the resulting isocyanate undergoes hydrolysis to yield a primary amine following decarboxylation. In this study, we hypothesized that modification of reaction conditions could redirect intermediate reactivity to favor the formation of carbonyl-containing products, such as aldehydes or ketones, rather than the traditional amine product. Expanding this mechanistic pathway would enhance the synthetic utility of the Curtius rearrangement.

SYNTHESIS OF Iridium(III) MESO-TETRAPHENYLBENZOCARBAPORPHYRINS

Presenter(s): Crain, Kacey (Undergraduate, Chemistry)

Mentor: Timothy Lash

Authorship: Kacey Crain, Timothy Lash

Carbaporphyrins, porphyrinoid systems in which one or more of the pyrrolic nitrogens are replaced by carbon atoms, have the potential to provide new insights on the nature of aromaticity in organic systems, and often undergo unusual reactions. Specifically, carbaporphyrins act as trianionic ligands and generate stable organometallic derivatives with silver(III) and rhodium(III). Most of this work was conducted on meso-unsubstituted carbaporphyrins which are prone to oxidative degradation. Organometallic complexes of late transition metals have potential value in catalysis, and we are currently interested in extending the range of these types of carbaporphyrins derivatives. Although an example of an iridium(III) meso-unsubstituted carbaporphyrin has been reported, it was isolated in low yield. In order to overcome this problem, metalated derivatives of meso-tetraphenyl benzocarbaporphyrin 1a were investigated. Tetraphenylazuliporphyrin 2 was prepared by condensing pyrrole, azulene and benzaldehyde in a ratio of 3:1:4 in the presence of boron trifluoride etherate, followed by oxidation with 2,3-dichloro-5,6-dicyano-1,4-benzoquinone (DDQ). Oxidative ring contraction in the presence of tert-butyl hydroperoxide and potassium hydroxide gave 1a together with two related aldehydes 1b and 1c. Reaction of 1a with chloro(1,5-cyclooctadiene) iridium(I) dimer, sodium acetate and pyridine gave a poorly soluble iridium(III) complex 3a in good yields. Furthermore, a related derivative 3b was obtained with 4-phenylpyridine. Further examples of iridium(III) complexes are under investigation using 4-tert-butylpyridine and 4-methylpyridine. The new derivatives can be characterized by NMR spectroscopy and mass spectrometry. In addition, efforts towards characterization by X-ray crystallography are underway.

SYNTHESIS OF PORPHYRIN METHIODIDES BEARING FUSED QUINOLINE, ISOQUINOLINE AND PHENANTHROLINE SUBUNITS

Presenter(s): Delzell, Aiden (Undergraduate, Chemistry)

Mentor: Timothy Lash

Building on more than three decades of research into porphyrinoids with fused quinoline, isoquinoline, and phenanthroline subunits, the influence of these fused aza-benzenoids on porphyrin aromaticity and conjugation remains under investigation. To that end, methiodide salt derivatives have been prepared to study the effects of electron-withdrawing groups on porphyrin aromaticity and extended conjugation. Pyrroles with these fused units were prepared via a modified Barton-Zard synthesis using 5-nitro-1,10-phenanthroline, 6-nitroquinoline, and 5-nitroisoquinoline; ethyl isocyanoacetate; and the non-nucleophilic base DBU or a phosphazene superbase. Related tripyrranes were subsequently obtained by acetic acid-catalyzed condensation with two equivalents of acetoxymethylpyrrole, followed by a MacDonald '3+1' condensation with pyrrole and indene dicarbaldehydes, respectively, to generate porphyrins and carbaporphyrins. Methiodide salt derivatives were obtained by reaction with iodomethane in DMF at 60-80 °C, with optimal results obtained using a septum-sealed condenser and a nitrogen-filled balloon. The resulting methiodide salts are stable compounds that exhibit enhanced aromaticity and solubility in polar solvents.

COMPLEXITY BUILDING ORGANIC SYNTHESIS TOWARD [5+2] CYCLOADDITIONS

Presenter(s): Eifert, Rex (Undergraduate, Chemistry)

Mentor: Andy Mitchell

This study presents an approach for the synthesis of versatile starting materials utilizing maltol as a key scaffold for [5+2] cycloaddition reactions or other complex molecular rearrangements. The synthetic pathway involves sequential transformations; offering a practical route for the preparation of starting materials derived from maltol, amenable to [5+2] cycloaddition reactions and other complex rearrangements. The pathway involved drives towards complex rearrangements, working on optimization of the reaction as well as experimentation with different molecules compatible with this rearrangement. New pathways to create these rearrangements and cycloadducts are being examined by looking into the specific tethers and amines that are being added.

NATURAL PRODUCTS INSPIRED ORGANIC SYNTHESIS

Presenter(s): Elsharef, Ali (Undergraduate, Chemistry)
Schulze, Landen (Undergraduate, Chemistry)

Mentor: Andy Mitchell

The experiments being performed are on maltol reactions, to create starting material for more complex molecules which will be used in [5+2] cycloadditions. To synthesize these starting materials, a protection, bromination, and amination will be performed. Amination will differ on amine based on reaction being performed. These three reactions on maltol will be used as starting material to help test different R group dienophiles and synthesizing an oxidopyrylium.

PREPARING FOR THE BASE-MEDIATED REARRANGEMENT REACTION

Presenter(s): Ervin, Quentin (Undergraduate, Chemistry)

Mentor: Andy Mitchell

The purpose of these experiments was to synthesize various maltol-based compounds with different R-groups to analyze the Base-Mediated Rearrangement Reaction. Some of the R-groups that were chosen to be synthesized include: tert-butyl, PMB, methyl, primary, and tosyl. The reactions performed during the synthesis of the Base-Mediated Rearranged Product include Protection of Maltol, Bromination, Aminations with various amines, and Acylations with methyl malonyl chloride, all culminating in the Base-Mediated Rearrangement. Techniques used to monitor, purify, and characterize the compounds include Thin Layer Chromatography (TLC), Flash Column Chromatography, ^1H and ^{13}C NMR Spectroscopy, and Mass Spectrometry. These reactions provided practice for optimizing reactions and provided starting material that could be used for the Base-Mediated Rearrangement.

THE CURTIUS-WEERMAN PROJECT

Presenter(s): Hemeson, Godson (Undergraduate, Chemistry)

Mentor: Shawn Raynard Hitchcock

Authorship: Daniel Wright, Jaron Houston, Aidan Beltramini, Devon Cameron

The Curtius- Weerman rearrangement of alkyl alpha- hydroxy carboxylic acids: an investigation into the “Interrupted” Curtius rearrangement.

- The original Curtius-Weerman reaction was developed in 1910 and was initially designed for the degradation of carbohydrates into simpler structures. This project looks at a modified version of the Curtius–Weerman reaction to see how different conditions of the acyl hydrazide/sodium nitrite pathway affect the formation of phenylacetaldehyde. In the experiment, L-(+)-phenyllactic acid is taken through a process of esterification using the Fischer esterification conditions with methanol and catalytic concentrated sulfuric acid. The isolated ester was then converted to the corresponding acyl hydrazide via a hydrazinolysis reaction with hydrazine hydrate. The resultant α -hydroxy acyl hydrazide was mixed with hydrochloric acid and sodium nitrite at a low temperature to form an acyl azide. This intermediate then rearranged and broke down during the workup process. After extraction, the product was analyzed using ^1H NMR, which showed aldehyde formation in the final product ranging from 13% to 94% depending on the amounts of reagents used. The evolution of gas bubbling and color changes occurred during the course of the rearrangement. Overall, the reaction has proven to work, but it is very sensitive to the exact conditions, which affects how much the aldehyde product and how clean the final product (benzaldehyde) is.

A NEW DIRECTION FOR AN OLD REACTION: THE CURTIUS REARRANGEMENT AS A TOOL FOR THE SYNTHESIS OF CARBINOLAMIDES AND CARBINOL CARBAMATES, INTERMEDIATES IN ANTIBIOTIC STRUCTURES

Presenter(s): Houston, Jaron (Undergraduate, Chemistry)

Mentor: Shawn Raynard Hitchcock

Authorship: Jaron Houston, Daniel Wright, Shawn Raynard Hitchcock

The Curtius rearrangement has been known for more than 130 years and is named after Theodor Curtius, who first described the reaction in 1890. This transformation converts a carboxylic acid derivative into an amine through a molecular rearrangement that causes the loss of carbon dioxide. The Curtius rearrangement involves the formation of an acyl azide, which then can rearrange an isocyanate intermediate. This highly reactive isocyanate can then be trapped to form a variety of functional groups.

Isocyanates derived from the Curtius rearrangement serve as intermediates for the synthesis of carbamates, amines, and urea derivatives. Carbamates are widely used as protecting groups, while amines are essential for building blocks in polymer chemistry and pharmaceutical development. Urea derivatives are also prominent scaffolds in many biologically active compounds. Overall, these reactions highlight how adaptable and valuable the Curtius rearrangement remains in organic chemistry.

In our research, we explore a modified pathway of the Curtius rearrangement in which the reaction is altered to produce dehomologated carbonyl compounds, specifically aldehydes and ketones rather than amines. The proposed synthesis begins with the conversion of a carboxylic acid into an ester, which is transformed into a hydrazide through reaction with hydrazine under acidic conditions. Notably, Curtius himself was the first to synthesize hydrazine through diazoacetic acid, laying the foundation for these transformations. The hydrazide can then be converted into the corresponding acyl azide, a key intermediate in the Curtius rearrangement. Upon heating, the acyl azide rearranges to the isocyanate, which can be further transformed into the desired aldehyde product. This alternative reaction pathway expands the synthetic utility of the Curtius rearrangement and demonstrates its potential for accessing carbonyl compounds through controlled rearrangement chemistry.

BUILDING MATERIALS TOWARDS REARRANGEMENT REACTIONS

Presenter(s): Nsabaah, Joseph (Graduate, Chemistry)

Mentor: Andy Mitchell

The [5+2] cycloaddition is a highly efficient and versatile process for forming seven-member rings, which are common structures in natural products and pharmaceuticals. This [5+2] cycloaddition involves the concerted union of a 5-atom π -system, typically a heterocyclic or a vinyl cyclopropane equivalent and a two-atom π system, resulting in the creation of new stereocenters and new bonds. A series of transformations were performed on maltol to synthesize novel derivatives suitable for [5+2] cycloaddition reactions. Initially, maltol was protected with TBDPSCI (tert-butyldiphenylsilyl chloride). The protected maltol subjected to bromination, thus introducing a reactive handle, which was then converted to an amine through substitution. Finally, acylation of the amine yielded a novel maltol derivative bearing a functional group poised for participation in [5+2] cycloaddition reactions. These derivatives are expected to serve as valuable intermediates in the synthesis of complex molecules.

TOWARDS THE DEVELOPMENT OF ENABLED N-O TETHER FOR NET INTERMOLECULAR (5+2) CYCLOADDITION

Presenter(s): Oluborode, Joseph (Graduate, Chemistry)

Mentor: Andy Mitchell

Intermolecular cycloadditions provide an efficient route to complex three-dimensional (3D) structures. However, entropic factors often pose significant challenges in achieving high regio and stereoselectivity. An effective approach to overcoming this limitation involves the use of a temporary tether, which can be cleaved after the successful formation of the cycloadduct, thereby improving reaction efficiency and selectivity. Hydroxylamine-based tethers allow favorable assembly of new cycloadducts, with the potential for controlled modification of the resulting alkoxyamine structure. This transformation can be efficiently achieved via N–O bond cleavage using zinc in acetic acid, as well as through alternative methods such as catalytic hydrogenation (H_2/Pd in methanol) and reduction with Raney nickel. Very recent initial data for this concept using a Boc-protected alkoxyamine afforded a promising initial result with a 68% yield of the cycloadduct. Additionally, alkoxyamines have been suggested as potential drug precursors for cancer therapy, demonstrating promising applications in brain tumor treatment due to their unique chemical reactivity and biological relevance.

BIOCHEMICAL INVESTIGATION OF THE METABOLIC REGULATION AND FUNCTION OF CLEAVED BAX IN MAMMALIAN CELLS

Presenter(s): Omoniyi, Hope (Undergraduate, Chemistry)

Mentor: Mohamed Eldeeb

Authorship: Hope Omoniyi, Mohamed Eldeeb

The Arg-N-degron pathway targets destabilizing N-terminal residue-containing protein substrates for ubiquitin-dependent proteasomal degradation. It has been shown that this pathway plays a crucial cellular role in cardiovascular development, G-protein signaling, apoptosis, and genomic stability. Upon apoptosis in various cancer cells, Bax, an apoptosis regulator, is cleaved by proteases (calpains) to generate a pro apoptotic cleaved fragment of Bax that bears a destabilizing N-terminal amino acid residue. While several studies demonstrated the potent pro-apoptotic activity of cleaved BAX, the regulation of the metabolic stability of this pro-apoptotic fragment and the subsequent impact of its pro-apoptotic role has been elusive. Herein, we describe our biochemical investigations of the metabolic regulation and cellular role of the cleaved pro-apoptotic fragment of Bax. Further studies delineating the role N-terminal dependent degradation of Bax in mammalian cells would expand our understanding regarding the substrates of Arg-N-degron machinery in mammalian cells, specifically in the context of regulating apoptotic cell death in cancer cells.

COMMUNICATION

“THEY WANT TO ERASE US”: SOCIAL IDENTITY, INTERGROUP THREAT, AND FRAMING IN NIGERIA’S 2023 MUSLIM–MUSLIM PRESIDENTIAL TICKET

Presenter(s): Adeyemo, Grace (Graduate, Communication)

Mentor: John Baldwin

Nigeria’s 2023 presidential election generated intense controversy when the All-Progressives Congress (APC) selected a Muslim–Muslim presidential ticket, breaking Nigeria’s long-standing informal norm of Christian–Muslim balancing at the highest level of executive power. Drawing on Social Identity Theory, Intergroup Threat Theory, and Framing Theory, this analysis demonstrates how the ticket functioned as a symbolic cue that activated subgroup boundaries, intensified perceptions of symbolic and material threat, and shaped the emotional meanings citizens attributed to national leadership. The paper demonstrates how political communication and media narratives amplified identity-based interpretations, outlining theory-driven pathways for reducing religious–political intolerance in political campaigns and conflict-sensitive media framing.

EFFECTS OF MENTAL HEALTH ON STUDENT SUCCESS

Presenter(s): James, Maegan (Undergraduate, Communication)

Mentor: Stephen Hunt

College is, historically, one of the hardest parts of the transition from young adult to adulthood in one's life. From living by yourself for the first time to looking for your very first job within your career path, these are some of the more stressful parts during your time in college. By asking students how they feel their achievements are, by their own standards, we can see how institutions, instructors, and administrators can better help them with reducing stress levels. We know from previous research that a student's wish to succeed can cause great mental stress, but how does it work vice versa? We have yet to know how differently students will do in college after the Coronavirus Disease-19 (COVID-19), and there is no better time to start researching this. We have seen what college can do to students, but what can students' minds do to their academics? We predict that mental health diagnoses have a negative effect on student academic success which is measured by their Grade Point Average (GPA), with determining factors of campus involvement, their year in university, declared major, and their previous mental health diagnoses, if any. By proving this negative correlation, we can hope to show administrators and instructors how to better support their students to receive the academic statistics they wish to achieve.

COMMUNICATION SCIENCES AND DISORDERS

TELE-AUDIOLOGY SERVICE AVAILABILITY AND GEOGRAPHIC REACH ACROSS MIDWEST VA FACILITIES

Presenter(s): Holthaus, Jayden (Graduate, Communication Sciences and Disorders)
Smith, Jenna (Undergraduate, Communication Sciences and Disorders)
Remblake, Olivia (Undergraduate, Communication Sciences and Disorders)

Mentor: Antony Joseph

Authorship: Jayden Holthaus, Jenna Smith, Olivia Remblake, Dr. Antony Joseph

Background: Tele-audiology has emerged as a critical strategy for extending audiology services to Veterans who face geographic, mobility, or access-related barriers to in-person care, particularly in rural regions. Objective: To characterize the availability and geographic distribution of tele-audiology services across Veterans Affairs (VA) facilities in the Midwest states. Methods: Facility-level audiology data were analyzed using binary indicators to identify tele-audiology services offered at each site. Tele-audiology procedures were categorized and aggregated by facility and state to describe regional availability and service coverage. Results: Tele-audiology services were identified across multiple VA facilities in the Midwest, with substantial variation in availability by state. Several states demonstrated higher concentrations of tele-audiology offerings, while others showed limited tele-audiology service. A wide range of tele-audiology services was observed, including remote consultations, follow-up care, and diagnostic support. Conclusions: Tele-audiology services are widely implemented across Midwest VA facilities, but are unevenly distributed. These findings highlight tele-audiology's role in expanding access while identifying opportunities for targeted growth.

AUDIOLOGY SERVICE AVAILABILITY FOR VETERANS ACROSS MIDWEST VA FACILITIES

Presenter(s): Holthaus, Jayden (Graduate, Communication Sciences and Disorders)
Remblake, Olivia (Undergraduate, Communication Sciences and Disorders)
Smith, Jenna (Undergraduate, Communication Sciences and Disorders)

Mentor: Antony Joseph

Authorship: Jayden Holthaus, Olivia Remblake, Jenna Smith, Dr. Antony Joseph

Background: Equitable access to audiology services is essential for meeting the hearing health needs of Veterans, particularly across geographically diverse regions. However, the distribution of available audiology services across Veterans Affairs (VA) facilities in the Midwest has not been systematically described. Objective: To characterize the availability of audiology procedures across VA medical centers, outpatient clinics, and community-based outpatient clinics in Midwest states. Methods: A facility-level inventory of audiology procedures was analyzed using a binary indicator of procedure availability by site. Procedures were grouped into predefined analytic categories and summarized across facilities and states. Results: Across more than 100 VA facilities in 12 Midwest states, 399 procedures by facility offerings were identified. Hearing aid-related services were the most widely available, followed by diagnostic audiology services. Considerable variation was observed in the number and types of services offered at the state and facility levels. Conclusions: Audiology service availability across Midwest VA facilities is broad but uneven, highlighting regional strengths and potential procedural access gaps. These findings provide a foundation for future evaluation of service distribution and planning efforts.

SWALLOWING DISORDERS IN AN INFANT WITH SPINAL MUSCULAR ATROPHY

Presenter(s): Kastner, Jacqueline (Undergraduate, Communication Sciences and Disorders)

Mentor: Taeok Park

Introduction Spinal muscular atrophy (SMA) is a type of neuromuscular disorder that causes certain muscles to become weak and waste away. Weakness is more severe in the proximal muscles. Swallowing disorder is a symptom specific to subtype one. Features associated with infants with SMA include disturbed and weak sucking, problems with handling oral secretions, swallowing with dysfunctional airway protection, and gastroesophageal reflux. The purpose of this study was to examine the clinical features of swallowing in an infant with spinal muscular atrophy. **Methods** The subject was a 3-month-old male with spinal muscular atrophy type I. The videofluoroscopic swallowing examination videos were used to analyze the suck-to-swallow ratio and clinical features of the swallowing. The subject swallowed thin liquids via a bottle. **Results** The suck-to-swallow ratios range from 1:1 to 15:1 with an average ratio of 5.25:1. Clinical features observed include difficulty with latching onto the nipple, delayed pharyngeal swallows, and pharyngeal residue. **Conclusion** Infants with SMA have feeding and swallowing difficulties. Muscle weakness associated with SMA causes weak sucking resulting in larger suck to swallow ratios and difficulty latching onto the nipple. Infants with SMA require feeding and swallowing intervention to support nutrition and typical development. They could benefit from intervention from interdisciplinary teams including physical therapists, occupational therapists, speech therapists, otolaryngologists, and neurologists.

EVALUATION OF AI-GENERATED AND TEXTBOOK BASED ANATOMY LEARNING MATERIALS

Presenter(s): Williamson, Marriana (Undergraduate, Communication Sciences and Disorders)
Moeller, Hanna (Undergraduate, Communication Sciences and Disorders)

Mentor: Taeok Park

Artificial intelligence (AI) tools such as ChatGPT are increasingly being incorporated into education to enhance student learning through instant feedback and personalized explanations. Despite this potential, little research has compared the effectiveness of AI-generated learning materials with traditional textbook resources. This study examined how students perceive learning materials created by ChatGPT, by textbooks, and by combining both approaches. Participants included nine student creators and thirty-five student learners enrolled in Anatomy and Physiology of the Speech, Swallowing, and Hearing Mechanism course. The creators were assigned to one of three groups: (1) those who generated materials using ChatGPT, (2) those who used the textbook Speech, Language, and Hearing, and (3) those who combined both sources. The topic of swallowing stages was selected, and learners, who did not know which source each presentation came from, evaluated them using surveys on understanding, accuracy, organization, engagement, and likelihood of future use. Results showed that learners rated all three types of materials similarly in terms of learning effectiveness, engagement, and accuracy. Creators, however, expressed stronger positive attitudes toward using ChatGPT alone or with textbooks, noting quicker content creation and content generation. Learners showed a preference for using one resource at a time, as combining both could be seen as repetitive rather than beneficial. Overall, findings suggest that AI-generated materials can match textbook accuracy for topics while offering advantages in accessibility and speed. Blending AI tools with traditional resources could promote a balanced, efficient approach to anatomy and physiology education.

LEVELING UP THE WORKFORCE: WHERE GAMIFICATION CAN TRANSFORM INDUSTRY TRAINING

Presenter(s): Anderson, Donovan (Undergraduate, Creative Technologies)

Mentor: Kristin Carlson

This study investigates which industry would benefit most from the gamification of its training processes, considering current training limitations and potential economic impact. While gamification is commonly associated with entertainment, many industries operate on systems of mastery and progression that align with game design principles. By identifying areas with little to no gamification integration and analyzing inefficiencies in their existing training models, this research aims to determine where implementing gamification would yield the greatest benefit. Ultimately, this study aims to show where gamification can be strategically applied to improve work engagement, retention, and performance for serious game designers and company executives.

PANDORA'S CAULDRON

Presenter(s): Carol, Ani (Graduate, Creative Technologies)

Mentor: Kristin Carlson

Pandora's Cauldron is a potionmaking roguelike where a young alchemist must journey from their home to go from town to town and sell their wares while traveling through dangerous environments where they gather the ingredients for their potions. The player will have to decide between using their potions for themselves to help on their journey or to save them in order to sell and balancing their limited inventory space. Each potion will have a wide variety of effects, ranging from simple stat increases to completely changing how the player will defend themselves, it all depends on the ingredients used. Every decision will have a great impact on each run the player goes on, hopefully to make each time someone plays, different and unique while still allowing them to have control amid the randomness.

HOW TO MAKE AN ANIMATED SHORT FILM

Presenter(s): Davis, Noah (Graduate, Creative Technologies)

Mentor: Kristin Carlson

This paper documents the first-person design process of a character-driven animated short. By reflecting on the distinct stages of writing, storyboarding, drawing, animating, and production, I illustrate how specific design choices contribute to animation's capacity to captivate audiences. This study also analyzes how other successful animated projects examine the narrative structures and technical strategies used to maintain viewer engagement, as well as how these projects were packaged and pitched. These findings highlight the inherent challenges of solo narrative development, while articulating successful techniques and important parameters around personal style and communication.

WHAT ARE POSITIVE AND NEGATIVE ASPECTS OF CRUNCH TIME IN THE GAME INDUSTRY, AND WHAT ELEMENTS AND ROUTINES OF CRUNCH TIME CAN BE IDENTIFIED TO HELP MAKE FOR A HEALTHIER WORK ENVIRONMENT

Presenter(s): Erwin, AJ (Undergraduate, Creative Technologies)

Mentor: Kristin Carlson

The game industry has a common occurrence that can heavily affect developers, which is crunch time, the process of working on a short timeline to reach a project goal. This paper discusses crunch time in the video game industry, exploring the cause of crunch time, how crunch positively and negatively impacts developers, and what elements or routines of crunch time can be identified and manipulated to help make for a healthier work environment. I contacted developers who have experience with crunch time and how it has affected them. I also articulate my own experience as a game designer who has dealt with crunch. This work discusses many sources that tackle crunch time in detail and identifies how crunch time can have a positive impact in the industry if used properly. This work sheds light on the topic of crunch time and raises awareness on how crunch time can be very difficult on developers in the industry. This paper proposes solutions on how to avoid the bad crunch time in favor of one that can be used effectively, lessening the stress on and prolonging careers in game developers.

GLUE MAN - CROSS SECTIONS OF ACTIVISM AND ART

Presenter(s): Faulkner, Charlie (Undergraduate, Creative Technologies)

Mentor: Allison Alcorn

The focus of my presentation is the study of successful intersections of art/music and activism throughout history, comparing and contrasting both modern and historic methods of protest art across the world--and focusing on what ways artists can become activists through their art now. The outcome of this research was a series of posters/fliers and zines comprising of the information gathered. These were created such that they can be easily copied shared and distributed as a "guidebook" of sorts for artists and activists to use to think about how to protest effectively with art. The goal of creating in these mediums is for the information to spread as far as possible, stretching online spaces, physical spaces, and word of mouth. The materials created are presented as an activist magazine, taking graphical inspiration from DIY "zines" and protest flyers, as well as deriving its name, "Glue Man", from a song from the punk band Fugazi's album 13 Songs—changing the meaning from someone addicted (or glued) to substances, to someone addicted to finding out how to keep people united (trying to be a social glue / connecting force).

MAXIMALIST FASHION IN AMERICA AND JAPAN AS A METHOD OF SOCIAL NONCONFORMITY

Presenter(s): Gagliano-Campbell, Micah (Graduate, Creative Technologies)

Mentor: Kristin Carlson

This work documents the design process and aesthetic choices made in a fashion magazine, supported by research on the maximalist fashion movement, originating in Black streetwear culture. This fashion movement has proven to be key in the exploration of creative individualism in countries that demand social conformity, specifically America and Japan.

In this project, I seek to highlight whimsy and maximalism in American and Japanese fashion as a method of resisting the minimalist, traditionalist values associated with modern-day white supremacy. This work unpacks the larger implications and effects that advertising and fashion have on societal norms, cultural principles, and even personal biases.

Through an in-depth study of fashion trends, analysis of visual language and messaging in advertisements, interviews with experts, and a look into fashion history throughout the 20th and 21st centuries, I developed a Y2K and Harajuku-inspired fashion magazine incorporating and promoting the sensibilities of the maximalist fashion movement in direct opposition to modern-day white supremacist agendas.

CHALLENGES IN INDIE GAME DEVELOPMENT

Presenter(s): Joshi, Anish (Graduate, Creative Technologies)

Mentor: Kristin Carlson

This research investigates the factors that cause the creative vision of a game to shift during production in small development teams. By revisiting completed projects, the study analyzes the differences between original design concepts and the final products. The methodology includes a triangulation of surveys, analysis of community discussions (Reddit), and interviews with team members across different disciplines to identify challenge areas. Specifically, this project compares intended creative goals, experiences and perceptions of the development process against the actual development experiences and the final outcomes. The findings offer a framework for small studios to refine their communication, documentation, and workflow, to better align between their initial vision and the shipped game with minimal friction.

STRESS RESILIENCE AND COPING MECHANISMS IN COMPETITIVE GAMING ENVIRONMENTS

Presenter(s): Krajewski, Arnold (Undergraduate, Creative Technologies)

Mentor: Greg Corness

Electronic sports, or esports, have seen significant growth globally in the past two decades; however, esports have also seen a significant surge in early retirements among esports athletes. A large contributor to these early retirements is the extraneous schedules esports athletes experience throughout the season, which typically consist of 8-12-hour days, 5-7 days a week. Due to the novelty of esports, research has been limited compared to traditional sports, particularly on esports athletes' stress resilience and coping strategies. Esports competitors also encounter unique stresses as part of their competitions. Unlike traditional sports, online games are regularly updated, causing the metagame, or meta, to fluctuate; the entry barrier is extremely low, creating an oversaturated player pool. The combination of an updated meta in an esports athlete's respective game and the hundreds of thousands of players globally contributes to an immensely toxic and stressful environment. This study proposes that to fully understand and implement effective strategies to reduce the rate at which esports athletes are burning out, we can leverage research undertaken in areas such as traditional sports. Performance must dive deep into social, sports, and cognitive psychology to explore the relationship between self-efficacy theory, cognitive appraisal theory, coping strategies, and resilience. I approach this research with the hypothesis that further exploration into how esports athletes manage stress in dynamic environments at a consistently high level can help organizations manage player burnout, which can lead to longer careers and better well-being. The more players understand stress and how to deal with it, the less likely we'll see twenty-three-year-olds retiring due to burnout. The studies and articles analyzed in this literature review comprise multiple stress and coping theories used and researched in various frenetic environments to understand the commonalities of stress and coping. This review will examine and synthesize multiple theoretical frameworks from various areas of psychology to explain how stress and coping operate within esports athletes.

HUMAN HAND VS. ALGORITHM: AUDIENCE PERCEPTION AND COMMUNITY RESPONSE TO AI-GENERATED AND TRADITIONAL 2D ANIMATION

Presenter(s): Lucas, Sam (Graduate, Creative Technologies)

Mentor: Kristin Carlson

This study investigates how audiences perceive and engage with traditionally hand-drawn 2D animation compared to AI-generated animation. Through the production of a hybrid animated battle sequence featuring traditionally animated characters interacting with AI-generated characters I analyze viewer responses across social media platforms and structured feedback surveys. Particular attention is given to emotional resonance, perceived authenticity, and ethical concerns surrounding AI-assisted creation. Preliminary findings suggest that while AI-generated animation is often praised for efficiency and novelty, traditional animation maintains stronger emotional credibility and community trust. The project highlights the cultural tension between craftsmanship and automation, proposing that hybrid approaches may redefine authorship and artistic identity in contemporary animation.

MAPPING BARRIERS TO PLAY: ONBOARDING NEW DUNGEONS AND DRAGONS PLAYERS

Presenter(s): McGraw, Doug (Graduate, Creative Technologies)

Mentor: Kristin Carlson

When standing at the base of a mountain, be it a literal mountain or a metaphorical mountain of information, people often hesitate to start trekking. One such mountain is the game Dungeons and Dragons, which has had a resurgence of popularity in recent years. However, many potential players struggle to get into the game, becoming overwhelmed and confused by the scale of it. This research compiles and articulates challenges that new players face when attempting to begin playing D&D through surveys and interview data. Utilizing this data, I present a guide for new players that lists the most helpful resources and popular tools in a simplified and easy-to-read format. This user-centered approach is evaluated to assess how formidable the mountain continues to be, to provide a better experience for new players with this single, cohesive source of information.

A LISTEN AT GENDER BIASES: PERCEPTION OF TRANSGENDER VOICES IN AUDIO MEDIA

Presenter(s): McMonigal, Bren (Graduate, Creative Technologies)

Mentor: Kristin Carlson

I am exploring the gender biases that listeners of audio media have towards transgender voices and characters. While the gender biases towards cisgender voices are well-documented, there is little research on how a transgender identity may factor into voice and/or character perception. Survey responses from listeners for my own audio drama as well as other audio fiction pieces that feature prominent transgender characters display the listener perception/bias of these voices. Despite a typical preference for masculine or lower-pitched voices, a transgender identity may usurp those preferences due to biases for or against a trans identity.

EXPLORING LIGHTING BEYOND A VISUAL DEVICE IN VIDEO GAMES

Presenter(s): Wierschem, Sarah (Undergraduate, Creative Technologies)

Mentor: Kristin Carlson

Lighting is primarily used as a visual device within game environmental design. However, as an impactful design element, lighting can also be used as a guide to players, a narrative device, or as a character within the world of games. I explore different uses of lighting in games by analyzing select games and their methods of utilizing lighting in ways outside of a typical visual device. To test these approaches, I developed multiple prototype games to explore various parameters of lighting as a narrative tool. Building on explorations of existing games, these prototypes are simple, white-boxed environments to only focus on lighting elements within Unity Engine, and playtested with players. Through these investigations of existing games and tested versions, I examine how players are impacted by unique lighting uses and apply and present this to solutions of how future developers can best utilize these lighting devices.

CRIMINAL JUSTICE SCIENCES

PERCEPTIONS OF SAFETY AND VICTIMIZATION THROUGH ONLINE DATING PLATFORMS

Presenter(s): Cope, Chloe (Graduate, Criminal Justice Sciences)

Mentor: Jeffrey Walsh

This research explores current perceptions of safety on dating apps by users with a focus on college students. The project includes a comprehensive literature collection and review of the history of dating apps, the development of user safety features, and current crimes related to online dating apps. Student survey data focused on usage of dating apps, perceived safety on dating apps, perceptions of crime on these applications, and safety measures taken when using these platforms. Data was then collected, analyzed, and summarized to gauge attitudes towards safety and crime in using online dating platforms.

Key Words: Dating Apps, Dating Platforms, Safety Measures, Security Features, Crime, Perceptions, Attitudes, College Students

ANALYZING CAUSES OF MIGRATION FROM MEXICO TO THE UNITED STATES

Presenter(s): Zacarias, Angeli (Graduate, Criminal Justice Sciences)

Mentor: Marta Ascherio

The study analyzes economic instability, social insecurity, and political challenges within Mexico that cause people to migrate to the United States, with a particular focus on drug-related violence. However, existing research suggests to some extent, drug-related violence influences migration from Mexico to the United States. Therefore, I will be collecting data using primary and secondary resources, including government records, interviews, and scholarly literature, to provide a more profound understanding of the motivations for individuals to migrate from Mexico to the United States. In brief, the importance of the results is to determine whether drug-related violence, combined with economic, social, and political causes migration from Mexico to the United States. Overall, the results will provide insight for potential policies or resources that could be implemented to help reduce migration rates in the future.

ECONOMICS

ECONOMIC EFFECTS OF COLONY COLLAPSE DISORDER IN THE UNITED STATES

Presenter(s): Singh, Vikrant (Graduate, Economics)

Mentor: Srishti Slaria

In the United States, pollination by Honeybees has an economic valuation of \$12 billion, playing an essential role in agriculture and commerce. Crops such as almonds, apples, peaches, pears, pumpkins, squash, and strawberries form substantial chunks of the agricultural income for many states that depend completely on bee pollination. Across the world, farmers rely on natural pollinators, and bee-pollinated crops contribute to approximately one-third of the total human dietary supply. Given this crucial role, a serious dent in bee population would mean large changes to agriculture and food security. Colony Collapse Disorder (CCD), characterized by the sudden, inexplicable disappearance of adult worker bees from a hive, is a poorly understood phenomenon impacting bee health and population. Between 1998-2008, some bee colonies around the US lost 90% of their population to this condition – a scale that was unprecedented in the country. This paper seeks to quantify the economic effects of this loss on the prices of produce dependent upon bee pollination. To do this, I use data from 1998 to 2012 from the US Department of Agriculture's National Agricultural Statistics Service (NASS) to track bee population and honey production across different states. I also utilize state-level data on production and average prices of produce dependent on bee pollination and set the base value in terms of prices in 1998 to adjust for inflation and check real price change. To quantify the effects, I employ simple linear regression models and include additional metrics such as percent stock of the produce, yield per colony, and national average price to better estimate the impact on prices. My findings suggest that the production of honey is not solely dependent on bee population as states with a lower bee population such as the Dakotas produced more honey than California. This indicates that other factors like climate and farmer practices may play a role as well. I also find that the loss of colonies impacted California severely as their production capacity and production value decreased. Furthermore, I find that honey prices remained relatively stable in states maintaining a stock of at least 10-15%, and states who did not produce a lot of honey had higher average prices than the top honey producing states. Finally, my analysis suggests that these events led to Midwestern states like the Dakotas becoming the top honey producing states by 2012, accounting for more than half of the honey production in the country.

NEGATIVE HEALTH RISK FACTORS IN HAITIAN CHARCOAL COOKING: INITIAL FIELD RESEARCH

Presenter(s): Hinline, Kevin Adair (Graduate, Educational Administration and Foundations)

Mentor: Lenford Sutton

According to the World Bank, cooking in Haiti burns over 900,000 tons of charcoal annually, destroying 9,000,000 tons of trees. While there is disagreement on dangers and ecological impacts, few studies explore charcoal-cooking's health impacts. Researchers herein measured traditional charcoal-cooking's health risk exposure in comparison to available improved cookstoves. The researchers gathered field data in Haiti: They measured the background exposure of air impurities of each test site, then utilized the same sensors to gather readings of PM 2.5 and CO air-impurity levels of stoves in use in the field. The tested stoves included an improved biomass cookstove and multiple Haitian charcoal stoves in actual Haitian kitchens. Researchers followed the manufacturers' recommended protocols for the DYLOS 1700 PM 2.5 and the LASCAR EL - USB - CO air-impurity monitors. They then compared the results with WHO and EPA maximum recommended air-impurity exposure levels. Results: During cooking, the improved cookstove recorded low cooking exposure rates for PM 2.5 and CO, well within WHO and EPA recommendations. In contrast, traditional Haitian charcoal stoves' CO results exceeded 300 ppm: six-times the EPA's 50 ppm "EVACUATE" level. For PM 2.5, the charcoal stoves registered up to 125 $\mu\text{g}/\text{m}^3$: 12.5 times WHO Annual Thresholds. This study also includes data from separate lab testing, supporting data gathered in the field. The authors encourage further study and offer recommendations for sustainable biomass development in Haiti, including introduction/ adoption methods for improved cookstoves and a scalable indigenous fuel-forest/ job implementation plan

LOOKING BACK TO LOOK FORWARD: USING WARING'S "EMBODIED THEORY OF TEACHING" AS A FRAMEWORK FOR REFLECTIVE PRACTICE

Presenter(s): Hossain, Md Didar (Graduate, English)

Mentor: Kris Lewis

In this qualitative research study, I used discourse analysis and reflective practice to explore and improve my pedagogy. Reflective practice supports teachers to critically analyze their own teaching practices (Farrell, 2013, 2018; Richards & Lockhart, 1994). Waring's (2016) "embodied theory of teaching"—which includes principles of competence, complexity, and contingency—served as a framework to examine how my pedagogical beliefs and practices impact student engagement.

Data for this study includes 14 hours of videorecorded classroom data collected over four months in a general education course that I taught. Before conducting the study, I obtained approval from the Institutional Review Board (IRB). Informed consent was provided by 26 student participants. I transcribed the recorded data using discourse analysis conventions (Rymes, 2016; Wong & Waring, 2021) and used Waring's (2016) framework to analyze selected interactions between myself and students. The purpose was to examine how I reshape my classroom interactions and how they impact student engagement.

The poster will present an analysis of two transcribed interactions from different class sessions. Drawing on Waring's (2016) framework, I will demonstrate how I reflected on my pedagogical beliefs and practices to develop new instructional strategies that increased student engagement. Specifically, I will focus on two questions that I asked my students, and how they impacted the interactions in class. Reflecting on the first question through the transcripts, my reflective notes, and a post-observation discussion with my mentor helped me realize how the question confused my students and put me in a "confused-teacher" position. Although I hoped the first question would relate to my belief in the principles of competence and contingency, the analysis showed that it did not align with either of the principles. Reshaping the question in a later class positioned the students and me as co-creators of knowledge, resulting in increased engagement, which aligns with Waring's (2016) principles. It showed me that to properly orient the principles for student engagement, I should reshape my practices through reflection. This study has helped me critically examine my pedagogy and promote more equitable interactions in my classroom, resulting in increased student engagement. This poster will offer implications for other teachers to engage in reflective practice through the examination of classroom interaction.

EMOTIONAL VULNERABILITY IN TRANSNATIONAL TESOL PHD STUDENTS' IDENTITY CONSTRUCTION

Presenter(s): Jiang, Ziyu (Graduate, English)

Mentor: John Baldwin

Co-Mentor: Kris Lewis

This study examines how transnational TESOL PhD students navigate emotional vulnerability and professional identity construction in native English-speaking classrooms. Drawing on an ecological framework and using thematic analysis of online questionnaires and semi-structured interview data from five transnational teachers, the findings show that teachers' emotional vulnerability emerges through everyday classroom interactions, institutional expectations, and broader sociopolitical pressures. Rather than reflecting individual incompetence, these experiences highlight ecological conditions shaping teachers' legitimacy, agency, and well-being. By emphasizing the importance of transnational teachers' emotional vulnerability, the study highlights the need to recognize structural constraints and calls on institutions and teacher educators to provide concrete support for more equitable and sustainable TESOL environments.

FROM SURVEILLANCE TO AGENCY: TEACHING ETHICAL AI USE IN FIRST-YEAR COMPOSITION WITH UNDERGRADUATE WRITERS

Presenter(s): Neequaye, Ishmael (Graduate, English)

Mentor: Kris Lewis

As generative AI tools increasingly shape academic writing practices, TESOL and composition instructors face pressing questions about how to teach AI use ethically and critically without reducing instruction to surveillance. Recent scholarship calls for pedagogical approaches that foreground critical digital literacies and writer agency rather than viewing AI as a neutral or purely technical tool (Darvin, 2025; Warschauer et al., 2023). Responding to this call, this classroom-based study examines how a multiliteracies-informed instructional unit supported ethical and critical engagement with generative AI among undergraduate writers.

The study was conducted in two sections of a first-year composition course enrolling both monolingual and multilingual students. Drawing on the Pedagogy of Multiliteracies (New London Group, 1996), the instructional unit positioned students as active meaning-makers. The unit unfolded across four phases: (1) eliciting students' existing beliefs about AI; (2) analyzing AI-generated texts through case studies and guided ethical discussions; (3) designing hypothetical AI writing-support tools that adhere to academic integrity standards; and (4) reflective uptake documenting shifts in their beliefs and practices. Data included IRB-approved student surveys and reflective narratives.

I used thematic analysis (Braun & Clarke, 2006; 2021) to develop three major themes. First, students developed clearer distinctions between ethical and unethical AI use, framing ethical use as supporting idea generation, language refinement, and organization, while identifying unethical use as replacing critical thinking and originality. These insights from participants are consistent with critical digital literacy scholarship urging students to interrogate AI's perceived neutrality and reflect on its sociopolitical implications (Darvin, 2025). Second, the AI design task prompted a shift from passive consumption to ethical authorship as students articulated how AI tools could support learning without enabling academic dishonesty. This task fostered digital agency, creativity, and ethical reasoning, aligning with multiliteracies scholarship and arguments that AI should develop the writer rather than the writing (Ingley & Pack, 2023). Third, participants reported shifts in writer identity, confidence, and agency, with initial anxieties about AI as a form of "cheating" evolving into self-perceptions as ethical, capable users who retained ownership of their writing. This finding aligns with multiliteracies' emphasis on transforming learners into reflective, socially aware meaning-makers.

As a work in progress, this study contributes to ongoing discussions in composition and L2 writing instruction by illustrating how multiliteracies-oriented pedagogy can scaffold ethical AI literacy as a socially situated writing practice with implications for pedagogy, curriculum design, and institutional AI policy.

FAMILY AND CONSUMER SCIENCES

ANALYZING REPRESENTATION OF BODY IDEALS AND GENDER ROLES IN MUSIC VIDEOS TARGETING ADOLESCENTS

Presenter(s): Abel, Antoniette (Graduate, Family and Consumer Sciences)

Mentor: Ui-Jeen Yu

This study examines how contemporary music videos targeting adolescent audiences represent cultural body ideals and gender roles through two forms of social power: agonic power—characterized by achievement, action, independence, aggressiveness, strength, expertise—and hedonic power, which centers on physical attractiveness, dependence, heterosexual attraction, and decorative presence. Using content analysis, this study examined the top100 Billboard music videos, coding 115 lead artists (52 female and 63) for body size and portrayals of agonic and hedonic gender roles. Results indicate that thinness was the dominant body ideal portrayed in popular music videos, reinforcing narrow body standards for both female and male artists. Overall, agonic (50.43%) and hedonic (49.57%) gender roles appeared in nearly equal proportion. However, when analyzed by gender, their distribution remained stereotypically gendered. Female-led videos emphasized hedonic gender roles (61.54%), emphasizing physical attractiveness, heterosexual appeal, and decorative presence, whereas male-led videos more frequently displayed agonic gender roles (60.32%), highlighting action orientation, independence, strength, and expertise. These findings suggest that contemporary music videos continue to reproduce traditional gender stereotypes while simultaneously promoting thin body ideals as normative. These representations may influence adolescents' body image development, sexual socialization, and internalization of gendered power structures. The study highlights the importance of critical media literacy and calls for more diverse and balanced representations of body ideals and gender roles in youth-oriented media.

SUPPORTING SIBLING RELATIONSHIPS WITHIN THE CONTEXT OF CHRONIC CONDITIONS

Presenter(s): Sulak, Meg (Graduate, Family and Consumer Sciences)

Mentor: Luke Russell

The purpose of this study is to support sibling relationships within the context of chronic conditions. I plan to present my findings of how siblings experience family life when one or more children have a chronic condition, particularly gearing my attention to the relational process that promotes connection, adaption, and resilience among sibling units. The central focus of this thesis is understanding the way we can intentionally support sibling and family relationships while navigating chronic health conditions. In existing research on families, siblings, and chronic conditions, it has largely focused on stressors and challenges (Vancampfort et al, 2017). By supporting families and positive relationships between siblings, I hope to advocate for how to navigate family stressors while focusing on the lifelong connection the siblings have with one another.

GEOGRAPHY, GEOLOGY, AND THE ENVIRONMENT

SEDIMENTATION IN LAKE BLOOMINGTON, A VOLUMETRIC AND HISTORICAL ANALYSIS OF A PRIMARY WATER SOURCE FOR BLOOMINGTON, IL

Presenter(s): Adelman, David (Graduate, Geography, Geology, and the Environment)

Mentor: Wondwosen Seyoum

Storage capacity in Lake Bloomington is decreasing as sediment accumulates on the lakebed. This project aims to measure sediment accumulation in lake Bloomington volumetrically and spatially to determine if manual intervention will be required to ensure this primary reservoir of water remains functional and accessible to the community it serves. Measuring sedimentation is performed by bathymetric survey, measuring the elevation of the lakebed, and comparing the results to historic surveys. Using a custom designed autonomous survey vessel, measuring along the same survey lines that have previously been measured will give a clear picture of changes in elevation over time.

CHARACTERIZING A LOW-GRADIENT STREAM IN CENTRAL ILLINOIS AS GAINING OR LOSING AND OBSERVING SEASONAL CHANGES IN THIS BEHAVIOR

Presenter(s): Brunner, Eric (Graduate, Geography, Geology, and the Environment)

Mentor: Eric Peterson

Authorship: Eric Brunner, Eric Peterson

While the seasonal behaviors of low-gradient streams have been studied, the behavior of surface water and groundwater within low-gradient streams in glaciated terrain is not fully understood. To address this gap, a third order, low-gradient glacial stream is being studied in central Illinois to assess the viability of a saturated riparian buffer at reducing nitrogen in soil and to ascertain the importance of groundwater flowing into the stream. The goal of this study was to determine 1) whether the stream was gaining (or losing) water from (to) the groundwater, and 2) does the gaining or losing nature of the stream-aquifer system change seasonally? At both an upgradient and downgradient location, two wells were installed, one in the mobile streambed and one in the underlying diamicton surficial aquifer, to characterize the behavior of the stream. Conductivity, temperature, and depth (CTD) sensors recorded the elevation of the stream and the water levels within the wells. Stream discharge was measured using the velocity-area method employing a Marsh-McBirney flow meter to measure stream water velocity. After establishing a relationship between stream elevation and discharge, the gaining or losing nature of the stream was assessed between the two well locations. CTD data showed that the highest hydraulic head was consistently the surficial aquifer, and the lowest hydraulic head was the stream stage resulting in an upwards hydraulic gradient and a consistent upwelling of groundwater into the stream, indicating the stream gains water from the groundwater. The conditions producing the groundwater upwelling only changed during storm events when the stream stage briefly rose above the streambed and surficial aquifer heads, reversing the gradient and directing water into the groundwater. The periods of reversed conditions only lasted one to two days. Despite the direction of groundwater flow making it technically a gaining stream, the measured discharge decreased between the upstream and downstream locations. This is most likely due to the low hydraulic conductivity of the glacial surficial aquifer inhibiting flow and allowing minimal groundwater flux into the stream. The low influx of upwelling groundwater was not enough to offset the water lost to evaporation and plant uptake, resulting in the stream losing water and drying up despite having an influx of groundwater for nearly the entirety of the study period. Over the duration of the study, stream stage and discharge decreased as precipitation was limited.

ASSESSING RAINFALL DRIVEN CHANGES IN LANDSLIDE SUSCEPTIBILITY IN ILLINOIS USING LIDAR

Presenter(s): Khatri, Saraswati Maya (Graduate, Geography, Geology, and the Environment)

Mentor: Lisa Tranel

Rainfall triggered landslides are a growing hazard in many regions of the United States, including parts of Illinois where steep river valley slopes and soil covered hillsides are sensitive to intense precipitation events. This study aims to assess how projected increases in rainfall intensity under future climate conditions may alter landslide susceptibility across selected regions of Illinois using high resolution LiDAR derived terrain data. Landslide susceptibility will be modeled by integrating topographic variables derived from LiDAR, including slope, curvature, and terrain indices, together with hydrologic factors such as distance to rivers and rainfall intensity. Historical rainfall datasets will be used to develop the baseline susceptibility model, while future rainfall projections derived from climate model datasets will be incorporated to generate future susceptibility scenarios. Spatial comparison of current and projected susceptibility maps will be performed to identify areas where landslide risk is expected to increase. It is hypothesized that increasing rainfall intensity will significantly increase landslide susceptibility, particularly on steep, soil covered slopes where terrain conditions favor slope instability. The results of this study will provide insight into the spatial patterns of climate driven landslide risk and will support hazard planning, infrastructure management, and regional land-use decision making in Illinois.

ASSESSING LANDCOVER CHANGE IN THE LAGO ATITLAN WATERSHED IN GUATEMALA

Presenter(s): Lebron, Wesley (Undergraduate, Geography, Geology, and the Environment)

Mentor: Jonathan Thayn

Lago Atitlan is a particularly interesting lake in Western Guatemala; formed in a volcanic caldera 84,000 years ago. This Lake has been a pinnacle for Guatemalan residents for over 3,000 years, serving as a source for water, food, and income for over 100,000 people. Due to commercialized agriculture, mass industrialization and negligence to waste input, the lake saw three major algal blooms in 2005, 2009, and 2015. Lago Atitlán is an endorheic lake which means it has no surface drainage and any minerals or pollutants that enter the lake remain in the lake for extended periods of time. In these phenomena, cyanobacteria covered over 50% of the lake, causing an introduction of toxic waste to enter the watershed. This cyanobacteria introduction caused a lower oxygen rate in the lake, killed fish that locals rely on, sickened the people who drink from the lake, and overall, negatively altered the biodiverse ecosystem. Through my independent study under Dr. Jonathan Thayn, I downloaded and processed a multi-year series of satellite data to map the land cover and land use change in the Lago Atitlán watershed. I utilized Landsat data, specifically Landsat 5-9, to cover a considerable time interval to gain a comprehensive understanding of the watershed change. With Lago Atitlán being an endorheic lake, there is a high potential for adverse concentrations of agricultural chemicals in the lake and for dangerous invasive algae blooms that affect native species. We seek a better understanding of how land use change in the watershed has altered the lake and soil nutrient levels.

NEGATIVE EFFECTS OF URBANIZATION ON CHLORIDE AND NITRATE CONTAMINATION IN TRIBUTARY OF SUGAR CREEK

Presenter(s): Miller, Ava (Undergraduate, Geography, Geology, and the Environment)

Mentor: Eric Peterson

Authorship: Ava Miller, Eric Peterson

As the world becomes increasingly urbanized, impacts on natural landscapes can be seen. With the increase in urbanization, it is necessary to investigate how these changes affect natural landscapes and resources. This study focused on a tributary of Sugar Creek, an important watershed in McLean County, to determine the effects of urbanization on the urban stream. The goals of this study were to determine whether the site is being affected by urbanization, determine the severity of those impacts, and identify potential sources of urban contamination. Weekly water samples were collected from upstream and downstream locations within the study site for the duration of the study period. Anion concentrations of water samples were measured, with a focus on chloride and nitrate (as nitrogen). Chloride levels were compared to EPA thresholds for chronic (230 mg/L) and acute (860 mg/L) concentrations, alongside weather conditions recorded during the study period. These data allowed us to assess severity of contamination and examine how weather conditions influence stream contamination, helping in the identification of potential sources. Comparison between chloride and nitrate concentrations identified road salt, septic effluent, and animal waste as sources of contamination, indicating that the observed pollution is anthropogenically caused.

ASSESSING SURFACE WATER–GROUNDWATER EXCHANGE BETWEEN THE SANGAMON RIVER AND MAHOMET AQUIFER USING GIS AND MODFLOW

Presenter(s): Nyambayo, Munyaradzi (Graduate, Geography, Geology, and the Environment)

Mentor: Wondwosen Seyoum

The Mahomet Aquifer is the main groundwater source for fourteen counties in east-central Illinois and supplies water for municipal, agricultural, and industrial use. As groundwater withdrawals increase and climate variability continues, it is important to understand how the aquifer interacts with the Sangamon River. River–aquifer exchange affects groundwater levels and river baseflow, especially in areas where the river crosses the Mahomet Aquifer system.

This study aims to assess the surface water–groundwater exchange between the Sangamon River and the Mahomet Aquifer using GIS spatial analysis and a MODFLOW groundwater model. GIS will be used to compile digital elevation models, geological data, well logs, recharge information, and river data to map hydraulic head distributions and identify gaining and losing river reaches. These datasets will support the development of a MODFLOW model.

The model will simulate river–aquifer interaction and groundwater pumping effects, particularly in Champaign, Piatt, and Macon Counties. Model calibration will use historical monitoring well data to ensure accuracy.

Expected results include identifying areas where the river gains or loses water, evaluating how pumping influences groundwater levels and baseflow, and assessing how future pumping may affect river–aquifer interactions. This research will provide information useful for sustainable groundwater management in east-central Illinois.

REGIONAL AND LOCAL GEOLOGY FOR A POTENTIAL CCS SITE; AN EXAMPLE FROM THE ILLINOIS BASIN, SANGAMON COUNTY, ILLINOIS

Presenter(s): Pozzo, Maggie (Undergraduate, Geography, Geology, and the Environment)

Mentor: David Malone

Authorship: Maggie Pozzo, David Malone, Kendall Taft

Carbon capture and storage (CCS) is a necessary solution to the growing issue of increasing carbon dioxide emissions. The capture and storage of carbon dioxide emissions from point sources prevents millions of tons of CO₂ from entering the Earth's atmosphere. To consider a potential CCS site, local and regional geologic studies are necessary to understand a site's suitability for geologic carbon sequestration. This study evaluates a potential CCS site located near Springfield, Illinois on the west flank of the Illinois Basin, and is part of a US Department of Energy CarbonSAFE project called Illinois Basin West. We completed a literature review of the regional geologic history of the Illinois Basin as well as the local geology of the project site in Sangamon County, Illinois. We analyzed geological subsurface data including Quaternary glacial aquifers, oil wells and test wells, plus faults, folds and other structures. Results support previous conclusions that the geological history of the Illinois Basin is defined by several tectonic events that occurred dominantly Precambrian through Pennsylvanian, with recurring deformation in the far southern Illinois Basin from Pennsylvanian to post-Cretaceous. The project site contains strata ranging from the Precambrian basement to Pennsylvanian age bedrock and is capped with Quaternary glacial sediments. Subsurface data from exploration wells and other Illinois Basin Department of Energy supported test wells have studied and confirmed the suitability of the Cambrian-aged Mt. Simon Sandstone and Eau Claire Formation as the storage and confining zones for the project site. The summary formulated from this study will be utilized as a reference throughout the lifetime of the project to ensure the protection of important subsurface resources and the success of the potential carbon sequestration project.

ICE IN CHICAGO: ASSESSING THE RELATIONSHIP BETWEEN A CITY AND IT'S COMMUNITY

Presenter(s): Zarco, Jacqueline (Undergraduate, Geography, Geology, and the Environment)

Mentor: John Kostelnick

A current sociopolitical issue affecting racial-ethnic minority groups in cities across the United States is the presence and operations of ICE (Immigration and Customs Enforcement). This research study aims to view this issue through an understanding of spatial relationships and a geographical perspective with the aid of Geographic Information System (GIS) mapping tool. The focus will predominately be on Chicago and how the ICE force impacts the city and its communities.

HEALTH SCIENCES

RISK ANALYSIS AND QUALITY MEASURES IN ILLINOIS HOSPITALS

Presenter(s): Jones, Cody (Undergraduate, Health Sciences)
Masri, Sulaf (Undergraduate, Health Sciences)

Mentor: Jennifer Peterson

Patients and healthcare professionals alike desire the highest level of quality and safety in healthcare. There are a variety of quality and safety measures that are important when evaluating a hospital's risk profile. These measures include a number of patient safety and quality statistics as well as patient satisfaction and other legal metrics. Healthcare professionals must evaluate these to ensure they provide the highest quality and safest care. While it is important for patients to be knowledgeable about the facility in which they are receiving care, this data may be difficult for patients to find if they are not in the healthcare field and are not familiar with locating such information. This qualitative research study was conducted to analyze quality and safety data for ten organizations across the state of Illinois. Data for this study was collected from publicly available data sources including LeapFrog Hospital Safety Grade, Illinois Hospital Report Card, and CMS Care Compare databases, which all include comparisons to standardized performance measures. The quality and safety measures used in this research include infections, surgical complications, safety issues, prevention practices, and communication. Additional data was included on patient satisfaction with the facilities in which they received care. The purpose of this study is to evaluate how these organizations perform and how they compare to average hospitals' performance. This research is useful for both healthcare organizations and for patients. Understanding these measures is crucial to healthcare professionals as this information can be used to identify areas for improvement within the organization, creating opportunities for growth, improving patient care, and enhancing patient decision making while also reducing overall risk. The use of publicly available data for this study demonstrates the availability of quality and safety information that patients can use when making healthcare decisions.

NOVEL THERAPEUTIC AGENT TARGETING HIPPO-YAP SIGNALING IN BREAST CANCER TUMOR GROWTH: TOTAL SYNTHESIS OF THE EASTERN FRAGMENT OF A SUPPRESSIVE 1,2,4-OXADIAZOLE DERIVATIVE. A TRANSFER STUDENT'S FIRST YEAR JOURNEY INTO CHEMICAL RESEARCH.

Presenter(s): Okeke, Chelda (Undergraduate, Health Sciences)

Mentor: Shawn Raynard Hitchcock

Authorship: Chelda Okeke, Gia Alongi, Shawn Raynard Hitchcock

Breast cancer is the most frequently diagnosed malignancy in women, though most cancer-related deaths arise from metastatic spread rather than failure to control the primary lesion. The Hippo signaling network is increasingly associated with aggressive breast cancer because it integrates growth control with mechanobiology, stem-like behaviors, and drug resistance. In its "ON" state, MST1/2 activates LATS1/2 (with SAV1 and MOB1), leading to phosphorylation of YAP and TAZ, cytoplasmic sequestration, and finally proteasomal degradation. When Hippo signaling is "OFF," unphosphorylated YAP/TAZ accumulate in the nucleus and, through TEAD family transcription factors, initiate pro-survival, pro-growth, and pro-migratory gene expression interrelated with epithelial-mesenchymal transition, cancer stem cell phenotypes, and therapeutic escape. Upstream inputs that affect this switch include cell density, GPCR signaling, cytoskeletal tension, extracellular-matrix stiffness, and crosstalk from pathways such as PI3K/AKT, MAPK/ERK, and Wnt/ β -catenin.

Importantly, YAP function is context dependent: TEAD-partnered YAP can be anti-apoptotic, whereas under DNA damage YAP-p73 complexes can promote apoptosis, complicating indiscriminate inhibition approaches. Because YAP/TAZ lack the well-defined pockets typical of enzymes, drug discovery has focused on disrupting YAP/TAZ-TEAD interactions or promoting YAP/TAZ inactivation and degradation. Recent work proposes 1,2,4-oxadiazoles as suppressors that restore Hippo output by inducing YAP degradation, which provides a way to inhibit metastatic competence. However, traditional oxadiazole synthesis can rely on phosgene, a highly toxic gas, necessitating safer reagent alternatives alongside pathway-targeted design. Together, integrating Hippo-YAP/TAZ biology with phosgene-free oxadiazole synthesis can provide safer means of reprogramming resistant breast cancer states and allow for approaches that suppress invasion while preserving apoptosis.

A CONTINUED EXPLORATION OF HSC 206 GLOBAL CITIZEN RESEARCH

Presenter(s): Tenuto, Katelyn (Graduate, Health Sciences)

Mentor: Alicia Wodika

Authorship: Alicia Wodika, Katelyn Tenuto

Have you ever wondered how you can play an active role in your community, or even globally? My research aims to find the best way for Illinois State University students to achieve exactly this. This project is a continuation of a study that began in Fall 2024, examining how enrollment and participation in an undergraduate level global health course impacts students' civic engagement on an individual and collective level. After IRB approval was received, a pre-post survey design was utilized to collect data from students enrolled in HSC 206 during Week 1 and Week 15 of the semester. The original survey contained a total of 26 questions including 8 demographic questions that assessed changes in students' civic attitudes, civic engagement behaviors, and views of global activism. The survey was later revised to include 10 attitude questions, 6 behavior questions, 17 questions focused on social cognitive theory, 1 open-ended question, and 1 question focused on defining community. Civic attitudes were defined as personal beliefs and feelings that students have about their own involvement in their community and perceived ability to make a difference. Civic engagement behaviors were defined as actions that a student can take to engage in and make a difference in their community. Global activism was measured through incorporating the social cognitive theory into closed and open-ended statements such as asking students how they would describe a global citizen, and what skills young adults need to address global and local issues. This study also explored student apathy towards global citizenship and links to social cognitive theory such as a student's sense of self-efficacy. Findings aim to emphasize the role of global health education in promoting civic engagement and global responsibility among undergraduate students.

REDBIRD TOBACCO- AND VAPE-FREE PROGRAM

Presenter(s): Vitalez, Casey (Graduate, Health Sciences)
Wadsworth, Marissa (Undergraduate, Health Sciences)
Lay, Avery (Undergraduate, Health Sciences)

Mentor: Jacqueline Lanier

Co-Mentor: Alicia Wodika

The Redbird Tobacco and Vape-Free Program was implemented to promote a healthy campus environment by increasing awareness of the University's 100% tobacco- and vape-free policy and by providing free, evidence-based cessation resources for students, faculty, and staff. This project used a mixed methods research approach to inform program development, combining qualitative input from key campus partners with quantitative survey data to better understand campus attitudes, behaviors, and experiences related to tobacco and vape use. Initial collaboration with campus stakeholders provided contextual insights into current trends, concerns, and observed policy challenges, ensuring that program planning was grounded in lived campus experiences.

Quantitative surveys were then administered to students, faculty, and staff to assess awareness and understanding of the tobacco- and vape-free policy, attitudes toward smoking and vaping, and the frequency of tobacco- or vape-related issues encountered in campus settings. Integrating findings from both qualitative and quantitative data sources guided the development of targeted outreach and education strategies, with an emphasis on increasing use and awareness of cessation supports such as the Truth Initiative's smoking cessation program. By aligning assessment, education, and resource promotion through a mixed methods framework, the Redbird Tobacco and Vape-Free Program sought to reduce tobacco and vape use, support behavior change, and strengthen a campus culture of health and well-being consistent with university policy and wellness goals.

HISTORY

COMPLICATING NARRATIVES OF RELIGIOUS SECTERIANISM IN THE OTTOMAN MIDDLE EAST: THE SVOBODA DIARIES

Presenter(s): Behm, Aspen (Undergraduate, History)

Mentor: Camille Cole

Sectarian violence dominates news about the Middle East, leading many Americans to assume sectarianism in the region is ancient and intractable. But it is not obvious how, exactly, contemporary[CC1.1] examples of violence build upon a history of religious sectarianism, or what caused this sectarianism. How significant were sectarian ideals in the everyday lives of the Ottoman Empire's religious minorities around the turn of the twentieth century? Scholars like Bruce Masters and Ussama Makdisi have argued that European influence in the Ottoman Empire promoted sectarianism by treating Jewish and Christian Ottomans differently than their Muslim counterparts, heightening class and power conflict along religious lines. This work has largely focused on a few specific locations, and it has often relied heavily on European sources. Due to sources being predominantly European, elite, and focused on conflict, examples of relatively peaceful religious relationships are represented far less in the scholarship. Supplementing that work, this project argues that in the 19th century Ottoman Baghdad, sectarian violence was often isolated and localized and that daily life was often characterized by indifferent religious coexistence.

In order to break away from European, elite, and conflict-focuses sources, this project focuses on the late 19th century and early 20th century diaries of Joseph Svoboda, a Christian steamboat worker in Ottoman Iraq. In contrast to the sources many scholars rely on, the Svoboda diaries present a personal and non-colonial view into the lives of Baghdad's historical Christian communities. Svoboda's diaries suggests that Christians in Baghdad did little to[CC2.1] separate Muslims, Jews, and Christians from each other or to separate different sects of Christianity. For example, when Joseph described people of different religious backgrounds, he emphasized their occupation and his connection to them much more than religion. He used religion as an identifier only when it was directly relevant to occupation or actions, such as with priests and religious pilgrims[CC3.1]. Though religious violence in Bagdad did occur, it was neither constant or inherent and was often in response to specific triggers. Through the diaries, this project is uniquely able to paint a picture of the relatively peaceful religious coexistence of Baghdad in the 19th century that is left out of the most prominent English and Ottoman sources that highlight conflict over coexistence. Focusing on Svoboda's 52nd and 55th diaries from 1901 and 1904, the project identifies 3 individuals from different backgrounds and investigates how Svoboda's descriptions demonstrate his cultural perceptions surrounding religion.

MARBLE OF VALLE GIANNI

Presenter(s): Black, Kylie (Graduate, History)
 Cordray, Brooke (Undergraduate, History)

Mentor: Kathryn Jasper

Authorship: Kylie Black, Brooke Cordray,

This project investigates the participation of a Roman villa in the international marble trade. We seek to situate the site in relation to global networks and connections across the Mediterranean. As a result, we provide insights into the economic status of the people who lived there as well as their access to a global market.

VISENTIUM: LOST CITY OF LAKE BOLSENA

Presenter(s): Chase, Lucas (Undergraduate, History)
Mani, Alivia (Undergraduate, History)

Mentor: Kathryn Jasper

Authorship: Lucas Chase, Alivia Mani

This poster will explore the city of Visentium, and its relationship to the villa at Valle Gianni in Lazio, Italy. This involves using digital historical methods to spatially and statistically understand the city and its periphery. The poster is part of a larger expansion of research surrounding the site at Valle Gianni.

NYMPHAEUMS AND BATHS THROUGHOUT THE ITALIAN PENINSULA

Presenter(s): Diaz, Josiah (Undergraduate, History)
 Albrecht, Mike (Undergraduate, History)

Kathryn Jasper

Mentor:

This project examines the distribution, function, and ownership of nymphaea in the region surrounding Orvieto and across the broader Italy. By compiling archaeological, spatial, and chronological data, the study seeks to identify patterns in where these water-related architectural features appear and how their roles may have evolved over time. Particular attention is given to questions of patronage, including who likely commissioned or owned such installations, the social contexts in which they were displayed, and whether they served primarily practical hydraulic purposes or decorative and symbolic ones. Through regional comparison and temporal analysis, this research aims to clarify how nymphaea functioned within Roman and post-Roman landscapes and what their distribution reveals about status, aesthetics, and water management practices.

INVESTIGATION OF LEOPOLI CENCELLE

Presenter(s): Parkin, Jack (Undergraduate, History)
 Thompson, Jake (Undergraduate, History)

Mentor: Kathryn Jasper

Authorship: Jack Parkin, Jake Thompson

This project will use data software and archeological records to create a visualization related to the history of Leopoli Cencelle in central Italy. With a focus on castellization in the medieval period, this project seeks to visualize migration and settlement patterns at and around Leopoli Cencelle.

ROMAN VILLA FOUNTAINS AND WATERSHED ROUTES

Presenter(s): Parrott, Trey (Undergraduate, History)
 Faulkner, Luke (Undergraduate, History)

Mentor: Kathryn Jasper

This research project involves the site of Valle Gianni, the archeological site that Dr. Kathryn Jasper has been digging. Valle Gianni is located in central Italy alongside Lake Bolsena. A large Roman nymphaeum (fountain) is located on site, and the reason for its position is still unknown. This project involves the combination of quantitative data in the form of hydrology statistics and maps, and qualitative data from Roman authors. Broadly exploring the hydrology of the area may help historians understand the placement of the fountain, because notably, there were no nearby aqueducts. The monographs from Roman authors also provide context to the ideal placements of fountains and water features.

SPATIAL ANALYSIS OF HISTORICAL LANDSCAPES IN VALLE GIANNI

Presenter(s): Rassano, Joey (Undergraduate, History)
 Elrod, Hannah (Undergraduate, History)

Mentor: Kathryn Jasper

Authorship: Joey Rassano, Hannah Elrod

This project explores the potential of a digital approach to the study of historical landscapes in Valle Gianni. We seek to answer how spatial analysis and digital mapping tools can help better understand how the area developed over time and how geography shaped historical change. Our approach to answering these questions involves a disciplinary approach using historical research with geographic analysis. We will examine historical sources using digital mapping tools to visualize spatial relationships across landscapes. The goal of my project is to better understand how geography influences historical interpretation and to evaluate how useful spatial methods are for studying history.

POSTROMAN CONFLICT IN THE LAZIO REGION OF CENTRAL ITALY

Presenter(s): Watter, Zachary (Undergraduate, History)
 Koutsky, Shayne (Undergraduate, History)

Mentor: Kathryn Jasper

This project explores the potential of a digital approach to the study of Roman and Late Antique Italy. We seek to answer these questions: What patterns can we find in the areas that saw conflict between different empires, and what changes can we find as a result of such conflicts? Our approach to answering these questions involves an interdisciplinary study. Using ArcGIS, we will map empires in the Lazio region of Italy and use our sources to pinpoint areas where conflict occurred between them. The goal of our project is to use the maps we create to determine what different conflicts mean in different areas and whether there are any correlations or patterns that result from the interactions.

ETHICAL FAILURES AS CYBERSECURITY VULNERABILITIES IN AI-ENABLED DEFENSE: A DESIGN SCIENCE FRAMEWORK FOR TRUSTWORTHY OPERATIONS

Presenter(s): Bello, Ahmed (Graduate, Information Technology)

Mentor: Philip Sumesh

Artificial intelligence now plays a central role in cybersecurity, helping organizations detect threats, sort through large amounts of data, and even automate parts of their response. Yet when these AI systems make ethically questionable choices such as acting without clear explanation, relying on biased data, or taking actions without proper human oversight, these issues are often treated as compliance problems rather than as genuine security risks. This article argues that ethical failures should be understood as a form of vulnerability: they can be exploited by attackers, they can mislead decision-makers during crises, and they can magnify the harm caused by security incidents.

The goal of this research is to show how ethical decision-making can be built directly into the way cybersecurity systems are designed and operated, shaping how data is analyzed, how processes are created, and how security controls function. To support this, the article introduces the Ethical AI Framework for Cybersecurity (EAIF-C), a practical, lifecycle-based approach that turns ethical principles into concrete system behaviors. The framework explains how ethical risks emerge and spread through data, models, and automated workflows, and how they can be managed through responsible design, human oversight, and clear accountability.

Overall, the article offers a cybersecurity-specific approach to trustworthy AI that is understandable, implementable, and aligned with human values.

DETECTING ANOMALIES IN NONLINEAR DATA USING DEEP LEARNING AND HYBRID TREE-BASED MODELS

Presenter(s): Berekashvili, Gia (Graduate, Information Technology)

Mentor: Sally Xie

Co-Mentor: Mangolika Bhattacharya

Authorship: Sally Xie, Mangolika Bhattacharya, Gia Berekashvili

Anomaly detection in nonlinear, high-dimensional datasets remains a critical challenge in intelligent transportation systems, infrastructure monitoring, and other structured data environments. Traditional linear and margin-based methods often struggle to capture complex feature interactions and nonlinear dependencies, limiting their effectiveness in dynamic, multivariable systems.

This study proposes a hybrid anomaly detection framework integrating deep learning architectures - including Autoencoders and Transformer-based models - with tree-based ensemble techniques such as Neural Network-enhanced Isolation Forests. The framework leverages representation learning to extract latent nonlinear structures from multivariable datasets prior to anomaly scoring. Autoencoders are employed to learn compressed feature embeddings and reconstruction-based irregularities, while Transformer models capture long-range dependencies and temporal relationships within structured data streams. These learned representations are subsequently evaluated using isolation-based and margin-based classifiers, with comparisons conducted against Support Vector Machine (SVM) baselines.

The proposed approach aims to investigate whether combining deep representation learning with ensemble-based isolation methods improves sensitivity to complex nonlinear deviations while maintaining scalability for large datasets. This work contributes to the development of adaptable and data-driven anomaly detection strategies for heterogeneous infrastructure and transportation systems.

BAYESIAN INFERENCE VIA MCMC FOR TRANSFER LEARNING IN STRUCTURAL HEALTH MONITORING OF BRIDGES

Presenter(s): Berekashvili, Gia (Graduate, Information Technology)

Mentor: Sally Xie

Co-Mentor: Mangolika Bhattacharya

Authorship: Sally Xie, Mangolika Bhattacharya, Gia Berekashvili

Inverse transfer problem techniques offer a practical alternative for estimating unresolved quantities with limited data, reducing the need for extensive computational and experimental resources. These methods infer a parameter's abnormal history from sparse measurements taken at discrete time points. However, in high-dimensional or complex systems, traditional solutions often become trapped in local optima. This paper presents a Bayesian inverse modeling framework using Markov Chain Monte Carlo (MCMC) sampling to dynamically generate parameter distributions during machine learning training and posterior validation. By leveraging MCMC for posterior estimation, the framework enables effective transfer learning from well-instrumented bridge structures to data-scarce cases, enhancing predictive accuracy and reliability in structural health monitoring. The integration of probabilistic inference with machine learning provides a scalable solution for infrastructure systems with heterogeneous data availability and supports robust uncertainty quantification in model adaptation.

LOW-POWER ENCRYPTION BENCHMARKING FOR CUBESAT AND EMBEDDED SYSTEMS

Presenter(s): Cravens, Tristan (Undergraduate, Information Technology)
 Arndt, Mitchell (Undergraduate, Information Technology)

Mentor: Rudra Prasad Baksi

CubeSats and other nanosatellites operate under strict power, memory, and computational constraints, making traditional cryptographic solutions challenging. As space systems increasingly rely on onboard processing and wireless communication, selecting encryption algorithms that balance security with energy efficiency becomes critical. This research evaluates the performance and power consumption of multiple encryption algorithms on low-power embedded platforms commonly used in CubeSat and Internet of Things (IoT) applications.

An experimental benchmarking framework is implemented on three microcontrollers: the ESP32-C6, STM32L432CK, and Raspberry Pi Pico-2W. The study evaluates a diverse set of ciphers, including Advanced Encryption Standard (AES), ChaCha20, RC6, Simon, Speck, TwoFish, Serpent, and MARS. Each algorithm is executed for one million iterations per device configuration. Real-time current consumption is recorded using the Nordic Power Profiler Kit II. From these measurements, energy usage metrics such as milliamp-hours, watt-hours, and total charge are computed to support cross-platform comparison.

Results show measurable differences in execution time and total energy consumption across evaluated algorithms and hardware platforms. Algorithms with simpler round operations and reduced memory access requirements, including add-rotate-XOR (ARX)-based and other lightweight ciphers, complete encryption operations in less time and consume less total energy on the tested devices. In contrast, substitution-permutation network-based algorithms with more complex round structures and key scheduling exhibit higher execution times and increased energy usage under the same benchmarking conditions.

These findings demonstrate that encryption algorithm choice has a significant impact on performance and energy usage in resource-constrained embedded environments. By measuring these tradeoffs across multiple microcontrollers, this work provides practical insight to inform encryption algorithm selection decisions for CubeSats and similar low-power systems, where security requirements must be balanced against limited energy budgets.

USE SENSORS AND AI TECHNOLOGY TO IMPROVE SAFETY, EFFICIENCY AND COMFORT DURING BUILDING CONSTRUCTION AND USE

Presenter(s): Gong, Jiajun (Graduate, Information Technology)

Mentor: Mangolika Bhattacharya

This project aims to combine artificial intelligence and sensors to improve the overall performance, reduce energy consumption and enhance human comfort during subsequent use.

AI and sensors can be used in enhancing building user experience. I prefer this approach because the data from sensors is more accurate and stable than that from cameras. Furthermore, cameras require more power and storage to capture images, and they also require computer graphics knowledge to analyze the image content, making them a less direct data source. We use sensors to measure temperature, humidity, CO₂, and lighting levels. Then AI analyzes these readings and automatically adjusts HVAC, ventilation, and lighting for optimal comfort. Lighting systems adjust color temperature and brightness. AI-controlled ventilation ensures fresh air by detecting high CO₂ levels or pollutants. As more people enter the building, AI increases airflow and cooling.

RECONSTRUCTING THE MITNICK TCP SEQUENCE PREDICTION ATTACK IN A CONTROLLED LAB

Presenter(s): Hoffman, Justin (Graduate, Information Technology)

Mentor: Sumesh Philip

Authorship: Justin Hoffman

Legacy networked systems were often designed for small, trusted environments, where it was common to allow remote access based mainly on which computer was connecting. In this project, I recreated a classic historical attack in a controlled laboratory setting to show how that trust model can be broken by exploiting predictable behavior during network connection setup. The demonstration centers on TCP (Transmission Control Protocol) and IP (Internet Protocol), the core protocols behind most Internet communication. IP exists to address and route data between machines, while TCP exists to establish reliable connections on top of IP (ordering, retransmission, and flow control).

Using Python and Scapy (a packet-crafting tool), I simulated the attack end-to-end and showed how an attacker can obtain administrator-level access on a legacy target by imitating a trusted host. In the lab demonstration, the attacker does not need to sit “in the middle” of the network. Instead, the attack relies on predicting connection timing/sequence behavior to make the handshake appear valid and trigger remote command execution on a service that assumes trusted hosts are safe.

As part of the presentation, I will explain the intuition behind the vulnerability in plain terms and show how modern systems mitigate it through stronger authentication (for example SSH, Secure Shell), improved randomness, and network filtering.

AI-POWERED CAREER ADVISOR BOT: PERSONALIZED CAREER GUIDANCE THROUGH RESUME ANALYSIS

Presenter(s): Limon, Md Shahnawaj Alom (Graduate, Information Technology)

Mentor: Tahmid Rashid

Finding the right career path is one of the most consequential decisions people face, yet meaningful support remains limited. Traditional career counseling is effective but expensive and hard to access, while existing online tools offer generic advice that ignores individual backgrounds. This project addresses that gap through an AI-powered career guidance platform that combines conversational AI, intelligent resume understanding, real-time job market data, and structured domain knowledge to deliver personalized career advice through a web-based application. The platform supports three AI providers, OpenAI GPT, Anthropic Claude, and an open-source language model, allowing the research to compare how each performs in a career advisory context. The conversational interface delivers real-time responses shaped by each user's skills, education, work history, and career aspirations, making every interaction feel personal rather than scripted.

When a user uploads their resume, the system uses AI to automatically extract key details, skills, qualifications, job titles, experience, and areas of expertise, then populates the user's profile without requiring manual data entry. From a single document, the platform understands who the user is, and every feature benefits from that understanding immediately.

The platform aggregates job listings from four external sources into a single searchable interface. A resume builder with eleven professional templates generates polished documents directly from profile data. An interview preparation module creates tailored practice questions across twenty topics. For employers, an AI-powered screening tool evaluates candidates with match scoring, skill gap analysis, and hiring recommendations. A career insights dashboard tracks application outcomes, highlights in-demand skills, and offers actionable next steps. Recommendations are not based purely on what AI models generate from training data. The platform maintains a curated knowledge base of salary benchmarks, career progression pathways, and industry-specific skill demand, grounding suggestions in real-world data rather than speculation.

A built-in evaluation framework tracks system performance, measuring resume parsing accuracy, recommendation relevance, and how the three AI providers compare against one another. User-centered evaluation complements this through structured studies where participants assess usefulness, personalization, and trustworthiness compared to traditional career resources.

This research demonstrates that when AI is grounded in real user data, structured knowledge, and live market information, it can deliver career guidance that is both deeply personal and widely accessible, helping close the gap between those who can afford professional support and those who cannot.

CYBERSECURITY AI MODELS: PRIVACY & ETHICS

Presenter(s): Love, Kaiden (Undergraduate, Information Technology)
 Bennett, Logan (Undergraduate, Information Technology)

Mentor: Sean Sanders

Artificial Intelligence (AI) is rapidly growing in the cybersecurity industry. There are implications for Artificial Intelligence's use in a space where Personally Identifiable Information (PII) is the center of the data that AI is being tasked with protecting. This study uses a mixed-methods approach to assess privacy and ethical concerns with AI agents running on top of PII. Few studies have been conducted on the potential exploitation of AI agents running on top of PII. This study is going to use synthetical analysis of existing discourse, behavioral analysis of Illinois State University's (ISU) homegrown AI, and interviews with industry professionals, to provide an in-depth analysis of privacy, ethical concerns, and the potential for exploitation of AI. Synthetical analysis techniques will be used on previous existing data from studies that have gathered relevant statistics of handling and management of data derived from AI. ISU's homegrown AI will be prompted extensively through directed queries to provide data to form a behavioral analysis of how AI is handling and accessing specific types of data in real time. Interviews with industry professionals will be conducted to gather primary research with relevant opinions on the nature of AI in the cybersecurity industry.

Keywords: Artificial Intelligence, Cybersecurity, Personally Identifiable Information, Ethics, Privacy.

USING MACHINE LEARNING ALGORITHMS TO DETECT AND PREDICT EARLY ONSET ATRIAL FIBRILLATION

Presenter(s): Marrella, Patrick (Undergraduate, Information Technology)
Chukwuyem, Emmanuelson (Graduate, Nursing)
Langhani, Akshay (Undergraduate, Information Technology)

Mentor: Nariman Ammar

Co-Mentor: Marilyn Prasun

Authorship: Nariman Ammar, Marilyn Prasun, Patrick Marrella, Emmanuelson Chukwuyem, Akshay Langhani

Background. Atrial fibrillation (AF) is the most common cardiac arrhythmia and leads to increased risk of thromboembolic events such as stroke. Early identification of AF is critically important to minimize risk of future events.

Purpose. The aim of this study is to examine risk factors of individuals diagnosed with AF and associations of variables from a large dataset.

Methods. The team obtained access to Medstar Health de-identified patient data following Institutional Review Board approval. Inclusion criteria include patients 18 years or older, hypertension diagnosis, and two recorded 12-lead ECG exams. Exclusion criteria include patients with insufficient medical data.

Patients were split into an AF cohort and an NSR cohort. Patients with a previous AF diagnosis, or a PR-Interval of 0 are grouped into the AF cohort. Patients with a normal PR-Interval are grouped into the NSR cohort. Risk factors examined included comorbidities, social determinants of health, lifestyle factors and the Social Vulnerability Index.

Findings. A total of 130,000 patients met the inclusion criteria, with 12,937 in the AF cohort and 27,471 in the NSR cohort. The mean Charleson Comorbidity Index for the AF cohort was 8.33 (SD 6.72). Alcohol use reported by 901 patients, smoking by 871, exercise by 426. Mean SVT values: socioeconomic 0.40 (SD 0.28), household characteristics 0.46 (SD 0.27), racial & ethnicity minority status 0.62 (SD 0.26), and housing type & transportation 0.45 (SD 0.28).

Conclusion. This preliminary review provides insight into modern technology in healthcare, and for subsequent machine-learning tasks to classify AF using patient-level factors.

AUDIO SIGNAL PROCESSING AND MACHINE LEARNING

Presenter(s): McCaslen , Aiden (Undergraduate, Information Technology)

Mentor: Elahe Javadi

Signal processing is a field of mathematics where different things give analyzable signals such as audio signals or earthquakes. Using the Fast Fourier Transform (FFT) we can complete computations to get more human-readable information out of the detected signals. In the scope of this project, I apply this mathematical tool to extract information from music. Using the information extracted with the FFT, we can extract certain features such as a Mel-Frequency-Cepstral-Coefficient (MFCC) to understand which note is being played on an instrument. With the help of a public dataset (GuitarSet), it is possible to read through these files, perform the FFT, and extract features like the MFCC. Using these features, we can train a model to identify different characteristics of a new input signal such as tempo or chords. This is more desirable than using exclusively the FFT since the model would be able to look at an entire signal, instead of just specific frames. Using Python and other libraries such as Librosa, PyTorch, or TorchLibrosa (a combination of the two) we can train a model to compute the characteristics and apply them to get human-readable musical information.

CANARY TOKENS FOR INSIDER THREAT MONITORING IN ACADEMIC/ENTERPRISE ENVIRONMENTS: A LOW-COST DETECTION APPROACH.

Presenter(s): Nlerum, Oma (Graduate, Information Technology)

Mentor: Dmitry Zhdanov

Academic institutions manage large volumes of sensitive data, including research findings, student records, and intellectual property. At the same time, universities operate as open and collaborative environments, which increases exposure to insider-related risks. Because students, faculty, and staff often have legitimate system access, traditional intrusion detection systems may struggle to identify misuse that originates from within the network.

This project examines whether canary tokens can serve as a practical and low-cost method for improving internal threat visibility in academic network environments.

Canary tokens are intentionally placed digital decoys such as monitored documents, embedded URLs, or credential traps that generate alerts when accessed. Unlike complex behavioral detection systems, canary tokens create clear detection signals by design: any interaction with a properly placed token is inherently suspicious. This makes them particularly attractive for academic institutions that may have limited cybersecurity resources.

In this study, multiple token types will be deployed within a simulated academic file-sharing environment. Tokens will be embedded in realistic storage locations where unauthorized access could occur. Simulated insider scenarios including unauthorized document access and link activation will be performed to evaluate detection latency, alert reliability, false positive occurrence, and deployment complexity.

The aim of this research is to determine whether deception-based mechanisms such as canary tokens can provide a scalable supplementary control for academic institutions seeking to strengthen internal monitoring without significantly increasing infrastructure costs.

SMARTER DRONES FOR SEARCH AND RESCUE: MAKING ADVANCED AI WORK IN THE SKY

Presenter(s): Pfeifer, DaShawn (Graduate, Information Technology)

Mentor: Tahmid Rashid

Imagine a drone flying over a disaster zone, not just taking pictures, but actually understanding what it sees. Instead of simply detecting objects, it can recognize signs of human activity, describe a scene in natural language, and suggest where rescuers should search next. That is the vision behind this project. Modern artificial intelligence models can combine vision and language to interpret complex scenes. However, these powerful models usually require large computers and high energy consumption, which makes them difficult to run directly on lightweight drones. In real disaster scenarios, drones cannot always rely on internet connections or remote servers. They must think and respond on their own. This research explores how to make advanced AI models run efficiently on small, battery powered drones used in search and rescue missions. The proposed system, called MAVREN, reorganizes how computations are handled inside the drone so that the AI can operate faster while using less energy. Instead of relying on heavy floating point operations, the framework compresses and restructures calculations in a smarter way. It also dynamically schedules tasks to balance speed, accuracy, and battery life in real time. The result is a drone that can process images onboard, generate meaningful descriptions, and support decision making without constant human control. Experimental evaluations show that this approach improves processing speed, reduces energy usage, and maintains strong detection accuracy compared to traditional methods. By enabling drones to reason about what they see while operating within strict hardware limits, this work brings us closer to intelligent, autonomous aerial systems that can assist first responders when every second counts.

DESIGN AND EVALUATION OF A DEEP LEARNING PIPELINE FOR MULTI-LABEL 12-LEAD ECG CLASSIFICATION AND VISUALIZATION

Presenter(s): Rojsiristith, Suphanat (Graduate, Information Technology)

Mentor: Qi Zhang

Electrocardiograms (ECGs) are widely used to detect arrhythmias and other cardiac abnormalities, but manual interpretation requires clinical expertise and can be time-consuming. This project implements an end-to-end deep learning pipeline for multi-label classification of 12-lead ECG recordings and produces visual explanations of model decisions. The system supports loading PhysioNet/WFDB-style ECG files, preprocessing signals, predicting multiple diagnostic categories, exporting evaluation artifacts (ROC/AUC), and generating interpretability outputs using contrastive saliency maps. Two model families were implemented and evaluated: a CNN--GRU model with attention pooling and a CNN + Transformer Encoder model. The workflow is configuration-driven and reproducible, with saved checkpoints, split indices, and prediction exports that support repeatable evaluation and future deployment.

DEEP LEARNING FOR SINGLE-TASK AND MULTITASK ELECTROCARDIOGRAM CLASSIFICATION

Presenter(s): Tiffany, Joshua (Undergraduate, Information Technology)

Mentor: Qi Zhang

Authorship: Joshua Tiffany, Qi Zhang

The electrocardiogram (ECG) is a widely available, noninvasive tool for detecting and monitoring cardiac conditions including arrhythmias, conduction disorders, and ischemic events. Although the ECG is a powerful tool, manual interpretation is labor-intensive and time-consuming. To overcome this issue, deep learning models have been developed to perform automatic ECG analysis. These show promising results, but there are still limitations to their performance. Namely, class imbalance leads to poor performance on rare conditions and deep learning models typically have limited interpretability. This work presents two deep learning models that utilize strategies to address these challenges and improve outcomes. The first model performs multilabel arrhythmia and conduction disorder classification using signal augmentations and an adaptive iterative training strategy to improve the model's ability to recognize rare and difficult-to-detect conditions. The second model has a multitask, multi-head transformer architecture for myocardial infarction (MI) analysis, simultaneously detecting MI, performing region localization, and predicting artery-of-origin. Our results show significant improvements in these tasks, suggesting that the proposed approaches allow for more accurate and informative predictions to overcome the described challenges and support clinical decisions.

UNSUPERVISED PHENOTYPING OF DIABETIC INPATIENTS: A CLUSTER ANALYSIS OF RESOURCE UTILIZATION PATTERNS

Presenter(s): Zhang, Simon (Graduate, Information Technology)

Mentor: Qi Zhang

Diabetes mellitus imposes a substantial and growing burden on healthcare systems worldwide. While supervised models for predicting hospital readmission have been extensively studied, comparatively little attention has been given to unsupervised approaches that aim to uncover latent structure within diabetic inpatient populations. Identifying utilization-driven phenotypes may provide valuable insight for hospital operations and clinical decision support

FROM SPORT TO LIFE: EXAMINING FACTORS INFLUENCING RESILIENCE TRANSFER IN FIRST-YEAR COLLEGIATE STUDENT-ATHLETES

Presenter(s): Brown, Aidan (Graduate, Kinesiology & Recreation)

Mentor: Scott Pierce

The transition to college brings many challenges for student-athletes yet also presents the opportunity for growth and development. Student-athletes can benefit from proactive, strengths-based resilience programming to support self-esteem, satisfaction, and performance in sport. Yet, it is unclear if resilience can transfer between sport and other life contexts. This study examined if student-athletes believed they transferred resilience from sport to other life domains, and the contextual (e.g., support from significant others) and psychological factors (e.g., confidence to transfer resilience) that influenced the transfer of resilience. Participants in the study included 200 first-year student-athletes at a NCAA Division I university in their first semester of college, and who have completed a resilience development program. Measures included resilience, factors influencing resilience transfer, resilience transfer outcomes. Descriptive statistics are being analyzed to assess student-athletes' levels of resilience, perceptions of contextual and psychological factors influencing the transfer of resilience, and resilience transfer outcomes. Multiple regression analysis will then be conducted to assess contextual factors and psychological processes as predictors of resilience transfer outcomes. These findings will be reviewed in relation to theories of life skills development through sport to highlight factors influencing and supporting the transfer of life skills from sport. Furthermore, practical recommendations will be provided for coaches and support staff to promote the transfer of resilience and learning from sport to other life domains

ESTIMATES OF BODY COMPOSITION METRICS IN MALE AND FEMALE COLLEGIATE ATHLETES OVER A COMPETITIVE SEASON

Presenter(s): Burkhalter, Tyler (Undergraduate, Kinesiology & Recreation)

Mentor: Michael Torry

Authorship: Tyler Burkhalter, Samantha McDonald, Marcel Lopes dos Santos, Kelly Laurson, Evan Semonis, Dale Brown, Jake Gillum, Karan Rai, Michael Torry

Body composition (BC) strongly influences sport performance and risk of injury. As such, monitoring changes throughout sport seasons may provide coaches important insights into an athlete's training program effectiveness, sleeping patterns, nutrition habits, etc. Air displacement plethysmography (ADP) gained popularity in the sports realm as a cost-effective methodology for BC.

PURPOSE: To compare percent body fat (PCTF), fat (FM) and fat-free mass (FFM), estimated via ADP, in collegiate male (M) and female (F) basketball players during the pre- and post-season.

METHODS: Twenty-four collegiate basketball athletes volunteered for this study (males, $n=13$, age: 20.38 ± 0.92 , Hgt: $1.96\text{m} \pm 0.094$, Wght: 91.52kg ; females, $n=11$, age: 19.91 ± 1.64 , height: $1.79\text{m} \pm 0.063$, Wght: 72.93kg). Athletes underwent BC testing via ADP, each within 30 days of pre- and post-season. All athletes were properly fasted, hydrated and tested between 0600-0900AM and prior to any exercise training. ADP quantified FM and FFM using sex, age and race/ethnicity-specific Siri prediction equations. Pre- and post-season differences in PCTF, FM, and FFM were assessed via paired t-tests for all athletes ($N=24$) and separately for males ($n=13$) and females ($n=11$) with a significance level set at $p \leq 0.05$.

RESULTS:

Athletes ($N=24$) gained $0.32\text{kg} \pm 2.94$ PCTF, lost $0.25\text{kg} \pm 2.09$ FFM, and gained $0.31\text{kg} \pm 2.74$ FM over the season. However, there were no significant differences for these variables (all $p > 0.05$). Female athletes ($n=11$) gained $0.29\text{kg} \pm 3.78$ PCTF, gained $0.51\text{kg} \pm 2.29$ FFM, and gained $0.17\text{kg} \pm 3.21$ FM throughout the season. Similarly, no significant differences in pre- and post-season BC were observed (all $p > 0.05$). Male athletes ($n=13$) gained $0.34\text{kg} \pm 2.18$ PCTF, lost $0.51\text{kg} \pm 2.29$ FFM, and gained $0.43\text{kg} \pm 2.41$ FM throughout the season, yet these changes did not reach statistical significance (all $p > 0.05$).

CONCLUSION:

Females exhibited a non-significant increase in all dependent variables, while males elicited a non-significant increase in PCTF and FM, and a non-significant decrease in FFM throughout the season. Other influences on BC could be differences in training regimens, nutrition, and inaccuracies in ADP to estimate BC over time.

USING SHORT-TERM PHYSICAL ACTIVITY INTERVENTIONS TO REDUCE PERCEIVED BARRIERS TO PHYSICAL ACTIVITY AND CAMPUS RECREATION FACILITY USAGE IN COLLEGE STUDENTS

Presenter(s): Colbert, Ben (Graduate, Kinesiology & Recreation)

Mentor: Kristen Lagally

Co-Mentor: Tony Amorose

Introduction

Physical activity (PA) guidelines recommend adults get 150 minutes of moderate to vigorous PA per week (American College of Sports Medicine et al., 2022). Approximately 36-50% of college students are inactive and report numerous barriers to being physically active (Keating et al., 2005). PA barriers are any obstacle an individual believes affects their PA participation (Bowles et al., 2002). Individuals who perceive more barriers to PA are less likely to participate, highlighting the importance of understanding PA barriers (Gómez-López et al., 2010). Although campus recreation facilities are accessible, student discomfort remains a barrier to facility use (Wilson et al., 2022). No existing research has examined interventions reducing campus recreation facility barriers. Most research on PA interventions has focused on interventions ≥12 weeks in adolescents and older adults. Further exploration is needed to determine the effectiveness of short-term interventions on barriers in college students. Exercise is Medicine® on Campus (EIM-OC) is an intervention on university campuses aimed at promoting PA and reducing participant barriers (ACSM, 2021). Assessing program effectiveness has been limited through inconsistent collection of participant outcomes across programs. Illinois State University utilizes a referral-based program where health and counseling services refer students. Participant outcomes have been collected across program implementation. The purpose of this study was to document PA and campus recreation facility barriers in university students and examine the influence of an EIM-OC intervention on barriers.

Methods

Students in EIM-OC were referred to the program by student health or counseling services. Participants completed a questionnaire regarding barriers to PA and campus recreation facility usage. The same questionnaire was sent to the student body at large. EIM-OC participants completed an 8-week intervention, with sessions 2x/week focusing on resistance training. Following the intervention, EIM-OC participants completed the same questionnaire. Barriers were examined 1) between EIM-OC participants and the student body and 2) before and after the EIM-OC program.

Results

A significant main effect was reported for PA and campus recreation barriers between groups. 5/6 PA barriers and 8/12 campus recreation barriers differed significantly between groups. A significant main effect was reported for PA and campus recreation barriers before and after the intervention. 3/6 PA barriers and 8/12 campus recreation barriers differed significantly before and after the intervention.

Conclusion

College students referred to the EIM-OC program experienced more PA and campus recreation barriers than students who were not referred. The EIM-OC program was effective in reducing barriers in its participants.

EFFECTS OF ANKLE TAPING ON THE PROPULSION PHASE OF SINGLE-LEG AND DOUBLE-LEG APPROACH JUMPS

Presenter(s): Kurcab, Cody (Undergraduate, Kinesiology & Recreation)

Mentor: Michael Torry

INTRODUCTION: Vertical jump performance depends on a coordination of lower-extremity mechanics that produce a well-timed vertical ground reaction force (vGRF) during the propulsion phase. Because the ankle contributes a significant amount to total mechanical work in jumping, restrictions to ankle motion may alter propulsion mechanics. Ankle taping is commonly used to improve stability and reduce ankle sprain risk, but it can limit sagittal-plane ankle ROM and modify neuromuscular control, possibly influencing approach jump performance.

PURPOSE: The purpose of this study was to examine how closed basket-weave ankle taping affects the propulsion-phase biomechanics during single-leg approach jumps (SLAJ) and double-leg approach jumps (DLAJ).

METHODS: One male participant (23 years; 195.6 cm; 99.8 kg) performed four conditions: SLAJ untaped, SLAJ taped, DLAJ untaped, and DLAJ taped. Five maximal effort trials were completed per condition. Kinetic and kinematic data were collected using a Vicon motion-capture system (200 Hz) paired with two AMTI force plates (2000 Hz). The difference in jump height (peak vertical center of mass), peak vGRF, vGRF behavior within 35–65% of the propulsion phase, sagittal-plane ankle ROM (dorsiflexion/plantarflexion), rate of force development (RFD), and peak joint moments at the ankle, knee, and hip was taken from the data and averaged across all conditions.

RESULTS: Jump height was nearly unchanged with taping in both jump types (DLAJ: 1595.1 to 1595.2 mm; SLAJ: 1681.6 to 1667.7 mm). Taping decreased sagittal-plane ankle ROM, decreasing dorsiflexion (DLAJ: 20.04° to 18.1°; SLAJ: 2.86° to 2.15°) and plantarflexion (DLAJ: 29.0° to 26.9°; SLAJ: 34.68° to 33.88°). Peak ankle moment decreased with taping in both jumps, while knee moment increased in taped SLAJ but decreased in taped DLAJ. vGRF in the 35–65% propulsion region decreased in both jumps up to around 14 to 16%.

CONCLUSION: Based on the results we conclude that, closed basket-weave ankle taping reduced sagittal-plane ankle ROM and effected metrics involved in force and time and joint moment during propulsion, but it did not meaningfully reduce jump height in either SLAJ or DLAJ. These findings suggest that athletes may maintain approach jump performance while taped, potentially through compensation through changes in mechanics at proximal joints, with the changes in ankle mechanics from taping.

SYNTHESIS OF MATERIALS FOR PREPERATION AND STUDY OF [5+2] CYCLOADDITIONS

Presenter(s): Mundsinger, Sam (Undergraduate, Kinesiology & Recreation)
Casteel, Jordan (Undergraduate, Chemistry)

Mentor: Andy Mitchell

Authorship: Samuel Mundsinger, Jordan Casteel

The purpose of these experiments is to synthesize materials which can be later used in the study of (5+2) cycloadditions. With the intention of becoming well versed in the synthesis of these substrates for this important reaction, several procedures have been practiced and carried out. In particular, various known reactions including the protection of Maltol, bromination of the protected Maltol, and an amination of this bromide. Some of the techniques to purify and analyze these reactions include Flash Column Chromatography, ^1H NMR, and ^{13}C NMR. Additionally, Thin Layer Chromatography (TLC) is a technique used to track these reactions. Finally, carrying out these procedures provided a foundation of experience in the laboratory as well as a supply of starting materials for the future research of (5+2) cycloadditions.

IDENTIFYING LOWER-LIMB JOINT ANGLES THAT MAXIMIZE REACTION SPEED IN VOLLEYBALL SERVE-RECEIVE

Presenter(s): Rossi, Arianna (Graduate, Kinesiology & Recreation)

Mentor: Michael Torry

Reaction time is a critical determinant of successful serve-receive performance in volleyball, as athletes must rapidly perceive a stimulus and initiate movement to control the first contact. The purpose of this study was to identify the lower-limb joint angles and stance height that maximize reaction speed during the defining phase of serve-receive. It was hypothesized that a medium ready position would optimize neuromuscular readiness, force production, and joint mechanics, resulting in faster reaction times compared to low and high stances.

One 23-year-old Division I female libero performed 45 randomized trials (15 per stance) while standing on dual force plates. Motion capture (200 Hz), surface electromyography (2000 Hz), accelerometers, and ground reaction force data were collected to measure cognitive reaction time, total reaction time, baseline force, time to generate propulsive force, muscle activation, and ankle torque onset.

Results showed that the medium stance consistently produced the shortest total reaction time and demonstrated higher baseline vertical ground reaction force along with the fastest time to generate propulsive force, indicating more effective preloading of the muscle-tendon units and an improved rate of force development. The high stance emerged as the second most effective position because it allowed the presence of an unweighting phase, enabling use of the stretch-shortening cycle and supporting faster propulsive force generation than the low stance. In contrast, the low stance proved to be the least effective position, as the absence of an unweighting phase limited elastic energy utilization and resulted in slower force production. Although gastrocnemius pre-activation and ankle torque onset did not fully support the hypotheses, the unweighting mechanism appears to be a key factor influencing rapid movement initiation. Optimal joint angles associated with faster reactions were approximately 16–17° of ankle plantarflexion, 39–41° of knee flexion, and 66–71° of hip flexion.

In conclusion, a medium ready position provides the most mechanically efficient posture for rapid directional responses in volleyball serve-receive, followed by the high stance, while the low stance represents the least advantageous configuration. By positioning muscles near their optimal force-length relationship and promoting effective force transfer, the medium stance enables quicker and more explosive reactions. These findings offer practical implications for coaching, strength training, and rehabilitation; however, the single-subject design limits generalizability, and future research should include larger and more diverse athletic populations.

ARE HEART RATE BASED INTENSITY METRICS APPROPRIATE FOR MONITORING EXERCISE INTENSITY IN PREGNANT WOMEN?

Presenter(s): Smith, Sebastian (Undergraduate, Kinesiology & Recreation)

Mentor: Samantha McDonald

Authorship: Sebastian Smith, Samantha McDonald, Evan Semonis, Diego Soto, Gia Positano, Mia Manisco, Linda May

Given the positive linear association between heart rate (HR) and physical workload, HR-based metrics are often utilized in exercise interventions for accurately monitoring the intensity. However, resting HR progressively increases throughout pregnancy, potentially resulting in decreased accuracy of standard HR-based metrics. **PURPOSE:** To evaluate the agreement in the classification of exercise intensity between maximum HR and HR reserve equations compared to relative oxygen consumption (VO₂) measured via indirect calorimetry in a small sample of pregnant women. **METHODS:** Five pregnant women participated in this study and were, on average, 29.3 ± 5.5 yrs old, 20 to 25 weeks pregnant and had a body mass index of 25.8 ± 3.9 kg/m². Participants performed a previously validated, submaximal treadmill exercise test. The subjects walked at a constant speed of 3.0 mph with incremental changes in incline, every two minutes (0% to 12%) until volitional fatigue or reaching 85% of age-predicted maximum HR (AMPHR). Four established HR-based intensity equations were used, with average values at each stage classified into their respective intensity categories. VO₂peak (highest VO₂ achieved during the treadmill test) was calculated and intensity classified into 'light', 'moderate' or 'vigorous' using defined thresholds (20 to 39%, 40 to 59% and ≥60%, respectively). Fisher's Exact Tests were performed to evaluate the agreement in exercise intensity classifications between the HR-based metrics and %VO₂peak with a significance level of $p < 0.05$. **RESULTS:** For exercise stages 1 through 5, %AMPHR and %HR reserve metrics predominantly underestimated exercise intensity compared to %VO₂peak, with proportions ranging from 66.7% to 100%. Despite apparent and large differences in intensity classifications, none of the comparisons reached statistical significance ($p=0.29$ to 0.71), most likely consequent to the small sample size. **CONCLUSION:** Our study showed large, albeit non-significant, differences in agreement for exercise intensity classification between HR- and VO₂-based metrics during a submaximal exercise treadmill test. Larger samples are needed to further evaluate the agreement among these intensity metrics in the pregnant population.

MANAGEMENT

AGAINST ALL HEADWINDS: WHAT IS NEXT FOR ETHIOPIAN AIRLINES?

Presenter(s): Krueger, Leo (Undergraduate, International Business)

Mentor: Barbara Ribbens

Authorship: Leo Krueger

Headquartered at Bole International Airport in Addis Ababa, Ethiopia, Ethiopian Airlines was first discussed under an agreement signed on September 8, 1945. The airline was formed as a joint venture between Transcontinental and Western Airlines (TWA) and the Ethiopian government. Ethiopian Airlines was officially founded on December 21, 1945, and began operations on April 8, 1946. The case will explore how operating in an emerging market has made Ethiopian Airlines one of Ethiopia's most successful enterprises and Africa's most globally competitive airline. Emerging market conditions have both enabled and constrained the company's growth. The research in this case will analyze the factors affecting Ethiopian Airlines and to identify the positives and negatives of starting and sustaining a venture in an emerging market, which can both hinder and help a company have a competitive edge in the global market. This case will be accompanied by a teaching note, meant for student instruction and students to answer the question: What is Next for Ethiopian Airlines?

PERCEPTIONS OF VACCINATION POSTERS IN RETAIL PHARMACIES AFTER COVID-19

Presenter(s): Liyanage, Shishi (Graduate, Business Administration)

Mentor: Rodger Singley

Influenza vaccination uptake in the United States has declined in the post-COVID period, with adult coverage falling from pre-pandemic levels of approximately 50–60% to the mid-40% range in recent seasons. While retail pharmacies continue to rely heavily on in-store posters promoting seasonal influenza vaccination, it remains unclear whether these “passive” visuals function as effective “cues to action” within an increasingly fragmented and politicized health information environment. Drawing conceptually from the Health Belief Model and theories of message framing, this paper will examine how individuals perceive influenza vaccination posters displayed in retail pharmacy settings. Using a brief survey (target $n \approx 50$), participants are shown two poster formats: a standard promotional pharmacy advertisement and an alternative educational-style poster presenting informational content. After exposure to each format, respondents assess perceived credibility, persuasiveness, and changes in willingness to receive a vaccine using Likert-scale and categorical measures.

The study does not measure vaccination uptake, instead it evaluates perceived impact in a survey context. The findings are interpreted as exploratory and limited in generalizability. By focusing specifically on poster design within retail pharmacies, this study provides preliminary insight into whether promotional and educational messages are perceived differently in the post-pandemic environment. The results may help improve pharmacy vaccination messaging, so it is viewed as credible and informative rather than purely promotional.

MATHEMATICS

EXTENDING PARTIAL ARRAYS TO COMPLETE LATIN SQUARES: A GENERALIZATION OF RYSER'S THEOREM

Presenter(s): Fleming, Jalen (Undergraduate, Mathematics)

Mentor: Amin Bahmanian

Let r , s , and n be natural numbers such that n is greater than the maximum of r and s , and let u be greater than or equal to some number (λ) . Let L be an n by n array whose top left r by s subarray, L' , contain (λ) symbols in each cell. We find conditions that ensure L' is extended to an n by n array such that each row and column contains u copies of each symbol, and each cell contains u . This result generalized Ryser's theorem from 1951.

POSTER CANCELLED

AI FOR CYBER INSURANCE

Presenter(s): Minga, Andy (Graduate, Mathematics)

Mentor: Maochao Xu

Cyber risk affects organizations in many ways, including data breaches, system vulnerabilities, and regulatory concerns. However, much of the information related to cyber risk is written in text documents such as security reports, breach descriptions, and public disclosures, which makes it difficult to use directly in statistical analysis.

This project explores how large language models (LLMs) can help process and organize this information. The study reviews common sources of cyber-risk data and explains the limitations of traditional structured datasets. It then develops simple LLM-based workflows to extract key risk-related information from text and convert it into structured data that can be analyzed using standard statistical methods.

The project also examines how LLMs can be fine-tuned to better identify and summarize cyber-risk indicators at the organizational level. Overall, this work shows how language models can support actuarial and cybersecurity analysis by making complex and unstructured cyber-risk information easier to measure, compare, and analyze.

MUSIC

THE WELL-TEMPERED MÁGHÂM: RECONSTRUCTING PERSIAN MUSICAL IDENTITY IN THE ORCHESTRAL WORKS OF REZA VALI

Presenter(s): Tavakkol, Ehsan (Graduate, Music)

Mentor: Allison Alcorn

This research examines how Iranian-American composer Reza Vali reconstructs Persian musical identity within the medium of the Western orchestra, proposing an alternative model for intercultural composition in the twenty-first century. In response to the long-standing dominance of Western tonal systems and the concept of so-called “international music,” Vali rejects both the imitation of Western modernism and the exoticization of Persian tradition. Instead, he re-centers the internal logic of the Persian Dástgâh/Mághâm modal system as the primary structural and philosophical foundation of his music.

Drawing on Vali’s theoretical writings, particularly *Return to the Origins*, and analytical case studies of selected orchestral works such as *Segâh: Double Concerto for Persian Ney, Kamancheh, and Orchestra* and *Calligraphy No. 14 (Âshoob)*, this study investigates how Persian modal thinking, microtonality, cyclic temporality, and non-harmonic polyphonic textures are reconstructed within contemporary orchestral practice. The research employs analytical methods from music theory, intercultural musicology, and philosophy of music to examine pitch organization, temporal structure, and timbral strategy in these works.

Central to this investigation is Vali’s concept of Perso-Centrist Pluralism, a compositional philosophy that challenges Eurocentric hierarchies by asserting Persian classical music as an autonomous cultural center rather than a peripheral influence. Through the rejection of equal temperament and the use of microtonal systems—supported by technological innovations such as the Arghanoon digital interface—Vali transforms the orchestra into a pluralistic space capable of expressing Persian modal logic without assimilation into Western harmonic syntax.

The findings demonstrate that Vali’s music represents not a stylistic fusion but a structural and epistemological reconstruction of Persian musical logic in a global context. His work models a form of musical decolonization in which cultural identity is preserved through internal coherence rather than surface hybridity. This research contributes to contemporary discussions on intercultural composition, global modernism, and the role of non-Western modal systems in redefining universality in art music. Ultimately, the study argues that Vali’s approach offers a compelling framework for composers navigating cultural identity in an increasingly globalized musical landscape.

NURSING

SAFE HAVEN INFANT RELINQUISHMENT: INCREASING AWARENESS

Presenter(s): Fishman, Elizabeth (Undergraduate, Nursing)
Bianchi, Chad (Undergraduate, Nursing)

Mentor: Denise Hammer

Co-Mentor: Paula Porter

Authorship: Elizabeth Fishman, Chad Bianchi

Safe Haven laws are a safeguard to provide parents of infants a safe and legal way to relinquish their child. In Illinois, this can be done anonymously by a parent without legal repercussions for a child who is 30 days old or younger handed directly to staff at a hospital, fire station, police station (including campus police), or emergency medical facility. The relinquishment process can be confusing for parents, emergency personnel, volunteers and the broader community.

For hospital staff, emergency responders, and volunteers, infant relinquishment represents a high risk yet low frequency event. Our research focuses on improving awareness through education to the staff and volunteers who might receive an infant under Safe Haven laws, reducing infanticide, preventing unsafe abandonment, and reducing stress for all parties involved.

As part of our independent honors projects, we created a matrix for easy access to our literature from a literature review, enhanced educational materials for staff, and refined the Safe Haven relinquishment process for a medical center. We continue this work by assisting a medical center in developing an improved response process, with plans to conduct a simulated relinquishment drill to increase staff confidence and preparedness.

To increase awareness and understanding of Safe Haven Infant Relinquishment Laws on the Illinois State University Campus we entered the Images of Research Competition. We created an image about relinquishment that featured the powerful heartbreaking yet hopeful event between mom and baby. Our entry received both first place and the People's Choice Award.

Throughout this work, we had the opportunity to collaborate with leadership from the Save Abandoned Babies Foundation and an author of the Illinois Safe Haven Laws. They connected us with individuals who were relinquished as infants. We were deeply moved when we met these children and heard their incredible stories. These experiences have opened our eyes to the impact Safe Haven laws have on children and their families. We hope to continue to make an impact increasing awareness for Infant Safe Haven Laws that we started as our independent honors project.

PHYSICS

TOKAMAK PLASMA SIMULATION

Presenter(s): Alexander, Austin (Undergraduate, Physics)

Mentor: Jay Ansher

Nuclear fusion has long been viewed as a promising solution to global energy needs due to its potential to provide abundant, clean, and sustainable power. Since its early development in the mid-20th century, fusion research has advanced through significant experimental achievements, particularly in the area of magnetic confinement. Tokamak reactors, which use powerful toroidal magnetic fields to confine high-temperature plasma, remain one of the most extensively studied designs. Modern projects such as ITER represent the latest efforts to overcome remaining challenges, such as plasma instability, confinement, and sustaining fusion conditions for long durations. This research project examines both the historical progression of nuclear fusion technology and the computational modeling of plasma dynamics within a tokamak reactor. A central component of the work is the development of a Python-based plasma simulation program that models the trajectories of charged particles under the influence of electromagnetic fields. To achieve accurate and stable numerical integration, the simulation utilizes the Boris integrator, a widely used algorithm in plasma physics due to its energy-conserving properties and effectiveness in resolving cyclotron motion in strong magnetic fields. The program applies the Lorentz force equation to simulate particle motion in a simplified tokamak geometry, allowing us to look at things such as confinement behavior, drift effects, and the influence of electric and magnetic field configurations. By using the Boris integrator, the simulation provides improved long-term stability compared to standard integration techniques, making it particularly suitable for studying plasma behavior over many time steps. Through this combined historical and computational approach, the project connects foundational fusion research with modern numerical techniques used in contemporary plasma physics. The results demonstrate how simulation tools can contribute to understanding the complex physical processes that govern plasma confinement and stability, supporting ongoing efforts toward achieving practical nuclear fusion energy.

MAGNETIC RECONNECTION IN EARTH'S MAGNETOTAIL

Presenter(s): Butterfield, Trent (Undergraduate, Physics)

Mentor: Jay Ansher

Magnetic reconnection in Earth's magnetotail plays a critical role in converting magnetic energy into particle motion and plasma flows. The Earth's magnetic field traps plasma (electrically charged gas) from the Sun. The Sun's magnetic field can interact with the Earth's magnetic field, through magnetic reconnection on the day side of the Earth and on the night side of Earth in the magnetotail. Magnetic reconnection is the process where magnetic field lines break and reconnect releasing magnetic energy which can then inject the trapped plasma into the polar regions, or eject the plasma down the magnetotail away from the Earth. In this study, we present a preliminary analysis of magnetotail reconnection signatures using magnetic field and particle flux measurements from the Geotail spacecraft that was launched in 1992. Electron and ion observations spanning distinct energy ranges are examined to identify reconnection related features, including changes in particle flux, timing differences between species, and associated magnetic field variations. Ongoing work will explore further data to identify additional reconnection events, to better understand particle dynamics in the magnetotail.

STUDENT SUCCESS COURSES INTRODUCING STUDENTS TO THE MAJOR DEPARTMENT

Presenter(s): Campbell, Claire (Undergraduate, Physics)

Mentor: Matthew Hagaman

University students who have early introductions to their department and its resources, personnel, and opportunities are more likely to feel a sense of belonging, increasing departmental retention. Departments or schools at Illinois State University can provide students with these introductions through student success courses, which may increase student investment in the major.

In Fall 2024, Spring 2025, and Fall 2025, ISU student researchers conducted faculty interviews and student focus groups, identifying ideal models and establishing student expectations for student success courses introducing students to the major department. This work led to a greater understanding of the approaches being taken in these courses in different departments or schools across campus, from bringing research faculty and community members into the classroom to sharing department resources that might otherwise go underutilized.

Records of students' hopes for and reactions to these courses also had a direct impact on the development of new student success components in ISU's introductory biology courses in Fall 2025. Researchers gathered student feedback on these course changes and feedback from long-running courses with the hope of capturing successes and ideas for further iteration in the biology courses and beyond.

THERMOELECTRIC SIGNATURES OF DNA NUCLEOTIDES

Presenter(s): Dudley, Makayla (Undergraduate, Physics)

Mentor: Justin Bergfield

We investigate the sensitivity of electrical conductance and thermopower to external perturbations in molecular-scale transport. While conductance is strongly affected by variations in lead-molecule coupling, we find that the thermopower is robust and retains sensitivity to molecular electronic structure even when coupling strengths vary by orders of magnitude. This robustness motivates the use of thermoelectric response as a chemically specific probe.

As a case study, we examine the thermoelectric response of single-stranded DNA in a direction perpendicular to the molecular backbone. Using a simplified transport model, we find that each DNA nucleotide exhibits a distinct thermopower signature arising from differences in electronic and chemical structure among the four bases. These results suggest that thermopower measurements may provide a sensitive means of distinguishing molecular identity. In particular, our work motivates the possibility of identifying DNA bases by translating single-stranded DNA through metallic contacts, such as in a nanopore geometry, while monitoring the thermoelectric signal.

IMAGING QUANTUM INTERFERENCE WITH SPACIALLY RESOLVED THERMOPOWER

Presenter(s): Jilek, Helen (Undergraduate, Physics)

Mentor: Justin Bergfield

Authorship: Helen Jilek, Justin Bergfield

A temperature gradient drives charge carriers from hot to cold, producing a thermoelectric voltage quantified by the Seebeck coefficient (S), also referred to as thermopower. Beyond its technological relevance, S is a sensitive probe of quantum interference and symmetry breaking in nanoscale conductors. Within a fully interacting many-body framework, we demonstrate that the thermopower maps coherent combinations of Dyson orbitals connecting N and $N \pm 1$ electron states, thus functioning as a phase-sensitive quantum transport interferogram.

As a representative example, we study the spatially resolved thermoelectric response of ethylene and benzene molecules adsorbed on metallic substrates. We show that spatial thermopower maps resolve bonding geometry and molecular orientation in cases where conductance maps provide little or no contrast.

SILICON-BASED OXIDE NANOPATTERNING FOR MEMORY DEVICE APPLICATIONS

Presenter(s): Khan, Asad (Graduate, Physics)
Kondowe, Tylon (Undergraduate, Physics)

Mentor: Mahua Biswas

Co-Mentor: Uttam Manna

Authorship: Asad Khan, Tylon Kondowe, Mahua Biswas, Uttam Manna

With the continued advancement of microelectronics and next generation memory technologies, scalable methods for fabricating inorganic nanopatterns with controlled size and spacing are increasingly important. Sequential infiltration synthesis (SIS) is a vapor phase deposition technique that enables selective growth of inorganic materials within polymer templates. Through alternating exposures of reactive precursors, SIS promotes precursor diffusion and chemical binding inside specific polymer domains, effectively hardening those regions and converting soft polymer features into robust inorganic nanostructures while preserving nanoscale morphology. Block copolymer (BCP) self assembly provides periodic nanoscale templates that are well suited for SIS based pattern transfer. In this work, polystyrene block poly(methyl methacrylate) (PS-b-PMMA) BCP thin films are spin coated onto silicon substrates and thermally annealed to form well defined nanoscale morphologies. SIS is then performed using trimethylaluminum (TMA) and tri(tert-pentoxo)silanol (TPS) molecules to selectively infiltrate the PMMA domains, resulting in localized silicon dioxide (SiO₂) nanopatterns that retain the original polymer feature size and spacing. Field emission scanning electron microscopy (FESEM) is used to evaluate morphology preservation and pattern continuity, and energy dispersive X ray spectroscopy confirms elemental composition. Silicon dioxide remains a key dielectric material due to its high resistivity, chemical stability, and compatibility with CMOS processes. In our lab, these SiO₂ nanostructures will be integrated into a proof of concept metal insulator metal device architecture to evaluate their electrical and optical performance for resistive switching memory applications.

EXTENSIONS BEYOND 4-POINT AMPLITUDES IN CONSTRUCTIVE QED

Presenter(s): Majestic, Nicholas (Graduate, Physics)

Mentor: Neil Christensen

The field of particle physics constitutes the theoretical and experimental methods that we implement to study the universe at the smallest fundamental scales. The current primary theoretical framework that for electrons, positrons, and photons is Quantum Electrodynamics (QED). To compare QED with experiment, it is necessary to calculate scattering amplitudes. The traditional method of calculating amplitudes involves Feynman diagrams. Although sufficient in principle to calculate any possible amplitude, it has been found that as the number of particles within a process increases, both the number of Feynman diagrams as well as the complexity of calculating the diagrams grow to become too computationally expensive even for the most powerful supercomputers. New techniques for calculating scattering amplitudes are needed. Constructive amplitudes are a potential candidate with their own set of strengths and challenges. It has already been used to calculate scattering amplitudes in QED for up to 4 particles. In this work, we extend these calculations to diagrams beyond 4 particles.

PARTICLE PHYSICS: AN INTRODUCTION TO RELATIVISTIC KINEMATICS, FERMI'S GOLDEN RULE, AND FEYNMANN DIAGRAMS

Presenter(s): Palczynski, Dylan (Undergraduate, Physics)

Mentor: Neil Christensen

Understanding the Physics behind the fundamental particles and building blocks of the universe requires the math and understanding of relativistic kinematics. Accounting for time dilation and length contraction requires the use of four vectors and using Minkowski Space over the commonly used Euclidian Space. Analyzing vectors in terms of a temporal component and spatial components allows us to make sure that in every perceivable reference frame, energy and momentum are conserved according to the energy-momentum relation. Using four vectors we can apply relativistic kinematics to concepts such as particle decay and scattering in association with Fermi's Golden Rule. Fermi's Golden Rule requires that we analyze the phase space and amplitude of these situations that are on the quantum level. The phase space is a representation of how quantities including mass, energy, or momentum can be arranged into a final state while the amplitude looks at the probability of a said processes happening. Now combining knowledge from relativistic kinematics and quantum mechanics, it's possible to define equations for the lifetime of particles after a collision and the range of scattering to happen. However, the amplitude in these equations must be calculated separately using Feynmann diagrams. Where based on the decay or the collision occurring, the probability of said process can be calculated through a multi-step process using these diagrams. It is all a beautiful mixture and process of explaining how the fundamental building blocks of our universe act.

USING STOKES POLARIMETRY TO DETERMINE THE OPTICAL PROPERTIES OF SILICON NANOPARTICLES.

Presenter(s): Rios-Narciso, Jesus (Graduate, Physics)
 Khan, Asad (Graduate, Physics)

Mentor: Uttam Manna

Co-Mentor: Mahua Biswas

Unlike their metallic counterparts, Silicon Nanoparticles (SiNPs) can sustain both electric and magnetic resonances. To study the optical properties of SiNPs, in this study, SiNPs were synthesized via chemical etching of Silicon dioxide (SiO₂) powder using hydrofluoric acid (HF), followed by centrifugal cleaning to further separate the pure silicon from non-etched SiO₂ powder. Using an Optical microscope and Scanning Electron Microscopy (SEM) we can accurately identify the size, shape, and quantity of SiNPs. To further characterize their optical properties, we are developing a horizontal microscope that can be used to measure their electric and magnetic resonances separately. This setup employs a series of optical lenses, objectives and a high precision 3-axis (x,y,z) translation stage, allowing for characterization of single SiNPs.

POLITICS AND GOVERNMENT

FROM ROCKS TO ROCKETS: HOW MINERAL WEALTH FUELS THE ARMS TRADE

Presenter(s): Majka, Sam (Graduate, Politics and Government)

Mentor: Mike Hendricks

Authorship: Mike Hendricks

The resource curse literature has established a strong link between oil wealth and increased arms imports, yet the role of critical minerals remains underexplored. Driven by surging demand from the green energy transition and other industries, this paper investigates whether mineral wealth, similar to oil, leads to an increase in countries' arms imports. This paper theorizes that mineral rents increase arms imports through three primary channels: 1. providing rentier states the fiscal capacity for internal repression and regime survival, 2. incentivizing supplier states to use arms transfers as a tool to secure mineral access, and 3. fueling conflict between state and non-state actors over lootable resource deposits. This study hypothesizes that arms imports will increase as mineral rents constitute a larger share of a state's GDP. Using time-series cross-sectional (TSCS) analysis of Stockholm International Peace Research Institute (SIPRI) arms transfer data and World Bank mineral rent data, this paper tests this relationship while controlling for key political and economic variables. The eventual findings will move beyond the traditional hydrocarbon-centric paradigm, offering crucial insights into the new frontier of resource-driven conflict and global security, where the scramble for minerals may fuel the proliferation of arms and instability.

DULY CONVICTED: DO THE HISTORICAL CONTEXTS OF THE U.S. PRISON INDUSTRIAL COMPLEX UNDERMINE THE UNITED STATES' ABILITY TO PROVIDE DUE PROCESS OF LAW?

Presenter(s): Whiting, Shyia (Undergraduate, Politics and Government)

Mentor: Meghan Leonard

Authorship: Shyia Whiting

Since the passing of the Thirteenth Amendment in 1865, it has been assumed that involuntary servitude, or slavery, does not exist except as “punishment for crime whereof the party shall have been duly convicted.” This assumption is further justified by the passing of the Fourteenth Amendment in 1868 which states “nor shall any State deprive any person of life, liberty, or property, without due process of law.” These two amendments were to mark the start of a United States where the liberties of all persons were protected, yet they are the key principles used to create a system whose foundation is the upholding of racial inequalities and predatory practices. There is ample evidence showing that black Americans have historically been targeted and jailed at far greater rates than white Americans since the first prisons emerged. Do these unequal practices and the historical contexts behind the rise of the Prison Industrial Complex undermine its ability to duly convict and provide due process of law. This paper will explore the timeline between the abolishment of slavery and modern-day prisons while analyzing key eras such as Jim Crow and the War on Crime to highlight the discrepancies in the United States’ ability to duly convict. It will explore the equal protection clause as part of the Fourteenth Amendment, and institutions containing executives, legislators, peace officers, and other figures in the criminal justice system to determine where due process begins and who has the ability to uphold it.

PROMOTING EMOTION REGULATION AND WELL-BEING IN ELEMENTARY-AGED CHILDREN

Presenter(s): Aguilar, Jessica (Graduate, Psychology)

Mentor: Karla Doepke

This presentation highlights the collective work of an emotion regulation group in which a team was dedicated to understanding and promoting emotion regulation among elementary-aged children. Data was gathered to better understand the present emotion identification abilities and coping mechanisms within the group of children. This presentation aims to share the broader findings and implications of the team's work within developmental and educational contexts.

The primary goal of this research was to understand how elementary-aged children develop, practice and refine their emotional skills necessary for healthy social, behavioral, and academic functioning. Emotion regulation during this developmental period is important for later social competence, overall well-being, and academic success. Various strategies were used to teach emotion regulation skills to children including video modeling, direct practice with feedback, scenarios and group games. A caregiver component was also incorporated to provide parents with strategies to support their children's emotion regulation and increase the likelihood that children would practice skills between group sessions

Data was gathered on children's responses to three scenarios during each group, specifically identifying what the child in the scenario felt and what coping strategies they could use. Progress monitoring data for each child revealed significant individual differences, with some children making gains and others not affected by the intervention.

Discussion will include ideas for the implementation of evidence-based practices in group settings, and ideas for the use in educational settings. This presentation emphasizes the value of promoting emotion regulation skills in early developmental trajectories and contributes to ongoing conversations about how schools can incorporate emotional well-being for all students. Discussing the practical relevance of emotion regulation, the importance of a culturally responsive implementation, and the need for ongoing collaboration is pivotal. A student who struggles to regulate their emotions can have a significant impact on their academic, social, mental, and physical well-being. Social emotional learning is just as important as academics. One cannot happen without the other.

THE ASSOCIATION BETWEEN BODY SURVEILLANCE AND OBSERVED ONLINE APPEARANCE MONITORING

Presenter(s): Auth, Sydney (Graduate, Psychology)

Mentor: Kyla Cary

Authorship: Kyla Cary, Sydney Auth, Megan Maas, Dar Meshi

Social media use has been linked to body image concerns (Vandenbosch et al., 2022). These concerns can manifest through self-objectification offline, through body surveillance, or how often one thinks about their appearance (Fredrickson & Roberts, 1997), and through online appearance monitoring, or monitoring themselves through the social media lens, checking their account for activity, analyzing their appearance, to ensure they are meeting cultural beauty standards (Choukas-Bradley et al., 2022). The present study examined the effect of offline body surveillance on online appearance monitoring and whether the level of problematic Instagram moderated this effect. Participants (N = 70) were undergraduate men (39.8%) and women (64.2%) at a large midwestern university. They completed a survey including demographics, measures of problematic Instagram use, and offline body surveillance behaviors. We then directly observed online appearance monitoring behaviors. To do this, participants posted a selfie to Instagram, then spent 10 minutes using the app, while we recorded their phone screen. Researchers then scored the recording for how often participants engaged in online appearance monitoring via checking their post for likes and comments and zooming in on the photo.

Hayes' PROCESS macro v4.2 was used to test a moderation model with body surveillance as the predictor variable, online-appearance monitoring as the outcome variable, and problematic Instagram use as the moderator. To control for potential differences in body surveillance and problematic Instagram use between men and women, gender was entered as a covariate, though no main effect was found. Results showed no main effect of offline body surveillance on online appearance monitoring, but there was a significant main effect of problematic Instagram use on online appearance monitoring. There was a significant interaction effect, supporting that problematic Instagram use moderates the association between offline and online appearance monitoring. Simple slopes showed that body surveillance was positively associated with online monitoring at high levels of problematic use and negatively associated at low levels. At average levels of problematic use, no effects on appearance monitoring were found. When an individual has high levels of both body surveillance and problematic Instagram use, they are more likely to engage in online appearance monitoring behaviors. Individuals with low levels of problematic Instagram use were less likely to engage in the same online appearance monitoring behaviors. Problematic patterns of social media use could be an intervention target for individuals with body image concerns.

THAT OUTFIT LOOKS AMAZING! A GUIDE TO SARCASM AND IRONY.

Presenter(s): Burress, Brody (Undergraduate, Psychology)
 Dasovic-Walker, Anna (Undergraduate, Psychology)
 Woolever, Marlie (Undergraduate, Psychology)
 Nevel, Ashley (Undergraduate, Psychology)
 Nguyen, Allison (Graduate, Psychology)

Mentor: Allison Nguyen

Humor, particularly sarcasm or irony, might be especially difficult to coordinate between speakers, as it is easy to misunderstand (Fox Tree, et al., 2020). People also overestimate how sarcastic utterances are and believe that their interlocutors understand when they are being sarcastic, though evidence suggests that people are not good at noticing sarcasm and often believe they have communicated successfully even when their conversational partners report not noticing sarcasm (Fox Tree et al., 2020). Sarcasm and irony are usually studied together and have previously been thought to share a single tone, though the production of sarcastic or ironic phrases can vary (Bryant & Fox Tree, 2005).

In this study, we examine how well people can distinguish between sarcasm and irony, as well as attempting to understand what makes a comment ironic versus sarcastic when people are asked to identify them. We constructed stimuli based on a method adapted from Fox Tree et al., 2020, where speakers produced comments while looking at pictures of celebrities attending the Met Gala. We collected written comments on celebrity outfits. These comments will be normed on whether they are sarcastic or ironic. Participants will view the celebrity outfits, read the comments, and give two judgements, using a method adapted from Fox Tree, et al., 2020. They will first evaluate how sarcastic they find the comment, and why, and then they will evaluate how ironic they find the comment, and why. We plan to collect 80 participants from a Midwest research institution and the study is expected to be completed by March of 2026. We predict that participants will detect sarcasm and better explain why a comment is sarcastic rather than ironic.

Sarcasm and irony are double-edged swords. For social and practical implications, they can be used to convey humor, solidarity, and culture of various groups; however, they also run the risk of misunderstanding one another, and when used in less secure relationships can lead to feelings of hostility. Something deemed humorous or witty in one culture may not be viewed as such in another. This has broad implications for the development of artificial speech agents, as human-like conversational agents should be able to be both sarcastic and ironic.

SLEEP PATTERNS AND THIER IMPACT ON COGNITIVE PERFORMANCE AND EMOTIONAL WELL-BEING

Presenter(s): Castillo, Natalia (Undergraduate, Psychology)

Mentor: Dawn McBride

Authorship: Natalia Castillo

Sleep plays a vital role in both cognitive and emotional functioning. On average, an adult requires about 7-9 hours of sleep each night. During sleep, the body engages in essential restorative and regulatory processes that support brain health, memory, emotional regulation, and overall well-being. However, the extent to which sleep influences daily performance may vary depending on various factors. The purpose of this study is to examine the relationship between sleep habits, cognitive functioning, and mood in daily life. Participants will complete a one-week self-report survey answering questions regarding sleep quantity and quality, daily cognitive functioning, and mood during this period. Other variables, such as caffeine intake, physical activity, and screen time, will also be measured and may influence sleep, cognitive functioning, and mood. Some of the data will be collected through applications such as sleep, fitness, and screen time trackers. This study is expected to show that lower sleep quality and quantity will negatively impact cognitive performance and mood, but these effects may be influenced by caffeine consumption, screen time, and/or physical activity, which can increase or decrease their effect. This study aims to improve the understanding of how sleep and everyday behaviors interact with cognitive performance and emotional well-being while promoting healthier lifestyle choices.

Keywords: Sleep habits, cognitive functioning, mood, physical activity, screen time, caffeine

HOW MUSIC CHANGES EMOTION AND HOW ATTACHMENT STYLE MAY INFLUENCE IT

Presenter(s): Colon, Janedis (Undergraduate, Psychology)

Mentor: Suejung Han

Music is known to strongly influence emotions and mood, but people do not all respond to music in the same way (Verling, 2020). Research suggests that attachment style may explain these differences, as individuals with anxious attachment tend to use music more for emotional processing and comfort, while avoidant individuals show weaker emotional engagement with music (Andersson, 2017). This supports the idea that music can act as a form of emotion regulation, especially for those with insecure attachment styles (Andersson, 2017). Building on this framework, the present study examines how listening to emotionally valenced music after reading a short story influences participants' reflective emotional responses and interpretation of the story, and whether attachment style moderates these effects. Participants will be randomly assigned to one of three conditions: (a) a sad story followed by happy instrumental music ("I Want You Back"), (b) a happy story followed by sad instrumental music ("Sad Emotional Piano"), or (c) a control condition in which the story is read in silence. Mood and emotional responses will be assessed at baseline, after reading, and after music exposure. It is hypothesized that listening to music after reading will change how people think and feel about the story, but the size of this effect will depend on participants' attachment style. Participants with anxious attachment are expected to show the biggest changes in emotion, those with avoidant attachment are expected to show little change, and securely attached participants are expected to show moderate changes. These results could help us understand how music can change emotional reflection and how different attachment styles affect the way people process emotions.

MIXING PERSONALITIES: HOW EXTRAVERSION AND AGREEABLENESS INFLUENCE TEAM OUTCOMES IN COGNITIVE TASKS.

Presenter(s): Costello-Southfield, Sean (Undergraduate, Psychology)
Tampa, Lindsey (Undergraduate, Psychology)
Taylor, Sean (Undergraduate, Psychology)
Burcheri, Gabriel (Undergraduate, Psychology)
Alas Espana, Carlos (Undergraduate, Psychology)

Mentor: Burak Ozkum

Authorship: Sean Taylor, Noah Mansour, Lindsey Tampa, Sean Costello-Southfield, Seren Burak Ozkum

Problem/Purpose: The present study will examine how emergent cognitive and affective states mediate the relationship between the mechanistic personality variables of extroversion and agreeableness, as they relate to group performance on a novel task involving interdependent roles. Agreeableness has been shown to promote empathy, trust, and cooperation within groups which may facilitate cohesive, pleasant interactions (Graziano & Eisenberg, 1997). Similarly positive, extroversion has been shown to promote participation and effective social engagement (Humphrey et al., 2007). Additionally, extroversion has been shown to promote creative thinking and idea generation within groups (Jung et al., 2012); these effects, however, are contingent upon the degree to which the group can effectively coordinate and implement contributions. In exceedingly high levels, either trait may lead to conformity or domineering leadership that may tip the scale out of balance. Current literature has indicated that moderate levels of extroversion and agreeableness are most conducive to performance, with one study concluding a U-shaped curvilinear relationship suggesting higher levels may impose a hinderance to performance (Cur?eu et al., 2018). Prior meta-analytic findings further suggest that additional contextual factors may influence how personality traits predict performance and account for inconsistencies between studies, such as through the mediating group processes of communication, coordination, and shared cognition (Peeters et al., 2006). The present study seeks to address these inconsistencies by examining the relationship between these emergent group processes and the personality traits of extroversion and agreeableness in predicting group performance. **Procedure:** Participants will include undergraduate and graduate students from Illinois State University, haphazardly assigned to three-person groups based on scheduling. Groups will play a shortened version of the cooperative board game Pandemic, which features several distinct interdependent roles where communication and strategic planning are conducive to success. Participants will then complete a Big Five-based inventory measuring extraversion and agreeableness, along with ratings of group performance and satisfaction. **Expected Results:** We expect mixed-trait groups to outperform homogenous groups with the assistance of positive emergent states mediating personality composition and performance on the interdependent task. As we are finalizing the conceptualization phase, we expect data collection to begin, at the latest, by early next year and to conclude no later than next April in time to present. **Conclusions/Implications:** Findings will clarify how balanced personality composition, mediated by emergent processes, predicts team success.

WITNESSED VIOLENCE AS A PREDICTOR OF SUBSTANCE ABUSE OUTCOMES AMONG ADOLESCENTS

Presenter(s): Curry, Ava (Undergraduate, Psychology)

Mentor: Joanne Savage

Problem: Adolescence is a unique and critical period of human development, in which rapid changes influence how adolescents feel, think, make decisions, and interact with the world around them (World Health Organization [WHO], 2026). In recent years, the developmental literature has emphasized “Adverse Childhood Experiences (ACEs).” One adverse experience of note is exposure to violence, and this is particularly relevant, given that previous research suggests that adolescents are two to four times more likely to witness violent behaviors than directly experience them (Richters and Martinez, 1993). It is unknown, however, if witnessing violent behaviors is associated with adolescent substance abuse. The proposed study presents an analysis of secondary data to test whether witnessing violence during adolescence predicts substance abuse in the transition to adulthood.

Method: Data came from the 1995 Correlates and Consequences of Juvenile Exposure to Violence in the United States dataset, a publicly accessible survey assessing adolescents’ exposure to violence and subsequent participation in delinquent activities, including alcohol and drug use. The analytic sample included 4,023 adolescents, aged 12-17. Witnessing violence and substance use were assessed through validated self-report measures. I will use multivariate analyses to estimate associations, accounting for potential confounding factors.

Results: I hypothesize that witnessing violence will be positively correlated with later substance abuse and dependence in the transition to adulthood.

Conclusions and Implications: Findings are expected to contribute to a deeper understanding of the impact of ACEs and how indirect exposure to violence shapes substance use trajectories for adolescents. The inclusion of both alcohol and drug substance abuse and dependence may help to encourage future research regarding the relationship between witnessed trauma and adolescent health outcomes.

A QUALITATIVE INVESTIGATION INTO SIBLINGS AS ETHNIC-RACIAL SOCIALIZATION AGENTS

Presenter(s): Cutshall, Teagan (Undergraduate, Psychology)
North, Addyson (Undergraduate, Psychology)
Gross, Lauren (Undergraduate, Psychology)

Mentor: Laura Finan

Co-Mentor: Chang Su-Russell

Authorship: Laura Finan, Chang Su-Russell, Teagan Cutshall, Addyson North, Lauren Gross

Purpose: Ethnic-racial socialization is a process that helps shape individuals' racial and cultural identity, understanding, and beliefs (Hughes et al., 2016). Research on this socialization highlights its protective effects as it prepares youth for potential discrimination and contributes to positive development (Hughes et al., 2006; Umaña-Taylor & Hill, 2020). Much of existing research focuses on parents as the primary socialization agents, ignoring other important agents within the family system, including siblings. Studies have long demonstrated the powerful role of siblings across developmental and adjustment domains (Buist et al., 2013; Backer-Grøndahl & Nærde, 2017; Smith, 2020; Whiteman et al., 2016), but their role in ethnic-racial socialization processes (e.g., cultural socialization, preparation for bias, promotion of mistrust, an egalitarianism) is not yet understood, despite calls for research (Su-Russell & Finan, 2022). Therefore, using a qualitative approach, this study explored the role of siblings in the ethnic-racial socialization process.

Procedure: Young adult college students who had a sibling were invited to complete an online survey about their ethnic-racial socialization from family members and adjustment outcomes. Participants who reported having at least one ethnic-racial socialization process from siblings were invited to participate in an additional follow-up interview in which they were asked to reflect on their experiences with learning about ethnicity and race. In total 17 (Mage = 19.59; SD = 2.50; 88% female; 52% Non-Hispanic White) interviews were completed in a virtual setting with a research team member.

Results: After the interviews, data were transcribed and checked for accuracy by multiple research team members. Currently, all interviews have been initially coded and are being reviewed to explore higher order themes, aligned with the thematic analysis process outlined by Braun and Clarke (2008). Our preliminary analyses reveal that siblings are indeed important socialization agents. We anticipate that the coding process will be complete by January 2026 as we will continually work on data reduction throughout the remainder of the year.

Implications: Findings from the current study highlight the importance of including siblings in the study of ethnic and racial socialization and suggests new possibilities for understanding how this socialization occurs in different family relationships.

RELATIVELY STIGMATIZED MENTAL DISORDERS AND CLINICAL DECISION MAKING AMONG NURSING AND CLINICAL COUNSELING STUDENTS

Presenter(s): Dasovic-Walker, Anna (Undergraduate, Psychology)
Thorson, Fern (Undergraduate, Psychology)

Mentor: Allison Nguyen

Authorship: Anna Dasovic-Walker, Fern Thorson, Allison Nguyen

The stigma around mental illness still exists in clinical settings. Certified emergency nurses demonstrated higher levels of stigma towards mental illness than non-nurses (McIntosh & Jacobowitz, 2024), and while mental health professionals were found to have explicitly positive attitudes towards mental health, their implicit attitudes were still negative (Brener et al., 2013). This stigma is particularly unevenly applied to certain disorders. Depression and anxiety were frequently reported to be the least stigmatized by healthcare professionals, however patients with personality disorders were treated as “frustrating” or “difficult” (Jauch et al., 2024), (Putman, 2008). This phenomenon, known as relative stigmatization, as described by Jauch et al. (2024), colors mental health professionals’ perceptions and expectations of patients. The names of some disorders alone can cause clinicians to have worse opinions on their patients compared to patients who exhibit the same behavior but are not labeled with a stigmatized disorder name (Newton-Howes et al., 2008). To test how relative stigma impacts clinical decision making, nursing and clinical counseling students will be asked to give a professional opinion on a fake patient case for one of three disorders; depression, narcissistic personality disorder (NPD), and substance abuse disorder (SAD). Participants would see one of three conditions for the fake case; disorder name only, disorder symptoms as listed in the DSM-5 only, or disorder name and symptoms. They would then be asked to select a treatment they find appropriate and rate the severity of the proposed treatment. We predict cases mentioning NPD by name will be evaluated more harshly than the symptom picture of NPD alone; however, cases describing the behavior associated with SAD will be evaluated more harshly than by name alone. Depression, being the least clinically stigmatized, will likely not see much variation across the three conditions. By examining the way stigma impacts future health professionals’ decision making, we can improve the way we diagnose and treat mental illness.

COMPARING THE WELLBEING OF ELEMENTARY SCHOOL AND SECONDARY SCHOOL TEACHERS

Presenter(s): Dinnsen, Lauren (Undergraduate, Psychology)

Mentor: Adena Meyers

Authorship: Lauren Dinnsen, Adena Meyers

Although elementary and secondary school teachers represent the same line of work, their experiences differ in terms of teaching priorities and motivations for staying in the profession. Some contrasting priorities center around having a good relationship with staff, freedom in the classroom, and interest in the subjects taught (Marston et al., 2005). As a result, teachers at different grade levels likely require different supports to increase job satisfaction. Job satisfaction has been identified as a pivotal factor influencing teacher retention, burnout, and instructional delivery (Lüleci & Çoruk, 2018; Soe & Alegado, 2024). A comparison between elementary and secondary teachers' well-being and job satisfaction may increase our understanding of how to support all teachers.

University researchers collaborated with a nearby school district to survey teachers on job demands, satisfaction, and burnout. Subscales derived from the National Teacher and Principal Survey measured job satisfaction ($\alpha = .860$) and support from administration ($\alpha = .874$). Burnout was measured with the Oldenburg Burnout Inventory, which includes two 8-item subscales measuring disengagement and exhaustion. Lastly, turnover intentions were measured through a survey question about likelihood of looking for another job within the year. This study investigated 6 elementary schools with K–5th graders and 2 secondary schools with 6th–12th graders, totaling 153 participants. Independent samples t-tests were conducted to compare the responses of elementary and secondary school teachers on each of the variables.

My data shows that elementary teachers perceived more support from colleagues compared to secondary teachers. Interestingly, they also reported marginally higher levels of emotional exhaustion and turnover intentions. There were no significant differences in work satisfaction or emotional disengagement between the school levels.

Compared to secondary teachers, elementary teachers reported a greater level of support from staff but had marginally higher emotional exhaustion levels and marginally higher turnover intentions. On the other hand, there was no significant difference in job satisfaction and disengagement-related burnout between secondary and elementary school teachers. The results pinpoint areas of growth for teachers' well-being, and how to promote a healthy and positive work environment for all teachers. Despite reporting more support from colleagues, elementary teachers may encounter job demands that lead to burnout and turnover.

EMOTION REGULATION AND SUBSTANCE USE IN COLLEGE STUDENTS: THE ROLE OF CONSCIENTIOUSNESS

Presenter(s): Donnelly, Caitlyn (Graduate, Psychology)

Mentor: Jeffrey Kahn

Authorship: Caitlyn Donnelly, Jeffrey Kahn

Difficulties in emotion regulation have been consistently linked to substance use among college students. However, individual differences may influence this relationship. Conscientiousness, a personality trait characterized by self-control, planning, and goal-directed behavior, has been proposed as a potential protective factor.

The present study examined associations among difficulties in emotion regulation, conscientiousness, and substance use behaviors, as well as whether conscientiousness moderates the relationship between emotion regulation difficulties and substance use. Using a quantitative, cross-sectional, correlational design, data was collected from college students recruited through a university participant pool. Participants completed self-report measures of emotion regulation difficulties, conscientiousness, and substance use via Qualtrics. Due to positive skew in substance use frequency variables, dichotomous indicators of substance use were used in analyses.

Pearson correlations indicated that greater difficulties in emotion regulation were associated with lower conscientiousness and with greater cannabis and illicit substance use, but not with alcohol or electronic cigarette use. Higher conscientiousness was associated with lower electronic cigarette, cannabis, and illicit substance use. Substance use indicators were significantly and positively correlated with one another, with alcohol use showing particularly strong associations with electronic cigarette and cannabis use, and moderate associations observed between cannabis and illicit substance use. Moderated multiple regression analyses indicated that conscientiousness did not significantly moderate the relationship between difficulties in emotion regulation and substance use. These findings suggest that emotion regulation difficulties and conscientiousness independently contribute to substance use risk among college students

RACIAL SOCIALIZATION AMONG COPARENTS

Presenter(s): Edwards, Tatiana (Graduate, Psychology)

Mentor: Chang Su-Russell

Racial socialization is a significant component of a child's development influenced by parental values and experiences. Explicit discussions about race benefit minoritized children and youth (Perry et al., 2022) as well as in White families (Katz, 2003). Most research (some recent publications on white and minoritized families) focuses on one parent from the participating families rather than considering the family systems (Cox & Paley, 1997; 2003). For example, for families who have two parents or parenting figures, racial socialization is likely to involve both partners. Additionally, extended families may also play important roles, especially among the single-parent household. In the current study, we explore the coparenting dynamics on a specific aspect of daily conversations, i.e., when skin color or race emerges in their daily life brought up by their children or the families were exposed to an opportunity for further discussions. We interviewed 10 families whose family backgrounds vary by multiple demographic characteristics (family structures, sexual orientation, nationality, relationship statuses). In each participating family, there is at least one child in their early childhood. We conducted interviews virtually via Zoom and asked the participants about their relationship quality, coparenting relationship, and about their experiences in the discussions of race. Two researchers coded the transcripts independently and met frequently to discuss our coding to reach agreements. Our inductive coding reveals three emerging themes: (1) Though each family expressed that their coparenting relationships are supportive and healthy, on the topic of racial socialization, families varied in the levels of (dis)agreements. Some coparent dyads both adopted the color conscious approach, whereas in other families, the coparent dyads can hold different beliefs with one leaning towards the colorblind approach and the other navigating the color conscious approach. (2) Various racial socialization approaches are influenced by parents' social locations where their past experiences, upbringing, educational training, and current employment. (3) Another key theme that influenced racial socialization included children's exposure to racial diversity and children's perspectives on race. Children who expressed curiosity and asked questions regarding race helped determine how detailed and specific the parents elaborated on race. Critical race theory highlights how these findings can be structured and influenced by systemic and structural understandings of race while addressing the gap in the research can better support families in fostering intentional, cohesive racial socialization practices.

DEVELOPMENT AND VALIDATION OF READINESS FOR CHANGE FOR OPENNESS TO DIVERSITY SCALE

Presenter(s): Faudoa, Marisol (Undergraduate, Psychology)
Barrera, Kruz (Undergraduate, Psychology)
Clark, Jenna (Undergraduate, Psychology)
Mao, Charlisa (Graduate, Psychology)
Vankeuren, Reed (Undergraduate, Psychology)
Wesselhoff, Beckham (Undergraduate, Psychology)

Mentor: Suejung Han

Authorship: Suejung Han, Marisol Faudoa, Kruz Barrera, Jenna Clark, Charlisa Mao, Reed Vankeuren, Beckham Wesselhoff

Diversity interventions are widely used across higher education and organizational contexts to foster inclusion and equity. However, findings on their effectiveness have been mixed—some interventions producing negligible effects, and others producing unintended consequences such as backfire (e.g., Thoman et al., 2021; Zhao et al., 2025). These responses may arise when individuals perceive diversity-related content as inconsistent with their values or identity, leading them to disengage or reject intervention messages. One factor for this variability in response is individuals' readiness for change in openness to diversity.

Drawing on the Transtheoretical Model of Change (Prochaska & DiClemente, 1983), we developed and conducted preliminary validation of a measure for readiness for change for openness to diversity. To establish content validity, we reviewed literature on openness-to-diversity constructs and existing readiness-for-change instruments on other behavioral/attitudinal domains, identifying key conceptual features of the Precontemplation, Contemplation, Preparation, Action, and Maintenance stages. Based on this, we generated an initial pool of items representing each stage (7 items for each stage=35 items).

A total of 323 undergraduates participated in an online survey for research credit. The survey included the newly developed Readiness for Change in Openness to Diversity Scale, the Miville–Guzman Universality–Diversity Scale Short Form (MGUDS-S; Fuertes et al., 2000), the Critical Consciousness Scale (CCS; Diemer et al., 2017), and a Social Desirability Scale (Marlowe & Crowne, 1960) for construct and discriminant validity testing.

Preliminary analyses indicated that Precontemplation scores were negatively associated with MGUDS ($r = -.33$, $p < .001$) and CCS scores ($r = -.20$, $p < .001$), whereas the strength and direction of correlations shifted progressively across later stages ($r = .32 \sim .70$, all $p < .001$ for MGUDS scores, $r = .33 \sim .46$, all $p < .001$ for CCS scores). These patterns support the scale's stage-based structure and construct validity. Internal consistency estimates for the five subscales ranged from $\alpha = .70$ to $.91$. Associations with social desirability were nonsignificant for all subscales except the Maintenance stage ($r = .13$, $p = .027$). Exploratory and confirmatory factor analyses with a new sample will be conducted by February 2025 and full results will be reported at the conference.

These findings provide initial support for a readiness-based approach to understanding individuals' engagement with diversity interventions. The measure may be valuable for assessing audience readiness and for tailoring intervention content to meet individuals where they are in the change process, thereby improving receptivity and reducing defensive responses.

DO INDIVIDUALS RECALL EXPERIENCING DISPARAGING HUMOR AS A TYPE OF EXCLUSION

Presenter(s): Feiger, Rachel (Undergraduate, Psychology)

Mentor: Kimberly Schneider

Co-Mentor: Eric Wesselmann

Authorship: Rachel Feiger

Purpose: Disparaging humor is a joke that insults or devalues an individual or group of individuals. Individuals often use this type of humor to express prejudice that allows them to deflect or outright to evade criticism for making inappropriate remarks. Humans have an innate ability to belong – to forge meaningful relationships with others. Social exclusion – social situations that make individuals feel physically or psychologically isolated from others – threaten individuals' need to belong and cause myriad negative physical and psychological consequences.

Project Methodology: Participants were randomly assigned to an adapted recall paradigm in which they were asked to recall a specific autobiographical event in detail. They typed these details into a text box and then answered several rating scale questions about how they felt during the event they described. Participants either recalled a time in which they "heard someone tell a joke that insults a social group that you belong to" or recalled "yesterday afternoon" (control condition). Afterwards, participants completed items indexing their recalled feelings of relational devaluation, perceived ostracism (i.e., being ignored and excluded), and basic need satisfaction during the event they described. Participants were asked the degree to which their group affiliation that was targeted by the joke was important to their identity.

Results: We will analyze data ($n = 46$) to focus on descriptors of the types of incidents recalled in the exclusion condition along with coding the types and intensity of emotions expressed in recalling the incident. We also expect that participants in the disparaging humor condition will recall feeling more relationally devalued, more ostracized, and recall less basic need satisfaction during the event than participants in the control condition. We screened data in the control condition to remove any participants who recalled experiencing disparaging humor (or some other established type of social exclusion) the previous afternoon to reduce contamination of results. Initial correlational analysis indicated that there was a significant positive correlation between intensity ratings of the incident and the numbers of words written by the participant, $r(44) = .33$, $p = .027$, indicating that more intense experiences were associated with longer descriptions.

Implications: Preliminary findings suggest that higher intensity was linked to longer descriptions, highlighting the potential role of perceived severity in shaping how individuals recall and communicate experiences of exclusion.

SEXUAL PAIN AND PLEASURE IN COLLEGE STUDENTS' FIRST-TIME HAVING SEX

Presenter(s): Fontes, Camila F. (Undergraduate, Psychology)

Mentor: Kelly Clemens

Co-Mentor: Kyla Cary

Authorship: Camila Fontes Fialho, Kyla Cary, Kelly Clemens

Previous research has aimed to find the role of response expectancy in pain during vaginal intercourse; the current research aims to expand what was previously studied, focusing on people who haven't had sex and how they feel after having it for the first time. The present study also aims to understand how people's beliefs about sex and its pain and pleasure affect their future sexual experiences. This research was done in a survey form, divided into two waves: the first wave was open to all college students. Participants were asked a variety of questions; including their beliefs on pain and pleasure during sex (e.g., if they think sex is painful and pleasurable), their current anxiety, depression, and stress diagnosis (measured by using the DASS-7), and general questions about sex education they've received. A month later, students who qualified for the follow-up survey (the ones who were assigned female at birth and hadn't had intercourse), completed a similar survey which asked if they have had intercourse since the last survey was sent. Some of the questions from the second wave served for measurement (e.g., DASS-7) and others were used to find a correlation (e.g., previous pain catastrophizing and if sex has been a painful experience). We expect to find similar results to the previous research, which indicated that response expectancy and pain catastrophizing are significant in both pain severity and frequency, and to find a negative correlation between sexual pain and pleasure. This research is important because it explores the moment in which people experience their first time having intercourse and if there are factors impacting their experiences of pain and pleasure. The results can be used to improve sex education among emerging adults and to better understand gynecological pain during sex.

TEMPORARY ALCOHOL ABSTINENCE CHALLENGE AMONG COLLEGE STUDENTS

Presenter(s): Gross, Lauren (Undergraduate, Psychology)
Schuur, Kylie (Undergraduate, Psychology)

Mentor: Laura Finan

Authorship: Lauren Gross, Kylie Schuur

Purpose: Sober curiosity and temporary alcohol abstinence challenges (TAACs) are on the rise (NIAAA, 2024). Studies suggest that TAACs have positive effects on health and drinking outcomes, including post-challenge decreases in drinking behavior and improved physical and mental wellbeing (Butters, 2023). Despite this, existing literature has largely relied on samples from the UK and of those in mid-life, ignoring some of the most common drinkers, college students. College student drinking is common and is associated with a range of adverse outcomes (NIAAA, 2025). To our knowledge, no other studies have explored TAACs among this population. Therefore, modeling extant research on the Sober October TAAC, we conducted an exploratory pilot study of a TAAC among college students to examine the cognitive and motivational factors that contribute to success in completing this challenge.

Procedure: Participants included college students ($N=91$; $M_{age}=20.98$, $SD=2.67$, 75.8% female) from a large Mid-Western university. In September 2025, participants completed a background and demographic survey which assessed their (a) drinking motives (Drinking Motive Questionnaire-Revised; Kuntsche, 2006), (b) positive and negative drinking expectancies (Comprehensive Effects of Alcohol Questionnaire; Fromme, 1993), and (c) positive and negative urgency (UPPS-P; Lynam et al., 2006). After completing this survey, they were contacted via email to formally enroll them in the TAAC. Throughout the challenge, participants were sent emails with information about participating in TAACs (e.g., tools for preparing for people's reactions, way to avoid drinking contexts, suggestions for events in the community, etc.) and text messages (e.g., reminders about the TAAC, words of encouragement, ways to prepare for the weekend and drinking event exposures, etc.). As the TAAC just ended, participants have now been invited to complete their post TAAC follow-up online survey which assesses their experiences in the TAAC and their past month alcohol use.

Results: Post TAAC follow-up data collection is underway, and we plan to have this process completed by the end of the Fall 2025 semester. To address the proposed research questions, we will use logistic regression analyses to examine associations between alcohol expectancies, drinking motives, and urgency with the outcome variable of whether participants completed the TAAC. Models will include age and gender covariates. Data cleaning and management will continue to occur throughout the data collection phase to ensure the project is completed in time for the conference.

Implications: Current study findings extend the TAACs literature to a high-risk drinking group and may inform prevention efforts for colleges.

DISABILITY DISCLOSURE IN HIGHER EDUCATION: LANGUAGE USE AND EXPLICIT PRIMING EFFECTS ON DECISION-MAKING

Presenter(s): Guthrie, Alison (Graduate, Psychology)

Mentor: Allison Nguyen

Authorship: Alison Guthrie, Marlie Woolever, Victoria Walsh, Kino Gomez, Kobe Aguzar, Allison Nguyen

Disclosure of disability in higher education plays a pivotal role in ensuring equitable access to accommodations and support, yet many students exhibit reluctance to disclose (Toutain, 2019). Low disclosure rates represent a growing problem for students with disabilities and highlight a need for research within this population. This study investigates the influence of language framing and explicit priming on students' disclosure of disability. Using a between-subjects experimental design, participants will be randomly assigned to one of six conditions in a 2 (prime vs. no prime) $\times$ 3 (disability framing, health framing, social framing) factorial design. The priming conditions include a list of categories for health conditions along with examples designed to activate awareness related to the framing type, while the control condition does not involve a prime. Participants will be asked whether they have a disability, health condition, or health barrier, depending on framing. Comparisons between secondary and postsecondary disability support will be analyzed, along with questions used to determine predictive variables for disclosure, including perceived stigma, attitudes, norms, and self-efficacy. Because college students do not identify with disability-related question framings (Lister, 2020), and because common conceptions of disability remain limited (Couzens et al., 2015), it is predicted that both the presence of a prime and question framing will significantly affect disclosure rates in the health and social framings compared to the disability framings. Findings from this study will highlight the importance of linguistic and contextual cues in shaping disclosure behaviors and suggest practical implications for institutional communication strategies aiming to foster more inclusive environments for students with disabilities.

TORNADOES WITH A CHANCE OF MISUNDERSTANDING: LINGUISTIC SIGNALING OF PROBABILISTIC INFORMATION IN TORNADO-RELATED COMMUNICATIONS

Presenter(s): Guthrie, Alison (Graduate, Psychology)

Mentor: Allison Nguyen

Authorship: Alison Guthrie, Fern Thornson, Angelina Owens, Vanessa Jodlowski, Allison Nguyen

Climate change has resulted in a geographic shift in a region of the United States known as Tornado Alley, an area prone to frequent tornadic activity. This shift represents a growing risk for the Midwest and specifically, the state of Illinois (Agee et al., 2016). For severe weather risk communications to result in protective action that prevents loss of life and destruction of property, individuals must accurately comprehend warnings related to tornadoes (Lindell & Perry, 2012). Few studies have investigated tornado watch and warning comprehension, with no studies investigating risk-perception and comprehension in the state of Illinois. The present study investigates comprehension of tornado risk-communications and understanding of differences between tornado watches and tornado warnings while evaluating understandings of probability of occurrence and appropriate protective action, given each type. Definitions will be coded for accuracy based on definitions used by the National Weather Service. Participants will be asked to define tornado watches and warnings, assign probabilistic values to general and specific tornado occurrences, select appropriate protective actions for each, and interpret probabilistic statements used by common media to describe tornado threat. Numeracy, the ability to accurately understand and interpret probabilistic information, will be assessed using the Berlin Numeracy Test and serve as a predictive variable (Cokely et al., 2012). It is hypothesized that those scoring high in numeracy will have a better understanding of the overall probabilistic risk of severe weather implications, as well as appropriate protective action. Findings from this study will inform strategies to improve tornado risk communication, as well as what actions should be taken, given the type of warning. Results will enhance public safety in a region facing increasingly severe weather threats.

PREDICTING JOB SATISFACTION: THE ROLE OF WORK ENVIRONMENT, SOCIAL BELONGING, AND CHANGE READINESS

Presenter(s): Hindman, Katie (Undergraduate, Psychology)
Williams, Sarah (Graduate, Psychology)

Mentor: Kimberly Schneider

Authorship: Katie Hindman, Sarah Williams

Purpose: Job satisfaction contributes to many aspects of a workforce due to its effects on overall workplace attitudes. Previous research shows that elements such as work environment, social belongingness, and change readiness can be the strongest indicators of job satisfaction and well-being in the workplace. This study examines the effects of these three key elements on the employees' well-being and which can be the strongest predictor of job satisfaction. Based on prior studies (Reyne-Pugh et al., 2020; Winter-Collins, 2000; Moric-Milovanovic et al., 2022), it is hypothesized that social belonging will have the strongest effect on job satisfaction, compared to work environment and change readiness.

Procedure: 68 employees at The Baby Fold completed the entire anonymous online survey developed and distributed by the research team. The survey covered many areas, including the three key parts the study focuses on: work environment, change readiness, and social belonging. For the work environment section, the questions included preferred lighting, space between others, noise level, etc. Social belongingness included relationships with coworkers and supervisors. Finally, change readiness included questions concerning how each employee would feel about change in certain areas and aspects of the office. Job satisfaction was measured using a scale representing satisfaction with coworkers, supervisors, communication, and compensation. Data were analyzed in SPSS using Pearson correlations and multiple regression.

Results: Correlational analyses showed that job satisfaction was strongly related to social belonging ($r = .74, p < .001$) and moderately related to work environment ($r = .53, p < .001$). Change readiness was not significantly correlated with job satisfaction ($r = -.06, p = .68^*$). * The multiple regression model was significant, $F(3, 52) = 24.27, p < .001$, explaining 58 % of the variance in job satisfaction ($R^2 = .583$). Social belongingness showed to be the strongest predictor of the three and the only significant one as well ($\beta = .69, p < .001$). Work environment ($\beta = .13, p = .24$) and change readiness ($\beta = -.03, p = .76$) were not significant when belonging was added in the set.

Conclusion and Implications: The results supported the hypothesis that social belonging has the greatest influence on job satisfaction. Feeling part of something bigger and feeling connected with others is crucial to the satisfaction of an employee and the organization. Social belonging had contributed the most out of the three categories, representing the importance of cultivating an inclusive and positive social environment to enhance overall employee wellbeing.

THE ROLE OF PERCEIVED BELONGINGNESS IN THE RELATIONSHIP BETWEEN PSYCHOLOGICAL DISTRESS AND SOMATIC SYMPTOMS IN HIGHER EDUCATION STUDENTS

Presenter(s): Hossain, Tasfia (Graduate, Psychology)

Mentor: Laura Finan

Psychological distress and somatic symptoms frequently co-occur among higher education students, yet the role of perceived belongingness in this association remains unclear. Somatic symptoms refer to physical complaints such as pain, headaches, and fatigue that lack a clear medical explanation and are common during emerging adulthood. Guided by the biopsychosocial model and allostatic load theory, the present study examines whether perceived belongingness moderates the association between psychological distress and somatic symptoms in a non-clinical student population.

Participants include approximately 395 students from Illinois State University who complete an online survey assessing psychological distress using the Kessler Psychological Distress Scale, perceived belongingness using the General Belongingness Scale, and somatic symptoms using the Somatic Symptom Scale–8. Regression analyses test whether psychological distress is associated with somatic symptoms while controlling for gender, followed by a moderation analysis using Hayes' PROCESS macro. Data collection and analysis are ongoing, with completion expected by March 2026.

Based on theory and prior research, psychological distress is expected to be positively associated with somatic symptoms, and perceived belongingness is expected to attenuate this association. Findings from this study aim to clarify whether belongingness functions as a buffering or direct protective factor within the mind–body connection among higher education students.

THE EFFECTS OF PHYSIOLOGICAL AND EMOTIONAL AROUSAL AND LIST TYPE ON FALSE MEMORY IN THE DRM

Presenter(s): Jodlowski, Vanessa (Graduate, Psychology)
Mailhiot, Courtney (Undergraduate, Psychology)

Mentor: Dawn McBride

False memories occur when associative networks of information are activated after being presented with a stimulus, such as a word or image. False memories in short-term memory (STM) have also been found to be influenced by certain emotional and physiological states. Previous research using the Deese-Roediger-McDermott (DRM) (1995) paradigm has shown false memories in the STM to occur when studying varying list types and stimuli as well. While mood has been shown to affect false memory formation, variation in methodological procedures and challenges with mood state measurement has produced inconsistent findings. The current study aims to examine the relationship between arousal, along with list type (semantic vs. phonological) on false memory at a short-term delay. The relationship between the two mood dimensions of valence and arousal will also be explored to address the lack of consistent findings. Participants will receive either a fear (low valence, high arousal) or sadness (low valence, low arousal) mood induction. It is hypothesized that the low arousal condition, compared to the high arousal condition, will show lower rates of false memories. It is also hypothesized that false memories will occur more frequently for phonological lists than semantic lists. Lastly, it is hypothesized that phonological lists will show greater rates of false recognition than semantic lists in high arousal groups than low arousal groups. Exploring these relationships will provide more clarity on the effect of mood states, such as arousal, on memory performance in STM, which can help bridge the inconsistent findings for mood effects on false memories in STM.

POSTER CANCELLED

EVALUATING AI RELIABILITY FOR ACCURATE WORD COUNT AND SPELLING ERRORS

Presenter(s): Kowalski, Courtney (Graduate, Psychology)

Mentor: Gary Cates

Artificial Intelligence tools are entering educational settings. The focus of utilizing AI will undoubtedly be centered on making work tasks for educators and school psychologists more efficient and effective. However, despite these tools being used for text analysis and grading tasks, their accuracy remains largely untested. This study examines AI reliability in facilitating the evaluation of writing probe responses. This preliminary investigation focuses on evaluating the extent to which AI platforms can be used to detect spelling errors and word counting functions that may impact educational decisions related to common Curriculum-Based Measurement (CBM) variables (Hosp et al. 2016).

Our research uses modified 6th grade Curriculum-Based Measurement (CBM) probes with predetermined error counts across 15 standardized passages. Multiple AI systems processed identical prompts requesting spelling error identification and word counts. The 15 passages were edited to contain specific error counts: three probes with 15 errors, 20 errors, 10, errors, 5 errors, and 0 errors. CBM probe word counts ranged from 286 to 312 words across all problems, maintaining consistency in text length while varying error density. Technical adequacy is evaluated through multiple reliability measures, including inter-system reliability (i.e., across platform) and test-retest consistency (i.e., within platform).

Initial findings show variability between success in error detection and total word count across AI platforms (i.e., Gemini, DeepSeek, Perplexity, and ChatGPT). Expected outcomes include higher rates of accuracy in spelling error detection across all AI platforms, but lower rates of accuracy in total word count across all AI platforms.

Limitations prevented some systems from completing tasks, highlighting validation needs before implementing AI into high-stakes contexts like grading or evaluating students' skills. Further limitations include testing only specific AI models and English text samples. Results may not generalize to all educational contexts or multilingual settings.

This study is grounded in established Curriculum-Based Measurement (CBM) theory, which provides a solid framework for evaluating the reliability and validity of educational assessment tools. CBM emphasizes specific characteristics that can be adapted to AI text analysis evaluation: technical adequacy through standardized procedures, measurements with clear specifications, and repeated measurement to establish performance patterns (Hosp et al. 2016)

SHADES OF PRESSURE: SKIN TONE MESSAGES AND APPEARANCE-ALTERING BEHAVIORS

Presenter(s): Marroquin, Julianna (Undergraduate, Psychology)
Marin, Molly (Undergraduate, Psychology)

Mentor: Caitlin Mercier

Authorship: Caitlin Mercier, Julianna Marroquin, Molly Marin

Tanning and skin lightening are two sides of the same coin, driven by pressure to meet unrealistic beauty standards. Using semi-structured interviews, this qualitative study examined how messages about skin tone impact skin-altering behaviors and mental health among nine undergraduate students at a Midwestern university. Thematic analysis yielded five themes, including messages from peers, family, and society that favored certain skin tones and reinforced tanning behaviors. Participants described both social and internal pressures to be tan, as well as emotional responses to their skin tone, including increased confidence and improved mood when tan. These messages influenced decisions to engage in skin-altering behaviors despite awareness of negative health outcomes. Consistent with prior research, tanning remains common due to appearance-related motivations, even when individuals are aware of health risks. These findings highlight the need for mental health professionals, researchers, and policymakers to address skin tone-related appearance pressures in efforts to reduce risky skin-altering behaviors among college students.

EXAMINING INCIDENTAL REMEMBERING OF OBJECT PROPERTIES SPECIFIED BY DIFFERENT INVARIANTS

Presenter(s): McAuliffe, Jillian (Undergraduate, Psychology)
Hishinuma, Sanako (Graduate, Psychology)

Mentor: Jeffrey Wagman

Everyday tasks rely heavily on haptic perception, from grabbing a backpack off the floor to gripping and controlling a steering wheel while driving. Arguably, how people heft and wield objects is the most well-investigated realm of haptic perception. The ecological approach hypothesizes that perception of object properties — such as weight, length, shape, orientation, and grip position — is determined by selective sensitivity to invariant mechanical properties. In haptic perception, rotational inertia serves as such an invariant, and detecting different aspects of rotational inertia allows individuals to perceive different object properties. For example, perceiving length and heaviness relies on selective detection of the moments of inertia, while perceiving grip position relies on the products of inertia. Previous research found that when an individual attends to the length of an object, its heaviness is remembered without any intention to do so — a phenomenon referred to as incidental remembering, which appears to be due to the shared reliance on the moments of inertia. In the present study, our primary question is whether incidental remembering occurs when the perceived property and the to-be-remembered property do not share the same specifying component. Participants wielded an object while attending to grasp position, or where their hand is on the wielded object, then after it was removed, were asked to recall its heaviness. We hypothesized that incidental remembering would not occur given that grasp position and heaviness rely on different components of rotational inertia.

DOMINANCE AND DISCONNECTION: GENDER NORMS, NARCISSISM, AND PROBLEM GAMBLING

Presenter(s): McDaniel, Sean (Graduate, Psychology)
 Donnelly, Caitlyn (Graduate, Psychology)

Mentor: Dan Lannin

Authorship: Sean McDaniel, Caitlyn Donnelly

Problem gambling represents a significant and understudied mental health concern among U.S. college students, with prevalence estimates substantially exceeding those observed in the general adult population. These rates coincide with the well-documented consequences of problematic gambling on psychological functioning, academic performance, financial stability, and interpersonal relationships. Individual differences in gender norm conformity and personality may play a critical role in shaping gambling risk, yet their unique and joint contributions remain insufficiently explored. Masculine norms emphasizing dominance, competitiveness, and winning are consistently linked to risk-taking behavior, whereas feminine norms emphasizing care, relational orientation, and responsibility may serve a protective function. In addition, narcissistic traits, particularly antagonistic and status-oriented characteristics, are often associated with problematic engagement in high-risk behaviors. The present study examines how specific dimensions of masculine and feminine gender norms and facets of narcissism uniquely predict problematic gambling among undergraduate students.

Undergraduate participants completed an online survey assessing gambling severity using the Problem Gambling Severity Index; conformity to masculine and feminine norms using the Conformity to Masculine Norms Inventory-46 and Conformity to Feminine Norms Inventory-45; and narcissistic traits using the Narcissistic Admiration and Rivalry Questionnaire and the Five-Factor Narcissism Inventory. Relative weights analyses estimate the unique proportion of variance in problematic gambling accounted for by each gender norm and narcissistic trait, with statistical significance determined using 95% bootstrapped confidence intervals.

Across gender identities, greater conformity to traditional masculine norms was associated with higher gambling severity, whereas greater conformity to feminine norms was associated with lower gambling severity. Narcissistic traits characterized by rivalry and antagonism were positively associated with gambling severity, whereas admiration-related facets showed weaker or non-significant associations. In the combined model explaining 27% of the variance in gambling severity, antagonistic narcissism facets and dominance-oriented masculine norms showed positive associations with gambling severity, while relational and romantic feminine norms showed negative associations.

“I LOVE MY APPEARANCE...I WAS MADE THAT WAY”: A QUALITATIVE INVESTIGATION OF SELF-ESTEEM AND BODY IMAGE OF BLACK WOMEN

Presenter(s): Mitchell, Lila (Undergraduate, Psychology)
Gordon, Thalia (Undergraduate, Psychology)

Mentor: Caitlin Mercier

Authorship: Caitlin Mercier, Thalia Gordon, Lila Mitchell

Black women face discrimination, especially regarding feelings about their body image and self-love with research. The main themes we uncovered was confidence regarding self and identity and confidence regarding self-appearance. The intersection between being Black and being a woman comes with a societal pressure to look and act a certain way, here we examined how that may affect a Black woman's sense of confidence. There has been a lack of studies done on Black women regarding their views of self; especially regarding positive feelings of identity and body image. Our findings helped us infer that confidence among Black women in general is present when given the resources to resist societal pressure. A common theme in the responses from this interview is loving features about oneself that historically have been scrutinized. More studies regarding this should be done to more deeply understand how resistance fuels confidence.

EXPLORING HOW GENDERED RACISM AND COLORISM UNDERMINE BLACK WOMEN'S WELL-BEING

Presenter(s): Mwaura, Bridget (Graduate, Psychology)

Mentor: Caitlin Mercier

Authorship: Mannat Kandal, Bridget Mwaura, Caitlin Mercier

Black women often face scrutiny about their appearance rooted in gendered racism and colorism, including stigma surrounding darker skin tones, textured hair, and Afrocentric features (Crooks et al., 2025). These intersecting pressures stem from both externally imposed Eurocentric beauty standards and intragroup colorism, each contributing to diminished mental health, happiness, and overall well-being (Brown et al., 2021; Jones et al., 2024). Appearance-based biases also reinforce gendered colorism and intersectional invisibility, as darker-skinned women are more frequently mis-categorized or overlooked (Bart-Plange & Trawalter, 2025). Despite these realities, the combined impact of internal and external appearance-based pressures remains understudied. Our study addresses this gap by qualitatively examining how these pressures shape Black women's happiness and well-being.

Procedure:

Using archived data from a larger qualitative study of 21 Black women living in the United States, we analyzed responses to one protocol question: "Thinking about the messages and how people treated you as a Black woman with your skin tone, hair texture, and other physical features, how have these impacted your happiness and health?" A thematic analysis was conducted to identify recurring patterns related to self-perception, social experiences, and well-being.

Results:

Three overarching themes emerged: (a) Adverse Experiences, (b) Emotional and Relational Impacts, and (c) Coping through Individual Strategies and Social Support. Participants described systemic dismissal in academic, social, and healthcare settings; social isolation; and exclusion from desired romantic relationships. They also reported experiences of exoticization and gendered racialized fetishization, such as being pursued as an "experiment," commodification of physical features, pressure to alter natural hair, comparisons to foods associated with darker complexions, and frequent comparisons to white or lighter-skinned peers. These experiences contributed to depression, loneliness, stress, and lowered self-esteem. Participants also described ongoing identity negotiation in both Black and non-Black spaces, adjusting their behavior or appearance depending on context. Many relied on personal resilience and community-based support to cope.

Conclusions/Implications:

Findings indicate that cumulative external and internal appearance-based scrutiny is a significant source of emotional distress for Black women. Clinicians should screen for intra-racial trauma and explore appearance policing in therapy to validate these lived experiences. Policymakers must evaluate institutional practices that reinforce Eurocentric standards, and educators should address how appearance policing and stereotyping affect Black women's participation, confidence, and sense of belonging.

LANGUAGE AND PERCEIVED PET CARE REQUIREMENTS

Presenter(s): Owens, Angelina (Undergraduate, Psychology)

Mentor: Allison Nguyen

Authorship: Angelina Owens, Victoria Walsh, Allison Nguyen

The misinformation and marketing strategies surrounding animal care requirements can lead to sub-par living conditions for pets and impulsive attitudes towards animal purchases and adoptions. Impulsively adopting pets can lead to inadequate pet care, or pets with more behavioral issues (Luna-Cortes, 2025). The succinct nature of pet care instructions in stores or online forums makes the language used to describe pet care extremely important, as pets often described as “low-maintenance” are not low-maintenance but rather typically need specialized animal care. The topic is relevant as proper husbandry guidance is easily accessible online, yet often remains under-researched by potential pet owners. This study explores whether the information content and wording used to promote “low-maintenance” pets influence the assumed level of care and research needed for the pet. A within-subjects design was used to determine whether context-based trivializers in basic pet care instructions affect the assumed manageability of potential barriers. We showed participants passages framing pets as either “easy” or “neutral”, and then asked them questions about the assumed amount of care the pet would need. We predict that using selective language to understate the demanding nature of pets will decrease the assumed level of time, research, and funds needed for that animal. This study will explore the influences of language in information content describing pet care requirements, and may help encourage proper research in those seeking an animal companion.

SUPPORTING EDUCATORS AND REDUCING BURNOUT THROUGH WELLNESS PROGRAMMING

Presenter(s): Sanchez, Chelsea (Graduate, Psychology)

Mentor: Adena Meyers

Authorship: Chelsea Sanchez, Adena Meyers, Emily Jones

Educators in two local schools were identified for wellbeing programming by a district-wide survey for educator wellbeing and burnout. After identifying the schools, researchers delivered a six-week intervention focused on topics in wellness during the staff members' lunch periods. Descriptive statistics illustrated an improvement across both years from pre to post test in wellbeing items.

ADOLESCENT FRIENDSHIP QUALITY, SATISFACTION, AND CHANGE THROUGHOUT COVID-19

Presenter(s): Speirer, Jackie (Undergraduate, Psychology)
Alba, Alondra (Undergraduate, Psychology)

Mentor: Jackie Cerda-Smith

Authorship: Jackie Speirer, Alondra Alba, Jackie Cerda-Smith

Purpose: Friendships are important in adolescence; however, adolescent friendships fluctuated during COVID-19 due to less in-person time together (Austin et al., 2025; Patrick & Pamflett, 2025). This longitudinal quantitative study examines (a) friendship change and stability throughout the pandemic, (b) whether friendship quality and satisfaction predict friendship change, and (c) whether friendship quality and satisfaction differ by recent friendship change.

Procedure: The data were collected with adolescents attending a public high school in the Southeastern U.S. every six months, starting in February 2020 (3 weeks before school shut down) and ending in April 2022. At each timepoint, participants nominated their closest friend at their school, reported their satisfaction with this friendship from 1 (very dissatisfied) to 7 (very satisfied), and completed the short version of the Friendship Quality Questionnaire (Weeks & Asher, 2018), which included two subscales: conflict and positive qualities. We created dichotomous variables representing a nomination change between timepoints (0 = no, 1 = yes). The final sample included participants who nominated a close friend at two or more timepoints (N = 435, Magebaseline = 14.87, SD = 1.34), see Table 1 for demographics.

Results: To address our first research question, we examined nomination change frequencies (see Table 2). Most nominations were stable when schooling was online (Time 1 to 2, Time 2 to 3), but almost all nominations changed between Time 3 and 4 (in-person, new school year) and nearly half of the nominations changed from Time 4 to 5. To address our second research question, we conducted a series of binary logistic regressions (see Table 3). Notably, friendship satisfaction at Time 2 predicted nomination change at Time 3 such that participants with a stable friendship reported greater satisfaction than those whose friendship changed. To address our final research question, we conducted a series of independent sample t-tests (see Tables 4,5). Friendship quality and satisfaction did not significantly differ by recent nomination change at any timepoint.

Implications: Our findings demonstrate that some adolescents maintained their closest friendship during the pandemic, especially if they were satisfied with it. However, when returning to school in-person, most nominations changed. Regardless of nomination change or stability, friendship quality and satisfaction were similar. Aligned with prior research (Austin et al., 2025; Patrick & Pamflett, 2025), this descriptive study suggests that schools played an important role in supporting teen friendships during COVID-19

EFFECT OF FORCED RESPONDING AND QUESTION TYPE ON FALSE MEMORY FORMATION

Presenter(s): Troiden, Brenden (Graduate, Psychology)

Mentor: Dawn McBride

This study will examine how the format of questions for which a participant is forced to answer regarding an event that did not occur influences the formation of false memories. Traditionally, experiments involving forced responding and misinformation have used two different types of questions: multiple-choice questions, where participants are asked to select options for events that did not occur, and short-answer questions in which participants are asked to write about an event that did not occur. There has been little research on whether these question types influence results from forced-response studies. This study will consist of two key variables: Type of Question with multiple-choice and short answer questions, and Confabulation Condition with forced responding and no forced responding (given the option to answer "I don't know."). A final test of memory will be conducted following the presentation of these questions. The predicted result is that forced responding with a short answer will result in the highest rate of false memories. These results would support existing theories of how testing effects operate.

MEDIA REPRESENTATION, SOCIAL EXCLUSION, AND IDENTITY

Presenter(s): Walis, Emma (Graduate, Psychology)
Brown, Lynn (Undergraduate, Psychology)

Mentor: Eric Wesselmann

Co-Mentor: Jordan Arellanes

Authorship: Emma Walis, Lynn Brown, Eric Wesselmann, Jordan Arellanes

There have been increased discussions about the importance of having diverse representation in media (e.g., Film and TV shows). Media research predominantly focuses on the effects of positive versus negative depictions of individuals from different identity groups. The prevailing assumption is that a lack of representation is worse than negative representation, yet this is not conclusive. This assertion converges with research on interpersonal social exclusion, which demonstrates that negative attention, feeling invisible, or unworthy of attention is harmful. We hypothesize that media representation can be experienced similarly to interpersonal forms of social inclusion, and a lack of representation can be experienced similarly to social exclusion/ostracism. We examine this in two studies, the first focused on identity categories broadly and the second focusing specifically on individuals with a minoritized racial/ethnic identity. We conducted two experiments (Study 1 = 467; Study 2 in progress). In both studies, participants engaged in an adapted autobiographical recall paradigm.

Study 1: Participants first identified an identity category key to their self-concept and completed a measure of identity centrality. Participants were randomly assigned to one of four groups. Group one recalled a time when someone who shared their identity category was positively represented in media. Group two recalled a time in which a someone who shared their identity category was noticeably absent in media. Group three recalled a time in which they were excluded interpersonally because of their identity category. Group four served as the control condition, writing about an unrelated event. Participants then completed measures various measures related to social exclusion (e.g., self-esteem).

Study 2: Participants first indicated their race/ethnicity. Any participant who chose "White" was re-directed to an unrelated study. All other participants completed the same procedure as Study 1.

In Study 1, ANOVA results and patterns demonstrate that there both is overlap and nuance in how people experience interpersonal exclusion compared to systemic exclusion via a lack of representation. We expect similar patterns in Study 2, though perhaps with stronger effect sizes given the explicit focus on one identity category rather than the variable nature of the categories identified in Study 1.

These studies provide evidence that media representation can be connected social inclusion and exclusion research. It offers interesting possibilities for unpacking the type of representation (i.e., positive vs. negative), and for the complex relation between feelings of exclusion and perceived relational value.

INCLUSIVE LECTURES IMPROVE SOCIAL FIT AND SELF-EFFICACY FOR BLACK COLLEGE STUDENTS

Presenter(s): Walis, Emma (Graduate, Psychology)

Mentor: Kelly Clemens

Co-Mentor: John Matkovic

Authorship: Emma Walis, Kelly Clemens, John Matkovic

Incorporating diverse perspectives in the college setting can increase student performance, attitudes (Kite & Clark, 2022), and feelings of belonging, especially for Black students. Representing Black students in college lecture materials may increase belonging and other outcomes crucial to health and collegiate success. While there are other factors that influence belonging, we studied the extent representation alone plays a role. Specifically, we investigated whether showing lecture slides with images of Black models would improve feelings of belonging and reduce depression, anxiety, and stress for Black college students.

Black and Black-multiracial college students (N = 216, 53% Women, M = 31.03 years) completed an online survey. They were randomly assigned to view a 7-minute lecture video on the topic of social psychology which included either representative (i.e., Black models) or nonrepresentative (i.e., White models) slides. After watching the video, participants filled out scales on the following measures: Depression, anxiety, and stress (Parkitny & McAuley, 2010), sense of social fit (Walton & Cohen, 2007), school self-efficacy, self-esteem (Rosenberg, 1979), clarity, engagement, Participants experienced a significantly greater sense of social fit ($t(214) = 2.32, p = .021, d = -0.32$), school self-efficacy ($t(214) = -2.38, p = .018, d = -0.32$), and engagement ($t(214) = -2.35, p = .020, d = -0.32$) after viewing the representative lecture. These results suggest that even brief instances of representation can improve the immediate experiences of Black college students and provides a foundation for future research on how best to include representative materials.

Our results show that, when participants feel represented in lectures, they may experience greater levels of social fit, school self-efficacy, and engagement in class. This supports the idea that engaging Black students through representative lecture materials fosters belonging (Gurin et al., 2004; Wood & Harris, 2015). We did not find any improvements in self-esteem and confidence or with depression, anxiety, and stress levels. Perhaps students are still experiencing ongoing microaggressions in the classroom that cannot be mitigated by inclusive lecture slides. Further, longstanding depression, anxiety, or stress from external factors may reduce the effectiveness of short-term pedagogical change. This study contributes to ongoing efforts to create equitable learning environments by highlighting the importance of representation in everyday instructional practices.

CROSS ARTIFICIAL INTELLIGENCE PLATFORM RELIABILITY IN CALCULATING FLESCH-KINCAID READABILITY INDICES FOR 6TH-GRADE READING PASSAGES

Presenter(s): Weber, Madison (Undergraduate, Psychology)

Mentor: Gary Cates

Schools are using artificial intelligence (AI) tools to help teach reading and writing. However, we don't know much about how trustworthy the readability checks are on different AI systems. This study investigates how consistent the Flesch-Kincaid readability scores were from 3 different AI systems when they analyzed the same fifteen 6th-grade EasyCBM reading passages. The results showed that there were differences in scores between different platforms. The range across AI platforms estimated readability to be one whole grade level higher or lower than others. However, there were ranges accurate when compared to manual calculations. These differences indicate that teachers who use AI tools to check readability could potentially give students texts that are too hard or too easy for them. Future discussion focuses on future research and practical implications.

PRECRASTINATION IN ACADEMIC AND COGNITIVE CONTEXTS

Presenter(s): Yates, Jen (Undergraduate, Psychology)
 Whitlock, Emilie (Undergraduate, Psychology)

Mentor: Dawn McBride

Authorship: Emilie Whitlock, Jen Yates

The phenomenon of precrastination is described as the tendency to begin and complete tasks as soon as possible, typically at the expense of extra physical or cognitive effort. One very common example of this phenomenon in everyday life is carrying all of the grocery bags inside in one trip, when it would likely be easier to make multiple trips to the car. Current literature on the subject has examined this idea through the use of a task that involves moving buckets. It has been established that more often than not, individuals will choose to move the bucket closer to them, even though that means they will have to carry the bucket for a longer distance. Or, in other words, most will precrastinate in this task. The most commonly accepted explanation for this behavioral tendency is that it's a form of "cognitively offloading" tasks, meaning that completing the task early will relieve the mental effort of remembering it later. Precrastination is a behavior that people engage in within contexts of academic assignments or personal tasks, but there is a gap in the current literature with respect to examining the phenomenon relating to those contexts. In the current study, we aimed to explore this side of precrastination through a cognitive task that replicates the action of academic precrastination in a lab setting, and comparing the performance on this task with data from both the bucket moving task and a self-report measure designed to evaluate individuals' precrastinatory tendencies. Through this research, we seek to shed light on the potential correlations between precrastination as it has been studied (in the bucket moving task) and precrastination in other settings.

Keywords: precrastination, cognitive offloading, academic contexts.

SOCIAL WORK

THE EFFECTIVENESS OF ACCEPTANCE AND COMMITMENT THERAPY IN A GROUP UNIVERSITY COUNSELING SETTING COMPARED TO A COGNITIVE BEHAVIORAL APPROACH

Presenter(s): Gawlik, Kasia (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

Anxiety is one of the most common mental health concerns among college students and a leading reason for seeking services at university counseling centers. Cognitive Behavioral Therapy (CBT) is the most commonly used evidence based treatment for anxiety in these settings. However, it does not result in lasting improvement for all students. Acceptance and Commitment Therapy (ACT) is an alternative evidence based approach that emphasizes mindfulness, and values based action and may better address the ongoing stress and uncertainty faced by college students. Despite increasing implementation of ACT in counseling centers, limited research has examined its effectiveness relative to CBT using standardized outcome measures. This study examines the effectiveness of an ACT based anxiety management group delivered in a university counseling center using pre and post intervention data from the Counseling Center Assessment of Psychological Symptoms (CCAPS). Changes in students' self-reported anxiety, distress, and well-being following ACT participation are evaluated and conceptually compared to outcome patterns typically reported for CBT based anxiety groups using existing CCAPS data. This research aims to clarify whether ACT group interventions produce outcomes comparable to those of CBT while offering a distinct therapeutic approach for college students experiencing anxiety.

DISPOSSESSED: A CRITICAL ANALYSIS OF RESOURCES AND BARRIERS TO FOOD SECURITY FOR THE UNHOUSED

Presenter(s): Despe, Tyler (Undergraduate, Sociology/Anthropology)

Mentor: Intan Suwandi

Homelessness and food security are two pervasive and interconnected social problems in the United States. The people experiencing these hardships live daily lives that are significantly different than those who are housing and food secure. Life in the intersection of these issues poses a unique set of challenges. This paper reviews the current literature on the experience of eating and food insecurity for the unhoused. Bourdieu's theory of social capital, social reproduction theory, and stigma theory are used to analyze the food security barriers and resources faced by the unhoused, as well as argue for a greater emphasis on the systemic factors within capitalism that influence homelessness and related food insecurity.

I argue that a critical examination of the relationship between food insecurity and homelessness should place structural violence by capital at the center, in contrast to the mainstream framework that focuses on the individual "failings" of those experiencing homelessness and food insecurity. A focus on the role of capitalism recognizes that it constricts the food access landscape for the unhoused: reducing their food choices, tying them to systems that do not fully meet their needs, and forcing them to sacrifice health or safety in order to eat. Recognizing the capitalist roots of U.S. food assistance programs and their shortcomings is critical to creating effective solutions. Hunger, especially for the unhoused, goes far past individual qualities like drug addition, laziness, or lack of education. Capitalist economic processes, such as wage labor and gentrification, enforce a select few food obtainment options (e.g., SNAP, food pantries/kitchens, and fast food and convenience stores in food deserts) to be presented to the unhoused that keep them dependent upon those sources—stigmatized in a way that upholds capital ideals of the wage laborer and consumer, and ensures the continuation of capital accumulation.

WHAT BONOBO STONE TOOLMAKING CAN TEACH US ABOUT HUMAN ORIGINS

Presenter(s): Jackson, Valerie (Undergraduate, Sociology/Anthropology)

Mentor: Shelby Jedele Putt

Authorship: Shelby Jedele Putt, Chloe Holden, Valerie Jackson

The bonobos, Kanzi and Panbanisha, showed the world that humans and their ancestors are not unique in their ability to make chipped stone tools. Their legacy continues to deepen our understanding of human origins. By analyzing archival video footage of their stone toolmaking, we can better characterize how bonobo toolmaking actions compare to those of humans and gain new insight into the evolution of early stone tool production. Most of what we know about how the earliest stone tools were made comes from experiments in which human subjects in Western society replicate Stone Age artifacts. Our early ancestors, however, were, in many ways, more ape-like than human-like. The stone-knapping behaviors of great apes may therefore provide a more realistic model for reconstructing the toolmaking actions of these early hominins. This study investigated whether the stone reduction behaviors of bonobos fall within the range of experienced modern humans. The actions of Kanzi and Panbanisha were coded by two independent observers and compared to those of five skilled human knappers using correspondence analysis. The bonobos' actions clustered together and were distinct from those of humans, even though both produced similar tools. Bonobos exhibited unique behaviors, such as alternating between their dominant and nondominant hand, and using a foot as support. These results show that there may have been more than one way to make the same kinds of Stone Age tools. This challenges the assumption that we can rely on modern humans to serve as reliable models for understanding how early hominins developed technological skills. Interestingly, the bonobos also showed some patterns typical of novice human knappers, such as the angle they would strike at the stone, the location of impact, and often failing to detach flakes. Ongoing research continues to compare bonobo and novice human toolmaking to further explore these overlaps.

SPECIAL EDUCATION

THE ROLE OF HEAT SHOCK PROTEINS AS A PROTECTIVE RESPONSE TO THERMAL STRESS IN EMBRYONIC DEVELOPMENT

Presenter(s): Fairbanks, Mallory (Undergraduate, Special Education)

Mentor: Ryan Paitz

Early embryonic development is a vulnerable stage of development when considering the impact of thermal stress on the embryo. Our research examines the protective mechanisms implemented by the developing embryo and the importance that they play in surviving beyond this vulnerable window. The method of protection we studied in our project is heat shock proteins, or HSPs. In our initial study, we assessed the importance of heat shock protein 90 (HSP90) in the development of chicken embryos. Our hypothesis was that heat shock proteins act as protection from thermal stress during early embryonic development. We tested this hypothesis in chicken embryos by inhibiting HSP90 with the experimental drug ganetespib. In this study, chicken eggs from the University of Illinois Poultry Farm were injected with vegetable oil alone (control) or oil containing 50µg of ganetespib. Eggs were then incubated, with half the eggs being incubated at the optimal 100°F for 14 days and half of the eggs experiencing thermal stress (a simulated heatwave of 102°F from days 0-7). As expected, our results found that thermal stress reduces growth and survival. Unexpectedly, the ganetespib injected eggs did not survive, indicating a vital role of HSP90 for early development. This experiment informed us of the importance that HSP90 has in developing embryos. Presently, as of Spring 2026, we are building on this knowledge to better characterize when and how HSP90 is expressed during development. Our research question for this project asks: "How does thermal stress influence the expression of HSP90 variants, HSP90AA, HSP90AB, and HSP90BB, in embryos?" We approach this by exposing embryos to a heatwave of 102°F on day 4 of incubation. The control group will only be exposed to the optimal temperature of 100°F. Membrane samples will be collected on days 4, 6, and 8 of incubation. These samples provide a source for RNA extraction, which can then be utilized to quantify the expression of HSP90AA, HSP90AB, and HSP90BB using qPCR. Sample analysis and data collection are ongoing for this project. However, we expect HSP90 variants to be expressed in different ways, which correspond to specific roles.

TEACHING AND LEARNING

PRE-SERVICE TEACHERS' PERSPECTIVE ON USING AI IN EDUCATION: CONTRIBUTIONS, CHALLENGES AND PROBABLE SOLUTIONS

Presenter(s): Mehedi, Mussarath (Graduate, Teaching and Learning)

Mentor: Miranda Lin

Artificial Intelligence (AI) is rapidly creating its own space in this human world. It possesses human-like qualities that have made humans rethink their way of life. Along with other sectors, AI is affecting the way educators educate their students. Teachers from different levels of education are going through a transformation in classroom practices, assignments, and policies in education. Technology is upgrading every moment, and teachers need to be upgraded and trained to use that technology for the best results. To upgrade pre-service teachers' skills, finding out about their experiences and viewpoints is important. This study deals with the pre-service teachers to gather data on what they think about AI's contributions, challenges, and probable solutions to the challenges. The purpose of the study is to understand the positionality of AI through the lenses of future teachers. The research is based on the data collected from the students of the teacher education program at Illinois State University. A questionnaire containing thirty questions was answered by the participants for the survey. This study will lead to an overview of what the young teachers are thinking about AI implementation in classroom practices as well as focus on the challenges that pre-service teachers are concerned about.

Keywords: AI implementation; pre-service teachers; benefits; challenges; probable solutions

DETERMINING PARENTS' OPINIONS ON EDUCATIONAL PRACTICES FOR GIFTED STUDENTS IN THE UNITED STATES

Presenter(s): Ozkaya, Emre (Graduate, Teaching and Learning)

Mentor: Barbara B. Meyer

Gifted education has long been considered a priority in educational systems, yet parents' perspectives on these practices remain underrepresented in the literature. This study examined whether parents in the United States perceive educational processes for gifted students as satisfactory and effective. The research was conducted with 135 participants in a Midwestern state, and the data were analyzed using quantitative methods. Findings indicated that parents were generally satisfied with the education provided to their children, believed that programs met their children's needs, and viewed teachers as effective in addressing students' interests and abilities. Schools were also perceived as informative and supportive. However, the type of school program emerged as a significant factor influencing parental perceptions.

TECHNOLOGY

STUDY ON THE TECHNOLOGICAL AND ECONOMIC FEASIBILITY OF INSTALLING A PV SYSTEM ON THE ROOFTOPS OF BUILDINGS ON THE QUAD OF ISU

Presenter(s): Camp, Gabrielle (Undergraduate, Technology)

Mentor: Jin Jo

ISU has been a place of innovation, advancement, and moral development. Over the years, ISU has made strides toward greater environmental sustainability through the installation of recycling bins, EV charging stations, a free on-campus thrift shop for all students, and a vertical farm. ISU has a PV system at Turner Hall. However, this system is for demonstration use and makes only a very small contribution to reducing ISU's energy bill. With that in mind, this study will conduct an economic and technological analysis of the feasibility of installing rooftop PV systems on buildings on the Quad. This project will focus on roof-mounted PV systems due to the lack of ISU-owned unused land. The determination of which building will be used will be conducted by observation of the roof pitch angle, shading, and roof space. The observation will be conducted using HelioScope, which provides a view of the building's roof without requiring a permit to access the roof. Methodology will be quantitative, employing data sheets and graphs to present the data meaningfully, supported by structured observation and data simulation tools. For Example, the systems HelioScope and the System Advisory Model will be used to calculate energy-consumption metrics, energy costs, energy savings, payback period, and the types of solar panels and inverters best suited to this project.

DEVELOPING AN INTELLIGENT INVENTORY ASSISTANT TO IMPROVE RETAIL STORE INVENTORY ACCURACY

Presenter(s): Deslaurier, Nolan (Graduate, Technology)

Mentor: Isaac Chang

For major retailers like Walmart and Target, inventory accuracy remains a significant yet often underestimated financial challenge. Despite the widespread belief that their advanced systems deliver near-perfect precision, industry accuracy averages only about 65%. When the system records ten bottles of detergent on the shelf but fewer are actually there, it creates “phantom inventory,” which ultimately leads to lost sales. While many issues, such as theft, delayed system updates, manual recording practices, and human errors like incorrect inputs or misplaced items, can contribute to these discrepancies, this study focuses specifically on reducing mis-scanning errors that occur when employees restock shelves on the sales floor.

This project introduces an innovative, body-mounted camera system designed for retail environments to reduce mis-scans during shelf stocking and restocking. Using computer vision–based object detection, the system automatically identifies products as employees handle and place them on shelves. Each item’s barcode is scanned and cross-checked against the corresponding shelf barcode before updating the inventory system. Instead of relying on low-power platforms like Arduino or Raspberry Pi, the design leverages the Nvidia Jetson Orin Nano Super for its advanced GPU capabilities, enabling a wearable body camera that supports low-latency, real-time inventory updates. A functional prototype tested in a simulated retail environment demonstrates reduced human error and improved inventory accuracy.

IMPLEMENTATION FRAMEWORK FOR PUMPED STORAGE HYDROPOWER (PSP) INTEGRATION AT EXISTING DAM SITES

Presenter(s): Govardhana, Maithri (Graduate, Technology)

Mentor: Jin Jo

Authorship: Maithri Govardhana, Jin Jo

As more electricity is generated from renewable sources like wind and solar, managing fluctuations in power supply has become a major challenge. Energy storage systems help balance supply and demand by storing excess electricity and releasing it when needed. Pumped Storage HydroPower (SH) is one of the most reliable and widely used large-scale energy storage technologies in the world.

This project explores how pumped storage systems can be added to existing dam sites in the country. In a PSH system, water is pumped to a higher reservoir when electricity demand is low and released through turbines to generate power when demand increases. Because many dams already have the necessary infrastructure, they may offer practical opportunities for adding energy storage capacity.

The project develops a structured planning framework that outlines the technical requirements, regulatory considerations, environmental factors, and general cost elements involved in implementing such systems. Rather than focusing on a specific location, the study provides a general approach that can be applied to different dam sites. The goal is to support better planning of energy storage projects that improve grid reliability and help integrate renewable energy more effectively into the power system.

CAUSALITY DISCOVERY AND PREDICTIVE ANALYTICS ON THE SUCCESS AND FAILURE OF DIGITAL CONSTRUCTION STARTUPS USING INTERPRETABLE MACHINE LEARNING

Presenter(s): Kinoti, Hildah (Graduate, Technology)

Mentor: Xi Hu

Digital construction startups operate in environments characterized by fragmented markets, high capital intensity, regulatory constraints, and uneven adoption of emerging technologies. Despite growing interest in digital construction entrepreneurship, existing data-driven approaches are limited in explaining construction startup survival and failure patterns due to a strong reliance on black-box models that obscure internal reasoning and reduce trust in transparency. As such, this study proposes the use of interpretable machine learning (ML) to discover the causalities and predict the success and failure of digital construction startups through a structured, data-driven analytical framework. The associated objectives are to (1) develop a representative dataset of digital construction startups, (2) select and develop interpretable ML models (e.g., Bayesian networks) to perform causality discovery and predictive analytics on startups' survival and failure, and (3) compare and evaluate the model performance through qualitative and quantitative measures. A structured dataset of 50 North American firms was developed from fragmented public and proprietary sources, capturing workforce, technology, financial, competitive, strategic, leadership, and geographic factors. Model development and evaluation were conducted through Python programming. Experimental results showed that (1) the selected interpretable ML models could effectively capture the hidden causalities among factors and predict the success and failure of digital construction startups with high accuracy, and (2) the discovered causal relationships and the prediction results aligned with the established knowledge. Ultimately, this study contributes to the domain of knowledge by demonstrating how interpretable ML can uncover causal relationships while predicting the success and survival of digital construction startups, thereby adding to the evidence-based decision making for digital construction entrepreneurship.

AI-ENHANCED DIGITAL MATURITY BENCHMARKING FOR ELECTRICAL CONTRACTING AND POWER SERVICE ENTERPRISES

Presenter(s): Kinoti, Hildah (Graduate, Technology)

Mentor: Sally Xie

The rapid digitalization of power distribution, electrification services, and distributed energy systems has created an urgent need for structured methods to evaluate the digital capability of electrical contractors and service organizations. Despite the growing adoption of intelligent field tools, cloud-based workflows, Internet of Things (IoT) devices, and AI-assisted analytics, many firms lack a systematic framework to assess their digital readiness and prioritize investment decisions. This paper proposes a comprehensive Digital Maturity Assessment and Benchmarking Model designed specifically for electrical contracting and power service enterprises operating within increasingly digitized power ecosystems.

The model integrates five dimensions of digital capability, including technology infrastructure, data and information management, workforce digital skills, operational workflow automation, and AI-enabled decision support. A self-assessment survey and scoring rubric are developed to quantify maturity levels across these dimensions, enabling organizations to identify strengths, capability gaps, and required steps for advancing digital transformation. Benchmarking dashboards are introduced to compare performance against peer organizations of similar size, market, and service focus.

To validate the framework, the study applies the model to a diverse set of contractor profiles and analyzes maturity patterns across field service operations, asset management practices, and distributed project execution. Findings highlight common barriers to digital advancement, such as fragmented information systems, insufficient data governance, and underutilized automation, and offer targeted recommendations for staged digital investment. The proposed assessment tool provides a practical, scalable method for contractors to manage digital transformation, optimize operational efficiency, and better integrate with intelligent power distribution, smart grid environments, and AI-enhanced energy systems. This research contributes a structured pathway for improving digital readiness across the electrical contracting industry as it transitions toward fully digitized and intelligent service ecosystems.

DEVELOPMENT OF GUIDELINES FOR THE APPLICATIONS OF POLYMER CONCRETE.

Presenter(s): Olayeni, Stephen (Graduate, Technology)

Mentor: Pranshoo Solanki

Authorship: Stephen Olayeni, Pranshoo Solanki

Polymer concrete offers significant advantages over conventional Portland cement concrete in terms of strength, durability, corrosion resistance, and rapid curing. These qualities make it particularly well-suited for infrastructure applications such as precast components, bridge overlays, manholes, and sewer systems. Despite its growing adoption by Departments of Transportation (DOTs) and precast manufacturers across North America, its application remains hindered by inconsistent standards, fragmented practices, and limited guidance, particularly for precast products. This research aims to develop comprehensive guidelines for the application of polymer concrete, with a focus on structural and non-structural precast elements. The study involves an extensive literature review, analysis of existing ACI and DOT specifications, and direct engagement with manufacturers and suppliers via surveys and interviews. Key areas addressed include material selection (resins, aggregates, admixtures), surface preparation techniques, mixing and placement procedures, curing protocols, quality control measures, and safety considerations. The outcome of this study will be a standardized guideline that enhances the effective and consistent use of polymer concrete in various structural and non-structural precast applications.

IMPLEMENTING AI-DRIVEN CONTROL VIA EXTERNALLY GUIDED MOTION ON INDUSTRIAL ROBOTIC ARMS

Presenter(s): Perhay, Alexander (Undergraduate, Technology)

Mentor: Jeritt Williams

Co-Mentor: Elahe Jadavi

This research investigates the implementation of Artificial Intelligence (AI) for the control of ABB industrial robotic arms using Externally Guided Motion (EGM). EGM is a specialized software operation that facilitates high-speed communication between a robot and external devices. This study focuses specifically on “Position Guidance,” a feature within EGM that allows an external controller to direct robot movement in real time, as opposed to simple “Position Streaming” (read-only data) or “Path Correction” (minor adjustments to predefined paths).

The project utilizes Position Guidance through two distinct methods: Pose Mode and Joint Mode. In Pose Mode, the robot is directed via Cartesian coordinates, which this study tests using simple interfaces such as laptop-based Graphical User Interfaces (GUIs), keyboard mapping, and game controllers. In Joint Mode, the robot is controlled at a lower level through individual joint angle inputs. This mode synchronizes the movement of a large industrial arm with a smaller, servo-driven “leader” robot, enabling in-depth control for complex tasks.

This project extends prior work by applying imitation or reinforcement learning using the open-source LeRobot library developed by HuggingFace. While these AI models are typically trained on small servo-driven arms to perform tasks taught by a human operator, this project translates that output into industrial applications. The model’s predicted joint positions are converted into precise angles and transmitted via EGM to the industrial hardware. By bridging the gap between open-source AI software and industry-grade hardware, this research demonstrates the viability of independent AI research in improving industrial automation and flexibility.

ASSESSING DRIVER COGNITIVE WORKLOAD AND SITUATION AWARENESS USING EEG AND EOG IN A SIMULATED DRIVING ENVIRONMENT

Presenter(s): Pritchard, Lucy (Undergraduate, Technology)
 Chou, Chung Yi (Graduate, Technology)

Mentor: Isaac Chang

Electroencephalography (EEG) and electrooculography (EOG) provide complementary approaches for examining a driver's cognitive and visual processes. EEG records electrical activity generated by groups of neurons, enabling observation of changes in cognitive workload, alertness, and attentional engagement through shifts in frequency?band patterns. These neural signals help reveal how mental effort fluctuates as drivers interpret information, react to events, and manage competing demands. EOG measures eye?movement behavior by detecting the small electrical potentials generated during saccades, fixations, and blinks. These measurements provide insight into how drivers scan their surroundings, allocate their gaze, and shift attention in response to the environment. When used together, EEG and EOG give a more comprehensive picture of the driver's cognitive state than either method alone, enabling more accurate assessments of how drivers perceive and respond to dynamic roadway conditions.

This project implements this multimodal framework within a controlled driving simulation designed to produce meaningful variations in attention and mental workload. Participants navigate a virtual environment that includes shifting traffic density, unexpected hazards, and multitasking elements such as secondary tasks or decision?making challenges. Throughout each session, EEG and EOG are recorded simultaneously to capture both neural activity and eye?movement behavior as drivers respond to changing situational demands. These synchronized data streams allow for a detailed examination of how task difficulty and environmental complexity shape cognitive load, visual scanning patterns, and overall driving performance. By analyzing patterns across both modalities, the study aims to identify reliable indicators of reduced awareness, heightened workload, or compromised visual behavior. These insights can support the development of adaptive driver?assistance systems and training strategies that better align with drivers' cognitive and perceptual needs. The findings are intended to contribute to more responsive, human?centered automotive technologies that enhance safety.

EVALUATING ROOFTOP SOLAR PV AND BATTERY STORAGE FOR MAXIMIZING ENERGY OFFSET AND COST REDUCTION AT XAVIER UNIVERSITY OF LOUISIANA

Presenter(s): Rangel, Jorge (Undergraduate, Technology)
 Wyrick, Jackson (Undergraduate, Technology)

Mentor: Jin Jo

Electricity costs for campus facilities like Xavier University of Louisiana have been continuing to increase over the years, creating financial problems for both the students and the university. Rooftop solar photovoltaic (PV) systems offer a realistic way to reduce dependence on grid electricity, lower energy costs, and benefit a more sustainable campus environment. The main research question addressed in this project is: How can rooftop PV and battery storage systems at Xavier University of Louisiana maximize on campus electricity offset and long-term financial savings, and what impact would these systems have on electricity demand, utility costs, and related costs over time? This project evaluates how a rooftop solar PV system can be designed to maximize energy offset while providing long-term financial savings. The analysis focuses on PV system design parameters such as shading, roof orientation, and panel tilt angles, which are modeled using Helioscope. The system will also need to follow any guidelines or rules to make sure that we can add the right size for the PV system. In addition to rooftop PV, this project will evaluate the potential role of battery energy storage in improving system performance and economic outcomes. Battery storage can address the mismatch between solar energy production and building electricity demand by storing excess daytime generation and discharging it during periods of higher demand or peak utility pricing. One of the tools and simulations that we will use to figure this data out could be the System Advisor Model (SAM) as we can't use Helioscope for battery storage data analysis. The analysis will compare PV and PV-plus-storage scenarios using the 15-minute interval electricity data for Xavier's 22 buildings. The battery sizing will also be evaluated at a high level to see the impacts on the annual energy offset, peak load reduction, and long-term financial performance. While battery degradation and detailed operational control strategies will not be modeled in depth, the study will provide a realistic assessment of whether integrating battery storage enhanced the technical and economic feasibility of rooftop solar at Xavier University.

RENEWABLE ENERGY SOLUTIONS FOR SMALL BUSINESSES: A CASE STUDY OF LA MEX IN JOLIET, IL

Presenter(s): Turken, Ella (Undergraduate, Technology)
 Carlos, Bryan (Undergraduate, Technology)

Mentor: Jin Jo

se increasing challenges for small businesses seeking long-term financial stability. Renewable energy technologies, particularly solar photovoltaic (PV) systems, battery energy storage, and limited electric vehicle (EV) charging infrastructure present a potential solution. However, the technical and economic feasibility remain unclear for smaller businesses. This project investigates whether solar PV with battery storage represents a practical and economically sound investment for La Mex, a small family-owned restaurant located in Joliet, Illinois. In addition to reducing electricity costs, the project considers the potential business value of adding Level 2 EV charging stations as a customer amenity. Providing EV charging may offer an incentive for electric vehicle owners to choose La Mex over nearby restaurants without charging access, particularly for customers seeking a convenient location for a short charging session while dining. A high-level feasibility analysis is conducted using a combination of site assessment, energy production modeling, and financial evaluation. Roof characteristics and available space are reviewed to determine system suitability, while solar energy production is estimated using simulation tools. Battery energy storage is analyzed for its ability to reduce peak demand charges commonly associated with restaurant operations. Financial analysis incorporates current utility rates, incentive structures, expected equipment lifespans, and projected maintenance considerations to estimate cost savings and investment performance over time. Illinois utility interconnection requirements and technical standards are also reviewed to identify potential implementation constraints. Beyond this individual case study, the findings aim to provide insight for other small, independently owned restaurants evaluating renewable energy investments as a strategy for improving long-term economic resilience.

E-Posters Symposium

Chemistry

EFFECTS OF FREQUENT INFORMAL OBSERVATIONS ON SECONDARY STUDENT OUTCOMES

Presenter(s): Kaufman, Grant (Graduate, Chemistry)

Mentor: Meghan Kessler

It is common for administrators to perform short informal evaluations on teachers. These evaluations allow administrators to get a glimpse of the daily class environment created by the teacher without a formal evaluation. Studies on both teachers' and administrator's opinions on these evaluations are prevalent, however; there is a distinct lack of studies on student reactions to administrator presences in their classrooms. To better understand student reactions to these observations, this study uses survey and observational data from one Midwestern, rural high school to better understand students' perceptions of increased administrative presence in a classroom. To triangulate, interview data will be collected as well. Preliminary findings show that most students do see a benefit in administrative presence, with most students indicating that they believe it does improve their teacher's performance in class. However, student opinions diverge on whether they think the administrative presence is a distraction to their learning, citing worries about getting in trouble or other reasons. Based on these tentative findings, I believe further research is needed to determine what changes could be made to make more students feel more comfortable with the presence of administrators in the classroom.

GENERATIVE AI IN STEM EDUCATION: A SURVEY STUDY OF USAGE PATTERNS AND TRAINING EXPECTATIONS IN A CHINESE VOCATIONAL COLLEGE

Presenter(s): Ma, Lankun (Graduate, Chemistry)

Mentor: Anna Smith

As generative artificial intelligence (GenAI) tools become more integrated into daily life, faculty and students in higher education will need to adapt to learning and work supported by AI. In China, however, the development of information technology education has been relatively late, and most higher education institutions—particularly vocational colleges—provide limited guidance or formal training on the appropriate use of GenAI. This study examines STEM faculty and student awareness, usage patterns, and training content needs related to generative AI in a Chinese higher vocational college. Adopting a mixed-methods research design, the study collects quantitative data through separate surveys of teachers and students, focusing on their familiarity with GenAI applications, perceived benefits and concerns, current access to AI-related training, and expectations for future training content. Qualitative data are gathered through semi-structured interviews with a small number of faculty members to obtain deeper insights into their instructional use of GenAI and perceived training needs. By identifying current levels of understanding and clarifying faculty and student expectations for training content, this study aims to inform the development of institutional guidelines and targeted training programs for the responsible and effective use of GenAI in STEM education at vocational colleges.

HIGH SCHOOL TEACHER'S EXPERIENCES AND PERSPECTIVES TEACHING THE NEXT-GENERATION-SCIENCE-STANDARDS WITH THREE-DIMENSIONAL LEARNING

Presenter(s): Yestrumskas, Ashley (Graduate, Chemistry)

Mentor: Meghan Kessler

This study aims to gain information regarding teaching to this approach from other teachers who have both been handed a canned curriculum and/or who have been able to write their own curriculum for the new science standards in Pennsylvania. It aims to determine why perspectives might be more positive for some than others. It also aims to observe and determine the teacher's perspectives of student engagement as compared to prior teaching styles, and whether students are still able to master content presented in each unit. The research participants will be both middle and high school teachers at a public school district. The qualitative methods will include a survey, interview, and an observation of classes while teaching the new standards.

THE WORLD OF SOUND AND IT'S IMMERSIVE POWER

Presenter(s): Conoscente, Tristan (Graduate, Creative Technologies)
Samuel, Villalobos (Graduate, Creative Technologies)

Mentor: Kristin Carlson

Authorship: Samuel Villalobos, Tristan Conoscente

This project examines the importance of audio design in video games, with a focus on how sound enhances emotional immersion in horror games.

We present a narrative-driven horror game set in a maze-like environment where sound plays a central role in gameplay and storytelling. The player controls one of two brothers who becomes separated from his sibling while navigating a dark and unsettling location. The game is developed in Unreal Engine and uses Niagara particle systems to visualize sound. It also integrates Wwise to manage the music and audio systems. The final project is presented alongside an analysis of player experiences, evaluating how audio design impacts immersion and emotional response

FROM SCREEN READER TO ENVIRONMENT READER: AN EXPLORATION OF HOW PHYSICAL CONCEPTS OF DAILY INDEPENDENCE TOOLS CAN BE DIGITIZED TO MAKE VIRTUAL REALITY ACCESSIBLE FOR THOSE WHO ARE BLIND OR LOW VISION

Presenter(s): Edwards, Ethan (Graduate, Creative Technologies)

Mentor: Kristin Carlson

Co-Mentor: Greg, Corness

This research aims to explore ways to make virtual reality or other mixed reality experiences accessible to those who are low vision or blind. With virtual and mixed reality facing the potential to become a prominent computing platform, it is important that accessibility is a core value of the technology, ensuring that communities of people are not denied the ability to use the technology. With visuals being a popular modality in virtual and mixed reality, it is vital that other forms of sensory input, like spatial audio and haptics, are explored and developed in virtual platforms. Not only can these senses provide greater accessibility for those who are blind or low vision, these senses could also provide developers more ways to make their experiences immersive. This research explores how physical concepts like canes, the pull of a guide dog harness, intelligent assistance, and other tools translate into VR concepts. This work articulates challenges with the feasibility of making these tools function digitally in a virtual environment, their usefulness in typical non-linear or sequential scenarios, and how these tools can change when real-world physics are no longer at play.

USING TECHNOLOGY AND GAMES TO SUPPORT TEACHING SEQUENCING

Presenter(s): Gentry, Ellie (Graduate, Creative Technologies)

Mentor: Kristin Carlson

Learning is unique between all students in a classroom, and each learner brings individual preferences and challenges with their own learning styles. While some learners thrive through listening to lectures and worksheets, others benefit more from hands-on experiences, movement, and visual stimulation. For these students, some concepts can feel challenging unless they are paired with tangible interaction and visual or audible stimulation. This is where gamification—the integration of game-like elements such as points, rules, levels, and rewards into learning activities—can be beneficial in supporting students who struggle with traditional instructional approaches. By making learning interactive and engaging, gamification transforms difficult topics into easily understood concepts.

Sequencing is one concept that can be particularly challenging for young learners or students with learning differences. Understanding the order of events can be difficult when it comes to the organization of the steps in a sequence and the ability to visualize progression. Without clear visual or audio cues, students may struggle to understand how one step connects to the next. Incorporating visuals, such as pictures with the steps of a sequence, and immediate reinforcement, such as green lights and a noise indicating correct answers, can significantly improve comprehension and retention.

By using a tangible object with RFID tags and a reader, a teacher could set up a program on a screen that can present 3 steps in a sequence in a mismatched order that a student can rearrange using 3 different colored objects that slot into the reader. When the sequence is put into the correct order, the reader will light up green, indicating that the student has answered correctly.

This mix of technology, gamification, and learning can allow students who would benefit from a different learning style to be able to engage in learning in a style more catered to them.

TRACING THE DEVELOPMENT OF STUDENT RESEARCH PRACTICES IN ENVIRONMENTAL FIELD SCIENCE (2005 - 2025)

Presenter(s): Gisi, Matthew (Graduate, Creative Technologies)

Mentor: Kristin Carlson

This project examines how student research practices evolve and refine over time within a long running high school environmental field science program. The project assesses the epistemic approaches taken and quality of written reports but does not assess validity of student research. The motivation is to measure aspects of learning considered assumed but not traced longitudinally, particularly in scientific contexts. Drawing on a subset of 20 years of digitized works from students, this archive can be assessed regarding computational document analysis to highlight patterns in writing complexity, document structure, methodological signaling and reflection across years. This project discusses emerging patterns that can help inform the course on potential changes directed at the efficacy of it's instruction.

WHERE GLASS BECOMES SEA: STAINED GLASS, BLOWN VESSELS, AND PROJECTED TIDES

Presenter(s): Holtz, Lindsey (Graduate, Creative Technologies)

Mentor: Kristin Carlson

Our oceans are very fragile ecosystems that, when disturbed, can have catastrophic effects on the life that lives there. My work brings research about our world's oceans to a wider audience by using glass and projection mapping, while also exploring how the mediums of glass and technology can be combined to make a lasting impact. This work showcases four project variations in glass that focus on sea turtles. One project creates an animation with multiple stained-glass panels that, when photographed in sequences, illustrate a short, looped animation of a sea turtle entering the ocean. The second project involves a different stained-glass panel to be used as a canvas for projection mapping. Moving light from a projector makes the panel come alive with movement and color, adding a new dimensionality to the glass. The third project includes large hand-blown glass vessels that are etched to look like fishing nets. Inside these vessels, turtles and other sea life are projected to make it appear as if the animals are trapped by a human-made object. The fourth project is a short animation that mixes the mediums of digital and stop-motion animation. Certain materials will be used to enhance elements like the background and what is happening in the story. Exploring how different materials interact with one another can enhance the emotional impact, make a lasting impression on the audience, and add more to the meaning of the story. All these projects when shown together tell various stories of sea turtles and their ocean life while highlighting the precariousness of their lives through various explorations in glass.

HOW TO START AND RUN AN ORGANIZATION IN THE MUSIC WORLD - LEADERSHIP DYNAMICS AND TEAM BUILDING FROM SCRATCH

Presenter(s): Karp, Zander (Graduate, Creative Technologies)

Mentor: Kristin Carlson

Making music is a hobby enjoyed by many and widely accessible yet recording artists and record labels are elusive to learn about and get acquainted with. On a collegiate level, students interested in producing music do not always have access to resources that are high quality and friendly to their budget. Often, students look for direction with topics and concepts that they have difficulty understanding and look to their teachers and mentors for assistance. But as students from different backgrounds and different majors come together for their love of making music, there are not many opportunities to share a space and learn together outside of a “certain majors-only” classroom setting or learning to play an instrument and joining a local band. To provide a comfortable and reassuring environment for students to pursue their interests in music production, Redbird Studios was a Registered Student Organization (RSO) that was previously on hiatus but has been revived for the 2025-2026 academic school year. Bringing together students from different majors and leading them in a way that feels more comfortable than a class has its own difficulties and strengths. Maintaining engagement, creating positive experiences, and adjusting to different learning styles are a few ways that help with navigating leadership in a music space, and can even contribute to creating and keeping an organization.

SOUND-REACTIVE WEARABLES: EXPLORING DESIGN PRINCIPLES AND THEIR ROLE IN AUDIO VISUALIZATION

Presenter(s): Kentish, Rose (Undergraduate, Creative Technologies)

Mentor: Kristin Carlson

This research explores the intersection of technology, fashion, and audio by exploring examples of sound-reactive wearables. By surveying existing products, the materials and sensors involved, and the motivation behind them, this project articulates the state of wearable technologies in the audio community. This work examines how artists translate rhythm, frequency, and intensity into visual elements such as light, color, and movement while integrated into clothing. This project aims to understand how wearable sound visualizations can add to the immersiveness of a musical performance as well as enhance audience expression. It reveals the potential emotional and communicative purposes behind transforming sound and music into a multisensory experience.

PAST REIMAGINED: REVIVING ANCIENT VIETNAMESE PATTERNS THROUGH ADVANCED 3D TECHNOLOGY

Presenter(s): Nguyen, Thanh (Graduate, Creative Technologies)

Mentor: Kristin Carlson

This project explores the use of 3D scanning technologies to restore and preserve traditional Vietnamese patterns. Many of these patterns have been damaged or lost over time due to human activity, natural disasters, and war. These designs are culturally significant because they reflect local identity and specific historical periods. By using digital 3D scanning, multi-angle photography, and digital reconstruction techniques, the project aims to accurately document and recreate traditional patterns in digital formats. The study demonstrates how 3D technology can support cultural heritage preservation, provide valuable research resources, and help future generations learn from and appreciate traditional Vietnamese design.

GRAPHIC INCENTIVE: HOW VIDEO GAME VISUALS SHAPE THE DESIRE TO PLAY

Presenter(s): Upholz, Matt (Graduate, Creative Technologies)

Mentor: Kristin Carlson

Over the years, video game graphics have consistently improved, with each new console expected to visually outperform the last. Given the cost and time devoted to creating the art for these games, it is important to understand what kind of impact these visuals actually have on a gamer's motivation to play. In other words, are players truly drawn to better visuals? And does the effect vary by game genre? To investigate these questions, I will examine gamers' responses to various art styles across different game genres in order to identify the visual elements that shape their motivation to engage. Results will indicate if the efforts to pursue photorealism in the gaming industry are justified.

VIDEO GAMES AND AUDIENCE: FINDING THE “PERFECT” GAME.

Presenter(s): Winston, Maxwell (Graduate, Creative Technologies)

Mentor: Kristin Carlson

With the rise of ever increasing and niche genres of video games that extend far beyond the understanding of the average player, tastes and audiences for digital games have not been wider. This poses a challenge for developers, needing to weigh the value of focusing on a specific audience or a wider demographic, critical acclaim, or financial success? Like all art, there is no accounting for taste, as any game could have its fans or its detractors, especially since depending on the gameplay, certain games can feel like a completely different world even to active gamers. I ask if it is possible to find a game that appeals to a wide, unknown audience of a group of participants. These participants gave their views on their favorite games and what values they enjoy the most. That data was compiled, compared, and contrasted to trying to find a game that meets the criteria. This discovered game was given to each of the participants to play and give their feedback on. Will this hypothetical perfect game be beloved, or would the average sum of their answers only find mediocrity? I hope this to be a study that will help aspiring game designers.

PUERTO RICAN YOUTH LITERATURE PUBLISHING HOUSE AS CONOCIMIENTO MIRRORS: STORYTELLING, MENTAL HEALTH, AND CULTURAL IDENTITY

Presenter(s): Cintron Gonzalez, Edcel (Graduate, English)

Mentor: Roberta Trites

In the wake of Hurricane María's devastation in 2017, Puerto Rico witnessed the emergence of local publishing houses as sites of cultural resistance and renewal. Among them, Editorial Destellos has positioned itself as a beacon of hope, prioritizing the production of high-quality children's and young adult literature that centers Puerto Rican identity, mental health, and the narratives of collective survival. This presentation examines how Editorial Destellos and its authors use picture books to address the intersection of hurricane narratives, mental health, and Puerto Rican identity, positioning storytelling as a tool of resistance against U.S. empire and colonization. I will use picture books published by Editorial Destellos such as "Prohibido Llorar" by Gama Valle, *Nena y Roberta, ¿dónde está?* by Mariela Biskai, *"Caballito de palo"* by Jose Ernesto Hernández, among others.

Drawing from Marilisa Jiménez García's metaphor of "side by side," I analyze how Editorial Destellos's texts foreground marginalized voices and mirror real experiences of trauma and recovery within Puerto Rican communities. The metaphor highlights the coexistence of collective grief and resilience, fostering a shared space for cultural reflection and healing. Building on Gloria Anzaldúa's concept of "healing through storytelling," I argue that these narratives reclaim Puerto Rican identity while empowering children and youth as agents of *conocimiento*—transformative knowledge rooted in self-discovery, cultural affirmation, and resistance to oppression. Furthermore, this work engages with Jesús Montañó and Regan Postma-Montañó's framework of "tactics of hope" to explore how Latinx/e children's literature fosters moments of social and personal transformation. By representing youth as advocates for mental health within their communities, these stories provide readers with "conocimiento mirrors," where they can process pain and trauma while envisioning a more equitable and empowered future. Editorial Destellos's works embody these tactics, offering young readers a means to reimagine their world and claim agency within the broader context of Puerto Rico's colonial history and ongoing struggles for decolonization. This presentation situates Puerto Rican children's literature not only as a cultural artifact but as an act of resistance and a pathway to healing, inviting critical discussions on how youth narratives from the island challenge colonial frameworks while fostering solidarity, mental health advocacy, and cultural pride in the face of systemic oppression.

Family and Consumer Sciences

FOOD INSECURITY AMONG STUDENTS IN FOOD-RELATED ACADEMIC PROGRAMS: A CROSS-SECTIONAL STUDY

Presenter(s): Greenslaugh, Rebekah (Graduate, Family and Consumer Sciences)

Mentor: Amy Bardwell

Food insecurity among college students is well documented; however, less is known about how food insecurity manifests among students in food-related academic programs. This population presents a unique paradox: students training to become food and nutrition professionals may still experience food insecurity and stigma. This study aimed to assess the prevalence of food insecurity, food assistance utilization, stigma, and perceived program influence among students in food-related academic tracks, and to examine implications for dietetic education and practice. We administered a cross-sectional online survey to undergraduate and graduate students and dietetic interns enrolled in food-related academic programs. Measures included the USDA 10- item Adult Food Security Survey Module, questions on food pantry and SNAP use, the Food Insecurity Self-Stigma Scale (FISS), and two novel scales: Program Effect Beliefs (PEB) and Resource Self-Efficacy (RSE). We included only complete surveys (100% progress; n = 194) in the initial analysis and excluded incomplete surveys (n = 85), though we may consider them in final analyses. We calculated descriptive statistics.

Among respondents, 45% experienced food insecurity (19% marginal, 15% low, 11% very low). Despite this prevalence, 51% reported never using a food pantry, and 61% reported not being on SNAP (22% eligible, 63% not eligible, 15% unsure of eligibility). Thirteen percent of respondents reported stigma-related discomfort accessing food assistance. Among students who provided a yes/no response, 68% reported that their college assisted them in accessing food resources, while 32% reported that their college did not.

Findings highlight a paradox within food-related programs: students training to address food insecurity may experience it themselves. Dietetics educators and practitioners should integrate basic needs screening, SNAP education, and stigma-reduction strategies into academic and internship settings to support student well-being.

EXAMINATION OF COLORFASTNESS TO FROSTING AND CROCKING ON PIÑATEX® ORIGINAL PINEAPPLE LEATHER

Presenter(s): Voss, Amber (Undergraduate, Family and Consumer Sciences)

Mentor: Ui-Jeen Yu

Authorship: Amber Voss, Samantha Lopatowski, Omayah Stubbs, Palmer Helm Jr., and Ui-Jeen Yu

This study examines the colorfastness performance of Piñatex® Original Pineapple Leather, a plant-based textile valued for its sustainability and durability. Despite growing interest in pineapple leather as an eco-friendly alternative, limited research has investigated its colorfastness performance under abrasion and rubbing conditions. To address this gap, standardized AATCC 119 Colorfastness to Frosting (Flat Abrasion) and AATCC 8 Colorfastness to Crocking tests were conducted using samples of Piñatex® Original Pineapple Leather. Results indicate that the pineapple leather specimens demonstrated excellent colorfastness to frosting, showing strong resistance to color loss from flat abrasion. It also demonstrated superior colorfastness to crocking, with only minimal and acceptable dye transfer and color staining on white test fabrics under both dry and wet conditions. These findings suggest that pineapple leather maintains its color integrity under repeated abrasion and rubbing. This information is valuable for textile professionals, manufacturers, and consumers seeking reliable, sustainable leather alternatives, as the study provides empirical evidence supporting pineapple leather's long-term appearance retention in terms of colorfastness to crocking and frosting.

Kinesiology & Recreation

SOFTSHELL HEADGEAR EFFECTIVENESS IN PREVENTING CONCUSSIONS IN YOUTH SOCCER: A CRITICALLY APPRAISED TOPIC

Presenter(s): Randolph, Kyrrah (Graduate, Kinesiology & Recreation)

Mentor: Chelsea Kuehner-Boyer

Clinical Scenario:

Soccer is the most commonly played sport in the world with an estimated 265 million people playing worldwide each year. Concussion prevention remains a major concern in soccer, prompting interest in soft-shell headgear as a potential protective intervention. Despite increasing use, the effectiveness of headgear in reducing sport-related concussion (SRC) incidence remains unclear.

Focused Clinical Question:

In soccer athletes, does softshell headgear affect concussion rates?

Search Strategy:

An electronic search was completed in November 2024 of the Consortium of Academic Research Libraries I-Share Library system, which includes the databases of 89 libraries from colleges and universities throughout the state of Illinois. The search terms and Boolean phrases used were soccer AND headgear AND concussions. Article inclusion criteria included English language, available for online access, and articles published between 2019 and 2024. Articles were excluded if they did not discuss the evaluation of headgear, if they did not include soccer players, or were abstract only.

Results of Summary of Search:

The initial search through Milner Library's I-Share Library system returned 76 studies, 3 of which met the inclusion criteria. The majority of studies focused on youth participants, most specifically high school soccer athletes between the ages of 14-18. The results were statistically insignificant across all three articles, reporting no difference in incident of concussion, severity of concussion, days lost to concussion.

Evidence of Quality Assessment:

Methodological quality was assessed using the PEDro Scale for randomized controlled trials and the AMSTAR 2 tool for systematic reviews. The included randomized controlled trial demonstrated good quality PEDro score (7/10), and both systematic reviews were rated as moderate confidence. Overall, the body of evidence was considered to be of moderate quality.

Clinical Bottom Line:

Evidence suggests that soft-shell headgear does not significantly reduce the incidence of concussions in soccer athletes. Although the research shows that headgear may provide some protection against superficial injuries such as cuts or abrasions, it does not appear to offer meaningful protection against concussions. These findings highlight the need for alternative options for concussion prevention, including rule modifications and education on proper techniques.

Management

DECAFÉ

Presenter(s): Aguayo-Pizano, Kim (Undergraduate, Management)

Mentor: Barbara Ribbens

When Raúl Laurí asked himself “Why not take advantage of all the emotional aspects that coffee has when we can turn them into beautiful pieces of design?”, the question became a guidance towards his silent promise of doing something for our planet.

Decafé, founded by Raúl, is a company that takes coffee grounds and converts them into projects such as completely biodegradable lamps. Their material is 100% natural, ecological and resistant to temperatures up to 80°C. The company has distributors all around the world, including Spain, Germany, Mexico, France, Switzerland, Colombia, and many others. The case study focuses on Colombia to challenge students to take a company deeper into an emerging market to establish manufacturing there and develop a strategy for Latin America. By finding ways to expand their network and capitalize on the coffee culture that reigns in Latin America, students will have to develop a new product to grow their profitability and footprint. The research conducted for this case study emphasizes the importance of taking responsibility in consumption while contributing to the economic growth.

EFFECT OF ART ON WELL-BEING, STRESS, AND PERFORMANCE AT WORK

Presenter(s): Budik, Emily (Graduate, Psychology)
Stephanie, Baker (Undergraduate, Psychology)
Rachel, Feiger (Undergraduate, Psychology)

Mentor: Jeffrey Kahn

Authorship: Emily Budik, Jeffrey Kahn, Stephanie Baker, Rachel Feiger

Problem

Workplaces, where individuals spend most of their week, traditionally favor utilitarian, lean designs based on Taylorist literature assuming fewer distractions increase productivity (Tapping & Dunn, 2006). However, research suggests that such environments can lead to negative outcomes like increased stress, depression, and cardiovascular disease (Theorell & Karasek, 1996). To mitigate these effects, new theories propose intervening in workplace design. The current study explored these theories by implementing aesthetic enrichment (art and plants) and music in a simulated work environment to assess their effects on well-being and stress.

Procedure

Data collection completed with 122 college students have participated. Participants were subject to a 2 X 2 between subjects design and randomly assigned to one of four conditions in a simulated work environment: Control (no music/no aesthetic enrichment), Music Only, Aesthetic Enrichment (AE) Only, or Combined (AE + Music). Following baseline surveys, participants completed a stressful workplace simulation (answering high-importance emails) and then completed post-intervention surveys on well-being, stress, perceived task difficulty, control, and performance before debriefing.

Results

Two-way ANOVAs indicated no significant main effects of aesthetic enrichment or music, nor their interaction, on momentary well-being, objective task performance, or stress. Mean levels of well-being, performance, and stress were comparable across all conditions. Although stress was theorized as a mediator, the absence of significant effects on stress precluded mediation analyses. Exploratory correlational analyses revealed that perceived task difficulty was significantly associated with lower well-being and performance, whereas higher enjoyment and perceived control were positively associated with well-being and subjective performance. These relationships suggest that participants' subjective appraisals of the task were more strongly related to outcomes than the environmental manipulations themselves.

Conclusions/Implications

Contrary to expectations, brief exposure to aesthetic enrichment and music did not produce measurable improvements in well-being, stress, or performance during a short, novel workplace simulation. These findings suggest that the benefits of artistic workplace interventions may depend on factors such as exposure duration, task familiarity, individual differences in sensory sensitivity, and autonomy over environmental features. Additionally, these results support the view that lean environments offer no performance advantage over enriched ones, calling into question the assumptions underlying utilitarian office design. Future research should adopt longitudinal designs in office spaces to better capture the cumulative and individualized effects of artistic enrichment in real-world work settings.

EXPLORING THE IMPACT OF RACIAL MICROINVALIDATIONS PERPETRATED BY SCHOOL PERSONNEL ON ADOLESCENT MENTAL HEALTH

Presenter(s): Goins, Rochelle (Graduate, Psychology)

Mentor: Brea Banks

Microaggressions are harmful, verbal or non-verbal, identity-based actions inflicted upon individuals holding marginalized identities. Particularly relevant to the current study, racial microaggressions are everyday forms of systemic racism, which may be automatic and unconscious, and are meant to keep racially marginalized people in the racial margins (Pérez Huber & Solórzano, 2014; Sue et al., 2007). Literature suggests that experiencing racial microaggressions is related to symptoms of anxiety and depression among adolescents who hold racially minoritized identities (Allen et al., 2013; English et al., 2020; Huynh, 2012). The literature also suggests that racially minoritized adolescents are exposed to microaggressions at school (Steketee et al., 2021). There are three types of racial microaggressions: microinsults, microassaults, and microinvalidations. This study revolves around racial microinvalidations, or messages that nullify, negate, or exclude a racialized individual's psychological thoughts, feelings, or experiences (Sue et al., 2007).

Some research indicates that adolescents who hold racially minoritized identities experience racial microinvalidations at school more than college students (Aquino & Badescu, 2021). Still, there is not enough literature on the specific impact of racial microinvalidation on the mental health of racially minoritized adolescents. Using survey-based methods, we are exploring the impact of racial microinvalidations perpetrated by school personnel on adolescent mental health. Research indicates that racial centrality may moderate the relation between exposure to racism, including microaggressions, and negative mental health outcomes (Sellers et al., 2003; Yoo & Lee, 2005), and social support may mediate these relations (Harrell, 2000; Sanchez et al., 2018). As such, we hypothesize that exposure to racial microinvalidations enacted by school personnel will positively predict symptoms of depression and anxiety. Further, we predict that racial centrality will moderate the strength of these relations and that social support will mediate these relations.

FANTASY ORIENTATION, FANTASY PRONENESS, AND ANXIETY IN ADOLESCENTS

Presenter(s): Orhan, Begum (Graduate, Psychology)

Mentor: Julie Campbell

Authorship: Begum Orhan, Julie Campbell

Problem

Children's engagement with fantasy is a normal and adaptive part of development (Pierucci et al., 2014; Taylor & Carlson, 1997). Imaginative play helps children explore social roles, emotions, and creativity, supporting cognitive and emotional growth. However, excessive fantasy involvement in adulthood, known as fantasy proneness, has been associated with maladaptive outcomes such as dissociation and psychotic symptoms (Merckelbach et al., 2021). Despite these contrasting views, little is known about how early fantasy orientation relates to later fantasy proneness or anxiety. Moreover, the role of parental fantasy involvement in shaping adolescents' fantasy tendencies remains unclear. The present study examined whether childhood fantasy orientation predicts adolescent anxiety, whether it is associated with fantasy proneness, and how parental fantasy involvement contributes to these developmental outcomes.

Procedure

Parents and adolescents participated online. After providing informed consent and assent, parents completed demographic questions and measures assessing their own and their child's fantasy orientation (adapted from Taylor & Carlson, 1997), fantasy proneness (Merckelbach et al., 2001), anxiety (Screen for Adult Anxiety Related Disorders; Angulo et al., 2017), and support for their child's fantasy involvement. Adolescents completed a separate online survey assessing fantasy orientation, fantasy proneness, anxiety (Screen for Child Anxiety Related Emotional Disorders; Birmaher et al., 1997), and fantasy–reality differentiation (adapted from Taylor & Carlson, 1997), along with a brief memory check of early experiences.

Results

Correlational analyses revealed significant associations among fantasy-related variables. Children's fantasy orientation was positively associated with parents' beliefs about their child's fantasy orientation ($r = .45, p < .05$) and parents' own fantasy orientation ($r = .48, p < .05$). Regression analyses showed that parents' fantasy proneness predicted child fantasy proneness, $F(2,17) = 5.93, p = .011$, and parent anxiety predicted child anxiety, $F(1,18) = 13.59, p = .002$. Moderation analyses revealed that adolescent anxiety moderated the relationship between childhood fantasy orientation and adolescent fantasy proneness ($b = 2.57, SE = 1.17, t(24) = 2.20, p = .038$).

Conclusions/Implications

Childhood fantasy orientation appeared largely adaptive and unrelated to later anxiety or fantasy proneness. However, among adolescents with high anxiety, stronger fantasy orientation predicted greater fantasy proneness. Parental fantasy proneness, but not encouragement of fantasy, was associated with adolescent fantasy proneness, suggesting familial influences. Overall, early fantasy engagement appears beneficial but may heighten risk when combined with anxiety.

BRIDGING THE GAP BETWEEN INSTRUCTION TO APPLICATION: PILOTING OF TRAU-MA-INFORMED CARE INTERVENTION FOR PRE-SERVICE TEACHERS

Presenter(s): Spraggon, Meredith (Graduate, Psychology)

Mentor: Laura Finan

Authorship: Meredith Spraggon

Trauma-informed care (TIC) is increasingly recognized as essential for supporting students exposed to adversity; however, many pre-service teachers (PSTs) receive limited formal training in trauma-informed practices. Given educators' critical role in identifying and responding to trauma-related behaviors, preparing PSTs with foundational TIC knowledge and applied skills is essential. This pilot study examined PSTs' understanding, attitudes, and application of trauma-informed principles, as well as the extent to which targeted instruction enhanced trauma-informed competence.

Participants included 48 undergraduate students enrolled in a teacher preparation program (M age = 19.73). A mixed-methods pre-post design was used. At pre-test, participants completed a demographic questionnaire, self-rated their TIC knowledge, defined TIC in an open-ended response, completed the ARTIC-35 Education scale, and responded to a vignette assessing trauma-informed responses to trauma-affected student behaviors. Participants then completed a self-paced, interactive, four-module online TIC training intervention covering trauma foundations and principals of TIC, neurobiological impacts, recognizing trauma in classrooms, culturally responsive practices, and trauma-informed classroom strategies. Post-test measures mirrored pre-test procedures.

Results indicated that most PSTs demonstrated limited baseline understanding of TIC (M = 1.46). Following instruction, conceptual understanding significantly increased (M = 2.06), $t(47) = -4.96$, $p < .001$, $d = 0.84$. Although attitudes toward TIC were generally positive at baseline (M = 5.20), ARTIC-35 scores significantly improved post-intervention (M = 5.75), $t(47) = -6.84$, $p < .001$, $d = 0.56$. Additionally, PSTs demonstrated significant gains in trauma-informed responses to student behavior within vignette reflections (pre: M = 1.69; post: M = 2.50), $t(47) = -6.00$, $p < .001$, $d = 0.94$, suggesting improved application of a TIC lens.

Findings indicate that structured, online TIC instruction can meaningfully enhance PSTs' knowledge, strengthen trauma-supportive attitudes, and improve classroom-relevant application skills. Results support embedding trauma-informed training within educator preparation programs to promote safe, supportive, and culturally responsive classrooms. Implications for school psychologists include opportunities for interdisciplinary collaboration, consultation with teacher education programs, and systems-level advocacy to advance trauma-informed practices across school settings.

Social Work

BARRIERS TO SUCCESS FACED BY MARGINALIZED COMMUNITIES ATTENDING A PREDOMINANTLY WHITE INSTITUTION (PWI)

Presenter(s): Anderson, Faith (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

College education is often positioned as a pathway to social mobility; however, access to and success within higher education remain deeply inequitable for students from marginalized communities. Despite increased attention to diversity, equity, and inclusion, racial and ethnic disparities in degree attainment persist, particularly at Historically White Institutions (HWIs). While financial barriers are widely recognized as a significant obstacle, less is known about the non-financial challenges that remain when tuition costs are fully covered. This study explores the academic and personal experiences of marginalized, non-white students attending a HWI who receive full-tuition funding through scholarship. Using an exploratory approach, the research examines how institutional systems, campus culture, sense of belonging, academic support, and overall well-being influence student success. By centering the lived experiences of marginalized students, this research addresses a critical gap in higher education and shifts the focus from student deficits to institutional responsibility. Findings aim to inform policies and practices that promote more equitable and supportive environments for marginalized students attending HWIs.

DEVELOPING EMPATHY: THE IMPACTS OF SCHOOL EMPATHY-BASED PRESENTATIONS ON STUDENTS

Presenter(s): Baker, Jillian (Graduate, Social Work)

Mentor: Kate Sheridan

The aim of this study is examine the impact of a short-term empathy-based intervention or workshop on students views of empathy in the school setting with assessment before and after the intervention. Participants were 33 students from Cissna Park Middle School in grades 6th-8th. The researchers assessed whether or not a school-based presentation on empathy changed how students perceived their own levels of empathy as well as their feelings on the levels of empathy shown by their peers within the school before and after an empathy-focused guest speaker. Self-reports were obtained voluntarily and anonymously. Findings from the online pre and post surveys using the Basic Empathy Scale (Jolliffe and Farrington, 2006) as well as additional questions to assess the presentation indicated...

Results pending

TRAUMATIC EXPERIENCES IMPACT ON ALEXITHYMIA FOR ADULT COUPLES

Presenter(s): Mills, Lianna (Graduate, Social Work)

Mentor: Kate Sheridan

This study seeks to examine the relationship between traumatic experiences and alexithymia (difficulty expressing and identifying emotions) within romantic, adult couples. Specifically, examining whether trauma history in couples is associated with higher alexithymia in couples, whether alexithymia relates to difficulties in couples therapy, if gender differences exist in alexithymia among individuals, and whether an overall relationship exists between traumatic experiences and alexithymia. Participants consisted of adult couples currently in couples therapy at Truth in Love Counseling & Care located in Bloomington, Illinois. Secondary data were obtained from standardized self-report measures, including the Toronto Alexithymia Scale-20 (TAS-20), the Life Events Checklist for DSM-5 (LEC-5), and the PTSD Checklist for DSM-5 (PCL-5). Due to the small sample size ($n = 22$) and missing data, analyses were limited to descriptive statistics. Preliminary findings suggest a general trend in which greater trauma impact (exposure and symptoms) is associated with higher levels of alexithymia and males have slightly higher alexithymia than females, while no clear relationship was observed between alexithymia and therapy progress. Given the limited sample, these findings should be interpreted with caution. Further research with larger samples and deeper analyses is needed to better understand these relationships further.

SELF-CARE POLICY FOR CLINICIANS IN CHILD AND FAMILY PRACTICE

Presenter(s): Bettis, Sheri (Graduate, Social Work)

Mentor: Kate Sheridan

Burnout, compassion fatigue, and turnover are significant concerns in mental health settings, particularly in private practices where organizational wellness policies are often underdeveloped or inconsistently implemented. This study evaluates clinician awareness and perceived effectiveness of an existing self-care policy within a private mental health practice and examines whether a revised, evidence-informed policy improves clinician satisfaction and perceived organizational support.

Twenty clinicians will complete a baseline survey assessing their awareness of the current self-care policy, perceptions of its clarity, relevance, and usefulness, and perceived gaps in organizational support. A review of evidence-based literature on clinician self-care, burnout prevention, and workforce retention will then inform revisions to the policy. The updated policy will be distributed to the same clinicians, who will complete a follow-up survey evaluating changes in clarity, perceived support, and overall satisfaction.

Pre- and post-revision responses will be compared to assess whether the revised policy results in improved clinician understanding and acceptance of the organization's self-care framework. This project aims to demonstrate that organizational self-care policies are a meaningful component of clinician well-being and may contribute to improved mental health and retention in private practice settings.

TRACKING WHAT MATTERS: CLIENT FEEDBACK AND PERCEPTIONS OF PROGRESS IN COUNSELING

Presenter(s): Birlingmair, Kate (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

A core element of effective counseling is the collaborative process between clients and counselors. Despite this, many clients report feeling disconnected from their progress in counseling or uncertain about whether counseling is helping them achieve their goals. This perceived disconnection can reduce engagement, satisfaction, and overall treatment outcomes. One approach towards addressing this concern is called routine outcome monitoring (ROM), defined as the regular use of structured, client-reported measures across the course of treatment to guide clinical decision-making and identify when adjustments to counseling may be needed. The purpose of my research study is to explore how gathering client feedback, as a form of routine outcome monitoring, influences clients' perceptions of accomplishing their treatment goals.

IDENTIFYING AND RESPONDING TO STUDENT MENTAL HEALTH NEEDS AT BLOOMINGTON JUNIOR HIGH SCHOOL

Presenter(s): Cichon, Madelyn (Graduate, Social Work)

Mentor: Kate Sheridan

The aim of this study is to examine how certified staff who are not mental health professionals perceive identifying and responding to student mental health needs at Bloomington Junior High School. Participants were 23 certified staff members aged 18 years or older at Bloomington Junior High School who do not serve in mental health professional roles, such as social workers, psychologists, or counselors. The study explores how these staff members feel about recognizing student mental health concerns and responding appropriately within their professional roles. Data was collected using a one-time, 22-item self-report survey that required 22 minutes or less to complete. The survey was designed to gather information regarding staff comfort levels, perceptions, and current practices related to student mental health needs. Data analysis will focus on identifying trends in staff perceptions and tools currently being used at Bloomington Junior High School. The findings of this study will be used to inform potential improvements to school-based supports, resources, and professional development opportunities aimed at assisting certified staff in addressing student mental health needs.

THE ROLE OF DIVERSITY, EQUITY, AND INCLUSION (DEI) IN ASSESSMENTS AND EVALUATIONS AT ABC COUNSELING AND FAMILY SERVICES

Presenter(s): DeVault, Tyler (Graduate, Social Work)

Mentor: Kate Sheridan

This study examines the role of Diversity, Equity, and Inclusion (DEI) in the assessment and evaluation tools used by ABC Counseling and Family Services when working with clients. The study sample consists of therapists currently employed across the agency's offices. Participants are asked to complete 20 open-ended questions designed to explore how DEI principles are incorporated into existing assessment and evaluation practices, therapists' perceptions of the effectiveness of these tools, and areas for potential development. This study is intended to inform organizational understanding of DEI integration within clinical assessment processes, including implications for staff training, assessment selection, and responsiveness to a diverse client population.

ADMISSION/NON-ADMISSION INTO MCLEAN COUNTY DRUG COURT/RECOVERY COURT PROGRAM

Presenter(s): Dominguez, Anjelia (Graduate, Social Work)

Mentor: Kate Sheridan

The McLean County Drug Court Program provides an alternative to incarceration for individuals with substance use disorders (SUD), aiming to reduce recidivism and improve participant outcomes through structured supervision, treatment, and support. Despite its benefits, not all individuals referred to the program are admitted. Currently, it is unclear which participants are excluded, and whether exclusion is related to demographic, legal, or clinical factors. The purpose of this study is to examine which individuals are being excluded from the McLean County Drug Court Program and to identify the characteristics that differentiate excluded participants from those who are accepted. By analyzing existing data on drug court referrals and denials, this study seeks to uncover patterns and disparities related to demographic, legal, and clinical factors that influence program eligibility. This study uses a mixed-methods design, combining record review and semi-structured interviews. The record review will analyze an existing Excel datasheet, the EIA Master List, containing client-level information from the McLean County Drug Court Program. Semi-structured interviews will be conducted with employees at Chestnut Health Systems and the McLean County Law and Justice Center to clarify missing or incomplete information in the EIA Master List, utilizing an approximately 10 question interview anticipated to take 30–45 minutes to complete. The findings are expected to inform program improvement efforts, promote equitable access, and guide policy discussions aimed at expanding services to populations who may benefit from drug court participation but are currently excluded. This research aligns with national best practice standards for equity and inclusion in drug court programs, as outlined in the ALL RISE Equity and Inclusion Assessment Guide (2023). Using the guide's framework, the study will examine disparities across stages of program referral and acceptance, with particular attention to demographic, legal, and clinical characteristics (ALL RISE, 2023).

PROGRAM EVALUATION: DIALECTICAL BEHAVIOR THERAPY

Presenter(s): Freidheim-Perez, Isabella (Graduate, Social Work)

Mentor: Kate Sheridan

Dialectical Behavior Therapy (DBT) is an evidence-based intervention widely used in social work practice to support individuals experiencing emotional dysregulation and maladaptive coping behaviors. This intervention technique was designed by Marsha Linehan, who struggled with borderline personality disorder for several years of her life and felt no improvement with therapy. In her therapeutic process, there are four modules: mindfulness, emotion regulation, interpersonal effectiveness and distress tolerance. Distress tolerance skills are particularly relevant for clients navigating acute emotional crises for individuals who suffer from borderline personality disorder, of all ages. My program evaluation assessed a DBT-informed group intervention with a specific focus on the Distress Tolerance module, emphasizing alignment with Council on Social Work Education (CSWE) core competencies. The group was facilitated by my LCSW supervisor at Carle BroMenn Behavioral Health. Throughout her career she has served adolescent and adult clients with mood disorders, trauma histories, and difficulties managing intense affect. She found that Dialectical Behavioral Therapy showed the most success with many patients. I also have witnessed the positive changes in clients' symptoms through the repetitive use of DBT and the skills to be beneficial to clients during manic episodes and even diffusing episodes. The participants included in my data collection are clients within the group ranging from ages 18 – 68 years old. They were asked to partake in a pre and post module survey about their experience to navigate crises and heightened emotions. The survey is run through a data system called Qualtrics and once all responses are collected I will analyze my data. I believe that the clients participating in this group will feel that they have specifically learned how to challenge negativity and will better manage crises. I hope to use my data and knowledge gained from this evaluation in my future work with clients and potentially add on to the known skills to manage a crisis, to enhance the lives of my clients.

ELDERLY FALL RISK CAPSTONE PROJECT: A QUALITATIVE DESCRIPTION OF FALL-RELATED RESOURCES PROVIDED TO RESIDENTS OF AN INDEPENDENT LIVING COMMUNITY

Presenter(s): Hamilton, Miranda (Graduate, Social Work)

Mentor: Susana Calderon

Co-Mentor: Gloria Arroyo Sugg

Authorship: Miranda Hamilton, Susana Calderon, Nina Ford

Falling, or unintentionally dropping to the ground or a lower level, is a serious and prevalent health concern for older adults in the United States. Over 14 million, or 1 in 4, older adults fall every year (CDC, 2024). Although some research exists on what fall risk factors exist for older adults, little is known about what resources are provided by communities to mitigate these risks. The purpose of this capstone project is to describe fall-related resources that may be provided by a social worker or other social service professional. To accomplish this, semi-structured interviews were conducted with three staff members at an independent living community in the Midwest. Interviews were structured around elucidating information about formal and informal resources provided by the facility. Interviews were transcribed and a deductive thematic analysis was completed, sorting interview content into the following themes: biological, socioeconomic, behavioral, and environmental resources. Several additional themes emerged from the interviews, including barriers to resources, resident values, resource needs, and fall-risk factors. This project was part of a main pilot study that employed an interdisciplinary collaboration between an independent living facility and social work, nursing, and emergency science professionals. In conclusion, this capstone project provides a qualitative description of what resources an independent living community may provide to mitigate its residents' fall risk.

THE IMPACT OF SOCIAL-EMOTIONAL LEARNING (SEL) INTERVENTIONS ON TRI-VALLEY ELEMENTARY SCHOOL STUDENTS

Presenter(s): Helling, Scott (Graduate, Social Work)

Mentor: Kate Sheridan

Social-emotional learning (SEL) interventions have become increasingly common in elementary schools as a means of supporting students' behavioral, emotional, and academic development. This study examines the perceived impact of SEL interventions at Tri-Valley Elementary School, as well as school staff attitudes toward SEL implementation and its perceived effectiveness. Using a quantitative, cross-sectional survey design, data will be collected from general education teachers, special education teachers, support staff, and building administrators. Participants will complete a 20-item Likert-scale questionnaire assessing observed student outcomes across behavioral, emotional, and academic domains, staff attitudes toward SEL, and perceived evidence of SEL effectiveness. Descriptive and comparative analyses will be used to examine overall trends and differences in perceptions across staff roles. Findings from this study aim to contribute to a better understanding of how SEL interventions are perceived by school personnel and to inform future SEL implementation and evaluation efforts within elementary school settings.

BEYOND LITERAL HOMELESSNESS: MAPPING SERVICE GAPS IN RENTAL ASSISTANCE AND OPPORTUNITIES FOR UPSTREAM INTERVENTION

Presenter(s): Hill, Billie (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

This research aims to contribute to a more comprehensive understanding of rental assistance needs beyond literal homelessness and to identify opportunities for upstream intervention to prevent housing loss at the local level. Targeted rental assistance for the unhoused is restricted to those meeting the U.S. Department of Housing and Urban Development's (HUD) Category 1 definition of literal homelessness, which is limited to individuals residing in emergency shelter, vehicles, or unsheltered locations. However, housing instability often emerges prior to meeting federal criteria for literal homelessness, and these earlier stages of need are rarely captured at the local level. As a result, households experiencing significant housing instability may be excluded from assistance until crisis thresholds are reached. This research examines two primary variables: (1) the extent of unmet rental assistance demand from housing-unstable households who do not meet HUD Category 1 eligibility criteria, and (2) service provider perspectives on system-level barriers. This study aims to assess areas of alignment and divergence between quantitative patterns of unmet need and the narratives of local providers. These findings will contribute to a growing understanding of how current eligibility structures exclude those experiencing housing instability and how service providers interpret and navigate these gaps in practice.

IMPACT OF EMDR ON FIRST RESPONDERS & CULTURAL STIGMA

Presenter(s): Klepec, Jeffrey (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

First responders are routinely exposed to immediate and compounded traumatic stress through repeated stressful encounters with violence, injury, death, and life-threatening situations. As a result, many experience high rates of post-traumatic stress (PTSD), anxiety, depression, and job-related burnout. Generally, first responders face severe, lasting mental health consequences due to their demanding daily stressful work events. Despite the availability of effective trauma treatments, deep-rooted internalized cultural stigma within first responders which emphasize toughness, emotional control, and fear of professional, or career repercussions often presents a significant barrier to seeking mental health assistance and treatment. Eye Movement Desensitization and Reprocessing (EMDR) therapy is an evidence-based, trauma-focused intervention that has been shown to be effective therapy for treating PTSD and other trauma related symptoms. This paper examines the impact of EMDR therapy on first responders, with particular focus placed on the role of cultural stigma in influencing access to treatment, participation, and effectiveness. Current literature suggests that EMDR's structured, time efficiency, and non-verbal approach may align well with first responder values which may reduce the stigma associated to seeking mental health assistance. Understanding the interaction between trauma treatment and the culture involving first responders is necessary for improving mental health outcomes among this high-risk population. This study aims to explore how EMDR's unique, non-verbal approach can help circumvent the cultural stigma that prevents many first responders from seeking mental health treatment.

WHEN CARE FAILS, MOTHERS PAY: BARRIER TO CHILDCARE AND THEIR IMPACT ON EMPLOYMENT

Presenter(s): Leal, Alma (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

Access to reliable and affordable childcare plays an important role in deciding if parents can stay employed, especially for families with lower wage jobs. This qualitative study explores how childcare accessibility and affordability affect parental employment stability, including job retention, reduced work hours, job loss, and decisions to leave the workforce. The study focuses on the experiences of low-income parents who are forced to balance work responsibilities with limited childcare options.

While using semi-structured interviews, the study examines how growing cost of childcare, limited availability, work schedules that do not match childcare hours, and unexpected disruptions in care influence parents' that risk overall job stability. By providing the parents' voices, this study seeks to better understand how childcare barriers and caregiving expectations shape their experiences. The findings are intended to inform social work practice, community-based support, and policy efforts aimed at improving access to childcare; While providing insight the economic stability for low-income families.

PARENT PERCEPTIONS OF THE IEP PROCESS AT NORMAL COMMUNITY HIGH SCHOOL

Presenter(s): Link, Kerrigan (Graduate, Social Work)

Mentor: Kate Sheridan

The aim of this study is to evaluate Normal Community High School parent perceptions of the Individualized Education Program (IEP) process. This study aims to answer what are parents' perceptions of the IEP process for their student at Normal Community High School. Participants include the parents or legal guardians of students that have an IEP at Normal Community High School during the 2025-2026 academic school year. Participants are asked to complete an online survey containing 24 questions that will take less than 20 minutes to complete. This study seeks a designation as not human subjects research because there will be no public dissemination of data or findings. The data collected through the online survey will inform any needed improvements and support the continuation of beneficial practices at NCHS. The data will be shared within the Learning Resource department at Normal Community High School and Special Education Administrators.

THE EFFECTIVENESS OF SEL FOR ADOLESCENTS WITH HIGH ACE SCORES

Presenter(s): Nepereny, Alyssa (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

The utilization of social-emotional learning (SEL) in schools and after-school settings presents the opportunity to improve emotional awareness and management skills for children who test high for adverse childhood experiences (ACE). Previous research has shown SEL to be effective in the improvement of social and emotional competency skills, and an increase of emotional awareness as well as utilizing positive strategies when faced with adversity. The negative effects of the COVID-19 pandemic such as reduced engagement, motivation and apathy towards school work support the need for additional efforts to include SEL programming into current curricula. Inconsistencies in programming and poor child-teacher relationships create barriers to effective outcomes. This project aims to compare data from a strengths and difficulties questionnaire (SDQ-9) completed by adolescents (with assistance from an adult) who test high on the ACE questionnaire before and after the 8-week program to determine the effectiveness of the programming.

IMPACTS OF VICARIOUS TRAUMA AND VICARIOUS RESILIENCE IN CERTIFIED STAFF AT BLOOMINGTON JUNIOR HIGH SCHOOL

Presenter(s): Ondo, Noah (Graduate, Social Work)

Mentor: Kate Sheridan

Certified school staff are frequently exposed to students' trauma, stress, and adversity, placing them at risk for vicarious trauma while also creating opportunities for vicarious resilience. This study examines the types of vicarious trauma and vicarious resilience experienced by certified staff at Bloomington Junior High School and explores current trends and coping tools used within this school setting. The study seeks to answer the research question: What types of vicarious trauma and vicarious resilience are present among certified staff at Bloomington Junior High School?

Adult certified staff members aged 18 years or older at Bloomington Junior High School will be invited to participate in a one-time survey consisting of 22 items, designed to be completed in 22 minutes or less. The survey will assess participants' experiences related to vicarious trauma and resilience in their professional roles. This study is designated as not human subjects research, as there will be no public dissemination of data or findings.

Survey responses will be analyzed to identify patterns of vicarious trauma and resilience and to better understand the strategies currently used by certified staff to manage these experiences. The findings aim to provide insight into existing trends within the school environment and inform potential supports to promote staff well-being and resilience at Bloomington Junior High School.

RELATIONAL AND EMOTIONAL FACTORS ASSOCIATED WITH EATING DISORDER RISK AND SYMPTOM SEVERITY IN ADULTS

Presenter(s): Piper, Darlene (Graduate, Social Work)

Mentor: Kate Sheridan

The purpose of this study is to examine the relationships among early adverse experiences, adult attachment patterns, emotion regulation difficulties, and eating disorder risk and symptom severity in adults. Participants are adults aged 18 years and older who are current clients of One Hope Project. Participation is voluntary and anonymous, and all participants provide informed consent. Data are collected using four standardized self-report measures: the Relationship Structures Questionnaire (ECR-RS) to assess adult attachment anxiety and avoidance; the Adverse Childhood Experiences (ACE) Questionnaire to assess exposure to childhood abuse, neglect, and household dysfunction; the Eating Disorder Examination Questionnaire (EDE-Q) to assess eating disorder behaviors and cognitive concerns; and the Difficulties in Emotion Regulation Scale (DERS) to assess emotional awareness, impulse control, and access to emotion regulation strategies. All measures are self-administered, and no identifying information is collected. Findings from this study contribute to a deeper understanding of the relational and emotional factors associated with eating disorder risk and symptom severity and support the use of trauma and attachment-informed approaches to assessment, prevention, and intervention.

HOW BURNOUT AFFECTS JOB SATISFACTION

Presenter(s): Ramirez, Marissa (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

Burnout is a growing concern in the social work profession, negatively impacting practitioner well-being, client outcomes, and organizational functioning. Social workers frequently face ethical dilemmas, high caseloads, and emotional demands that contribute to chronic stress and burnout, characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment. This study examines the relationship between burnout and job satisfaction among social workers at a local counseling center. It is hypothesized that higher levels of burnout are associated with lower levels of job satisfaction. Using author-designed surveys and demographic variables to account for external influences, this study aims to address gaps in existing research by providing agency-specific insights that may inform organizational strategies to reduce burnout and improve job satisfaction.

MINDFUL MAKERS PROGRAM EVALUATION

Presenter(s): Schattke, Mimi (Graduate, Social Work)

Mentor: Kate Sheridan

The purpose of this study is to evaluate the Mindful Makers group interventions at Tremont Middle School. The Mindful Makers group aims to teach sixth and eighth graders diagnosed with autism about intrapersonal skills through creative mediums. My hypothesis is that the group-based interventions will increase the student's intrapersonal skills of self-awareness and self-confidence. Participants will be sixth and eighth graders diagnosed with autism who go to school at Tremont Middle School. Data will be collected through a pre and post group interview and five exit slips from the students done after each session. This study is designed as human subject research, but findings will not be publicly disseminated. Findings will be used to determine if Mindful Makers is an intervention plan the school should keep using the program as it or redesign the interventions.

EFFECTIVENESS OF FREE THERAPY SERVICES ON MENTAL HEALTH OUTCOMES IN COMMUNITY COLLEGE STUDENTS

Presenter(s): Swigart, Emily (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

Community college students experience high levels of psychological distress while having fewer mental health resources than students at four-year institutions. National data show increasing rates of anxiety, depression, and basic needs insecurity among college students, with these challenges often intensified for community college students who balance academic demands with employment, financial strain, and family responsibilities. Despite these elevated risks, research on collegiate mental health services has largely focused on four-year universities, leaving limited evidence on the effectiveness of free, on-campus therapy services in two-year college settings. This study examines the effectiveness of free on-campus therapy at Heartland Community College using a pretest–posttest research design. Psychological distress is measured using the Counseling Center Assessment of Psychological Symptoms, a standardized instrument developed for college populations that assesses depression, generalized anxiety, academic distress, eating concerns, and overall psychological functioning. The study asks whether participation in free on-campus therapy is associated with reductions in psychological distress following treatment, with the hypothesis that students will demonstrate lower distress scores after completing therapy compared to their scores prior to treatment. Existing research conducted primarily at four-year institutions indicates that short-term counseling reduces symptoms of depression, anxiety, and general psychological distress and improves academic functioning; however, limited research has examined these outcomes among community college students. Available studies suggest that counseling may reduce depressive symptoms, strengthen coping skills, and increase students' sense of connection to their campus environment, underscoring the need for further evaluation of mental health services in two-year institutions. This study contributes to the limited literature on community college mental health by evaluating changes in Counseling Center Assessment of Psychological Symptoms scores among students receiving free therapy services, and its findings have the potential to inform decisions related to counseling center funding, staffing, and program development while supporting the importance of accessible and responsive mental health services that promote student well-being and academic success.

ACADEMIC PRESSURE'S EFFECT ON THE MENTAL HEALTH OF GRADUATE STUDENTS

Presenter(s): Trenhaile, Jozie (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

Graduate School is known to be both academically and psychologically demanding. Despite the wide variety of disciplines, similarly (Graduate students encounter a unique pressure stemming from uncertain career paths, financial insecurity, high academic expectations, and sometimes the isolating nature of academic time consumption. Findings from this research are expected to provide insight into the prevalence of perceived stress among graduate students and its relationship to academic pressure.

This will be completed as a quantitative study through the use of closed ended survey questions through Qualtrics. In doing so, the independent variable will be defined as the academic pressure experienced by graduate students. Whereas, the dependent variable will be defined as the mental well-being of graduate students. This can be measured through the use of a perceived stress scale. This qualtrics survey will be distributed to graduate students at Illinois State University through mass email.

DEVELOPMENT OF A PATIENT SELF-MANAGEMENT AND RESOURCE NAVIGATION GUIDE FOR HOME HEALTH PATIENTS IN THE EASTERN REGION

Presenter(s): Ulrich, Kordelia (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

Home health patients and their families often experience educational gaps and difficulty navigating community services, which can interfere with effective self-management and continuity of care. This capstone project addresses these challenges through the development of a Patient Self-Management and Resource Navigation Guide for individuals receiving home health services in the Eastern Region. The project is informed by an extensive review of peer-reviewed literature on patient education, health literacy, self-management, social determinants of health, and resource navigation to identify common barriers and best-practice approaches in home health care. These findings are synthesized into a structured, patient-facing guide that combines a community resource directory organized by need with a self-management planning section for tracking medications, appointments, symptoms, and health goals. By consolidating educational content and resource information into a single, accessible tool, the guide is intended to enhance patient autonomy, improve understanding of available supports, and reduce barriers to independent care management.

HOSPICE ENTITY EVALUATION: MIXED METHOD RESEARCH EVALUATION

Presenter(s): Zummallen, Jason (Graduate, Social Work)

Mentor: Gloria Arroyo Sugg

Hospice entities in the United States have historically been non-profit organizations. In 1982, hospices began to shift to for-profit ownership. Using survey data from The Centers on Medicaid and Medicare Services, The National Hospice Survey, and The National Home and Hospice Care Survey, the effects of hospice ownership on patient satisfaction is examined. While literature examining the shift from non-profit to for-profit hospice entities exists, there are gaps in literature regarding the effect on patient outcomes, such as family bereavement risks and patient satisfaction. This study aims to add information to and understand the full effects of transitioning hospice entities and how the changes affect the families served. This study will examine the effects on the patients and families by examining existing data and surveys, as well as differences in hospice program evaluations before, during, and after the shift. The researcher will focus on data and qualitative literature ranging from 1980, prior to the shift to for-profit began, to 2007. The researcher will focus on services offered by each ownership type, as well as information on patient satisfaction such as reported pain levels and live or deceased discharge from the hospice program.

Special Education

ATTENTION TO INTERSECTIONALITY IN EDUCATIONAL POLICY RELATED TO DISABLED STUDENTS: A REVIEW OF THE LITERATURE

Presenter(s): Chlada, Anabella (Undergraduate, Special Education)

Mentor: Debbie Shelden

Authorship: Anabella Chlada, Debbie Shelden

Findings from a literature review on intersectionality addressed in educational policy related to disabled students will be presented. Themes related intersectionality, ableism, examination of historical and systemic issues, social model of disability, relationship to other policy areas, and implementation at the local level will be discussed. Implications for teacher preparation will be identified. This work is the product of an independent study of a special education undergraduate student.

Teaching and Learning

MORPHOLOGICAL AWARENESS INTERVENTION IN SECONDARY CLASSROOMS TO SUPPORT LITERACY DEVELOPMENT IN ADOLESCENTS

Presenter(s): Anderson, Belinda (Graduate, Teaching and Learning)

Mentor: Sara Jones

Foundational skills such as word reading, fluency, and word knowledge are integral to understanding or interpreting text. Though it is often assumed that adolescents have adequately developed foundational literacy skills by the time they are in high school, many students would benefit from targeted interventions to address deficits. This mixed methods study investigates the impacts of a morphological awareness intervention designed to improve the literacy outcomes of a group of freshman students from diverse backgrounds enrolled in a Tier 2 intervention course. Data were collected over a five-week period through direct instruction in morphological awareness, observations, and pre- and post-testing. Findings from this study suggest that explicit instruction of morphological awareness may support improvements in foundational literacy skills such as word reading, decoding, and reading comprehension. The use of morphological awareness instruction can offer educators more adaptable strategies to address specific literacy needs of older readers.

IMPACT OF EXPLICIT INFERENCE GENERATION INSTRUCTION ON THE READING COMPREHENSION OUTCOMES FOR MIDDLE SCHOOL READERS

Presenter(s): Anderson, Lindsay (Graduate, Teaching and Learning)

Mentor: Sara Jones

Many middle school students receiving reading interventions demonstrate sufficient decoding skills but struggle with reading comprehension, particularly when texts require the integration of background knowledge and the generation of inferences. This study examines the impact of explicit inference-generation instruction on the comprehension outcomes of sixth-grade students receiving reading intervention in a rural middle school in Central Illinois. Participants include a small intervention group of four to six sixth-grade students who are identified as significantly below grade level in comprehension, based on district FastBridge benchmark data and RTI procedures. Using a one-group design, data is collected through pre- and post-standardized comprehension assessment, a researcher-developed inference assessment, scored student work samples, observation field notes, and video analysis of instructional sessions. Quantitative data is analyzed for changes in comprehension and inference accuracy, while qualitative artifacts and transcripts are coded to examine patterns in students' reasoning, use of textual evidence, and inferential responses to instructional scaffolding. Tentative findings indicate gains in inference accuracy for most participants by Lesson 3, with several students demonstrating substantial improvement compared to pretest performance, suggesting responsiveness to explicit modeling and guided practice. Based on these preliminary results, the study suggests that targeted inference instruction may be a promising approach for remediation in supporting middle school readers within intervention settings.

TEACHING AT THE PACE OF CHILDREN: A KINDERGARTEN TEACHER'S SHIFT FROM BENCHMARK TO DEVELOPMENTAL PHONICS PRACTICES

Presenter(s): Caho, Hayley (Graduate, Teaching and Learning)

Mentor: Sara Jones

Some students come into kindergarten at the age of four years old because the start of school is before the cut off day. In some cases, parents decide to keep their child back due to their birthday resulting in a child being six at the start of kindergarten. With this, you then have 4-year-olds and 6-year-olds in your classroom learning the same material and are then held to the same standards, when a whole year difference in a child's age is significant for the different stages of development. This research study was done to look at how teachers can change their instruction and assessment practices to help students learn the materials they need to when looking at their developmental age, rather than the standard benchmarks that schools have in place. This study employs a Qualitative Case Study design, predominantly relying on qualitative methods, supplemented by a minor quantitative component. The qualitative component will provide insight into how a kindergarten teacher modifies instruction and assessment practices when shifting from a benchmark focused approach to a developmentally focused approach. The study focuses on how do Kindergarten teachers modify their instruction and assessment of early phonics skills when shifting from a benchmark-focused to a developmentally focused approach? By analyzing the students based on development rather than benchmarks, teaching decisions became more intentional and flexible for the students. Instead of pacing at grade level, students were pulled by readiness and skill development. This shift led to small group instructions that used developmentally appropriate strategies for each student.

MORE THAN JUST READING: HOW BOOK CLUBS INFLUENCE COMPREHENSION AND MOTIVATION IN FOURTH GRADE

Presenter(s): Cooper, Dana (Graduate, Teaching and Learning)

Mentor: Anna Smith

Many upper elementary students demonstrate accurate decoding skills yet struggle to engage in deeper comprehension and sustained discussion of texts, particularly as reading demands increase in fourth grade. Especially since reading goes from learning to read to reading to learn in the upper grades. This qualitative teacher research study examines how literature circles that include both fiction and nonfiction texts support fourth-grade students' reading comprehension, motivation, and discussion skills. The study takes place in one fourth grade classroom in a public elementary school and includes approximately 20 students representing a range of reading abilities. Data is being collected through weekly student reflection journals, pre and post reading comprehension assessments, and structured classroom observations of literature circle discussions. Early findings suggest that students demonstrate increased engagement, greater awareness of comprehension strategies, and more active participation in peer discussions when given structured roles and opportunities for choice within literature circles. These early findings suggest that literature circles may provide a meaningful instructional context for supporting both comprehension and collaborative talk in the fourth-grade classroom. This study has implications for reading instruction by highlighting the importance of student-centered discussion, teacher facilitation, and intentional use of small group structures to promote deeper comprehension and transferable literacy skills.

IMPACT OF GUIDED READING GROUPS ON READING COMPREHENSION

Presenter(s): Creamean, Erin (Graduate, Teaching and Learning)

Mentor: Anna Smith

Reading comprehension is often viewed simply as a reading skill, but it is far more complex (Catts, 2022). McKee (2012) defines reading comprehension as the ability not only to understand a text but also to analyze and accurately interpret the writer's message. Teaching students how to comprehend text involves multiple components of reading instruction, including explicit teaching of phonics, phonological awareness, vocabulary, and fluency routines (Duke et al., 2021). In my second-grade classroom, even students reading at or above grade level often struggle with fully grasping the texts. In my school's current curriculum, there has been an increase in phonics focused instruction. There is little to no explicit vocabulary or fluency practice as a whole group. The purpose of this study is to determine the effect of small, guided reading or intervention groups on filling these gaps and improving comprehension. As students get older and the content they read becomes increasingly complex, students are going to fall behind if they are unable to understand what they've read. It is important that we, as educators, find the most effective methods to help students improve in this area. The study was conducted in a second-grade classroom at a public school located in a mid-sized suburban community. Students were organized into guided reading groups and teacher observations, student artifacts, self-assessments, and comprehension assessments were collected. Based on findings, classrooms should implement small reading group instruction for all students in order to support their reading comprehension.

INFLUENCES ON INDEPENDENT BOOK SELECTION IN THE ELEMENTARY LIBRARY

Presenter(s): DeValk, Anita (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

Authorship: Anita DeValk

School libraries are the foundation of a school's reading culture. What is it, though, that actually prompts a child to choose a book? As a school librarian, my goal is to cultivate a culture of reading among students and help connect them with books. Knowing which personal and situational factors affect and motivate students can better determine how to advise them during their selection process. This study explores how librarians, peers, and self-interest influences students' book selection in an elementary school library. A class of fourth grade students from a major midwestern metropolitan suburb were invited to participate in this study, with eleven students providing assent and parental permissions. Data was collected during the students' weekly scheduled library class. A variety of protocols were used to collect and triangulate findings. A structured item survey was given to students to gather data on students' opinions, perceptions, and attitudes towards selecting books. Exit tickets prompted students identify specific book selection behaviors they demonstrated during book selection. Observations of students during book checkout and semi-structured interviews enabled the researcher to collect authentic data and engage in conversations with students about the structure of the library itself, the role of the librarian, and how peers may influence their decisions. Preliminary findings indicate that most students' selections are based on preferred genres, authors, or book series. Additionally, peers seemingly play an important role in students' selection. Many students indicated conversations and recommendations from peers highly influenced their decision to select a book. Based on these tentative findings, it is recommended that school librarians increase structured and unstructured opportunities for students to share what they are reading in order to expose students to the widest variety of authors, genres, and book series as possible.

SEL AND ITS IMPLEMENTATION

Presenter(s): Elias, Mason (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

Students are nearly 6 years in the classroom since COVID-19. However, there are still existing effects within the classroom, including mental health obstacles and difficulty socializing with peers and adults. These drawbacks have not only been felt from the student perspective but also from the teacher perspective. To better understand how teachers have managed all of these added pressures, this study explores teacher perspectives of SEL and how it is implemented within its current climate. Teachers within a district that promotes social-emotional learning, at an ethnically and socioeconomically diverse mid-sized metropolitan school setting, were chosen to be surveyed and interviewed. Survey and interviews were analyzed using a qualitative research methods approach to find teachers' perspectives of SEL as a whole and to provide feedback on how SEL is understood, implemented, and challenges it presents. Teachers agree that SEL is important and essential to student success. Teachers predominantly teach SEL multiple times per week, if not daily. Teachers perceive SEL being important because of its ability to help young students regulate their emotions, communicate their feelings, and provide lifelong strategies to grow intellectually and emotionally. Teachers also reported challenges with SEL, citing lack of time, large class sizes, and difficulty balancing social-emotional learning with academic content. Based on these initial findings, it is recommended that teachers are given an explicit SEL curriculum to follow to help support teachers in being able to manage SEL with academics. Although smaller class sizes and time constraints are not quick fixes, we suggest providing teachers with additional planning time while also trying to maintain a set teacher to student ratio to ensure that teachers are supported in being able to provide the highest quality learning possible.

CLOSING THE EQUITY GAP: SEL AND INTENTIONALITY

Presenter(s): Esparza, Laura (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

This study examines how elementary teachers perceive and implement social-emotional learning (SEL) with intentional attention to equity in classroom practice. Although SEL is widely implemented as part of Tier 1 instruction, differences in teacher beliefs, confidence, and bias awareness may influence how equitably SEL is enacted. When SEL instruction lacks intentionality, marginalized students may continue to experience disparities in discipline, access to support, and sense of belonging. This research seeks to better understand how teachers view the role of SEL in supporting student perseverance, problem-solving, and equitable classroom experiences.

Participants include approximately 10–15 elementary classroom teachers in grades K–5 from a suburban school serving a racially, linguistically, and socioeconomically diverse student population. The school has implemented SEL schoolwide and engages in equity-centered professional development, making it a relevant context for examining equity-focused SEL practices. A purposeful convenience sampling approach was used, with teachers volunteering to participate in the study.

Data were collected using a mixed-methods approach. Teachers first completed an anonymous, structured survey designed to measure beliefs about SEL, equity and bias awareness, perceived student outcomes, and professional support. Survey responses were analyzed to identify trends and variations in teacher perceptions. Based on these responses, a representative subset of four to six teachers participated in semi-structured interviews. Interview data were transcribed and analyzed using open coding to identify recurring themes related to SEL implementation, teacher beliefs, and equity in practice.

Preliminary findings indicate that teachers overwhelmingly view SEL as essential for supporting students' social-emotional development, particularly in areas such as perseverance and problem-solving. However, teachers reported varying levels of confidence in implementing SEL through an explicit equity lens. Early interview data suggest that access to professional development, opportunities for reflection, and administrative support influence teachers' ability to enact equitable SEL practices. Participants also identified challenges related to time constraints, training, and addressing personal bias.

These tentative findings highlight the need for sustained, equity-centered professional development that supports teachers as reflective practitioners. Implications suggest that intentional SEL implementation, grounded in equity and teacher support, can strengthen inclusive classroom environments and promote more equitable student outcomes.

CULTURAL RESPONSIVENESS OF FUNDAMENTALS UNLIMITED: SCHOOLWIDE'S SECOND GRADE FICTION AND NONFICTION CURRICULUM

Presenter(s): Fernandez, Carly (Graduate, Teaching and Learning)

Mentor: Sara Jones

Authorship: Carly Fernandez

This study investigates the cultural responsiveness of Fundamentals Unlimited: Schoolwide's second-grade fiction and nonfiction reading curriculum, with a focus on both character representation and instructional materials. Using a mixed-methods content analysis, the study examines 27 mentor texts and corresponding teacher manuals from the fiction and nonfiction units of the curriculum. Data are collected using a modified version of the NYU Steinhardt Culturally Responsive ELA Curriculum Scorecard, including quantitative tallies of character diversity and qualitative evaluations of representation, social justice orientation, and teacher materials. Preliminary findings indicate that diverse cultural representation appears limited across the mentor texts. Early findings also suggest minimal explicit guidance within the teacher manuals to support culturally responsive instruction. While data collection and analysis are ongoing, these early patterns point to potential gaps in both the frequency and depth of cultural representation within the curriculum. The implications of this study may inform educators and districts as they evaluate reading programs, emphasizing the importance of selecting curricula that not only meet academic standards but also meaningfully reflect the cultural identities of all students.

THE ROLE OF PLAY IN SUPPORTING STUDENT ENGAGEMENT, MOTIVATION, AND BELONGING IN A MIDDLE ELEMENTARY CLASSROOM

Presenter(s): Fippinger, Caitlin (Graduate, Teaching and Learning)

Mentor: Anna Smith

In recent years, increased emphasis on standardized testing has reduced opportunities for play and student-centered learning in elementary classrooms, potentially affecting students' engagement, motivation, and sense of belonging. To better understand play's role in testing-focused environments, this mixed-methods study evaluates how structured and unstructured play during the school day influences these outcomes among third graders. The study takes place in a third-grade classroom at a public Title I elementary school in a western suburb of Chicago and includes participating students and the classroom teacher. Students completed pre- and post-surveys containing Likert-scale and open-ended questions, and classroom observations and semi-structured interviews were conducted to examine engagement, motivation, and sense of belonging. Quantitative and qualitative data were analyzed to identify themes related to students' experiences and peer interactions. Findings from this study may inform educators and school leaders about how play can support student engagement, motivation, and sense of belonging in testing-focused middle elementary classrooms.

TEACHER BURNOUT IN EARLY EDUCATORS

Presenter(s): Fisher, Analiese (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

Teacher burnout and retaining new teachers is a complex issue. Teacher burnout is a significant problem in American schools and contributes to high turnover rates, specifically in new teachers. The purpose of this study is to explore burnout in new teachers. Identifying new teachers as teachers that have been in the profession for 1-5 years. Specifically, this study examined the impact of pre-service experiences, mentor programs and administrative support and how these factors impact new teacher burnout. This study was conducted in central Illinois with a focus on middle grade teachers in a midwestern, semi-urban school district. Specifically, teachers that are considered early educators, years one through five. These teachers were selected due to the high rates of burnout amongst educators in their early years. An email was sent out to potential participants. Participants consented and voluntarily participated in the study by completing an interview with the researcher. The interview consists of 11 questions that are open-ended. Teachers were very adamant that pre-service experiences, mentor programs and administrative support all impacted their feelings of burnout. Pre-service experiences impacted their first year of teaching, but the mentor programs and administrative support seemed to have a bigger impact on burnout. Teachers who experienced mentorships where they felt respected, trust towards their mentor and frequent meetings felt less burnout within their first year(s). Additionally, when teachers were confident in their administration they felt less burnout. Based on these tentative findings it is recommended that when pairing mentor/mentee relationships whenever possible they are paired with someone who is in the same grade level and department. It is also recommended that administrators prioritize teacher support, such as responding quickly when student behavior escalates and being consistent with consequences.

AN INTERDISCIPLINARY APPROACH TO CHEMISTRY CURRICULUM: QUANTUM CHEMISTRY AND THE GOLDEN ERA OF QUANTUM MECHANICS, WWII, AND THE NUCLEAR AGE

Presenter(s): Garro, Angelique (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

There is often a disconnect in high school curriculum of certain academic disciplines such as history and science, even though both are extremely influential on each other. This, in part, leads to limits in profound thought and appreciation towards subjects taught in these courses at the secondary level. This disconnect can be mitigated by incorporating an interdisciplinary approach to curriculum. This study will focus on a historical approach, with focus from the years 1900-post WWII to a quantum chemistry curriculum in a first year high school chemistry course. The participants in this study are students who are enrolled in this course. Through pre unit and post unit surveys, record of discussions throughout the unit, and summative/formal assessments, impacts on student learning outcomes of a quantum chemistry unit taught with an interdisciplinary (historical) approach will be assessed. Response data from these methods will be assessed for certain themes, growth in knowledge, and ability to draw connections between history and chemistry, and considerations of the influence each subject has on one another. Through analyzing student feedback, abilities amongst students to discuss scientific developments in a historical context are increasing in complexity. Learning outcomes such as comprehension and application of scientific theories will be assessed at the end of this unit to compare to initial student understanding to determine impact. These findings may be used to inspire other chemistry teachers on ways to incorporate interdisciplinary curriculum into their classrooms. It may also influence other disciplines that can be interdisciplinary approaches to chemistry, such as art.

UNFOCUSED FEEDBACK AND ITS EFFECT ON CONFIDENCE, COMPETENCE, AND MOTIVATION IN THE SOCIAL STUDIES CLASSROOM

Presenter(s): Gaudette, Kelsey (Graduate, Teaching and Learning)

Mentor: Anna Smith

Since the outbreak of COVID-19, and the return to in-person classrooms, there has been a decrease in intrinsic motivation and competence among students, thereby leading to a lack of confidence among students in their work. To build intrinsic motivation, competence, and confidence among students, teachers must be willing to support students with individualized feedback on skills schools want to foster, such as writing. To better see how these ideas are connected, this study looks at how unfocused feedback on writing in the Social Studies classroom can help foster competence and confidence in students, thereby increasing their intrinsic motivation. The study will look at sophomore students at a small, rural, ethnically and racially diverse high school who are currently enrolled in U.S. History. Students will be surveyed on their thoughts about writing and their confidence and comfortability levels with basic writing tasks before and after a writing workshop. Students will then participate in an in-class writing workshop where they will be given unfocused feedback on their written product and then revise and edit their writing accordingly. Looking at the students' survey responses both before and after the writing workshop should show growth in writing abilities and confidence. Based on these expected findings, more teachers should utilize unfocused feedback in responding to student writing so that students build their confidence as they develop and become more effective communicators, closing the gap on literacy skills lost during online learning.

EXAMINING THE RELATIONSHIP BETWEEN ORAL READING FLUENCY AND READING SELF-PERCEPTION AMONG FOURTH-GRADE STUDENTS

Presenter(s): Heinz, Andrea (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

Reading-related anxiety and negative self-perceptions can significantly influence students' reading development and long-term engagement with literacy, particularly during the upper elementary years when reader identities begin to solidify. This study examines the relationship between oral reading fluency and reading self-perceptions among fourth-grade students. Participants include approximately 20 general education students in a fourth-grade classroom at a public elementary school in a large Midwestern U.S. state. Using a mixed-methods research design, quantitative data are collected through DIBELS oral reading fluency assessments and a reader self-perception survey measuring students' confidence, motivation, and reading-related anxiety, which will be analyzed to explore patterns and relationships between fluency and self-perception. To build on the quantitative findings, follow-up semi-structured interviews will provide deeper insight into how students experience oral reading and interpret their identities as readers. This study is expected to inform instructional practices that support both reading achievement and the development of positive reader identities in upper elementary classrooms.

UNDERSTANDING PARENT PERCEPTIONS AND ENROLLMENT DECISIONS IN THE TRANSITIONAL BILINGUAL EDUCATION PROGRAM (TBE)

Presenter(s): Herrera Vega, Megan (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

To examine how parent perceptions shape enrollment, this study investigates the expectations, concerns, and decision-making processes of parents regarding a Transitional Bilingual Education (TBE) program. The study includes Spanish-speaking parents of preschool-aged children in a suburban school district, who are either currently enrolled, previously enrolled, or opted out of the program, alongside staff with a TBE school. Data will be collected through anonymous parent surveys, voluntary follow-up interviews, and a staff focus group, all offered in English and Spanish, and analyzed to identify key themes. Review of existing literature shows that parents strongly value bilingual programs for academic, career, and cultural reasons. However, they also face social pressures and have specific concerns that may have an impact on their decisions to withdraw or not enroll their students in the bilingual program. Based on these tentative insights, this study will find out what might be preventing students from joining the bilingual program so the district can help more students benefit from it academically and culturally. Finally, I hope that study will also serve as a helpful example and resource for other schools with bilingual programs.

ANNOTATIONS, COMPREHENSION, AND CONFIDENCE

Presenter(s): Herron-Cologna, Kenny (Graduate, Teaching and Learning)

Mentor: Anna Smith

Students from diverse (including all kinds of diversity) backgrounds have varying experiences with reading comprehension, writing, and other communications. The “problem” being addressed in this research project is the lack of confidence and ability in secondary students when presented with collegiate-level texts. 15 students in a Leadership & Efficacy class at an ethnically and socioeconomically diverse high school were interviewed and given a pre/post-survey to gather data about their existing experiences with high school-level annotations and how they feel about college-level reading demands. The participants were given specific instruction in how to annotate for relevant information and meaning and shown the difference in levels between high school and college-level texts. High school students, if college-bound, need exposure to college-level texts if they are to be successful at that level. If students are not given opportunities to experience reading and understanding more difficult literature, they may be more susceptible to feeling less prepared, engaged, or generally successful in rigorous, collegiate classes. This study aims to convey the importance of students feeling confident in their literacy abilities and finding the most efficient methods to digest more complicated content.

PERCEIVED MATH SELF-EFFICACY

Presenter(s): Ijiuboucha Daimai, Ashley (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

“Too often, students have a negative attitude toward learning math” (Willis, J., 2010, p. 2). One way to begin changing attitudes is through ensuring student engagement during math instruction (Roche et al., 2021 & Willis, 2010). In my school experiences growing up, and in my experience now as an educator, the traditional model of teaching math means students sitting and copying down math work in a notebook or workbook while the teacher does most of the talking. Passive learning, where the end goal is to pass a test, will not lead to real mathematical learning and understanding (Willis, 2010). Furthermore, this is not a level of engagement that is going to change negative attitudes toward math. One factor known to increase mathematical engagement is collaboration among students (Renninger et al., 2025). I’m interested in how students perceive their math self-efficacy, how they feel about math, and what they say contributes to or hinders their self-efficacy. The study was conducted in one first grade classroom in a suburban school district in a large midwestern U.S. state. A seven-question survey was read to each of the 11 participating first-graders. The survey contained structured items where each question had three choices: true (thumbs up), not sure (thumb to the side), or false (thumbs down). These questions were all related to student self-efficacy (eg: I am good at math; Even when math is hard, I do well; When I make mistakes in math, I want to give up). Once the survey was completed, each student participated in an interview that contained six open-ended questions (eg: What do you like teachers to do in math?; What part of math is your least favorite?; Tell me about a time when you felt good about math.). The rating scales were scored out of a possible 21 points, with 21 meaning the student has the highest math self-efficacy and 0 meaning they have the lowest math self-efficacy. The eleven students scored between 15 and 20 on the scale. Through the interviews, several themes have begun to emerge. The students attribute working with partners, using manipulatives, playing math games, and timely teacher help as contributing positively to their math self-efficacy. Interruptions by and arguing with classmates, teachers who don’t offer timely help, hard work that can lead to wrong answers, and easy or repetitive problems are frustrating for the students.

ENGLISH TEACHER PERCEPTIONS OF CURRENT SOCIOPOLITICAL CLIMATE ON THEIR STUDENTS & THEMSELVES: NAVIGATING SCHOOL COMMUNITIES DURING HEIGHTENED TENSION

Presenter(s): Isom, Allison (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

As political discourse becomes increasingly polarized, students and adults alike are left to maneuver an overwhelming amount of information on their own. This study explores the impact of sociopolitical discourse on secondary education English teachers and their students. A qualitative, interview-based design was employed to explore English teachers' perceptions of the current sociopolitical climate and its impacts on both their students and their own professional identities. A convenience sample of three voluntarily participating secondary English teachers were recruited from public schools in the region. Interviews were analyzed using an inductive thematic analysis process. In interviews, teachers reported worries about their own mental health and wellness in times of heightened sociopolitical turmoil. The influence of the community and district each teacher served affected how they viewed their own teaching identity, situated in the sociopolitical space. Findings indicate that teachers feel there is a strong need for digital media literacy instruction programs in their schools, coupled with teaching mental coping skills for navigating a complicated world.

GENRE EXPOSURE THROUGH THE FORMAT OF GRAPHIC NOVELS

Presenter(s): Johannes, Madison (Graduate, Teaching and Learning)

Mentor: Sara Jones

In many elementary classrooms, students frequently select graphic novels but often stick to reading a narrow range of familiar genres. This study examines whether intentionally selected graphic novels representing diverse genres can serve as a bridge to broaden students' genre exploration and support reading motivation. Participants include 21 fourth-grade students in a public elementary school in central Illinois. A mixed-methods design is used. Quantitative data sources include pre- and post-reading interest and self-efficacy surveys and independent reading logs tracking genre selection patterns throughout the study. Qualitative data sources include student reflection journals, whole-class discussions, structured observation notes, and researcher memos. Both the survey and reading log data are summarized using simple counts and comparisons to look for patterns and changes over time. Student reflections, discussion notes, and observations are reviewed and grouped into themes related to motivation, confidence, and genre interest. Results from the different data sources are then combined to explain any patterns or changes. Mid-study observations indicate high situational engagement during graphic novel instruction from the majority of students and increased student discussion of genre features and making inferences based on the visuals of the text. Early observations show that some students are expressing interest in genres they previously reported low interest in, though independent genre selection shifts are still emerging. Preliminary conclusions suggest that graphic novels, when paired with explicit genre instruction and reflective discussion, may support further genre exploration and situational motivation. Implications include using graphic novels intentionally as instructional entry points to expand students' reading interests rather than treating them solely as a preferred format.

BRIDGING THE GAP BETWEEN A SECONDARY ENGLISH TEACHER PREPARATION PROGRAM AND CLASSROOM TEACHING IN RURAL SCHOOLS

Presenter(s): Kipp, Cara (Graduate, Teaching and Learning)

Mentor: Anna Smith

Teacher preparation programs concentrate on preparing teachers for many eventualities through method courses and opportunities to practice in classrooms before graduation. Beyond student teaching, many universities and teacher preparation programs include a certain number of hours in schools surrounding the university's location. The purpose of this study is to evaluate whether preservice teacher program students feel they are being prepared to teach in rural settings at one state university, and what skills and practices teacher candidates and current rural teachers feel would be most important to concentrate on to prepare teacher candidates for rural contexts. The participants in this study are students or graduated students of one state universities Secondary English Education program and teachers in rural areas within the state. Methods used to collect data are surveys for students and former students as well as teachers in rural areas, as well as interviews of students and former students who have had clinical hours or student teaching in a rural school. This research is needed because while there is research quantifying the diverse needs in rural contexts in education, and showing the realities of difficulties, there is little available data on actionable steps and their efficacy. The easiest place to start changing the future of education is supporting those who are just starting in the field. This study will contribute to the field of teacher education, particularly programs where students are engaged in rural fields for clinicals, student teaching, and future positions as educators. Teacher programs can use this information to support the students and districts they are working alongside and that students will be working with as professionals.

THE USE OF GRAPHIC TEXTS AS SUPPORT FOR BUILDING READING COMPREHENSION IN SECONDARY EDUCATION STUDENTS

Presenter(s): Kroesch, Jeffrey (Graduate, Teaching and Learning)

Mentor: Anna Smith

As reading continues to decline as a recreational activity amongst students, so too do reading comprehension skills. The prevalence of social media continues to take up an increasing amount of time, resulting in diminished feelings toward reading for leisure. This study intends to look at the relationship between positive feelings toward reading, reading comprehension skills, and the ability of graphic novels to bridge the gaps left between underdeveloped and proficient reading skills. The study draws from five sophomore English classes in a large midwestern high school. Participants were surveyed on their reading activities, thoughts on reading in and out of the classroom, and their own comprehension skills. After engaging in three classroom units, two centered on graphic novels, students will take a post survey about their experiences visualizing related materials based on the texts and overall impressions of learning with graphic novels alongside traditional texts. Teachers will also be interviewed about their thoughts on teaching using these texts.

EFFECTS OF SCHOOL WIDE RESTRICTIVE CELL PHONE POLICY ON STUDENTS AND TEACHERS

Presenter(s): Lee, Craig (Graduate, Teaching and Learning)

Mentor: Anna Smith

The effects of cell phones on student learning and social-emotional development are a continually discussed topic. Some schools allow teachers to make their own classroom policy setting their level of restriction while other schools enforce a restrictive policy for the entire school. In this study, I will be collecting surveys from teachers and students, and de-identified achievement data from a central Illinois school in its first year since adopting a school-wide restrictive phone policy. The data will be analyzed and compared to past school years. Survey results from students and teachers will be collected and analyzed to increase the clarity of the policy's effectiveness. This study will provide evidence for administrators, teachers, and education professionals in choosing their course of action for school improvement. Research indicates that students are distracted by their phones in class which can lead to lower achievement. Additionally, phone access also increases social anxiety and the incidences of cyberbullying. Previous studies have found teachers appreciate the improved classroom environment and student relationships. Early evidence from the school to be studied supports this conclusion.

EXPLORING THE IMPACT OF DISCIPLINARY LITERACY ON FOURTH-GRADE STUDENTS' ENGAGEMENT IN SCIENCE DISCUSSIONS

Presenter(s): Loyd, Staci (Graduate, Teaching and Learning)

Mentor: Sara Jones

Many students struggle in science because instruction tends to focus on learning facts rather than helping students to read, write, and discuss complex texts and content. Literacy practices should be integrated into science instruction, with reading, writing, and scientific talk as tools to deepen understanding and engage students in authentic scientific thinking. This gap affects not only their literacy development, but also their understanding of scientific concepts. This study looked at how scientific talk, particularly through peer conversations, promotes engagement and how supports such as sentence stems and small group formats, encourage participation and affect students' interest and confidence. This study took place in a fourth-grade classroom in a public elementary school in a rural town in central Illinois. While approximately 44% of the school's students come from low-income families, the school has limited racial, ethnic, and linguistic diversity. This study used observations, student surveys, and learning artifacts to measure their behavioral and cognitive engagement in science discussions and learning. These data collection tools worked together to provide both quantitative and qualitative data on how students participated and demonstrated their scientific thinking. Engaging students in structured evidence based discussions increased both their participation and understanding of science concepts. The students confidently shared their ideas and used evidence based on texts, experiments, and observations to support their thinking. The findings suggest that structured scientific talk had a positive effect on students' behavioral and cognitive engagement in science learning. With supports such as sentence stems and small group discussion formats, they participated more and shared their ideas with greater confidence. This study indicates that peer discussions not only assist with participation but also strengthen students' knowledge and understanding of science concepts.

COOPERATIVE LEARNING AND THE IMPACT ON FIRST GRADERS' EXPRESSIVE VOCABULARY DEVELOPMENT

Presenter(s): Murphy, Alaina (Graduate, Teaching and Learning)

Mentor: Sara Jones

As students transition from play-based learning in kindergarten to first grade, they experience a more advanced curriculum and exposure to vocabulary that is beyond their everyday use. To better understand how to support students' exposure to advanced vocabulary, this study aims to explore how discussion-based cooperative learning groups can be used to improve expressive vocabulary and vocabulary knowledge in first grade students. Students from a racially, ethnically, and linguistically diverse school, including multilingual learners, from the same first grade classroom were invited to participate in the study. A small group of students were interviewed during a one-on-one conference pre-test with their teacher before any intervention took place to identify their current level of understanding of specific Tier 2 vocabulary words. The intervention consisted of 5 weeks of Cooperative Learning strategy use to practice expressive vocabulary with peers in small groups. Observations were conducted alongside audio recordings to note vocabulary use within the small groups. A one-on-one conference post-test was conducted with the same group of students at the end of the intervention to establish expressive vocabulary and vocabulary knowledge gains as part of the intervention. Pre-test scores indicated that students had limited to some expressive vocabulary and vocabulary knowledge prior to the start of the Cooperative Learning intervention. The observations from the intervention show increased use of targeted vocabulary words over time. Based on these tentative findings, we recommend teachers to use cooperative learning groups with their students to increase expressive vocabulary and vocabulary knowledge of targeted words in their English Language Arts curriculum.

REIMAGINE TEACHING WITH ETHICAL ARTIFICIAL INTELLIGENCE (EAIED)

Presenter(s): Narongsaksakul, Watsachol (Graduate, Teaching and Learning)

Mentor: Ryan Brown

Authorship: Watsachol Narongsaksakul

This presentation explores Ethical Artificial Intelligence in Education (EAIED), which has become a new pillar in implementing guardrail measures and maintaining human oversight to monitor the design and functionality, thereby fostering a 'humans-in-the-loop' approach. Educator Preparation Programs (EPPs) are required to equip teacher candidates with reflective practices for adapting to and filtering the evolution of AI automation. As a result, EPPs overcome these hindrances and enhance students' motivation and identity development. Cooper's (2015) protocol was used to synthesize and critically examine ten peer-reviewed publications on EAIED, published between 2023 and 2024. This review demonstrated four distinct key areas of EAIED: intelligent assessment, intelligent learning environments, intelligent support for the learning process, and intelligent teacher assistant. The integration of EAIED in EEPs offers holistic learning and raises significant ethical concerns, necessitating comprehensive educational initiatives. Future research includes integrating AI ethics into curriculum design, fostering experiential learning opportunities, and providing professional development and support systems to prepare teachers effectively for the ethical challenges posed by AI.

NAVIGATING THE NEW FRONTIER OF AI PLATFORMS IN EDUCATION WITH ETHICAL MINDSETS

Presenter(s): Narongsaksakul, Watsachol (Graduate, Teaching and Learning)

Mentor: Ryan Brown

Authorship: Watsachol Narongsaksakul

AI platforms shift the historical value of knowledge-based curriculum to a privately owned and data-driven structure. The intersection of human learning development and machine intelligence has led to potentially extensive ethical concerns with a digital divide crisis in the US that further exacerbates digital inclusion due to the national mandate for AI literacy. The growing interest in ethics overshadows the use of classroom decision support systems in K-12 AI technologies, including the perpetuation of existing inequalities and access issues resulting from synthetic outputs, especially among underrepresented groups. This session aims to empower educators, teacher educators, school leaders, and policymakers with a comprehensive understanding of the opportunities and challenges presented by AI platforms and strategies for mitigating existential risks in teaching and learning.

EXPLORING TEACHER SELF-EFFICACY THROUGH THE LENS OF SCHOOL CLIMATE: A MIDDLE SCHOOL PERSPECTIVE

Presenter(s): Novotny, Emma (Graduate, Teaching and Learning)

Mentor: Anna Smith

Teaching in a post-pandemic environment raises more and more concerns for teachers, as various factors impact teacher self-efficacy. With an increased number of teachers leaving the field, it is more important than ever that we recognize the factors most significantly impacting teacher self-efficacy, and how we can better support educators to help increase job satisfaction and confidence within the classroom. To better understand how to support teacher self-efficacy, this study looks at middle school teachers' perspectives across the United States regarding their self-efficacy, and how their school environments impact it. Surveys and interviews analyzed teachers' perceptions using their own words to better understand the various perspectives among the study. Teachers ultimately expressed that factors including administrative support and student behavior most predominately impacted their self-efficacy, and are looking for positive reinforcements for themselves, not just students, as well as more administrative support to help boost their self-efficacy, ultimately leading to higher levels of job satisfaction and success within their role. In interviews, teachers additionally expressed the need for autonomy within their teaching roles, in addition to administrative support helping to maintain behaviors that led to decreased levels of self-efficacy. Based on the tentative findings, it is recommended that school environments focus on building a safe culture within their schools. There are several strategies to do so that includes but is not limited to establishing an open environment where taking risks is encouraged, and asking for help is viewed as a sign of professional growth rather than weakness, as well as actively working to minimize unnecessary administrative burdens and stresses that can drain teacher confidence.

EXPLORING PROGRESSIVE TENETS WITHIN THE AMERICAN READING COMPANY (ARC CORE) CURRICULUM AND TEACHER EXPERIENCES IN BALANCING SCRIPTED AND PROGRESSIVE LITERACY INSTRUCTION

Presenter(s): Pierce, Kristina (Graduate, Teaching and Learning)

Mentor: Sara Jones

This study examines the extent to which the American Reading Company (ARC) Core curriculum incorporates progressive educational tenets. Specifically, it investigates how a scripted literacy curriculum both supports and constrains teachers' capacity to enact progressive teaching practices, as well as how scripted instruction and progressive pedagogy may coexist. Using a mixed-methods approach, the study includes a critical analysis of 240 ARC Core lessons to identify the presence of progressive tenets. Additionally, kindergarten through second-grade teachers were surveyed using Likert-scale and open-ended questions to gather data on perceived limitations and opportunities for integrating progressive practices. Tentative findings indicate that a narrow set of progressive strategies—such as cooperative talk structures—appears within daily lessons, though these practices are limited in scope, duration, and variety, with the same methods repeated across units. Tentative teacher responses report identifying opportunities to embed additional progressive practices; however, limited instructional time and pacing demands emerged as significant constraints. Overall, the tentative findings suggest that while ARC Core demonstrates partial alignment with progressive tenets, greater curricular flexibility, expanded pedagogical variety is needed. Increased support and time for teachers may be necessary to more fully integrate progressive teaching practices within the curriculum.

SEL AND STUDENT ENGAGEMENT/PARTICIPATION

Presenter(s): Provenzano, Nicolette (Graduate, Teaching and Learning)

Mentor: Anna Smith

A concern that is happening in some areas of school is how Social Emotional Learning (SEL) can affect student engagement and student participation. This can affect how students learn and the classroom environment. Research suggests that implementing Social Emotional Learning strategies may help provide a solution, but which specific strategies are left in question. To better understand how to support students' engagement and participation in class, this study looks at second grade students in a diverse and multilingual school. Students will be surveyed about how they feel at school and interviewed about what helps them learn best at school. Teachers will observe students and use checklists to see if they are participating in class. Parents will also be surveyed to see what strategies they notice at home and how students are using SEL skills. So far, students have been participating in partner work, and parent feedback shows that students are using different strategies. Based on these early findings, we recommend using SEL strategies in daily classroom routines while paying attention to students' individual needs and backgrounds, as this seems to help them participate more. As the study progresses, it will potentially show which SEL strategies work best to support all students in learning, as well as engaging and participating in class.

CLASSROOM STRATEGIES FOR FOSTERING MOTIVATION AND RESILIENCE AMONG MIDDLE SCHOOL STUDENTS RECEIVING SPECIAL EDUCATION SERVICES

Presenter(s): Rodcay, Michelle (Graduate, Teaching and Learning)

Mentor: Anna Smith

Students who receive special education services through Individualized Education Programs (IEPs) in middle school face ongoing difficulties when they attempt to develop their motivation and build their resilience. Students show their academic potential through their performance in controlled learning spaces, yet they lose their ability to stay focused and manage their emotions when they encounter academic obstacles. Research will investigate how students with IEPs develop motivation and resilience through their participation in goal setting activities and weekly reflection settings. The study takes place in a self-contained classroom and includes five students in grades five through eight. Mixed methods design is used to examine changes in student motivation and resilience over a six-week period. The research data comes from student surveys before and after the program, weekly reflection journals, interview responses, and teacher observation records and researcher documentation. The current data shows that students are starting to show better understanding of their learning actions and their emotional reactions to difficult situations, as well as their individual academic targets. Based on the initial journal entries, students appeared engaged in the reflection routines and were willing to set goals and reflect on strategies to help maintain those goals, as well as to identify what might be challenging for them. It is anticipated that continued use of structured goal setting and reflection will support increased persistence, confidence, and emotional regulation during academic tasks. The research findings will help teachers create inclusive learning methods through specific classroom methods which enhance student motivation and resilience for IEP students who remain understudied in educational research.

UNDERSTANDING TEACHER PERCEPTIONS OF YOUNG CHILDREN'S TRANSITIONS IN A REGGIO-INSPIRED INTERNATIONAL SCHOOL SETTING

Presenter(s): Said, Eman (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

Transitions are a regular and daily rhythm part of preschool classrooms, with children moving between spaces and activities many times throughout the day. These shifts take up classroom time and play an important role in children's participation, independence, and ability to regulate their emotions. Although existing research offers helpful strategies for organizing transitions and suggests that tools like music can support self-regulation, much of this work is older and does not fully reflect the day-to-day realities of young children today. In particular, there is limited understanding of how three- and four-year-olds personally experience transitions in classrooms that balance child-centered approaches with structured schedules. The purpose of this study is to explore how early childhood teachers in a Reggio-inspired, college-preparatory international school perceive transitions between classroom, recess, specials, and nap. For my study, I plan to use three data sources: online surveys and semi-structured interviews. Open qualitative coding will be used for analysis. Data collection is ongoing. Anticipated findings are that teachers will express frustrations with balancing external expectations with developmentally appropriate practice and the ability to be responsive to learners needs.

UNDERREPRESENTED MINORITY STUDENTS RELATIONSHIP WITH STEM EDUCATION

Presenter(s): Schaschwary, Hannah (Graduate, Teaching and Learning)

Mentor: Anna Smith

The lack of representation of minority groups in STEM (science, technology, engineering, math) directly correlates with the achievement gaps found in education, many of which begin in middle school grades or even elementary school. The purpose of this study is to see how middle school level students in underrepresented groups view themselves in relation to STEM, as well as the teacher's view of their engagement in STEM, at such a pivotal time in their development. Seventh grade students from a suburban area middle school were invited to participate. The student body at this school includes students from lower-middle and upper-class families, as well as students primarily from African American, Asian, American, White, and Latino/a/x backgrounds. Students who volunteered to participate completed a survey inquiring into their sense of belonging, interest, and confidence in STEM. The classroom teacher took observations about those areas from discussions and actions the participating students made during school. The findings promise to provide additional insight into how minoritized students experience their STEM education in the middle school context. STEM provides students not only with content knowledge that can help them in life, but also with skills that are applicable across many career paths they may choose to pursue. To best support and prepare students for life, we must be reaching all students in all areas, including STEM.

IMPACT: SUPPORTING TEACHERS IN IMPLEMENTING SCIENCE OF READING STRATEGIES IN A K-8 SETTING.

Presenter(s): Shrode, Trisha (Graduate, Teaching and Learning)

Mentor: Sara Jones

National concern regarding reading proficiency is well-documented, with the National Institute of Child Health and Human Development citing reading difficulty as a significant public health issue. Despite the critical role of literacy, data from the National Assessment of Educational Progress and state report cards indicate that a substantial portion of students continue to struggle with fluency and comprehension. To address these persistent gaps, school districts are increasingly investing in high-quality, job-embedded professional development aligned with the Science of Reading. However, acquiring new pedagogical knowledge is often insufficient without mechanisms to support the transfer of that knowledge into classroom practice. Given the importance of teacher learning, their experiences in the learning process are an important component to understand as part of the improvement process. This study examines teachers' perceptions of a multi-year, Science of Reading-based professional development initiative and investigates whether participation impacts self-efficacy and pedagogical application. Grounded in the frameworks of collective efficacy and high-quality professional development, the research employs an Explanatory Sequential Mixed Methods design. Quantitative data, collected via surveys from K-8 teachers in a diverse elementary district, informed the selection of a stratified sample for qualitative inquiry, which included in-depth interviews. Research participants are teachers currently participating in the science of reading-based professional development. Based on tentative findings, teachers note barriers to learning such as time, learning styles, and competing priorities. Teachers note changes in practice, while also exploring what struggles they face to implement what they learn within their classroom. Any initiative meant to impact teacher practice at scale must be well communicated, with high levels of support. Teachers need time to explore and feel safe to engage in new practices. All efforts must be made to remove competing priorities, and ongoing feedback and revisions must be made to increase fidelity.

THE IMPACT OF MORNING MEETINGS ON STUDENTS IN ELEMENTARY SCHOOL

Presenter(s): Silva, Michaela (Graduate, Teaching and Learning)

Mentor: Anna Smith

Morning Meetings are widely used in elementary classrooms as a social-emotional learning (SEL) practice designed to foster belonging, comfort, and student engagement. While existing research highlights positive outcomes and teacher perceptions of Morning Meetings, limited studies center students' own experiences with these routines. This qualitative study explores fourth-grade students' perceptions of Morning Meetings and similar SEL routines, with a focus on students' sense of belonging, comfort, and engagement in the classroom. Guided by a phenomenological approach, the study seeks to understand the lived experiences of students as they participate in daily community-building practices. Participants include all fourth-grade students in a single classroom at a diverse elementary school in a city southwest of Chicago, Illinois. Data collection methods include student surveys, classroom observations, and one-on-one semi-structured interviews, allowing for triangulation of data sources. Survey data provide an overview of students' perceptions, while observations and interviews offer deeper insight into student behaviors, interactions, and personal experiences. Data analysis is descriptive and interpretive, focusing on identifying patterns related to students' comfort, engagement, and perceived impact of Morning Meetings. Although findings are not yet available, this study aims to address a gap in the literature by centering student voice in the examination of SEL practices. The anticipated significance of this research lies in its potential to inform more student-centered Morning Meeting implementation and to support educators in designing SEL routines that authentically promote belonging, engagement, and readiness to learn.

POLITICAL POLARIZATION IN SOCIAL STUDIES CLASSROOMS

Presenter(s): Springer, Natalie (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

This study examines how political polarization is influencing social studies teachers' instructional decisions, classroom climate, and curriculum design. Using teacher surveys and interviews the research explores educators' perceptions of controversial issues, community pressures, and professional risks associated with teaching civics and history over the last ten years. In which the political divide and outside factors have continued to make their way into the classroom. Findings are expected to highlight how polarization shapes topic selection, instructional strategies, and the use of primary and secondary sources, as well as teachers' efforts to maintain balanced, inclusive discussions while fostering critical thinking and civic engagement. The study also investigates the emotional and professional impacts on educators, including self-censorship, stress, and shifts in pedagogical confidence. By identifying common challenges and effective classroom practices, the research aims to inform teacher preparation programs, school leaders, and policymakers seeking to support educators in navigating politically sensitive content while upholding democratic values and rigorous social studies instruction.

TEACHER BURNOUT AND RESILIENCE IN THE BROADER SOCIO-POLITICAL CONTEXT OF 2026 U.S.

Presenter(s): Springwood, Cheryl (Graduate, Teaching and Learning)

Mentor: Anna Smith

Increasing professional demands cause teachers to experience significant burnout (Jennings 2020). Designing a sustainable, well-integrated support model requires an ecological perspective considering synergy between faculty, students, administrators, and staff, who consistently share physical space. Any consideration of factors leading to burnout encounters numerous variables, from the use of value-added measures (VAM) to evaluate teachers, to linking student performance to faculty rewards, to the increase of standardized testing (Smith & Holloway, 2020). Altinay and Bicentürk (2023) found that an external locus of control was positively linked to emotional exhaustion and that emotional professional identity helps reduce exhaustion and depersonalization. The prevalence of locus of control as a measure of teacher resilience and burnout anchors this project, suggesting these questions:

What strategies improve professional identity and teacher resilience?

How do accountability initiatives and anti-education discourse affect teacher burnout?

The unsustainable levels of stress and exhaustion that characterize teacher burnout have increased recently. The covid pandemic, government oversight of teacher evaluation, and legislative assaults on public education have exacerbated the problem. This research seeks to identify effective practices for promoting the experience/perception of internal locus of control among faculty. In particular, a teacher's perceived locus of control has proven to be a significant factor. Altinay and Bicentürk (2023) argue that an internal locus of control ameliorates burnout. Locus of control is affected by nearly all the other factors, such as psychological well-being (Ding, Liu, & Peng 2025); teacher accountability initiatives (Ryan et al. 2017); student achievement and behavior (Covell et al. 2009); and a positive sense of professional identity (Kendrick, Kapoyannis, & Pagaling 2024). Research on teacher well-being tends to avoid consideration of the larger socio-political climate. Complete understanding must consider policies that seek to dissolve the U.S. Department of Education, reduce education funding and proscribe DEI initiatives. Since internal and external locus of control as factors critical to teacher well-being have not been analyzed in relation to national and international political discourse, here, teachers' perceptions of these politically conservative ideological attacks on education are emphasized. This project utilizes a quantitative, survey-based study with educators as participants. The survey instrument was framed by the Maslach Inventory Index and Rotter's Internal-External Locus of Control Scale, following Akça and Yaman (2010). Although initial results suggest a correlation between burnout and locus of control, it is too soon to speculate on the significance of any additional trends or more nuanced relationships between variables.

SUPPORTING FIRST AND SECOND GRADE READERS WITH HANDS-ON READING STRATEGIES

Presenter(s): Stark, Maddy (Graduate, Teaching and Learning)

Mentor: Sara Jones

Many students are more responsive to learning while using hands-on materials or manipulatives. Applying this strategy to decoding skills and phonemic awareness can help students directly interact with words. When providing different strategies to students, this can be used to help support their specific needs and give them different strategies that they can use later when reading. The following case study focuses on different hands-on decoding strategies that can be implemented with students who need additional support in decoding, letter-sound correspondence, or phonemic awareness. This study works specifically with first and second grade students, N=6 first graders, N=6 second graders, who were receiving tier two services from the reading interventionist. These students were selected from beginning of year assessments; students scoring below the 50th percentile on the composite DIBELS 8 score. Data is gathered through observations and progress monitoring assessments of nonsense word fluency. Through a six-week period, students engaged in building and decoding words using letter cards, Elkonin boxes, and magnetic letters then allowed students to choose which material they wanted to work with. This study includes observations with a checklist when analyzing student engagement with the materials. Students were assessed weekly on their progress with nonsense word fluency checks. The progress monitoring scores are used to analyze the rate of improvement with students' application to connecting letters with sounds and the ability to blend that into a word. While working with manipulatives, students are able to see the letter in front of them while making the sound that fits with the letter. They are able to better sound out words and blend together after explicit practice using different methods. Based on these tentative findings, students should be encouraged to use manipulative materials to support their early reading lessons.

AN EXPLORATORY STUDY OF WRITING FEEDBACK STRATEGIES AND WRITING WORKSHOPS IN THE SECONDARY CLASSROOM

Presenter(s): Stark, Katie (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

Over the years, concerns over student literacy and writing self-efficacy have increased. Effective and timely feedback on writing is a proven method to increase student confidence and effectiveness as writers. However, providing suitable feedback in a timely manner has always been a challenge. In addition, the emergence of generative-AI like ChatGPT has increased the complexity of writing instruction. Teachers and students alike must tackle a wide variety of quality and ethical concerns. Together, these concerns are the current state of affairs with writing instruction in English Language Arts classrooms. The purpose of this study is to explore various feedback strategies, including some AI applications, in writing workshops to empower students as writers in today's world. Students at a relatively diverse school in a medium-sized town in a rural county were surveyed, participated in multiple writing feedback activities, and asked to complete a writing reflection after each. In a mixed methods approach, survey responses, reflective writings, and work from their activities were analyzed to determine student writing experiences and the impact various activities have on their writing self-efficacy. Tentative findings indicate that most students have neutral or relatively positive experiences with writing instruction in school. This translates into neutral or majority reports of being confident writers. Students who reported negative experiences also felt less confident as writers and were less likely to read or perceive teacher feedback as helpful. Student opinions on writing instruction preparing them for the future or their ability to provide their peers with helpful writing feedback were mixed. Most students report preferring in-person teacher conferences that happen in or outside of class. The majority of students report using AI in writing to research, brainstorm, and organize their ideas. Another smaller group reports using AI to give feedback on their writing. Three students reported not using AI for writing purposes or at all. Based on these tentative findings, comprehensive writing instruction and variety in writing feedback strategies (with and without AI) could increase writing self-efficacy for all students and better prepare them for writing in the future.

ELECTRONIC VERSUS PAPER-BASED READING ASSESSMENTS

Presenter(s): Szymonik, Anna (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

This mixed-methods study examines the use of electronic versus paper-based reading assessments in a kindergarten classroom at an early learning center located in a large metropolitan suburb in the Midwestern United States. Participants include students from one kindergarten classroom and all kindergarten teachers at the school, which serves a racially, ethnically, and socioeconomically diverse population, including multilingual learners. Quantitative data was collected through weekly curriculum-based reading assessments administered in both electronic and paper formats, with student scores compared and averaged to identify differences in performance. Students will also complete a picture-based survey indicating their preferred assessment format. Qualitative data will be gathered through teacher surveys and student interviews focused on perceptions and preferences related to assessment format. Quantitative and qualitative data will be analyzed descriptively to examine relationships among assessment format, student performance, and assessment preferences. In interviews, teachers reported that they believe that students perform better on paper-based assessments but that electronic assessments make it easier for the teacher to keep track of and input data. Currently, students are showing similar scores on paper and electronic-based assessments. Based on these tentative findings, we as teachers have recommended that teachers get to choose which form of assessment is most beneficial to their students and their classrooms best practice to maximize their students' learning potential.

THE IMPACT OF USING WORD MAPS IN COLLABORATIVE READING ACTIVITIES ON NEW ACADEMIC VOCABULARY AMONG 6TH GRADE ELL STUDENTS

Presenter(s): Turczyn, Shannon (Graduate, Teaching and Learning)

Mentor: Sara Jones

There is an increasing number of students in classrooms who are being identified as English Language Learners. Learning English vocabulary can be more complex for multilingual learners. The words used in academic texts are often difficult because they are content-specific and not used in everyday conversation. Finding the right vocabulary support is crucial for reading comprehension. The purpose of this study is to examine the impact of using word maps in collaborative reading activities on new academic vocabulary among 6th grade English Language Learner (ELL) students. Seven students participated in the study over an eight-week period. During collaborative reading activities, word maps were used as graphic organizers to help ELL students understand word meanings. Students worked individually and in small groups to complete their word maps during reading activities. The data collected included pre- and post-assessments, classroom observations, and student interviews. The results from the assessments suggest that the majority of students demonstrated mastery of academic vocabulary after the intervention. Observations and interviews also suggested that collaborative use of word maps supported student engagement and vocabulary development. These findings suggest that word maps used in collaborative reading can be an effective strategy for improving academic vocabulary among 6th grade ELL students.

STUDENT LED READ ALOUDS AND THEIR IMPACT ON STUDENT READING CONFIDENCE, FLUENCY, AND STUDENT ENGAGEMENT

Presenter(s): White, Shelby (Graduate, Teaching and Learning)

Mentor: Sara Jones

Authorship: Shelby White

Currently, traditional 'popcorn reading' or exclusively teacher-led modeling can unintentionally induce anxiety or disengagement. National data from the 2021 Progress in International Reading Study indicates that 57% of U.S. 4th graders identify as only 'somewhat' or 'not' confident in reading. To address this gap in classroom practice, a shift in instructional delivery was piloted in a third grade classroom to allow students to prepare and lead read-aloud sessions. The study aimed to determine what effect student-led class read alouds have on student reading confidence, fluency, and class engagement. Nine third grade students in a class of twenty within a K-4 suburban elementary school volunteered to be participants of the study. Surveys, student-teacher conferences, and pre/post assessments were used to collect data along with the read aloud given by each student. Though tentative findings suggest little growth in reading fluency, the experience resulted in significant growth of student reading confidence. Originally unwilling students were motivated to participate, and the student-leadership opportunity resulted in significant engagement of peers through comments and reflection. This is consistent with a clear positive impact on classroom community as well as social-emotional growth and learning. We suggest more teachers in higher elementary and middle level classrooms consider implementing this opportunity in their own classrooms throughout their school years.

FREQUENCY OF SPECIFIC HOME LITERACY ACTIVITIES AND READING ACHIEVEMENT

Presenter(s): Winget, Andrea (Graduate, Teaching and Learning)

Mentor: Sara Jones

Traditional research on the home literacy environment (HLE) does not provide information on what types of home literacy activities best support reading achievement. Breaking down the HLE into smaller, more detailed activities and assessing the reading achievement of students who complete those activities as part of the HLE will give more well-rounded, specific information to teachers about the HLE of students, their backgrounds, and their strengths. Linguistically and culturally diverse kindergarten parents at a suburban elementary school were surveyed about their home literacy practices, with a smaller subset of parents participating in an interview describing their practices. Student reading achievement data was collected and linked to parent responses. Data was analyzed to recognize patterns in HLE and reading achievement. Anticipated results show a correlation between frequency of traditional HLE activities and reading achievement, as anticipated by previous research. Additionally, it is anticipated that a smaller, yet still significant, correlation will be found between non-traditional HLE activities—such as oral storytelling, singing songs, and drawing to tell a story—and reading achievement. These anticipated results affirm the place of non-traditional HLE activities, especially those that are culturally rooted, and provide a basis for teachers to understand and recommend home literacy practices to parents.

CORRELATIONS BETWEEN ABSENTEEISM AND STUDENT SUCCESS AMONG HIGH SCHOOL STUDENTS

Presenter(s): Woodard, Gabrielle (Graduate, Teaching and Learning)

Mentor: Anna Smith

Authorship: Gabrielle Woodard

As schools continue to address post-pandemic challenges, student absenteeism has emerged as a growing concern with potential implications for academic success. To better understand the relationship between attendance and achievement, this study examines whether a significant correlation exists between high school student absenteeism and academic performance in mathematics and reading. Using a non-human subject research design, the study analyzes de-identified attendance and assessment data from a racially, ethnically, linguistically, and socio-economically diverse high school located in a small town near a large metropolitan area.

Attendance records and STAR assessment data from approximately 1,200 ninth-, tenth-, and eleventh-grade students across the 2023–2024 and 2024–2025 school years were examined. Attendance data were obtained through the PowerSchool database and included all absence types, which were analyzed collectively to better capture overall absenteeism patterns. Academic achievement was measured using STAR math and STAR reading scaled scores and percentile ranks collected in the fall, winter, and spring of each school year. Demographic variables such as grade level, English language learner status, special education accommodations, and free/reduced lunch status were also included in the analysis.

Consistent with prior completed research, absenteeism is expected to be associated with lower academic achievement. However, ongoing changes in student learning, mental health awareness, and school attendance patterns highlight the need for updated and localized research. Findings from this study aim to inform more targeted, data-informed approaches to addressing absenteeism and supporting academic success among secondary students.

HIGH SCHOOL TEACHER'S EXPERIENCES AND PERSPECTIVES TEACHING THE NEXT-GENERATION-SCIENCE-STANDARDS WITH THREE-DIMENSIONAL LEARNING

Presenter(s): Yestrumskas, Ashley (Graduate, Teaching and Learning)

Mentor: Meghan Kessler

This study aims to gain information regarding teaching to this approach from other teachers who have both been handed a canned curriculum and/or who have been able to write their own curriculum for the new science standards in Pennsylvania. It aims to determine why perspectives might be more positive for some than others. It also aims to observe and determine the teacher's perspectives of student engagement as compared to prior teaching styles, and whether students are still able to master content presented in each unit.

The research participants will be both middle and high school teachers at a public school district. The qualitative methods will include a survey, interview, and an observation of classes while teaching the new standards. Middle school teachers are currently implementing a canned curriculum for new standards and three-dimensional learning. The high school teachers piloted a canned curriculum but are currently developing their own units to align with the new standards.

Tentative findings for this research will find that teachers prefer to write their own curriculum instead of adopting a canned "scripted" curriculum. It will also find that teacher's will feel more positive if they have been given training and time to collaborate with colleagues to write their new curriculum. Finally, the study should find that engagement levels are different for this type of teaching method depending on whether students are in middle or high school. Middle school students do better with three-dimensional learning as it is important for them to primarily work on many skills. However, by high school, many students have good learning skills and are more driven by content and rigor. I think that all teachers will find that mastery of content will have declined using this teaching approach, especially from a canned curriculum. As a result of this study, I hope administrators and curriculum personnel can gain some insight into the necessary time and resources needed to successfully implement both the new NGSS standards and three-dimensional learning. I also hope to determine whether perspectives are more positive when teachers have an active role in writing and developing their curriculum rather than using a canned curriculum. Finally, it would be beneficial to gain information as to whether this approach (three-dimensional learning) is beneficial for students in terms of engagement, motivation, and mastery.

THE IMPACT OF ENGLISH, SPANISH AND BILINGUAL (ENGLISH-SPANISH) REPEATED READING IN MULTILINGUAL STUDENTS

Presenter(s): Zelaya Rodriguez, Ivania (Graduate, Teaching and Learning)

Mentor: Sara Jones

Bilingual communities have increased along with schools' enrollment for English Language Learners (ELL). With this shift, schools have worked to service students in their home language and their second language. As ELL are working to acquire a new language while maintaining and continuing to develop their home language, they tend to underperform academically. Reading fluency can help students improve that performance as it contributes to the development of reading comprehension and complex reading skills. The purpose of this study is to examine if bilingual students would benefit from repeated reading using a bilingual text where it mixes English and Spanish within it, in addition to only repeated reading in English or only repeated reading in Spanish to improve their fluency. The participants for this study are students in second grade between the ages of 7-8 in second-grade bilingual, Spanish/English, where they are exposed to 75% instruction in Spanish and 25% in English. All members of the study will participate in a pre-test, ongoing observation during repeated reading, and post-test. The repeated reading will consist of 3 weeks of repeated reading 10 readings each week, one week in Spanish, one in English and the last week in a mix of languages between English and Spanish.

Research is conducted to tentatively find how repeated reading helps students gain word recognition, reading confidence, and reading fluency in English and Spanish and if students can read the words in English and Spanish with the correct pronunciation when presented with both languages mixed in the same text. However, students' reading behavior, such as whether they are following the words or if they memorize them when reading, should be considered when evaluating impacts.

ASSESSMENT CHOICES IN THE CLASSROOM

Presenter(s): Zenor, Danielle (Graduate, Teaching and Learning)

Mentor: Sara Jones

Within the English Language Arts classrooms, teachers see varied levels of engagement. Engagement is when the students are interested and interacting with the work in the classroom in an authentic way. When thinking about the classroom, students at times can appear to not be engaged in the material or could just be not interested in the material. One way to help with engagement and connection to the material could be knowing that there is a choice in their assessment. This study looks at how middle school students perceive the role of choice in their ELA assessments and in what ways they believe it influences their engagement and personal connection to the unit content. The research participants are 6th grade students in an English Language Arts classroom. This student sample is also primarily a white, middle-class background with some students that are ethnically and racially diverse all around ages 11-12. Classroom observations, student surveys and student interviews were all analyzed to find out about student perceptions of choice and how it impacts their engagement and personal connection to the unit. Students enjoyed having choice in their learning and believe that it helped keep them engaged knowing that they would get to choose how they showed their own learning. It helped them connect to the unit as they would get to choose an assessment option that showed their strengths. They felt strongly that having autonomy over their learning made a large difference in their behavior in the classroom. Based on these tentative findings, allowing and providing more student choice within the classroom would help with overall engagement in English Language Arts and allow for more personal connection to the unit content.

2026 University Research Symposium Oral Presentations

The School of Theatre, Dance and Film

Friday, April 10, Milner Library, Room 116
3:00 - 5:30 p.m.

Presenters:

Lawrence Quashigah

“Queer Identity in *Rafiki* and *My Beautiful Laundryette*”

Charlie Froy

“Utopia, Resonance and Conceiving a New Participation in Simon McBurney’s *The Encounter*”

Natasha Warloe

“Embracing Differing Abilities in Theatre Education”

Hyein Ock

“Theatrical Performance and Colonial Power: Korean Theatre During the Japanese Occupation”

Anna Oxborrow

“A Love Letter to Tin Pan Alley, Vaudeville and the Unseen Influencers Broadway”

Fredrick Igwe

“Engaging with Disability: Perspectives on Colonial control, Exploitation, and the Desexualization of the Disabled Body in *The Elephant Man*”

Each student has 15 minutes to present their research. Q&A will follow the presentations.

Department of Physics

Date: Saturday, April 11, 2026
Location: Moulton Hall, Room 309

SCHEDULE-AT-A-GLANCE

Session 1

8:00-8:15	Eyan James
8:15-8:30	Zachary Gunther
8:30-8:45	Moab Croft
8:45-9:00	Charles Stevenson Brown II
9:00-9:15	Eren Erdogan
9:15-9:30	Joshua Klein

Break: 9:30-9:45

Session 2:

9:45-10:00	Helen Jilek
10:00-10:15	Levi Webb
10:15-10:30	Elias Taira
10:30-10:45	Roberto Serrano
10:45-11:00	Nevin Smith
11:00-11:15	Claire Campbell

Break: 11:15-11:30

Session 3:

11:30-11:45	James Aygun
11:45-12:00	Samantha Sims
12:00-12:15	Helen Parker
12:15-12:30	Nicholas Majestic
12:30-12:45	Austin Alexander
12:45-13:00	Trent Butterfield
13:00-13:15	Carter West

Department of Physics Detailed Schedule and Abstracts

Session 1

(8:00-8:15) BIRTH PROCESS OF ELEMENTARY PARTICLES INSIDE SUPERCRITICAL FIELDS BASED ON DEGENERACY-BREAKING PERIODIC BOUNDARIES

Presenter: Eyan James (Undergraduate)

Mentor(s): Dr. Rainer Grobe, Dr. Q. Charles Su

Abstract: We examine the dynamics of the electron–positron pair creation process triggered by a static, spatially inhomogeneous electric field of supercritical strength. Special focus is placed on the spatial distribution of positrons within the interaction zone before they are ejected. By exploiting periodic boundary conditions, the usual degeneracy of the Dirac energy eigenstates in the Klein tunneling region can be lifted, allowing us to remove unwanted contributions from the computationally obtained density using a combination of energy- and spatially based filters.

(8:15-8:30) A GEOMETRIC PATH TO LORENTZ SPINORS

Presenter: Zachary Gunther (Undergraduate)

Mentor(s): Dr. Neil Christensen

Abstract: Geometric algebra provides a natural extension of vector geometry that unifies rotations, boosts, and spinors within a single geometric framework. Starting from rotations in physical space, rotors emerge as the fundamental objects encoding orientation and transformation. This structure extends seamlessly to spacetime, where Lorentz boosts appear on equal geometric footing with spatial rotations. Within this language, spinors arise as concrete geometric entities associated with mass and motion rather than abstract algebraic constructs. The Lorentz spinor is introduced to establish the geometric foundation for a constructive formulation of relativistic quantum theory and, ultimately, particle physics.

(8:30-8:45) GEOMETRIC INSIGHTS TO CONSTRUCTIVE PARTICLE PHYSICS

Presenter: Moab Croft (Graduate)

Mentor(s): Dr. Neil Christensen

Abstract: The Constructive Standard Model (CSM) of Particle Physics has recently been analyzed using the geometric Algebra of Physical Space (APS), thereby affording new geometric insights. The language of the APS' geometry is simpler and visualizable: Many objects of the traditional CSM now have straightforward geometric interpretations that can be drawn by hand and explained to someone with no background. This vastly improves the accessibility of the subject and simplifies the surrounding concepts.

(8:45-9:00) **ALGEBRAIC OBSTRUCTIONS TO OFF-SHELL CLOSURE IN 4D N=1 SUPERSYMMETRY**

Presenter: Charles Stevenson Brown II (Undergraduate)

Mentor(s): Dr. Neil Christensen

Abstract: The component-level closure of the four-dimensional N=1 superalgebra for chiral, vector, and tensor supermultiplets is a standard result in the supersymmetry literature. In many cases, however, closure of the algebra is achieved only upon imposing equations of motion, obscuring the structural distinction between on-shell and off-shell representations. In this work, we analyze this distinction directly at the component level and show that failures of off-shell closure arise from well-defined algebraic obstruction terms proportional to equations of motion. Using explicit closure computations for the chiral, vector, and tensor supermultiplets, we demonstrate how auxiliary fields eliminate these obstructions by completing representations of the superalgebra without introducing additional dynamics.

(9:00-9:15) **QUANTUM INTERFERENCE AND DEPHASING IN MOLECULAR-SCALE ELECTRONIC TRANSPORT**

Presenter: Eren Erdogan (Graduate)

Coauthor name(s): Justin Bergfield

Mentor(s): Dr. Justin Bergfield

Abstract: Understanding how decoherence influences heat and information flow is essential for realizing the promise of quantum technologies. Two widely used models for incorporating decoherence in quantum transport are the voltage probe (VP), which imposes local charge current conservation, and the voltage-temperature probe (VTP), which also conserves heat current. Although these models are often treated as functionally equivalent, we demonstrate that this equivalence exists only under highly symmetric conditions, which may be challenging to achieve experimentally. Under asymmetric coupling or thermal bias, the VTP respects thermodynamic constraints and enforces decoherence in both charge and heat channels, while the VP instead acts as a source or sink of heat. Strikingly, the VP can fail to model decoherence in heat transport entirely, even with large probe coupling strengths. Using a benzene-based molecular junction as a realistic example, we show that these effects significantly impact predicted heat transport. These results establish that the VP and VTP models are not interchangeable; only the VTP provides a thermodynamically consistent framework for modeling decoherence in quantum transport.

(9:15-9:30) **QUANTUM TRANSPORT SIGNATURES OF POLARITONIC STATES IN MOLECULAR CAVITY QED**

Presenter: Joshua Klein (Graduate)

Coauthor name(s): Justin Bergfield

Mentor(s): Dr. Justin Bergfield

Abstract: When a molecule is strongly coupled to a confined electromagnetic field, its electronic excitations hybridize with photons to form polaritonic states, a central concept in cavity quantum

electrodynamics (cQED). While such hybrid light–matter states are well described by the Jaynes-Cummings model for simple two-level systems, molecular junctions introduce additional complexity due to their many-body electronic structure and the presence of multiple transport pathways. In this work, we investigate how strong light–matter coupling modifies electronic transport through a molecular-scale junction coupled to metallic leads. By treating the molecule and a quantized cavity mode together as an interacting central system, we analyze how polaritonic eigenstates emerge and how their structure influences charge transport under nonequilibrium conditions. We find that the electronic current can act as a sensitive probe of polaritonic structure, revealing features that are not present in purely electronic or purely optical descriptions. This work highlights how combining concepts from quantum transport and cavity QED provides new insight into light–matter interactions at the nanoscale.

Session 2

(9:45-10:00) IMAGING QUANTUM INTERFERENCE WITH SPATIALLY RESOLVED THERMOPOWER

Presenter: Helen Jilek (Undergraduate)

Coauthor name(s): Justin Bergfield

Mentor(s): Dr. Justin Bergfield

Abstract: A temperature gradient drives charge carriers from hot to cold, producing a thermoelectric voltage in linear response, quantified by the Seebeck coefficient S . Beyond its technological relevance, S provides a uniquely sensitive probe of quantum interference and symmetry breaking in nanoscale conductors. Here we investigate the spatially resolved thermoelectric response of molecules adsorbed on metallic substrates using chemically accurate many-body quantum transport theory to simulate realistic scanning thermopower microscopy experiments. Within a fully interacting many-body formalism, we find the thermopower maps the coherent combinations of Dyson orbitals—the amplitudes connecting N - and $(N-1)$ -electron states—thereby functioning as a phase-sensitive quantum “transport interferogram.” As representative examples, we show for ethylene and benzene junctions that while conductance maps may fail to distinguish distinct bonding configurations, spatial maps of the thermopower $S(r)$ display pronounced, geometry-specific contrast that encodes bonding configuration, substrate symmetry, and molecular orientation.

(10:00-10:15) MD-INFORMED MICROFIELDS OF HED PLASMAS FOR LINE SHAPE CALCULATIONS

Presenter: Levi Webb (Graduate)

Coauthor name(s): Paul Grabowski, Jim Glosli, Thomas Gomez, Matt Caplan

Mentor(s): Dr. Matt Caplan

Abstract: Many properties used to study and classify astronomical objects depend upon the opacities of their constituent plasmas. Spectral line shapes are essential for determining the temperature and density of observed stellar and compact objects; understanding and accurately modeling plasma opacities from these parameters is crucial for computational stellar astrophysics. However, there are discrepancies between observed and calculated line shapes in the high energy density (HED) regime. We explore various plasma line shape models to ascertain potential sources of these discrepancies.

Current opacity models use semi-empirical molecular dynamics (MD) to simulate local particle electric fields (microfields), possibly contributing to the observed discrepancies in line shape calculations. Employing physically motivated MD models at these conditions may rectify this by improving microfield calculations. We demonstrate the microfield capabilities of LLNL's MD code ddcMD in preparation for a future merge with the pre-existing line broadening program Xenomorph to enable more accurate line shape simulations.

(10:15-10:30) DIFFUSION COEFFICIENTS OF PLASMA MIXTURES WITH LARGE CHARGE RATIOS

Presenter: Elias Taira (Graduate)

Coauthor name(s): Elias Taira, Dany Yacoub, Matt Caplan

Mentor(s): Dr. Matt Caplan

Abstract: Diffusion coefficients within crystalizing white dwarves (WDs) are vital to understanding their evolution as they impact how phase separation and sedimentary heat sources behave during this phase in the WD's lifecycle. Previous work has found an empirical law that relates the diffusion coefficient of a single ion to its coefficient in a mixture more analogous to a WD interior. This law works well for species with low charge ratios with respect to the average charge of the plasma but is much less accurate for higher charge ratios. In this work, we aim to use a symbolic regression algorithm to improve the accuracy of the model using the data from previous molecular dynamics simulations of charge ratios of up to $z_i/\langle z \rangle = 4.5$. Additionally, we seek to perform a new suite of simulations that will extend the range of available charge ratios to $z_i/\langle z \rangle = 6.0$.

(10:30-10:45) DIFFUSION IN YUKAWA CRYSTALS: THE EFFECTS OF GRAIN BOUNDARIES & SHEAR STRAIN

Presenter: Roberto Serrano (Graduate)

Mentor(s): Dr. Matthew Caplan

Abstract: Molecular modeling of the neutron star crust has shown that the diffusion of nucleons in the crystal lattice composing the crust is well described by an Eyring model. We show that adding the effects of grain boundaries and shear strain enhance diffusion relative to the fiducial monocrystal case. We show that these effects can be effectively modeled as a correction term to the exponential term in the Eyring model.

(10:45-11:00) MAGNETIC FAULTS AND PLASTIC FLOWS IN NEUTRON STARS

Presenter: Nevin Smith (Graduate)

Coauthor name(s): Matt Caplan, Ashley Bransgrove

Mentor(s): Dr. Matt Caplan

Abstract: The motion of magnetic field lines in the crusts of neutron stars (NS) can cause large shear forces to accumulate in the rigid ionic lattice, with stresses that exceed breaking causing crust quakes. This mechanism is believed to be the source of the spectacular bursts and flares of NS. From first principles, we perform molecular dynamics simulations of a screened Yukawa plasma coupled with

one-dimensional magnetic field lines to study magnetized faults within the crusts of a neutron star. We find that the crust yields by a formation of grain boundary networks that have a strong dependence on fault width. Additionally, we strain several polycrystalline lattices to agnostically study the viscoelastic properties of the crust and how energy is dissipated in the grain boundaries. We show the stress strain dependence on the grain density and box size, with robust convergence on our MD scales. We demonstrate hysteresis of a polycrystalline lattice strained at large deformations.

(11:00-11:15) MODELING THE FORMATION OF QUASI-STARS FROM SUPERMASSIVE STARS

Presenter: Claire Campbell (Undergraduate)

Coauthor name(s): Claire Campbell, Andy Santarelli, Matt Caplan

Mentor(s): Dr. Matt Caplan

Abstract: Recent James Webb Space Telescope observations of early-universe supermassive black holes (SMBHs), such as the $\sim 4 \times 10^7$ stellar mass quasar in UHZ1 and little red dots (LRDs), motivate work studying their early-time formation pathways. Known formation mechanisms do not explain SMBH mass and abundance: typical stellar core collapse is limited, and subsequent accretion onto even the largest of collapsed stars is not sufficient to form an SMBH within a Hubble time. An alternative method of SMBH formation is direct collapse, wherein a disk of pre-galactic gas rapidly infalls to its center. Direct collapse occurs in a quasi-star, a theoretical star-like gaseous envelope supported by BH accretion rather than nuclear reactions. In this work, we trace the evolution of supermassive stars to quasi-stars using the stellar evolution code MESA to place realistic constraints on the SMBH seeds formed via direct collapse.

Session 3

(11:30-11:45) TWO-DIMENSIONAL MODELING OF MOLECULAR PHOTOIONIZATION TIME DELAYS

Presenter: James Aygun (Undergraduate)

Mentor(s): Dr. Allison Harris

Abstract: The recent development of attosecond laser pulses has allowed for the ability to probe the dynamics of electrons inside atoms and molecules. Attosecond lasers allow us to study photoionization, during which a short, high intensity laser pulse causes the emission of an electron from an atomic or molecular target. One long-standing question is whether photoionization is instantaneous. It has been recently demonstrated that the photoionization process does not occur instantaneously and that it requires a finite time (called the ionization time delay). Our previous study in one dimension showed that using a type of sculpted ionizing XUV pulse, an Airy XUV pulse, can change the ionization time with dependence on the third-order and fifth-order spectral phase in atomic and molecular targets. Now we present a two-dimensional model to study the effect of pulse sculpting with airy pulses on the ionization time delay on a diatomic molecule. In two dimensions we can study angular implications on ionization delay time as well as the effects of symmetry and rotation of a diatomic molecule together with the effects of pulse shaping with the

(11:45-12:00) PREDICTING CROSS SECTIONS FOR COMPLEX MOLECULES USING MACHINE LEARNING

Presenter: Samantha L. Sims (Graduate)

Mentor(s): Dr. Allison Harris

Abstract: Atomic and molecular cross sections are essential for modeling complex system dynamics in many fields. Cross sections are a measure of the probability of a process occurring during a collision, and they provide key information about how charged particles interact with atoms and molecules. While there are several online databases where atomic and molecular cross sections can be found, such as LxCat or the NIST electron elastic-scattering cross section database, there is still a need for additional data, particularly for molecular targets. Existing methods for generating cross sections include solving the classical equations of motion, solving the quantum mechanical Schrödinger equation, extracting them from swarm data, or measuring them experimentally. While these methods work well, they are often computationally and technically challenging, as well as financially expensive. Machine learning techniques offer new avenues to overcome these challenges and are becoming effective tools for accurately and efficiently predicting cross sections where data is not currently available. I will review existing machine learning techniques used to predict atomic and molecular collision cross sections and provide an outlook for future applications to complex molecular targets.

(12:00-12:15) ENHANCED PRODUCTION OF CIRCULAR RYDBERG STATES USING TWISTED VORTEX ELECTRON COLLISIONS

Presenter: Helen Parker (Undergraduate)

Coauthor name(s): Samantha L. Sims, Daniel J. Lamphere II

Mentor(s): Dr. Allison Harris

Abstract: Circular Rydberg states have important applications in quantum information and quantum simulation, as they have long lifetimes and strong dipole-dipole interactions. However, producing these circular Rydberg states is technically challenging. In this work, we examine the ability of twisted electron collisions to produce these states. Twisted electrons carry orbital angular momentum, which may increase the efficiency of production of circular Rydberg states. Here, we use Bessel electron beams to excite hydrogen, rubidium, and cesium atoms to circular Rydberg states. Using a fully quantum mechanical framework, we calculate the total excitation cross sections for excitation to circular Rydberg states from the ground state. We find that twisted electrons with large opening angles increase the probability of excitation compared to their non-twisted counterparts, pointing to the possible utility of these techniques for efficiently generating circular Rydberg states. We also show that electrons with large orbital angular momentum contribute significantly to this increase in excitation probability. Lastly, we examine the effect of projectile-target alignment and find that a non-zero impact parameter increases the maximum intensity of total excitation cross sections in hydrogen and shifts that maximum to lower energies. Overall, our findings demonstrate that twisted-electron excitation may provide a feasible and potentially advantageous pathway for generating circular Rydberg states.

(12:15-12:30) EXTENSIONS BEYOND 4-POINT AMPLITUDES IN CONSTRUCTIVE QED

Presenter: Nicholas Majestic (Graduate)

Coauthor name(s): Dr. Neil Christensen, Gabriel Minney

Mentor(s): Dr. Neil Christensen

Abstract: The field of particle physics constitutes the theoretical and experimental methods that we implement to study the universe at the smallest fundamental scales. The current primary theoretical framework that for electrons, positrons, and photons is Quantum Electrodynamics (QED). To compare QED with experiment, it is necessary to calculate scattering amplitudes. The traditional method of calculating amplitudes involves Feynman diagrams. Although sufficient in principle to calculate any possible amplitude, it has been found that as the number of particles within a process increases, both the number of Feynman diagrams as well as the complexity of calculating the diagrams grow to become too computationally expensive even for the most powerful supercomputers. New techniques for calculating scattering amplitudes are needed. Constructive amplitudes are a potential candidate with their own set of strengths and challenges. It has already been used to calculate scattering amplitudes in QED for up to 4 particles. In this work, we extend these calculations to diagrams beyond 4 particles.

(12:30-12:45) TOKAMAK PLASMA SIMULATION

Presenter: Austin Alexander (Undergraduate)

Mentor(s): Dr. Jay Ansher

Abstract: Nuclear fusion has long been viewed as a promising solution to global energy needs due to its potential to provide abundant, clean, and sustainable power. Since its early development in the mid-20th century, fusion research has advanced through significant experimental achievements, particularly in the area of magnetic confinement. Tokamak reactors, which use powerful toroidal magnetic fields to confine high-temperature plasma, remain one of the most extensively studied designs. Modern projects such as ITER represent the latest efforts to overcome remaining challenges, such as plasma instability, confinement, and sustaining fusion conditions for long durations. This research project examines both the historical progression of nuclear fusion technology and the computational modeling of plasma dynamics within a tokamak reactor. A central component of the work is the development of a Python-based plasma simulation program that models the trajectories of charged particles under the influence of electromagnetic fields. To achieve accurate and stable numerical integration, the simulation utilizes the Boris integrator, a widely used algorithm in plasma physics due to its energy-conserving properties and effectiveness in resolving cyclotron motion in strong magnetic fields. The program applies the Lorentz force equation to simulate particle motion in a simplified tokamak geometry, allowing us to look at things such as confinement behavior, drift effects, and the influence of electric and magnetic field configurations. By using the Boris integrator, the simulation provides improved long-term stability compared to standard integration techniques, making it particularly suitable for studying plasma behavior over many time steps. Through this combined historical and computational approach, the project connects foundational fusion research with modern numerical techniques used in contemporary plasma physics. The results demonstrate how simulation tools can

contribute to understanding the complex physical processes that govern plasma confinement and stability, supporting ongoing efforts toward achieving practical nuclear fusion energy.

(12:45-13:00) MAGNETIC RECONNECTION IN EARTH'S MAGNETOTAIL

Presenter: Trent Butterfield (Undergraduate)

Mentor(s): Dr. Jay Ansher

Year in School: Senior

Abstract: Magnetic reconnection in Earth's magnetotail plays a critical role in converting magnetic energy into particle motion and plasma flows. The Earth's magnetic field traps plasma (electrically charged gas) from the Sun. The Sun's magnetic field can interact with the Earth's magnetic field, through magnetic reconnection on the day side of the Earth and on the night side of Earth in the magnetotail. Magnetic reconnection is the process where magnetic field lines break and reconnect releasing magnetic energy which can then inject the trapped plasma into the polar regions, or eject the plasma down the magnetotail away from the Earth. In this study, we present a preliminary analysis of magnetotail reconnection signatures using magnetic field and particle flux measurements from the Geotail spacecraft that was launched in 1992. Electron and ion observations spanning distinct energy ranges are examined to identify reconnection related features, including changes in particle flux, timing differences between species, and associated magnetic field variations. Ongoing work will explore further data to identify additional reconnection events, to better understand particle dynamics in the magnetotail.

(13:00-13:15) THERMAL DECOMPOSITION-ASSISTED THZ SPECTROSCOPY FOR AEROSOL DETECTION

Presenter: Carter West (Graduate)

Coauthor name(s): Eden Winters, Daniel Tyree, Michael Brothers, Ivan Medvedev

Mentor(s): Dr. Ivan Medvedev

Abstract: THz (Terahertz) spectroscopic sensing of volatile gases provides a rapid, accurate, and sensitive method for assessing the contents of a gas mixture. However, it is limited to detection of lighter volatiles. Thus, to extend the sensing to aerosols in ambient air, the aerosols must be modified to form molecules detectable by THz absorption spectroscopy. This project focuses on thermal decomposition of acetaminophen, the active ingredient in many common fever and pain relief medications. We are studying this molecule as it is safe, accessible and it is easy to decompose upon heating. By controlling the temperature of the sample, we can analyze the measured THz spectra using molecular spectroscopic facility at the ISU Physics Department. The system can record the THz spectrum of a sample in gas-phase between 0.207 and 0.320 THz. Analysis of the spectral changes as a function of temperature enables identification of molecular fragments produced during thermal Breakdown. By identifying characteristic decomposition products, this work establishes a framework for indirect THz detection of heavier aerosol species in ambient air.

**ALPHABETICAL BY STUDENT LAST NAME
MORNING SESSION**

Presenter Last Name	Presenter First Name	Poster Number	Mentor's Department/School	Mentor
A				
Abdullah	Abu Habib Md	7	Biological Sciences	Viktor Kirik
Abugu	Christabel	51	Geography, Geology, and the Environment	Wondwosen Seyoum
Achammer	Benjamin	71	Mathematics	Perry Kleinhenz
Adeyemo	Grace	94	Communication	Fernando Severino
Adjei	Jenell	165	Health Sciences	Jennifer Peterson
Akter	Tonmoy	184	Creative Technologies	Kristin Carlson
Akter	Saima	140	English	Lisya Seloni
Akuoko-Frimpong	Franklin	160	Family and Consumer Sciences	Yu Ui-Jeen
Alexander	Joseph	8	Biological Sciences	Kyle Floyd
Ali	Maham	79	Information Technology	Erin Franken
Ali	Sadira	72	Finance, Insurance and Law	Jim Jones
Alongi	Gia	31	Chemistry	Shawn Raynard Hitchcock
Ambrose	Jenna	52	Geography, Geology, and the Environment	Yiming Guo
Amirfazli	Mehdi	9	Biological Sciences	Wolfgang Stein

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A - B				
Ampong	Deborah	185	Creative Technologies	Kristin Carlson
Anderson	Madelynn	32	Chemistry	Christopher Mulligan
Anderson	Jessica	143	Teaching and Learning	Miranda Lin
Ayinde	Kuburat Adeola	95	Communication	John Baldwin
Azameti	Prosper	73	Mathematics	Mehdi Karimi
Azeez	Kaosarat Bola	74	Mathematics	Sunil Chebolu
Baldwin	Hannah	106	Psychology	Adena Meyers
Barlow	Haydn	33	Chemistry	Jeremy Driskell
Barnard	Bradley	107	Psychology	Jackie Cerda-Smith
Barrera	Kruz	108	Psychology	Dan Lannin
Baughman	Osprey	10	Biological Sciences	Tom Hammond
Benson	Jenna	11	Biological Sciences	Kara Andres
Betangah	Moses	34	Chemistry	Jeremy Driskell
Bhuiyan	Md. Ikram Hossain	151	Politics and Government	Mike Hendricks
Boley	Maddie	171	Kinesiology & Recreation	Karen Dennis

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B - C				
Botros	Laura	109	Psychology	Jordan Arellanes
Bradshaw	Jack	53	Geography, Geology, and the Environment	David Malone
Breausche	Faith	35	Chemistry	Jeremy Driskell
Breede	April	36	Chemistry	Shawn Raynard Hitchcock
Brozenec	Rachel	37	Chemistry	Andy Mitchell
Charles	Michael	110	Psychology	Kimberly Schneider
Chase	Lucas	147	History	Kathryn Jasper
Chen	Ching Lun	88	Technology	Isaac Chang
Clouse	Jake	80	Information Technology	Mangolika Bhattacharya
Cohen	Dinah	12	Biological Sciences	Carlos Rodroguéz-Saltos
Coleman	Alia	111	Psychology	Brea Banks
Coronado	Dana	38	Chemistry	Lisa Szczepura
Cortina Zanella	Marina	1	Agriculture	Maria Boerngen
Cottrell	Alex	155	Criminal Justice Sciences	Jessie Krienert
Cremer	Hannah	112	Psychology	Nicole Moore

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C - F				
Curry	Ava	113	Psychology	Kelly Clemens
DeSchryver	Elyse	172	Kinesiology & Recreation	Michael Torry
Dietmeier	Keelin	173	Kinesiology & Recreation	Michael Torry
Donahue	Michael	174	Kinesiology & Recreation	Michael Torry
Donaldson	Ian	42	Chemistry	Jun-Hyun Kim
Donnelly	Caitlyn	114	Criminal Justice Sciences	Jessie Krienert
Donovan	Lucas	156	Criminal Justice Sciences	Joshua Stout
Doyle	Katelyn	13	Biological Sciences	Pirmin Nietlisbach
Drager	Lillian	54	Geography, Geology, and the Environment	David Malone
Draper	Olivia	14	Biological Sciences	Viktor Kirik
Duncan	MacKenna	115	Psychology	Julie Campbell
Earll	Olivia	116	Psychology	Dan Ispas
Espitia	Alondra	166	Health Sciences	Jennifer Peterson
Eufemia	Katie	15	Biological Sciences	Pirmin Nietlisbach
Fanning	Aiden	55	Geography, Geology, and the Environment	David Malone

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F-G				
Farm	Isabelle	175	Kinesiology & Recreation	Marcel Lopes dos Santos
Faudoa	Marisol	117	Psychology	Byron Heidenreich
Feiger	Rachel	118	Psychology	Laura Finan
Flater	Rosalind	3	Agriculture	Michelle Kibler
Fritz	Sylvia	16	Biological Sciences	Javier delBarco-Trillo
Galewsky	Isaac	89	Technology	Jin Jo
Garcia Sanz	Elena	142	Languages, Literatures and Cultures	Benjamin Schmeiser
Gimm	Isabel	96	Communication	John Baldwin
Gitonga	Hosea	76	Economics	Harris Timothy
Gorsage	Abbie	167	Health Sciences	Liangcheng Yang
Graunke	Joshua	17	Biological Sciences	Scott Clem
Griffith	Jacey	119	Psychology	Gregory Braswell
Grobe	Megan	56	Geography, Geology, and the Environment	David Malone
Gross	Grace	97	Communication	Lauren Bratslavsky
Grove	Mia	120	Psychology	Dan Lannin

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G-I				
Gunther	Zachary	67	Physics	Neil Christensen
Hafsa	Hafsa	176	Kinesiology & Recreation	Michael Torry
Hamilton	Miranda	159	Social Work	Susana Calderon
Hanley	Rachael	162	Communication Sciences and Disorders	Ciera Lorio
Harris-Bommarito	Amira	57	Geography, Geology, and the Environment	David Malone
Higgins Aranda	Ellen	186	Creative Technologies	Kristin Carlson
Hishinuma	Sanako	121	Psychology	Dawn McBride
Hobson	Raegan	58	Geography, Geology, and the Environment	Lisa Tranel
Holvey	Cole	39	Chemistry	Shawn Raynard Hitchcock
Hopwood	Hannah	122	Psychology	Jordan Arellanes
Howell	Ben	98	Communication	John Baldwin
Hughes	Tamia	123	Psychology	Brea Banks
Igberaodion	Ejehiwease	187	Creative Technologies	Kristin Carlson
Igwe	Fredrick	191	Theatre and Dance	Le'Mil Eiland
Immordino	Sarah	169	Nursing	Maria Boerngen

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J-K				
Jaswal	Twinkle	81	Information Technology	Rosangela Follmann
Jayne	Audrey	77	Economics	Susan Chen
Jodlowski	Vanessa	124	Psychology	Allison Nguyen
Johnson	Kara	125	Psychology	Dan Lannin
Jones	Blaise	40	Chemistry	Christopher Mulligan
Jones	Brenna	157	Criminal Justice Sciences	Hailey Munir
Joseph	Echefulachi Prince	41	Chemistry	Timothy Andy Mitchell
Kabaalu	Linda	99	Communication	John Baldwin
Karafotias	Alexandra	189	Music	Allison Alcorn
Kerber	Nicole	2	Agriculture	Maria Boerngen
Kerr	Isaiah	92	Mechanical Engineering	Hafizur Rahman
Kiene	Lani	59	Geography, Geology, and the Environment	David Malone
Kietzman	Preston	60	Geography, Geology, and the Environment	David Malone
King	Oliver	126	Psychology	Jackie Cerda-Smith
Knapp	Job	43	Chemistry	Steven Peters

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K-M				
Kobulnicky	Trent	44	Chemistry	Jeremy Driskell
Krause	Erika	127	Psychology	Dawn McBride
Kuchanapally	Maheshwari	4	Agriculture	Fanson Kidwaro
Kuhn	Rory	128	Psychology	Kimberly Schneider
Kuhn	Rory	152	Sociology/Anthropology	Susan Sprecher
Lamphere	Daniel	68	Physics	Allison Harris
Little	Alexandria	153	Sociology/Anthropology	Susan Sprecher
Long	Brenna	18	Biological Sciences	Ben Sadd
Lopez	Victor	78	Accounting	Nathan Hartman
Lutt	Madelynn	177	Kinesiology & Recreation	Liz Sattler
Mate	Sam	82	Information Technology	Rosangela Follmann
McDaniel	Sean	129	Psychology	Suejung Han
McNulty	Brittany	144	Teaching and Learning	Carolyn Hunt
Mercado	Matthew	19	Biological Sciences	Rachel Bowden
Mielke	Grace	158	Criminal Justice Sciences	Jessie Krienert

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M-O				
Miller	Emily	45	Chemistry	Jeremy Driskell
Milligan	Garrett	46	Chemistry	Jun-Hyun Kim
Moeller	Sydney	61	Biological Sciences	Kara Andres
Montegrando	Erica	130	Psychology	Caitlin Mercier
Montet	Eric	20	Biological Sciences	Ryan Paitz
Moser	Cheyenne	178	Kinesiology & Recreation	Samantha McDonald
Munson	Kathrynne	141	English	Tara Lyons
Nation	Megan	5	Agriculture	Drew Lugar
Noonan	Ilaria	100	Communication	Lauren Bratslavsky
Nord	Lauren	131	Psychology	Suejung Han
Nwaiwu	Kingsley	47	Chemistry	Christopher Mulligan
O'Donnell	Tess	148	History	Kathryn Jasper
Oldham	Olivia	21	Biological Sciences	Pirmin Nietlisbach
Orhan	Begüm	132	Psychology	Suejung Han
Ortman	Caleb	62	Geography, Geology, and the Environment	David Malone

**ALPHABETICAL BY STUDENT LAST NAME
MORNING SESSION**

O-S				
Otoo	Elvis	101	Communication	John Baldwin
Otoo	Elvis	102	Communication	John Hooker
Panta	Kriti	63	Geography, Geology, and the Environment	Wondwosen Seyoum
Pantano	Dominic	103	Communication	Aimee Miller-Ott
Pappoe	Deborah	104	Communication	Stephen Hunt
Parmentier	Taylor	179	Kinesiology & Recreation	Marcel Lopes dos Santos
Ramos	Britney	133	Psychology	Jordan Arellanes
Rejniak	Olivia	170	Nursing	Susana Calderon
Rekart	Dylan	180	Kinesiology & Recreation	Marcel Lopes dos Santos
Reppen	Andrew	83	Information Technology	Qi Zhang
Rivadeneyra-Braswell	Nicte	64	Geography, Geology, and the Environment	David Malone
Romps	Sydney	22	Biological Sciences	Javier delBarco-Trillo
Rosenberg	Aaron	84	Information Technology	Rosangela Follmann
Sacco	Cameron	134	Psychology	Dawn McBride
Sanburg	Riley	168	Health Sciences	Guang Jin

**ALPHABETICAL BY STUDENT LAST NAME
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S				
Sandy	Heather	145	Teaching and Learning	Sue Hildebrandt
Schunke	Ellie	161	Family and Consumer Sciences	Yoon Jin Ma
Semonis	Evan	181	Kinesiology & Recreation	Michael Torry
Shaffer	Lillian	163	Communication Sciences and Disorders	Ciera Lorio
Shahare	Shubham Damodhar	90	Technology	Xi Hu
Sharkey	Scott	85	Information Technology	Mangolika Bhattacharya
Shaw	Lee	23	Biological Sciences	Pirmin Nietlisbach
Shields	Kathleen	135	Psychology	Gary Cates
Sizemore	Morgan	136	Psychology	Adena Meyers
Sloan	Mia	48	Chemistry	Lisa Szczepura
Sloan	Mia	49	Chemistry	Lisa Szczepura
Soyebi	Blessing	24	Nursing	Rebekka Darner
Stevens	Sarah	6	Agriculture	David Kopsell
Stowell	Julia	190	Music	Katherine Lewis
Stumpf	Ella	182	Kinesiology & Recreation	Samantha McDonald

**ALPHABETICAL BY STUDENT LAST NAME
MORNING SESSION**

S-V				
Swinford	Rylie	65	Technology	Matthew Hagaman
Szwed	Sydney	25	Biological Sciences	Ben Sadd
Testin	Michaelene	164	Communication Sciences and Disorders	Ciera Lorio
Thomas	Lydia	26	Biological Sciences	Javier delBarco-Trillo
Tiffany	Joshua	86	Mathematics	Amin Bahmanian
Timah	Jackline	66	Geography, Geology, and the Environment	Seyoum Wondwosen
Timm	Michael	87	Information Technology	Daniel Freiburg
Timsina	Ravi	27	Biological Sciences	Ben Sadd
Torkelson	Hannah	149	History	Kathryn Jasper
Torres	Daisy	137	Psychology	Alycia Hund
Tuttle	Sierra	150	History	Kathryn Jasper
VanDerBurg	Phillip	91	Technology	Heba Elgazzar
Velazquez	Agustin	183	Kinesiology & Recreation	Michael Torry
Verticchio	Mia	138	Psychology	Jackie Cerda-Smith
Vicente Horst	Leticia	105	Communication	John Baldwin

**ALPHABETICAL BY STUDENT LAST NAME
MORNING SESSION**

V-Z				
Vilsick	Lucy	28	Biological Sciences	Pirmin Nietlisbach
Wanda	Devin	188	Creative Technologies	Kristin Carlson
Warren	Clinton	29	Biological Sciences	Rachel Bowden
West	Carter	69	Physics	Ivan Medvedev
Westerhold	Adam	93	Technology	Jeritt Williams
Wheeler	Katherine	139	Psychology	Alexandra Ilie
Wilken	Madison	30	Biological Sciences	Rachel Bowden
Winters	Eden	70	Physics	Ivan Medvedev
Woodruff	Ella	154	Sociology/Anthropology	Susan Sprecher
Wright	Daniel	50	Chemistry	Shawn Raynard Hitchcock
Yindo	GiftY	75	Mathematics	Sunil Chebolu
Zaber	Md Mamunur Rashid	146	Teaching and Learning	Carolyn Hunt

**ALPHABETICAL BY STUDENT LAST NAME
AFTERNOON SESSION**

Presenter Last Name	Presenter First Name	Poster Number	Mentor's Department/School	Mentor
A - B				
Abel	Antioniette	155	Family and Consumer Sciences	Ui-Jeen Yu
Abraham	Ellee	32	Chemistry	Shawn Raynard Hitchcock
Adelman	David	45	Geography, Geology, and the Environment	Wondwosen Seyoum
Adeyemo	Grace	94	Communication	John Baldwin
Aguilar	Jessica	96	Psychology	Karla Doecke
Alexander	Austin	53	Physics	Jay Ansher
Anderson	Donovan	173	Creative Technologies	Kristin Carlson
Arzani	Alicia	3	Biological Sciences	Fernanda G. Duque
Auth	Sydney	97	Psychology	Kyla Cary
Barbour	Cait	4	Biological Sciences	Jan-Ulrik Dahl
Baruah	Padmanav	5	Biological Sciences	Fernanda G. Duque
Basu	Debajyoti	6	Biological Sciences	Kyle Floyd
Behm	Aspen	139	History	Camille Cole
Bello	Ahmed	67	Information Technology	Philip Sumesh

**ALPHABETICAL BY STUDENT LAST NAME
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B-C				
Beltramini	Aidan	33	Chemistry	Shawn Raynard Hitchcock
Berekashvili	Gia	68	Technology	Sally Xie
Berekashvili	Gia	69	Technology	Sally Xie
Bhatt	Tapasvi	7	Biological Sciences	Tom Hammond
Black	Patricia	1	Agriculture	Michelle Kibler
Black	Kylie	140	History	Kathryn Jasper
Brown	Aidan	166	Kinesiology & Recreation	Scott Pierce
Brunner	Eric	46	Geography, Geology, and the Environment	Eric Peterson
Burgoni	Joseph	8	Biological Sciences	Kara Andres
Burkhalter	Tyler	167	Kinesiology & Recreation	Michael Torry
Burress	Brody	99	Psychology	Allison Nguyen
Butterfield	Trent	54	Physics	Jay Ansher
Cameron	DeVon	34	Chemistry	Shawn Raynard Hitchcock
Camp	Gabrielle	83	Technology	Jin Jo
Campbell	Claire	55	Technology	Matthew Hagaman

**ALPHABETICAL BY STUDENT LAST NAME
AFTERNOON SESSION**

C				
Carol	Ani	174	Creative Technologies	Kristin Carlson
Castillo	Natalia	100	Psychology	Dawn McBride
Center	Bailey	9	Biological Sciences	Kevin Edwards
Chase	Lucas	141	History	Kathryn Jasper
Chaudhry	Habiba	10	Biological Sciences	Wolfgang Stein
Cheeseman	Erin	11	Biological Sciences	Andres Vidal-Gadea
Church	Gwen	12	Biological Sciences	Kara Andres
Colbert	Ben	168	Kinesiology & Recreation	Kristen Lagally
Colon	Janedis	101	Psychology	Suejung Han
Cope	Chloe	151	Criminal Justice Sciences	Jeffrey Walsh
Costello-Southfield	Sean	102	Psychology	Burak Ozkum
Crain	Kacey	35	Chemistry	Timothy Lash
Cravens	Tristan	70	Information Technology	Rudra Prasad Baksi
Curry	Ava	103	Criminal Justice Sciences	Joanne Savage
Cutshall	Teagan	104	Psychology	Laura Finan

**ALPHABETICAL BY STUDENT LAST NAME
AFTERNOON SESSION**

D-E				
Dasovic-Walker	Anna	105	Psychology	Allison Nguyen
Davis	Noah	175	Creative Technologies	Kristin Carlson
Delzell	Aiden	36	Chemistry	Timothy Lash
Deslaurier	Nolan	84	Technology	Isaac Chang
Despe	Tyler	149	Sociology/Anthropology	Intan Suwandi
Diaz	Josiah	142	Sociology/Anthropology	Kathryn Jasper
Dinnsen	Lauren	106	Psychology	Adena Meyers
Donnelly	Caitlyn	107	Psychology	Jeffrey Kahn
Dudley	Makayla	56	Physics	Justin Bergfield
Edwards	Tatiana	108	Family and Consumer Sciences	Chang Su-Russell
Eifert	Rex	37	Chemistry	Andy Mitchell
Elsharef	Ali	38	Chemistry	Andrew Mitchel
Emmert	Paul	13	Biological Sciences	Ben Sadd
Enevold	Alyssa	14	Biological Sciences	Fernanda Duque
Ervin	Quentin	39	Chemistry	Andy Mitchell

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AFTERNOON SESSION**

E-G				
Erwin	AJ	176	Creative Technologies	Kristin Carlson
Fairbanks	Mallory	136	Biological Sciences	Ryan Paitz
Faudoa	Marisol	109	Psychology	Suejung Han
Faulkner	Charlie	177	Music	Allison Alcorn
Feiger	Rachel	110	Psychology	Kimberly Schneider
Fishman	Elizabeth	165	Nursing	Denise Hammer
Fleming	Jalen	62	Mathematics	Amin Bahmanian
Fontes Fialho	Camila	111	Psychology	Kelly Clemens
Gagliano-Campbell	Micah	178	Creative Technologies	Kristin Carlson
Gawlik	Kasia	154	Social Work	Gloria Arroyo Sugg
Geyer	Tara	15	Biological Sciences	Carlos Rodriguez-Saltos
Gong	Jiajun	72	Information Technology	Mangolika Bhattacharya
Govardhana	Maithri	85	Technology	Jin Jo
Gross	Lauren	112	Psychology	Laura Finan
Guthrie	Alison	113	Psychology	Allison Nguyen

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G-J				
Guthrie	Alison	114	Psychology	Allison Nguyen
Hemeson	Godson	40	Chemistry	Shawn Raynard Hitchcock
Hindman	Katie	115	Psychology	Kimberly Schneider
Hineline	Kevin Adair	132	Educational Administration and Foundations	Lenford Sutton
Hoffman	Justin	73	Information Technology	Sumesh Philip
Holthaus	Jayden	157	Communication Sciences and Disorders	Antony Joseph
Holthaus	Jayden	158	Communication Sciences and Disorders	Antony Joseph
Hossain	Md Didar	133	English	Kris Lewis
Hossain	Tasfia	116	Psychology	Laura Finan
Houston	Jaron	41	Chemistry	Shawn Raynard Hitchcock
Jackson	Valerie	150	Sociology/Anthropology	Shelby Jeede Putt
James	Maegan	95	Communication	Stephen Hunt
Jiang	Ziyu	134	Communication	John Baldwin
Jilek	Helen	57	Physics	Justin Bergfield
Jodlowski	Vanessa	117	Psychology	Dawn McBride

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AFTERNOON SESSION**

J-L				
Jones	Mackenzie	16	Biological Sciences	Andres Vidal-Gadea
Jones	Cody	161	Health Sciences	Jennifer Peterson
Joshi	Anish	179	Creative Technologies	Kristin Carlson
Kastner	Jacqueline	159	Communication Sciences and Disorders	Taeok Park
Khan	Asad	58	Physics	Mahua Biswas
Khatri	Saraswati Maya	47	Geography, Geology, and the Environment	Dr. Lisa Tranel
Kimler	Addison	17	Chemistry	Shawn Raynard Hitchcock
Kinoti	Hildah	86	Technology	Xi Hu
Kinoti	Hildah	87	Technology	Sally Xie
Kowalski	Courtney	118	Psychology	Gary Cates
Krajewski	Arnold	180	Creative Technologies	Greg Corness
Krueger	Leo	66	International Business	Barbara Ribbens
Kurcab	Cody	169	Kinesiology & Recreation	Michael Torry
Lebron	Wesley	48	Geography, Geology, and the Environment	Jonathan Thayn
Limon	Md Shahnawaj Alom	74	Information Technology	Tahmid Rashid

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L-M				
Liyanage	Shishi	65	Business Administration	Rodger Singley
Love	Kaiden	75	Information Technology	Sean Sanders
Lucas	Sam	181	Creative Technologies	Kristin Carlson
Mabry-Mitchell	Sean	18	Biological Sciences	Ryan Paitz
Majestic	Nicholas	59	Physics	Neil Christensen
Majka	Sam	147	Politics and Government	Mike Hendricks
Marrella	Patrick	76	Information Technology	Nariman Ammar
Marroquin	Julianne	119	Psychology	Caitlin Mercier
McAuliffe	Jillian	120	Psychology	Jeffrey Wagman
McCaslen (WORK)	Aiden	77	Information Technology	Elahe Javadi
McDaniel	Sean	121	Psychology	Daniel Lannin
McGraw	Doug	182	Creative Technologies	Kristin Carlson
McMonigal	Bren	183	Creative Technologies	Kristin Carlson
Meek	Katelin	19	Biological Sciences	Kara Andres
Mehedi	Mussarath	137	Teaching and Learning	Miranda Lin

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M-O				
Miller	Ava	49	Geography, Geology, and the Environment	Eric Peterson
Minga	Andy	63	Mathematics	Maochao Xu
Mitchell	Lila	122	Psychology	Caitlin Mercier
Mundsinger	Sam	170	Chemistry	Andy Mitchell
Muthukumar	Avinaash	20	Biological Sciences	Andres Vidal-Gadea
Mwaura	Bridget	123	Psychology	Caitlin Mercier
Neequaye	Ishmael	135	English	Kris Lewis
Newton	Parker	21	Biological Sciences	Jan Dahl
Nlerum	Oma	78	Information Technology	Dmitry Zhdanov
Nsabaah	Joseph	42	Chemistry	Andy Mitchell
Nyambayo	Munyaradzi	50	Geography, Geology, and the Environment	Seyoum Wondwosen
Okeke	Chelda	162	Chemistry	Shawn Raynard Hitchcock
Olayeni	Stephen	88	Technology	Pranshoo Solanki
Oluborode	Joseph	43	Chemistry	Andy Mitchell
Omoniyi	Hope	44	Chemistry	Mohamed Eldeeb

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AFTERNOON SESSION**

O-R				
Ort	Peyton	22	Biological Sciences	Joseph Casto
Owens	Angelina	124	Psychology	Allison Nguyen
Ozkaya	Emre	138	Teaching and Learning	Barbara B. Meyer
Palczynski	Dylan	60	Physics	Neil Christensen
Parkin	Jack	143	History	Kathryn Jasper
Parrott	Trey	144	History	Kathryn Jasper
Perhay	Alexander	89	Technology	Jeritt Williams
Pfeifer	DaShawn	79	Information Technology	Tahmid Rashid
Plankenhorn	Jack	2	Agriculture	Rob Rhykerd
Pozzo	Maggie	51	Geography, Geology, and the Environment	David Malone
Pritchard	Lucy	90	Technology	Isaac Chang
Rangel	Jorge	91	Technology	Jin Jo
Rassano	Joey	145	History	Kathryn Jasper
Rios-Narciso	Jesus	61	Physics	Uttam Manna
Rojisristith	Suphanat	80	Information Technology	Qi Zhang

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AFTERNOON SESSION**

R-T				
Rossi	Arianna	171	Kinesiology & Recreation	Michael Torry
Sanchez	Chelsea	125	Psychology	Adena Meyers
Scalf	Jacob	23	Biological Sciences	Jan Dahl
Scott	Jadyn	24	Biological Sciences	Carlos Rodriguez
Seymour	Mackenzie	25	Biological Sciences	Wolfgang Stein
Singh	Vikrant	64	Economics	Srishti Slaria
Smith	Sebastian	172	Kinesiology & Recreation	Samantha McDonald
Speirer	Jackie	126	Psychology	Jackie Cerda-Smith
Spriggs	Alexandra	26	Biological Sciences	Tom Hammond
Stanley	Kate	27	Biological Sciences	Ben Sadd
Steiger	Charlotte	28	Biological Sciences	Wolfgang Stein
Steilmann	Paula	29	Nursing	Rebekka Darner
Sulak	Meg	156	Family and Consumer Sciences	Luke Russell
Tavakkol	Ehsan	185	Music	Allison Alcorn
Tenuto	Katelyn	163	Health Sciences	Alicia Wodika

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T-Z				
Tiffany	Joshua	81	Information Technology	Qi Zhang
Tobin	Ellana	30	Biological Sciences	Tom Hammond
Troiden	Brenden	127	Psychology	Dawn McBride
Turken	Ella	92	Technology	Jin Jo
Vitalecz	Casey	164	Health Sciences	Jacqueline Lanier
Walis	Emma	128	Psychology	Kelly Clemens
Walis	Emma	129	Psychology	Eric Wesselmann
Watter	Zachary	146	History	Kathryn Jasper
Weber	Madison	130	Psychology	Gary Cates
Whiting	Shyia	148	Politics and Government	Meghan Leonard
Wierschem	Sarah	184	Creative Technologies	Kristin Carlson
Wilderman	Rene	31	Biological Sciences	Andres Vidal-Gadea
Williamson	Marriana	160	Communication Sciences and Disorders	Taeok Park
Yates	Jen	131	Psychology	Dawn McBride
Zacarias	Angeli	153	Criminal Justice Sciences	Marta Ascherio
Zarco	Jacqueline	52	Geography, Geology, and the Environment	John Kostelnick
Zhang	Simon	82	Information Technology	Qi Zhang

**ALPHABETICAL BY STUDENT LAST NAME
E-POSTER**

Last Name	First Name A-C	Department/School	Faculty Mentor
Aguayo-Pizano	Kim	International Business	Barbara Ribbens
Anderson	Faith	Social Work	Gloria Arroyo Sugg
Anderson	Belinda	Teaching and Learning	Sara Jones
Anderson	Lindsay	Teaching and Learning	Sara Jones
Baker	Jillian	Social Work	Kate Sheridan
Benjamin	Lianna	Social Work	Kate Sheridan
Bettis	Sheri	Social Work	Kate Sheridan
Birlingmair	Kate	Social Work	Gloria Arroyo Sugg
Budik	Emily	Psychology	Jeffrey Kahn
Caho	Hayley	Teaching and Learning	Sara Jones
Chlada	Anabella	Special Education	Debbie Shelden
Cichon	Madelyn	Social Work	Kate Sheridan
Cintron Gonzalez	Edcel	English	Roberta Trites
Conoscente	Tristan	Creative Technologies	Kristin Carlson

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E-POSTER**

C-G			
Cooper	Dana	Teaching and Learning	Anna Smith
Creamean	Erin	Teaching and Learning	Anna Smith
DeValk	Anita	Teaching and Learning	Meghan Kessler
DeVault	Tyler	Social Work	Kate Sheridan
Dominguez	Anjelia	Social Work	Kate Sheridan
Edwards	Ethan	Creative Technologies	Kristin Carlson
Elias	Mason	Teaching and Learning	Meghan Kessler
Esparza	Laura	Teaching and Learning	Meghan Kessler
Fernandez	Carly	Teaching and Learning	Sara Jones
Fippinger	Caitlin	Teaching and Learning	Anna Smith
Fisher	Analiese	Teaching and Learning	Meghan Kessler
Freidheim-Perez	Isabella	Social Work	Kate Sheridan
Garro	Angelique	Teaching and Learning	Meghan Kessler
Gaudette	Kelsey	Teaching and Learning	Anna Smith
Gentry	Ellie	Creative Technologies	Kristin Carlson

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E-POSTER**

G-K			
Gisi	Matthew	Creative Technologies	Kristin Carlson
Goins	Rochelle	Psychology	Brea Banks
Greenslaugh	Rebekah	Family and Consumer Science	Amy Bardwell
Hamilton	Miranda	Nursing	Susana Calderon
Heinz	Andrea	Teaching and Learning	Meghan Kessler
Helling	Scott	Social Work	Kate Sheridan
Herrera Vega	Megan	Teaching and Learning	Meghan Kessler
Herron-Cologna	Kenny	Teaching and Learning	Anna Smith
Hill	Billie	Social Work	Gloria Arroyo Sugg
Holtz	Lindsey	Creative Technologies	Kristin Carlson
Ijiuboucha Daimai	Ashley	Teaching and Learning	Meghan Kessler
Isom	Allison	Teaching and Learning	Meghan Kessler
Johannes	Madison	Teaching and Learning	Sara Jones
Karp	Zander	Creative Technologies	Kristin Carlson
Kaufman	Grant	Teaching and Learning	Meghan Kessler

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E-POSTER**

K-N			
Kentish	Rose	Creative Technologies	Kristin Carlson
Kipp	Cara	Teaching and Learning	Anna Smith
Klepec	Jeffrey	Social Work	Gloria Arroyo Sugg
Kroesch	Jeffrey	Teaching and Learning	Anna Smith
Leal	Alma	Social Work	Gloria Arroyo Sugg
Lee	Craig	Teaching and Learning	Anna Smith
Link	Kerrigan	Social Work	Kate Sheridan
Loyd	Staci	Teaching and Learning	Sara Jones
Ma	Lankun	Educational Administration & Foundations	Anna Smith
Murphy	Alaina	Teaching and Learning	Sara Jones
Narongsaksakul	Watsachol	Teaching and Learning	Ryan Brown
Narongsaksakul	Watsachol	Teaching and Learning	Ryan Brown
Nepereny	Alyssa	Social Work	Gloria Arroyo Sugg
Nguyen	Thanh	Creative Technologies	Kristin Carlson
Novotny	Emma	Teaching and Learning	Anna Smith

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E-POSTER**

O-S			
Ondo	Noah	Social Work	Kate Sheridan
Orhan	Begum	Psychology	Julie Campbell
Pierce	Kristina	Teaching and Learning	Sara Jones
Piper	Darlene	Social Work	Kate Sheridan
Provenzano	Nicolette	Teaching and Learning	Anna Smith
Ramirez	Marissa	Social Work	Gloria Arroyo Sugg
Randolph	Kyrrah	Kinesiology & Recreation	Chelsea Kuehner-Boyer
Rodcay	Michelle	Teaching and Learning	Anna Smith
Said	Eman	Teaching and Learning	Meghan Kessler
Schaschwary	Hannah	Teaching and Learning	Anna Smith
Schattke	Mimi	Social Work	Kate Sheridan
Shrode	Trisha	Teaching and Learning	Sara Jones
Silva	Michaela	Teaching and Learning	Anna Smith
Spraggon	Meredith	Psychology	Laura Finan
Springer	Natalie	Teaching and Learning	Meghan Kessler

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E-POSTER**

S-Z			
Springwood	Cheryl	Teaching and Learning	Anna Smith
Stark	Maddy	Teaching and Learning	Sara Jones
Stark	Katie	Teaching and Learning	Meghan Kessler
Swigart	Emily	Social Work	Gloria Arroyo Sugg
Szymonik	Anna	Teaching and Learning	Meghan Kessler
Trenhaile	Jozie	Social Work	Gloria Arroyo Sugg
Turczyn	Shannon	Teaching and Learning	Sara Jones
Ulrich	Kordelia	Social Work	Gloria Arroyo Sugg
Upholz	Matt	Creative Technologies	Kristin Carlson
Voss	Amber	Family and Consumer Sciences	Ui-Jeen Yu
White	Shelby	Teaching and Learning	Sara Jones
Winget	Andrea	Teaching and Learning	Sara Jones
Winston	Maxwell	Creative Technologies	Kristin Carlson
Woodard	Gabrielle	Teaching and Learning	Anna Smith
Yestrumskas	Ashley	Teaching and Learning	Meghan Kessler
Yestrumskas	Ashley	Teaching and Learning	Meghan Kessler
Zelaya Rodriguez	Ivania	Teaching and Learning	Sara Jones
Zenor	Danielle	Teaching and Learning	Sara Jones
Zummallen	Jason	Social Work	Gloria Arroyo Sugg

2026 Affiliated Research Symposia

Mennonite College of Nursing

MENNONITE COLLEGE OF NURSING

Virtual Scholarship Symposium:

**Advancing Patient Care Through Research,
Quality Improvement, and Innovation**

Join us for a **FREE** virtual event on
Thursday, April 9 from 3-5 p.m.
Register online by Friday, April 3, as space is limited!

Program

3:00 to 3:05 p.m. - Welcome

3:05 to 3:30 p.m. - Keynote Speaker

- Elizabeth Angelo, DNP, RN
Chief Nurse Executive for Carle Health
President of Carle Foundation Hospital

"Nursing Art and Science: Improving Care at the Bedside"

3:30 to 4:00 p.m. - Live Podium Presentations

- Dr. Patricia Pence: *"Pill Passport: A quality improvement initiative to optimize patient education on home medications through usability testing"*
- Dr. Mo Baydoun: *"The Mindful Lung: A Systematic Review of Mindfulness Interventions in Lung Cancer Care"*

4:00 to 4:55 p.m. - Live Poster Presentations

4:55 to 5:00 p.m. - Awards and Continuing Education Information

Audience

Nursing professionals, nursing faculty, nursing students, and clinical partners are encouraged to attend.

Accreditation Statement

Illinois State University Mennonite College of Nursing is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's (ANCC) Commission on Accreditation. This live activity is a maximum of 2.0 ANCC RN contact hours. To be awarded for the RN contact hours learners must attend the entire virtual session and complete the required evaluation using the Qualtrics link.



Dr. Elizabeth Angelo

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April 17, 2026

5:30-8:00 pm

DeGarmo Hall 20A & Online

An ISU University Research Symposium Event

Women, Gender, and Sexuality



Friday, April 24th, 2026
8:30am – 5pm
Bone Student Center
Free and open to the public.

**Queer Extinctions;
or,
Learning How to Last**

29th Annual
Women's, Gender,
and Sexuality Studies
Student Research Symposium

Keynote Speaker:
Dr. Sarah Ensor

Registration is required.



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 **WOMEN'S, GENDER, AND
SEXUALITY STUDIES PROGRAM**
Illinois State University
