

2022 University Research Symposium Individual Abstracts - Morning Session

TEMPORAL AND SPATIAL PROFILING OF PRIORITY SOIL POLLUTANTS USING FILTER CONE SPRAY IONIZATION - MASS SPECTROMETRY (FCSI- MS)

Presenter: Addo, Rosemary
Graduate, Chemistry

Mentor: Prof. Christopher Mulligan

Authorship: Rosemary Addo, Shahnaz Mukta, Christopher C. Mulligan

Long-term monitoring (LTM) of environmental matrices can assist in detecting the onset or changes in chemical contaminant plumes and evaluating subsequent remediation efforts, but bears extreme cost, with significant funds going towards shipping costs of field-collected samples for off-site processing via hyphenated MS methods. To this end, portable technologies that offer both direct sampling capability and high throughput operation are appealing. We report and characterize the use of filter cone spray ionization-mass spectrometry (FCSI-MS) towards the temporal and spatial profiling of pollutants from unprepared soil samples and demonstrate its utility on portable and commercial MS systems alike.

FCSI-MS allows direct profiling of analyte residues from complex matrices by employing onboard filtration and an ESI-like ionization mechanism. MS system employed for this work included a lab-scale ion trap MS (Thermo LCQ Fleet) coupled with a home-built FCSI ionization source. Soil standards of varying compositions were spiked with target analytes and exposed to variable, yet controlled environmental conditions (such as moisture, temperature, etc.). Subsamples of soil samples were then analyzed directly via FCSI-MS, utilizing common spray solvent systems and high voltage (4.5 kV) delivered via a clamping electrode. Systematic experiments were performed on well known (e.g., amitraz) and emerging (e.g., neonicotinoid pesticides) agricultural chemicals and other priority pollutants to monitor the persistence and fate in varying soil types. By varying soil type, residence time in soil, water content, light exposure, and pH, degradation kinetics were accurately assessed, deducing the role of known breakdown processes like hydrolysis and photolysis.

IMPROVING DETECTION OF ILLICIT DRUGS USING PLASMONIC NANOPARTICLES BY PAPER SPRAY IONIZATION-SURFACE ENHANCED RAMAN SPECTROSCOPY

Presenter: Adehinmoye, Adewale
Graduate, Chemistry

Mentor: Prof. Jun-Hyun Kim

Co-Mentor: Prof. Christopher Mulligan

Authorship: Adewale Adehinmoye, John Harms, Jeremy Driskell, Christopher Mulligan, Jun-Hyun Kim

Surface-enhanced Raman spectroscopy (SERS) is an analytical technique in which the vibrational signal of samples can be amplified via adsorption onto nanoscale plasmonic materials. Our previous work has demonstrated the possibility of improving the detection limits of illicit drugs (i.e., cocaine, fentanyl, 2C-B, hydrocodone and JWH-018) on a plasmonic paper by utilizing a dual-instrument system consisting of paper spray ionization mass spectrometry (PSI-MS) and SERS. In this study, we attempted to control the arrangement of the drugs with plasmonic gold nanoparticles (AuNPs) onto a plasmonic paper to further improve SERS-based sensing capability without sacrificing the PSI-MS performance. This approach involves the generation of highly intense plasmonic environments for these drugs (e.g., vertically and laterally sandwiching drugs between plasmonic materials) where the SERS signals can be maximized by increasing the probability of plasmonic couplings. The optimized systems utilizing plasmonic nanoparticles can further be applied to the sensitive detection of various samples at low concentrations.

CHECK-IN/CHECK-OUT: VIRTUAL IMPLEMENTATION

Presenter: Akpan, Jessica
Graduate, Psychology

Mentor: Prof. Shengtian Wu

Authorship: Jessica Akpan

Check in/Check out (CICO) is described as a tier 2 targeted intervention commonly used within the school-based positive behavioral interventions and supports framework and applied behavioral analysis (Collins et al., 2016). This intervention can be used to decrease chronic, low level behaviors in children that are not dangerous. There are numerous articles that examine the effectiveness of the CICO intervention in traditional school-based settings (Drevon et al., 2018). There are also studies that test the use of CICO in non-traditional implementation (Boden et al., 2018). This study examined the effectiveness of Check-in, Check-up, Check-out for students with moderate intellectual disability during on- and off-site vocational trainings. Although that study addressed CICO in nontraditional settings, they did not address complete virtual implementation. It is important that we examine the feasibility of CICO being executed in a virtual format as we have seen the impacts that the COVID-19 pandemic has had on the world and educational system.

In the case of another global emergency, students should still be able to work on their behavioral goals, which makes it important for students, educators, and caregivers to implement CICO when needed. This descriptive study aims to describe the process of virtual CICO. This will require technology, such as reliable internet connectivity, a laptop/desktop computer/cellphone with a camera that receives and expresses audio. Participants will also need to have access to video conferencing software (e.g., Zoom). The teachers will then be able to access CICO materials that are used to track student progress. Steps of virtual implementation include an initial virtual check-in meeting through videoconferencing with the student and the teacher to discuss intervention goals. Second, the teacher and student will go over the electronic BRC and assess goals. The last step is the check-out component, which can be conducted through another videoconferencing call. Considerations of this descriptive study include potential lack of funds as it pertains to purchasing technical hardware, the potential for poor internet connection, and a lack of presence of the students during videoconferencing. With accurate access to the required tools, virtual CICO can be effective for students.

THE IMPACT OF COVID-19

Presenter: Appiah, Sarah
Graduate, Social Work

Mentor: Prof. Kate Sheridan

Authorship: Sarah Appiah

The purpose of this proposed study is to explore and describe the impact of COVID-19 among healthcare workers at the Carle Bromenn Medical Center. Participants are adults aged 18 years of age or older who are employed at the Carle Bromenn Medical Center. Participants are invited to complete an electronic survey. Findings from this study will inform the development and improvement of supports for employees

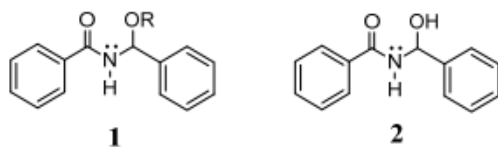
THE EFFECT OF THE ALKYL GROUP ON THE HYDROXIDE CATALYZED BREAKDOWN OF O-ALKYLATED CARBINOLAMIDES

Presenter: Arndt, Tom
Undergraduate, Chemistry

Mentor: Prof. Richard Nagorski

Authorship: Tom Arndt, Sarah Stewart, Yejun Park, Richard Nagorski

Carbinolamides are a class of compounds that have been shown to be vital in a large number of biological processes. As interest in this functionality has continued to grow, O-alkylated derivatives of carbinolamides have also been found to have interesting biological and pharmaceutical properties. The mechanism of the aqueous reaction of these carbinolamide derivatives is difficult to predict as alkylation of the hydroxyl group of the carbinolamide effectively blocks the primary routes by which carbinolamides are thought to react. The acid and hydroxide-dependent mechanisms for the breakdown of carbinolamides both require the loss of the proton on the hydroxyl group as some point during their aqueous reaction and the O-alkylated compounds lack this proton. The understanding of the reaction of O-alkylated carbinolamides is further complicated by the fact that the mechanisms of their reactions have never been investigated. Studies from our group have shown that, under acidic conditions, the O-alkylated carbinolamides (**1**) react at the same rate as the related carbinolamide compound (**2**). It was concluded that loss of the O-alkylated group was very fast as compared to the reaction of the carbinolamides themselves. However, under basic conditions, the O-alkylated carbinolamides reacted much slower than their related carbinolamides but yielded the same reaction products. What is reported here is the reaction of a series of structurally similar O-alkylated carbinolamides where the structure of the alkyl group attached to the oxygen has been varied. It has been discovered that, in the hydroxide dependent reaction, the structure of the alkyl group has a significant effect on the rate of the reaction of the compound. This is the first evidence that has pointed to the rate determining step of the O-alkylated carbinolamides involving the loss of the O-alkyl group itself. The kinetic studies and their implications towards the understanding hydroxide-dependent O-alkylated carbinolamide breakdown will be discussed



RELATIONSHIPS BETWEEN DISORDERED SUBSTANCE USE, DEPRESSION, ANXIETY AND EATING DISORDERS AMONG ILLINOIS STATE UNIVERSITY STUDENTS

Presenter: Asante, Philippa
Graduate, Social Work

Mentor: Prof. Karen Stipp

Authorship: Philippa Asante

Substance use among college students is a major, growing problem associated with lower academic performance, higher rates of physical, social, emotional problems, and development of chronic mental health disorders. Though previous studies have focused on the general college population in the US, this study has a purpose to examine the correlation between alcohol and other drug use among Illinois State University (ISU) students and mental health issues such as depression, anxiety, and multiple co-morbidities that students face which has been understudied over the years. A quantitative method used to examine 22 undergraduate students of ISU [females (5) 22.7%, males (16) 72.7 % & bisexual student (1) 4.5 %], referred by the Student Conduct and Conflict Resolutions (SCCR), between ages 18 to 23. The study used a collection of already existing data of students who visit the Student Health Services for behavior health services provided by the Alcohol and Other Drug Intervention Team. This study uses the scores of depression, anxiety and eating disorders, alcohol use disorders screening, cannabis use disorder screening instruments using the PHQ-4, AUDIT, CUDIT-R and the SCOFF, respectively. Quantitative data is grouped into 6 categories which include the three (3) mental health categories (depression, anxiety, eating disorders and their corresponding screening scores), alcohol use disorder score, cannabis use disorder score and student gender using Microsoft Excel group command options.

NATIONAL ATHLETE'S PERCEIVED IMAGE OF THE GOVERNMENT IN THE DEVELOPMENT OF SPORTS IN MALAYSIA

Presenter: Azizan Durisic, Danial Bin
Graduate, Kinesiology & Recreation

Mentor: Prof. Liz Sattler

Authorship: Danial Bin Azizan Durisic, Liz Sattler

: Malaysian national sports depend on the support of the government to further improve its quality and continue to grow. The declining quality of Malaysian sports prompted this study which seeks to explore the perceptions of the Malaysian government's sport development efforts through the lens of the national athletes and provide recommendations that could lead to strengthened sports development and improved quality of sports in Malaysia. This research intends to compare the results obtained from current and former national athletes and compare it with the Sport Policy Factors Leading to International Sporting Success or SPLISS Model (Bosscher et al., 2010) which identified nine pillars that influence elite sporting success and main issues in Malaysian sports. The nine pillars are financial support, facilities, integrated approach to policy development, structured competitions, solid approach to coaching provision and their development, foundation and participation, talent identification and development system, athletic and post-career support, and scientific research. The main issues identified in Malaysian sports include lack of management skills, incompetency of sport administrators, lack of financial aids, corruption, involvement of politicians in sports, and scarcity of availability and accessibility of venues and facilities. This study will provide a foundation of research on sports development in Malaysia due to the dearth of research on this topic. The full study results and implications will be shared at the University Research Symposium.

Keywords: Sports development, national athletes, SPLISS model, government support.

AMIDE IMITATION AS A PROBE OF STERIC INTERACTIONS

Presenter: Barnes, Andy
Graduate, Chemistry
Mentor: Prof. Andrew Mitchell

Authorship: Andrew Mitchell, John Goodell

Like the Diels-Alder, oxidopyrylium-alkene [5+2] cycloaddition reactions require extensive heating to undergo cycloaddition – or so we thought. Recently, silyloxypyrones utilizing *tert*-butyl amide tethers have shown a propensity to undergo [5+2] cycloaddition at far lower temperatures with some varieties even achieving extensive room temperature cycloaddition. What causes this substantial decrease in activation energy is not yet known with both the amide and *tert*-butyl group offering potential steric explanations while resonance with the alkene and amide or R-groups suggests electronic interactions may have a role. With its location at the pivot of the tether, the amide demands particular attention. Amides are sterically unique as their high resonance character generates a bond angle somewhere between the hybridizations sp^2 and sp^3 which, in turn, appears to be more favourable to cycloaddition than either extreme. Synthesis of imine- and iminium-tethered analogues offers sterically similar structures to probe the importance of this hybrid bond angle to the cycloaddition mechanism through direct comparison to amide-tethered analogues

SUBSTANCE USE DISORDERS BEHIND BARS

Presenter: Beattie, Grace
Graduate, Social Work

Mentor: Prof. Kate Sheridan

Authorship: Grace Beattie

The aim of this study is to explore and describe the drug use among inmates at the McLean County Detention Facility (MCDF). There are no human subjects included within this study, rather the sources of data comes from preexisting surveys and social history's previously administrated at the detention center. The researcher made prearrangements with administration to redact all identifiable information, prior to obtaining and analyzing the data. The data set consists of two 21 month periods, including March 2018-December 2019 and March 2020- December 2021. This time period was chosen with the intention to compare and contrast the impact COVID-19 had on those with substance use disorders and criminal activity. The key variables from the instrument include age, gender, race, education level, employment status, mental health diagnosis, and substance use history. Data analysis will demonstrate the relationship between the need for treatment for substance use within the MCDF (independent variable) and the number of individuals in custody dealing with a substance use disorder (dependent variable). The findings from this study will be written as a report for graduate course SWK445 and will be shared with interested parties at the McLean County Detention Facility. The research results will be used to highlight the overrepresentation of inmates at the MCDF with substance use disorders and the need for enhanced treatment services for those with substance use and other mental health disorders while in custody.

EMPLOYEE RETENTION: STAY OR LEAVE?

Presenter: Beavers, Laura
Graduate, Social Work

Mentor: Prof. Kate Sheridan

Authorship: Laura Beavers

Employee turnover is greater in child welfare settings compared to other professions. This study aims to explore and describe employee retention in the Family Community Services (FCS) Department at The Baby Fold in Normal, Illinois. The first aim will be to identify the turnover rate within the FCS Department during the past three years. The FCS Department is predominately comprised of social workers and human service professionals who provide child welfare services such as foster care, intact family services, and intensive community based services. The second aim is to understand the causes and antecedents of employee turnover. A quantitative and qualitative analysis of existing employee surveys and employee exit interviews will be conducted to explore reasons employees “stay” and “leave”. It is anticipated that once factors can be identified and explored, strategies to retain employees in the FCS Department can be developed.

EVOLUTIONARY RELATIONSHIP OF ISOLATED NORTH AMERICAN DEERMOUSE (*PEROMYSCUS MANICULATUS*) POPULATIONS INHABITING AN ISLAND SYSTEM

Presenter: Berg, Rachel
Graduate, Biological Sciences

Mentor: Prof. Pirmin Nietlisbach

Authorship: Rachel Berg, Pirmin Nietlisbach

Anthropogenic habitat fragmentation is increasing the number of small and isolated organismal populations. Small populations are at increased risk of extinction via demographic stochasticity and inbreeding depression. Natural geographic barriers, such as a rise in sea level, also create population divergence by splitting large populations into small, isolated island populations. Isolated island populations thus are great models to study the consequences of habitat fragmentation over time. The Gulf Islands of British Columbia, Canada provide an ideal study area, isolated by rising sea level several thousand years ago. North American deer mouse, *Peromyscus maniculatus*, populations inhabit several of these islands and are an excellent study organism as they cannot easily, if at all, travel between islands, creating highly isolated populations. Previous studies in the area suggested an absence of genetic exchange among *P. maniculatus* island populations for thousands of generations, but these studies were based on limited data or only two large populations. A thorough phylogenetic reconstruction and estimation of the time in isolation are lacking. This proposed research aims to determine the evolutionary relationship of *P. maniculatus* populations in the Gulf Islands and estimate their divergence times. This phylogenetic reconstruction will be compared to the sequence of island isolation events following the Pleistocene Epoch. Understanding the phylogenetic relationship and divergence times of these populations will provide insight into the evolution of small populations and how some have persisted through time. Results of this study will provide a model system for endangered species and generate useful information for conservation genetics.

A 10-WEEK SHOULDER STRENGTHENING PROGRAM TO INCREASE SHOULDER STRENGTH AND DECREASE INJURY RISK IN COLLEGIATE VOLLEYBALL PLAYERS.

Presenter: Bergeron, Kathryn
Graduate, Kinesiology & Recreation

Mentor: Prof. Kelly Laurson

Authorship: Kathryn Bergeron

Shoulder strength is of significant importance in volleyball athletes. Due to the emphasis placed on overhead movements, symmetrical strength imbalances are common concerns and can lead to increased risk of shoulder injury. Additionally, shoulder strength is directly related to swing and serve performance. This study was designed to quantify how a shoulder strengthening program might impact such performance outcomes. This study followed a shoulder strengthening program created by a strength and conditioning coach for a women's junior college volleyball team. It was hypothesized that by increasing overall shoulder strength, it would increase the speed at which the ball traveled at after being hit. The team ($n = 17$) completed a 10-week program that was performed 3 times a week. These exercises consisted of prone T-raises, banded external rotations, Prone 90/90 external rotations, and banded pull aparts. Pre and post-tests were used to assess the effectiveness of the program. The results of this study suggest that an increase in maximal reps of weighted prone 90/90 external shoulder lead to increases in both serve and spike speed. Overall increased shoulder strength can be theorized to decrease risk of injury in collegiate volleyball players.

I-U NH VS. LEURS-I: INFLUENCING GROWTH CHARACTERISTICS OF SULFOLOBUS ISLANDICUS

Presenter: Bergh, Allison
Undergraduate, Health Sciences

Mentor: Prof. Christopher Weitzel

Authorship: Allison Bergh

The Sulfolobaceae are a family of Archaeal extremophiles, with each member conserving two fulllength leucyl-tRNA synthetases (LeuRS) referred to as LeuRS-F and LeuRS-I. LeuRS is one member of a superfamily of proteins that catalyze the attachment of amino acids to transfer RNAs (tRNAs) in ATP-dependent reactions known as aminoacylation or charging. While LeuRS-F efficiently charges leucine onto tRNA^{Leu}, LeuRS-I has diverged to such a degree that this activity is seemingly disabled. Notably, while classical LeuRS activity is undetectable, a *Sulfolobus islandicus leuRS-I* knockout strain displays growth defects relative to an isogenic wild type strain, particularly at low temperatures and during extended stationary phase. While this likely underscores the importance of LeuRS-I for optimal *S. islandicus* viability, the gene for this LeuRS paralog was recently found to be the second of three within an operon. Directly downstream of *leuRS-I* is a gene encoding a purine-preferring nucleoside hydrolase (inosine-uridine nucleoside hydrolase, I-U NH) important for the recycling of RNA. Furthermore, sequence analysis also suggests that there may be two promoters in the 3' end of *leuRS-I* that may regulate the expression level of I/U NH. Therefore, removing *leuRS-I* may affect the transcription of I-U NH leading to the observed phenotypes in the *leuRS-I* knockout. The purpose of this study is to determine if the observed growth defects of Δ leuRS-I are due to the removal of *leuRS-I* or the mis-regulation of *iu nh*. Three *S. islandicus* knockout strains were made using homologous recombination and the gene for arginine decarboxylase (*argD*) from *S. tokodaii*. One strain had *leuRS-I* replaced by *argD* (known as Δ I), another had *i-u nh* replaced by *argD* (Δ NH), and a third strain had both *leuRS-I* and *i-u nh* replaced (Δ I/NH). A wild type strain (RJW003) was used as a control. Strain construction was confirmed via PCR analysis. Results from growth curve experiments of these four strains will be presented and discussed.

BUT YOU SAY YOU'RE NOT A READER? EXPLORING THE ROLE OF READING EXPERIENCES IN HIGH SCHOOL CLASSROOMS

Presenter: Blake, Kaitlyn
Undergraduate, English
Mentor: Prof. Danielle Lillge

Authorship: Kaitlyn Blake

My research disrupts the underlying assumption in many English Language Arts (ELA) classrooms that students need to identify readers, and instead asks the question: how can we support the needs of nonreaders and create meaningful reading experiences for all our students? By doing so, my research presents the argument for reframing the goal of reading instruction in secondary classrooms to focus less on students *being* readers and more on students *valuing* reading as a skill they can use throughout their lives.

Drawing on data from a larger qualitative study, this abstract focuses on the results of my survey data. The survey English IV students filled out asked a range of questions focusing on if they considered themselves a reader, if they believed others considered them a reader, what kinds of texts and for what purposes they read. The survey asked them to recall a time they enjoyed reading and a time they were challenged by reading.

One clear finding from this survey is that many participants considered themselves to not be readers and an even larger number believed others would not consider them readers. However, they still noted a range of genres, numbers of texts, and purposes for reading. My analysis of these student responses illustrated a range of answers narrating their reading experiences with one clear commonality: students were reading, even when they did not consider themselves to be readers. Many English teachers, like I did when the study began, believe the role our classrooms serve is to be the change and to help students see themselves as readers. There is not anything wrong with this desire. However, when English classrooms position being a reader as the goal, they also position being a nonreader or not a reader as not reaching the goal, as failing in a sense.

To embrace all students without the pressure to see themselves as a reader, we English teachers can reframe our classroom goal to be illustrating to students the *value* of reading. The results of this study suggest that if we shift the focus from *being* readers to *valuing* reading, we will be able to help students see the purpose of our classroom in their lives and will give them something all students can use in their lives—the skill of reading. Through this approach, my research complicates a commonly held framework among ELA teachers and offers a path forward for our classrooms that will make the purpose and importance of reading more relevant to the lives of our students.

RAPID, FIELDBORNE PROCESSING OF BULK SAMPLES WITH A 3D-PRINTED CONE SPRAY IONIZATION-MASS SPECTROMETRY (3D-PCSI) AUTOSAMPLER PLATFORM

Presenter: Bondzie, Ebenezer

Graduate, Chemistry

Mentor: Prof. Christopher Mulligan

Authorship: Ebenezer Bondzie, Rosemary Addo, Trevor McDaniel, Matthew Aldeman, Christopher Mulligan

3D-printed cone spray ionization is an ambient technique which provides some advantages over paper cone spray ionization. The rigidity of the polymeric-constructed cone makes it possible to scoop bulk material during sampling without damaging the integrity of the cone's tip. One major drawback to 3D-PCSI is that the manual positioning of the cone in front of the mass inlet reduces its reproducibility. In this study, a low-cost automated 3D-PCSI platform for use on portable MS system has been developed using off-the-top-shelf (COTS) parts and customized 3D-printed pieces. Application of this platform on portable MS system was demonstrated toward forensic, defense and environmental settings. The automation allows reproducible position, improved sample throughput and automated delivery of solvent for rapid and flexible analysis. The selection of conductive polymers for 3D cone based on compatibility with commonly used spray solvents and strength test to assess the ruggedness of different geometries has been investigated.

THE EVOLUTIONARY ECOLOGY OF IMMUNE PRIMING TO AN EMERGING INFECTIOUS DISEASE WITHIN INDIVIDUALS AND ACROSS GENERATIONS

Presenter: Calhoun, Austin
Graduate, Biological Sciences

Mentor: Prof. Ben Sadd

Authorship: Austin Calhoun

Selective pressures from fitness losses associated with pathogen infection have led to the evolution of diverse mechanisms to attenuate the detrimental effects of pathogens, either through resisting or tolerating infection. Invertebrates in particular have evolved a memory-like innate immune response functionally analogous to vertebrate adaptive immunity, which protects an individual from future pathogenic infection. This phenomenon, referred to as ***immune priming***, can offer general or specific protection against infection and can also occur across generations. Based on a progenitor's pathogenic experience, offspring resistance or tolerance can be boosted by ***transgenerational immune priming*** (TGIP). Exploring this phenomenon is particularly important for species experiencing declines, like wild bumblebees, where novel pathogens could facilitate their demise. Novel infections from pathogen spillover is an additional area of concern. Two viruses known to be detrimental to honeybee fitness called Israeli Acute Paralysis Virus (IAPV) and Deformed Wing Virus (DWV) are found in wild bee species and are infective under laboratory conditions. My proposed work will address the ability of this immune priming phenomenological response to combat novel infection. This will include investigations of the existence of priming against these viruses and effects on resistance and tolerance of infection, its specificity to pathogen types, genetic variation in its expression, and an investigation of the costs of environmental mismatches between priming environments. Finally, the work proposed here would be a first step to assessing the feasibility of analogous efforts to vaccine-induced disease protection that could eventually be employed in natural or managed populations of bumble bees.

A HEDONIC ANALYSIS OF THOROUGHBRED HORSES FROM ONLINE AUCTIONS

Presenter: Camp, Madalynn
Graduate, Agriculture

Mentor: Prof. Michelle Kilber

Authorship: Madalynn Camp, Michelle L Kibler, Jada Thompson, Jennifer Earing,
Michael Barrowclough, Jennie Ivey

A horse's lifespan ranges from 20 to 30 years while a Thoroughbred racehorse's career averages just 4.45 years. According to the American Horse Council Foundation, 33% of the horses in the United States are involved in the racing industry. After their racing careers, these horses have a variety of options on where they can go. These include being turned out to pasture, inducted into breeding programs, sold for slaughter, or started in a second discipline. Retired Thoroughbred racehorses can prove to be a great investment for equestrians wanting an athletic horse for an affordable price and provide a second career track for these retired racehorses. This study aims to analyze bid price determinants of Thoroughbreds going into non-racing careers on online auction sites. Data was collected on 246 Thoroughbred horses from various online auctions hosted by Sport Horse Auctions. Preliminary results show a horse's sex, color, and affiliation registration impact listing price. These results will help educated individuals in the equine industry on what demand determinants are most valuable in Thoroughbred horses.

RECOVERING NUTRIENTS FROM WASTEWATER

Presenter: Carroll, Rowan
Undergraduate, Health Sciences

Mentor: Prof. LC Yang

Authorship: Rowan Carroll

Excessive nutrients, such as nitrogen and phosphorus, harm aquatic life and limit recreational opportunities by promoting the growth of toxic algae and eutrophication. Therefore, finding ways to separate the excess nutrients from wastewaters with the ability to reuse them is of great interest. This study aimed to recover nutrients from anaerobic digestion effluent, which contains ammonium and phosphate. Digestion effluent was taken from a local wastewater treatment plant and was diluted before measuring the concentrations of ammonium nitrogen, reactive and total phosphorus. After that, magnesium chloride was added to react with these compounds to produce struvite (magnesium ammonium phosphate, $\text{NH}_4\text{MgPO}_4 \cdot 6\text{H}_2\text{O}$), a slow-release multi-nutrient fertilizer. A series of experiments was carried out to evaluate the effects of pH value, mixing ratio, and mixing time. The N and P concentrations in the supernatant were measured to evaluate the recovery efficiency.

METABOLISM OF CORTICOSTERONE PROTECTS AGAINST THE LETHAL EFFECTS OF CORTICOSTERONE ON DEVELOPING CHICKEN EMBRYOS

Presenter: Charboneau, Christina
Undergraduate, Biological Sciences

Mentor: Prof. Ryan Paitz

Authorship: Christina Charboneau, Emily Harders

Early pregnancy loss is complex and many of the mechanisms that cause it are not known nor understood. Experiencing stress during pregnancy increases the likelihood of early pregnancy loss. One aspect of stress that may play a role in this is the increased production of glucocorticoids that could result in embryonic exposure to elevated glucocorticoids. However, as maternal glucocorticoids pass through the placenta, most are metabolized to inactive forms and this is thought to serve as a protective barrier to glucocorticoids in humans. This metabolism, paired with changes in maternal physiology in response to elevated glucocorticoids, make it difficult to discern the direct response of embryos to elevated glucocorticoid exposure. In this study, we investigate the growth and survival of embryos in our model system, *Gallus gallus*, when subjected to elevated levels of the glucocorticoid, corticosterone, and two of its metabolites 5β -corticosterone and 20β -dihydrocorticosterone. We hypothesize that embryonic exposure to elevated corticosterone inhibits growth and increases mortality while the metabolites of corticosterone do not affect development. To test this, we conducted two separate experiments. The first experiment compared the effect of corticosterone to 5β -corticosterone on growing embryos compared to corticosterone. We used a similar experimental design to test the growth and survival effects of another metabolite, 20β -dihydrocorticosterone. Results show that elevated levels of corticosterone resulted in inhibited growth and increased mortality, while elevated levels of 5β -corticosterone and 20β -dihydrocorticosterone did not have any effect. This supported our hypothesis that the metabolism of corticosterone is providing protection to the embryos.

MEASUREMENT AND MODELING OF THERMAL TRANSPORT IN COMPOSITES

Presenter: Cole, Mason
Undergraduate, Physics

Mentor: Prof. David Marx

Authorship: Mason Cole

Carbon fiber/carbon matrix (CC) composites are used as the primary aerospace friction material in any mechanical braking application. They are also used for thermal management and as structural materials. In braking applications, the goal is to minimize wear and improve the friction performance of these components. To achieve this, the reduction of heat accumulation and thermal stresses within the composite from the dissipation of energy are required. To reduce thermal gradients and increase dissipation rate in a carbon composite, the most effective method is to improve upon the material's effective thermal diffusivity.

Thermal conduction is often described in terms of the thermal conductivity. In these composites, thermal conductivity is, in turn, determined by the product of the material's specific heat, its density, and its thermal diffusivity. This project is designed to determine the thermal diffusivity on the microscale.

Determining the most appropriate manufacturing methods of CC to maximize thermal diffusivity can be done experimentally - by studying the influence of component types, fiber orientation, and matrix materials on thermal conduction. Using ideas from Angstrom's method, carbon composites can be heated from one side of the sample using a pulsed laser and can be analyzed by a thermal imaging camera. Intensity data is extracted from the camera images using a customized program that then can find diffusivity from selected points on the image produced by the thermal imaging camera.

OFFICE REFFERRALS AT BLOOMINGTON HIGHSCHOOL AFTER A LIFE ALTERING PANDEMIC SHUTDOWN

Presenter: Collins, Nichelle
Graduate, Social Work

Mentor: Prof. Karen Stipp

Authorship: Nichelle Collins

There has never been a pandemic in the history of the United States that has shut down the school system for an entire year and a half. There is not much research that supports events that can cause uproar and alter behaviors and mental health in the capacity that it has since the start of COVID-19's virus spread and national shutdown. Because of the lack of research and information, the world was not prepared or equipped to deal with the repercussions from the shutdown especially in big businesses and educational institutions such as schools. In an attempt to understand the things that transpired upon returning to schools after being physically gone for a year and a half, the inquiry relied on qualitative and quantitative information in Bloomington High School's databases that reflected office referrals and behaviors from the student population. The information was compared from 2019 before the pandemic shutdown to 2021 when students physically returned to the learning environment at full capacity. The information was collected anonymously, data was uploaded by educators and office personnel. Data analysis will include number and type of referrals, year in school, gender, sexual orientation and race/ethnic identity.

ASSESSING A WORKSHOP SERIES' IMPACT ON STUDENTS' ATTITUDES ABOUT RACISM

Presenter: Concepción Cabán, Lourdes
Graduate, Psychology
Mentor: Prof. Gregory Braswell
Co-Mentor: Prof. Suejung Han
Authorship: Gregory Braswell, Suejung Han, Lourdes Concepción Cabán

Racial conflicts have plagued the United States from its very beginnings, particularly racial prejudice (Henry & Sears, 2002). Racism is a system of advantages based on race that is created and maintained by an interplay between psychological factors (i.e., biased thoughts, feelings, and actions) and sociopolitical factors (i.e., biased laws, policies, and institutions) (Robert & Rizzo, 2021). College students and members of the workforce report daily racist experiences that make them feel angry and uncomfortable (Ashburn-Nardo et al., 2008). These experiences make targets feel like they do not belong and, to the extent that they feel socially isolated, their performance suffers (Ashburn-Nardo et al., 2008). Thus, racism is a continuing problem in America. The following study argues that antiracism involves antiracist attitude and behavioral changes. Hence, people are at different places/stages in their readiness to make such changes, and effective interventions should be tailored for such differences. This study adopted the transtheoretical model for change (TTM; Prochaska & DiClemente, 1997) that proposes six different stages for readiness for behavioral change. Thus, a series of panel presentations/discussions for undergraduates were designed, targeting audiences at various stages in terms of their attitudes and behaviors towards racism/antiracism. Before and after each panel, participants fill out the Symbolic Racism Scale, Miniville-Guzman Universality-Diversity Scale, and other measures to analyze fluctuations in their attitudes. As a result, five stages are being implemented with the hope that participants will become culturally aware and culturally responsive in their daily activities.

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MENTAL ILLNESS IMPLICIT BIAS WITHIN EMERGENCY ROOM STAFF

Presenter: Conover, Kimberlee
Graduate, Social Work

Mentor: Prof. Karen Stipp

Authorship: Kimberlee Conover

In the United States, 51.5 million adults struggle with a mental illness each year. The life expectancy of an individual with both a serious mental illness and a medical condition, is on average, 25 years less than those who only have a medical condition. There are many barriers that can impact one's ability to access health care services; attitudes and perceptions of providers and other medical staff can be one of them. This research examines medical staff mental health implicit bias within an emergency care setting. A convenience sample of medical staff working within the UnityPoint Health Methodist Emergency Department was used. Participants were recruited via emails and staff meetings. Participants were asked to complete a confidential Implicit Association Test. This test asks participants to sort various words (such as dangerous, healthy, friendly) and medical conditions into categories, with each word appearing one at a time to measure the participants' implicit bias. In addition, secondary data retrieved from electronic medical records including wait times within the Emergency Department, race, and gender were analyzed. Data was analyzed using SPSS.

OXIDOPYRYLIUM-BASED [5+2] CYCLOADDITIONS

Presenter: Darko, Kwabena
Graduate, Chemistry

Mentor: Prof. Andrew Mitchell

Authorship: Kwabena Darko, Andrew Mitchell

The cycloaddition reaction is an important transformation in the field of organic chemistry since it serves as an indispensable tool in organic synthesis. Among these reactions, [5+2] cycloadditions afford seven-membered heterocyclic ring systems that are very useful in chemical synthesis. The oxidopyrylium-based [5+2] cycloaddition reaction has received enormous attention in chemical synthesis due to its usefulness in the formation of seven-membered heterocyclic ring systems present in complex natural products and biologically active compounds.¹ Due to this, studies of the synthesis of these ring systems are of great importance. Previous work in the Mitchell research group on the investigation of silyl transfer group, tether proximity, and alkene substitution revealed that bulky transfer group, substituted olefin and proximity of the tether to the transfer group are effective for cycloadditions.²

Herein, we extended the previous work in the Mitchell research group to an interesting amide substrate. The aim of this work is to afford a heterocyclic ring system with an amine handle, which is difficult to achieve via intermolecular cycloadditions. Different amine sources including ammonia, methyl amine and tert-butyl amine were used. The tert-butyl amine is seen to be very effective for cycloaddition since it affords cycloadduct at room temperature. The Kojic acid substrate which has shown to be really poor for cycloadditions from the previous work in the Mitchell research group gave trace amount of cycloadduct at room temperature when tert-butyl amine was used. The tert-butyl group is thought to lock the olefin underneath the pyrone due to steric hindrance, which is crucial for cycloadditions. These results provide more opportunities to investigate the reactivity and mechanistic pathway of oxidopyrylium-based [5+2] cycloadditions.

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GEOGRAPHIC AND TAXONOMIC BIASES IN CLIMATE CHANGE BIODIVERSITY RESEARCH.

Presenter: Darter-Krantz, Ava
Undergraduate, Biological Sciences

Mentor: Prof. Lise Comte

Authorship: Ava Darter-Krantz, Lise Comte

Taxonomic and geographic bias is commonplace in research today, and can be caused by funding inequalities, geographic distribution of researchers, how charismatic a species is, and a variety of other factors that influence the collection of scientific data. An example of this could be the study of charismatic species. Typically, certain species, such as megafauna, attract a disproportionate amount of attention from the public. This attention often provides them with more funding resources, conservation energy, and overall research effort. One of the reasons ecological data is more available for birds is due to societal preferences and a greater availability of data through citizen-science programs. In comparison, there is less ecological data on river or stream species, which are commonly seen as less interesting. By examining these biases, it allows researchers to precisely identify context dependent patterns, instead of misdiagnosing them as general, overarching ones.

My poster will focus on taxonomic and geographic biases in climate change biodiversity research, particularly on studies that have documented climate change impacts on species distributions. To do so, I will assess potential unequal research effort within major taxonomic groups and latitudinal zones using a previously compiled database of climate change studies. I will further discuss what causes taxonomic and geographic bias and the effects they have on the conclusions derived from these data, especially when conglomerated into larger reports. This research will bring greater awareness of how research bias can affect individual research projects, but also our understanding of ecological phenomena taking place at large spatial and temporal scales.

MCLEAN COUNTY CENTER FOR HUMAN SERVICES: RECOVERY-ORIENTED CARE

Presenter: Davis, Lucas
Graduate, Social Work

Mentor: Prof. Karen Stipp

Authorship: Lucas Davis

Recovery-oriented care aims to prioritize personal recovery, which includes person-centered, client-led treatment planning and interventions. The goal of recovery-oriented care is to address a disconnect between providers and consumers. Over the past two decades, recovery-oriented care has emerged as the primary model for mental health care. This inquiry aims to compare the perceived levels of recovery orientation and outcomes of personal recovery by providers, with perceptions by consumers, all within the same agency. This qualitative study includes semi-structured interviews of two chief supervisors of the Recovery Program at the McLean County Center for Human Services regarding their recovery-oriented framework. It also includes semi-structured interviews of a convenience sample of five clients who are part of the Recovery Program regarding the program's delivery of services and their own perspectives on personal recovery. Results are unavailable at this time as data collection is ongoing. The goal of this research is to inform the agency on the status of its recovery-oriented framework in terms of its outcomes, fidelity to its model, and overall its success in achieving its goals as a recovery-oriented program.

INCORPORATING COMPUTATIONAL ACTIVITIES IN A GENERAL EDUCATION ASTRONOMY COURSE

Presenter: DiCaro, James
Undergraduate, Physics

Mentor: Prof. Raymond Zich

Authorship: James DiCaro, Quinn MacKenzie

We report on the impact of an instructional intervention incorporating computational activities into a one semester general astronomy course. As science teaching is becoming more technologically inclined, new methods of teaching are being utilized through computers. One method becoming more prominent is the inclusion of computation as a core part of the instruction. Computation is an effective active learning tool for developing understanding of concepts, connecting concepts with formulae, and associating science with prediction. Spreadsheet-based computational exercises were included in the course curriculum and completed collaboratively, along with other active learning activities. Student learning pre to post was measured with the Test of Astronomy Standards (TOAST) and the Lunar Phases Concept Inventory (LPCI), and qualitative data was collected in the form of student surveys to investigate student learning, attitudes toward computational exercises, and overall perceptions of the course. Data collection over four semesters with one control semester shows an average increase in general student learning of astronomy by 14.4% on the TOAST and by 12.2% on the LPCI when given a computation-based curriculum compared to the control semester. An individual question correctness analysis of the TOAST and LPCI post-tests revealed a higher understanding of the moon's orbit, energy levels of atoms, and the origin of stars while there was a lesser understanding of the new moon, gravity in space, and the relationship between position of the moon in the sky and time. Student surveys revealed an overall positive attitude toward the addition of computational activities as well as the collaborative component of these activities. This study analyzing the effects of implementing computational activities in a general astronomy course shows an overall improvement in student learning of astronomy as well as student attitudes towards computation as a whole.

WHAT MAKES A SONG SIGNAL SEX OR STRIFE? SYNTHESIZED SONGS CAN TELL US WHICH SONG COMPONENTS MATTER TO FREE-LIVING BIRDS

Presenter: DiSciullo, Rachael
Graduate, Biological Sciences
Mentor: Prof. Charles F. Thompson
Co-Mentor: Prof. Scott K. Sakaluk
Authorship: Rachael A. DiSciullo, Charles F. Thompson, Scott K. Sakaluk

Bird song is widely regarded as an iconic sexually selected signal. Although previous studies have examined single facets of bird song in relation to female mate choice and male-male competition, selection typically acts simultaneously on multiple, often-correlated components that collectively influence an individual's mating success. By experimentally decoupling correlated song components, we can identify components of song that are preferred by females or incite males that otherwise might be obscured because of their correlative nature. Male house wrens (*Troglodytes aedon*) are songbirds with highly complex, multi-component songs. Male song is important in female mate choice and male-male competition, as females attend to male song and males respond aggressively to conspecific playbacks. Yet, the components of male song that are most attractive to females, or elicit the most intense aggression in males, remain unknown. Here, we present a study in which we synthesized male house wren songs in Raven Pro 1.6 and broadcast them in the field at unoccupied nestboxes in which newly constructed unlined nests had been placed. Songs were composed of phenotypically uncorrelated components, but all components remained within the parameters of actual song produced by males on our study area in central Illinois. Results from this study allow us to estimate linear and non-linear sexual selection imposed by wild female and male birds on song structure through use of multivariate selection analysis.

EXAMINING THE TEMPORAL RELATIONS OF SOCIAL DOMINANCE ORIENTATION, RIGHT-WING AUTHORITARIANISM, MORAL DISENGAGEMENT, AND BULLYING

Presenter: Donnelly, Megan
Graduate, Psychology

Mentor: Prof. Dan Lannin

Authorship: Megan Donnelly, Dan Lannin, Laura Finan, Chang Su-Russell, Eric Wesselmann

Bullying, a complex phenomenon impacting virtually every school, can be damaging both in the short term and long term (Nansel et al., 2001; Solomontos-Kountouri et al., 2017; Wolke et al., 2013). Troublingly, ideology-driven violence is on the rise, and bullying may be akin to such violence as school-based bullying has recently increased (Huang & Cornell, 2019; Southern Poverty Law Center, 2016). Bullying has been linked to ideologies such as right-wing authoritarianism and social dominance orientation (Donnelly, 2020; Goodboy et al., 2016) as well as cognitive processes such as moral disengagement (Bussey et al., 2014; Pornari & Wood, 2010; Robson & Witenberg, 2013). Although such relations have been examined more extensively using cross-sectional designs, more research is needed to disentangle the temporal relations among the variables of interest. Thus, the current study examines the temporal relations among social dominance orientation, right-wing authoritarianism, moral disengagement, and bullying behaviors across two waves of data collection. In particular, the current study examines these variables about one month apart among a sample of undergraduate students enrolled in Illinois State University's SONA system. To examine the temporal relationships between the target variables, the present study will utilize a 2-wave cross-lagged panel design. Findings will inform theoretical understanding of the link between ideologies and bullying behavior as well as assist with creating and implementing evidence-based anti-bullying supports.

YOU'RE GONNA NEED A BIGGER BOAT: FEELING A 'FISH' AT THE END OF A 'FISHING LINE'

Presenter: Duffrin, Tyler
Graduate, Psychology
Mentor: Prof. Jeffrey Wagman

Authorship: Tyler Duffrin, Jeffrey B. Wagman

People can perceive numerous properties of an unseen object by exploring that object with a haptic probe. For example, fly fishers anecdotally report that they can feel the size of an unseen fish that they have hooked at the end of the fishing line. We investigated a similar ability – whether people could perceive the length of an unseen ‘fish’ (a wooden rod) attached to a ‘fishing pole’ (another wooden rod) by a ‘fishing line’ (a length of string). In particular, we investigated whether participants could differentiate among different fish lengths and whether perceived fish length was influenced by the mass and mass distribution of the fish. In the first experiment, we found that people could differentiate among five different lengths of fish, ranging from 15 to 55 cm. In the second experiment, we found that perceived fish length increased with both fish length and fish mass (the addition of a small weight). A third experiment investigated whether perceived fish length increased as the mass distribution of the fish was shifted farther from the attached line. The results will be discussed in the context of the nature of the stimulation patterns relevant to perceiving by touch and the nature of the tissues that register such patterns.

RAPID VERTICAL FLOW IMMUNOASSAY VIA SANDWICHED PLASMONIC APPROACH FOR ENHANCED POINT OF CARE DIAGNOSTICS

Presenter: Ebbah, Eunice
Graduate, Chemistry
Mentor: Prof. Jun-Hyun Kim
Co-Mentor: Prof. Jeremy Driskell
Authorship: Eunice Ebbah, Richard Frimpong, Jeremy Driskell, Jun-Hyun Kim

Many diagnostic tools for the accurate detection of diseases are time consuming and must be conducted by a trained professional. Thus, there is a critical need to develop an alternative point of care test that provides rapid, reliable, and affordable diagnostics outside a laboratory. Recently, surface-enhanced Raman spectroscopy (SERS) has been established as an analytical technique that enables low levels of detection and quantitative chemical analysis. Properly controlling the structural features of plasmonic materials could further enhance SERS-based diagnostics. Here, we exploit SERS in the development of a rapid diagnostic test, using human IgG as a model diagnostic biomarker. The vertical flow immunoassay system utilizes filter paper embedded with gold nanoparticles (AuNP). Capture antibody (anti-hIgG) is then immobilized onto the prepared plasmonic paper and inserted into a vertical flow device. Sample is passed through the filter paper and the target antigen (hIgG) is selectively captured by the immobilized antibody to form an antibody-antigen complex. In a second step, a functionalized AuNP (extrinsic Raman label) passes through the filter paper to label the captured biomarker molecules. This sandwiched system enhances plasmonic coupling and SERS signal to provide ultra-sensitive detection. Importantly, this vertical flow test can be performed in less than 5 minutes, meeting the demands for point of care diagnostics.

UNIVERSAL CITIZENSHIP IN ECUADOR: A SUBSTANTIVE POLICY MODEL FOR MITIGATING THE VENEZUELAN REFUGEE CRISIS

Presenter: Eckhardt, Kiera
Graduate, Sociology/Anthropology

Mentor: Prof. Michael Hendricks

Authorship: Kiera Eckhardt

The Universal Citizenship Clause (UCC) included in Ecuador's ratified 2008 Constitution under Rafael Correa's administration (2007-2017) offers a model for progressive policy that can be used in the regional, South American efforts to mitigate the Venezuelan refugee crisis, while also promoting sustainable, inclusive development. Since the UCC's implementation, an increase in the number of Venezuelan refugees entering Ecuadorian communities has left Ecuadorian citizens with mixed feelings about the UCC as policy. This paper outlines the UCC policy and its alignment with the United Nations 2021-2023 Global Compact Strategy to paint the picture of how the UCC politically and socially benefits both Venezuelan refugees and Ecuadorian citizens. Data from refugee integration research and interviews with Ecuadorian Refugee Service Providers also offers perspective on how Venezuelan refugees are being professionally received and integrated into Ecuadorian communities.

Keywords: Universal Citizenship Clause, Venezuelan refugees, Ecuador, United Nations, United Nations 2021-2023 Global Compact Strategy

SYNTHESIS, CHARACTERIZATION AND ANALYSIS OF STRUCTURE-ACTIVITY RELATIONSHIPS OF RUTHENIUM-BASED ALZHEIMER'S DISEASE THERAPEUTICS

Presenter: Ehlbeck, Johanna
Graduate, Chemistry

Mentor: Prof. Michael Webb

Authorship: Johanna Ehlbeck, Jimmy Garcia, Michael Webb

The aggregation and subsequent extracellular buildup of the amyloid-beta ($A\beta$) peptide around neurons is a key hallmark found in the brains of patients with Alzheimer's disease (AD), the most common neurodegenerative disorder and seventh leading cause of death in the United States. Post-mortem studies have shown increased concentrations of redox-active metals within $A\beta$ plaques, therefore promoting aggregation and cytotoxicity. Taking advantage of the $A\beta$ peptide metal binding capabilities, ruthenium(III) complexes that coordinate to $A\beta$ have shown success in decreasing the formation of insoluble $A\beta$ aggregate species. Previous research within our group studied a series of Ru(III) complexes with pyridine-based ligands where a variety of functional groups were evaluated to determine structure activity relationships (SAR). It was determined that having a primary amine on the pyridine ring showed the greatest disruption of $A\beta$ aggregation. Building upon these findings, the current study evaluates the impact of the location of the amine on the pyridine ligand in regards to modulation of $A\beta$ aggregation. The prepared Ru(III) complexes were analyzed through a series of studies including turbidity, dynamic light scattering (DLS), transmission electron microscopy (TEM) and cytotoxicity assays. The results of these studies as well as obtained SAR will be discussed.

SPIRITUALITY AND DRUG COURT

Presenter: Elliott, Jordan
Graduate, Social Work

Mentor: Prof. Kate Sheridan

Authorship: Jordan Elliot

This study researches the relationship between spirituality and drug court participants in McLean County. The aim of this paper is to find a better understanding of drug court participant's experience of spirituality. Research participants completed a 25-question survey designed to elucidate the participants experience of spirituality. The results of this study are presently still being calculated.

PREDICTORS OF CROSS-RACIAL SHARING BEHAVIOR IN EARLY CHILDHOOD

Presenter: Ellis, Miranda
Graduate, Psychology
Mentor: Prof. Alycia Hund
Co-Mentor: Prof. Corinne Zimmerman
Authorship: Miranda Ellis, Alycia Hund, Corinne Zimmerman

Purpose: Prosociality, or behavior that benefits others, is largely influenced by social evaluations of others and ingroup biases. Implicit racial bias and preference for similar others can be detected early in childhood (Dunham et al., 2008; Renno & Shutts, 2015), necessitating a search for factors that may reduce bias in young children. The purpose of the present study was to examine the relation between parent-reported prosociality, inhibitory control, and exposure to people of color on young children's cross-racial prosocial sharing behavior.

Procedure: Eighty-four 4- to 5-year-old children were recruited through schools, preschools, and daycare centers in Illinois. One parent per child completed a questionnaire to provide measures of prosociality, inhibitory control, and exposure to people of color. While viewing Black-White pairings of photos gender-matched to the participant, children participated in a sticker-sharing task to measure cross-racial sharing behavior, a preference task to measure racial preference, and an expectation of prosociality task to measure expectations of helping behaviors from Black and White others. I hypothesized that White children would give more stickers to White others than Black others. I also expected children's inhibitory control and exposure to people of color would predict cross-racial sharing. Finally, I hypothesized that preferences and expectations would predict cross-racial sharing.

Results: White children shared significantly more stickers than they kept but did not share more with White others than Black others, indicating that the perceived division occurred between sharing and keeping instead of Black and White. Preferences for Black others and expectations of help from Black others significantly predicted cross-racial sharing scores. Inhibitory control was correlated with prosociality, but not with sticker sharing behavior. Exposure to people of color was positively correlated with preferences for Black others when controlling for age, and preferences for Black others significantly positively predicted the number of stickers shared with a Black other.

Conclusions: Preferences for Black others and expectations of help from Black others significantly predicted cross-racial sharing, although the data suggests that higher levels of preference and lower levels of expectations of help may produce higher levels of sharing. These findings provide important details about cross-racial sharing during the preschool years.

GERT SIMULATION TO STRENGTHEN THE KNOWLEDGE AND EMPATHY OF INTERIOR DESIGN STUDENTS

Presenter: Elsey, Erica
Undergraduate, Family and Consumer Sciences
Mentor: Prof. Gabriela Fonseca Pereira

Authorship: Erica Elsey, Gabriela Fonseca Pereira

The GERT suit is a series of components that simulate the aging experience, aiming to help people empathize and gain insight into the needs of the aging population. It simulates changes in eyesight, hearing loss, mobility restrictions, stiffness, and loss of strength (Moll, n.d.; Yumuşak, 2019).

In the Interior Design Program, students theoretically learn about the aging process and how to address the needs of older adults. However, there is an age gap of at least 40 years between most college students and their target clients. This study is aimed at understanding what students experience while wearing the GERT suit and if it has made them more understanding of the design needs of the aging process. The question guiding this study was: How does wearing a GERT suit influence students' learning about the aging process and applying design solutions for the aging population?

This study was proposed at the 'Human Factors in Interior Environments' class in the Fall 2021. There were 22 students and each one wore the GERT suit and completed five tasks: Go up and down a flight of stairs, sit down and get up from a seat, enter and exit a bathroom and stall, get directions from someone in the hallway, and use a wheelchair to leave and return to the classroom. After finishing, students were given questions to answer based on how they felt physically and mentally during the simulation (Johnson et al., 2018). By doing content analysis, emerging themes were identified based on students' common experiences and feelings.

The results showed that students frequently experienced changes with hearing loss, eyesight, and problems with coordination. Words that appeared frequently in responses were 'Tired' and 'Uncomfortable'. The majority also felt that it was difficult to complete their tasks safely and felt self-conscious walking through the building. When it comes to the experience, students empathized with the aging population and thought that this would have been more difficult with any cognitive impairments and that this simulation would make them more aware of older adults' needs when designing different spaces.

This study shows that students were able to experience some of the changes that come with age and with this, a better understanding of the experiences and needs of the aging population. By experiencing some of the difficulties that arise with the aging process, students understand the diverse range of needs that must be considered during the design process.

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OXIDOPYRYLIUM-BASED [5+2] CYCLOADDITION REACTION

Presenter: Erzuah, Marymoud

Graduate, Chemistry

Mentor: Prof. Andrew Mitchell

Authorship: Marymoud Erzuah, Andrew Mitchell

Over the last decade, several developments and advancements have been made towards the oxidopyrylium-based [5+2] cycloaddition reaction which is geared towards the production of natural products. Given its worth, focus on reaction limitations and development of new reaction pathways continue to be of interest to synthetic organic chemists, providing avenues to a wide range of new heterocyclic seven-membered rings embedded within biologically active natural products. Due to the underlying application of oxidopyrylium-based cycloadditions, the Mitchell group has actively explored this area of research. Oxidopyrylium-based [5+2] cycloaddition allows the formation of complex heterocycles in a single step with high stereoselectivity. Earlier studies done by the Mitchell group demonstrated three characteristics of silyloxypyrone-based [5+2] cycloadditions that contributed to their conversion. First of all, greater reactivity was observed with maltol-derived substrates in comparison with kojic acid-derived substrates. The steric interaction between the silyl group and the tether affected the reaction rate of the terminal olefin formed from maltol, as opposed to the kojic acid, thus affecting the formation of the cycloadduct. Among the silyl-transfer groups investigated, the t-butyldiphenylsilyl (TBDPS) group showed faster reaction rates than the t-butyldimethylsilyl (TBS) group. Also, the electronic effect of α,β unsaturated esters afforded much higher reactivity than the terminal olefins presumably by lowering the LUMO (Lowest Unoccupied Molecular Orbital). Based on these findings, further studies on dearomative indole [5+2] cycloadditions are under investigation. A synthetic approach involving the construction of fused seven-membered indoline compounds via dearomative [5+2] cycloadditions between the 2 component derived from the C2-C3 bond of indole and the pyrone is employed. Due to the development of non-bonding interactions in the transition state and the combination of entropic factors, seven-membered cyclohept(b)indoles are difficult to access via direct cyclization reactions. Utilizing cycloaddition rather than cyclization is the key to overcoming this challenge. Using the [5+2] indole cycloaddition with an oxidopyrylium ylide is a simple and economically efficient way to generate seven-membered fused indolines with a wide range of biologically active applications.

LESS PERIL WITH STERILE? STERILE INSECT TECHNIQUE EFFECTIVELY REDUCED AEDES MOSQUITO POPULATION

Presenter: Evans, Katherine
Graduate, Biological Sciences

Mentor: Prof. Steven Juliano

Authorship: Katherine G. Evans, Steven A. Juliano

Aedes mosquitoes are vectors of dengue, zika, and yellow fever. According to the World Health Organization, dengue alone causes 40,000 deaths per year. Recently, research on and implementation of novel mosquito control approaches have increased. Sterile Insect Technique (SIT) is one such approach. Most SIT projects to date have monitored egg number and hatch rate, as well as adult numbers. However, focusing on eggs and adults omits crucial information on how these control approaches affect mosquito larvae. We hypothesized that the effectiveness of SIT would be influenced by density dependent effects that act on the larval stage of mosquitoes. The study area consisted of four zones: (1) a treatment zone where SIT had been implemented since 2020, (2) a zone that received some treatment in 2021 and spillover from the treatment zone, (3) a zone where treatment had yet to occur and was unlikely to have spillover, and (4) a control zone that received no treatment, with no plans to receive treatment. We collected egg papers from traps in the four zones weekly. Larvae hatched from the egg papers from each trap were added to corresponding rearing containers in the lab, and allowed to grow and develop into adults, which were collected for analysis. Our data show lower production of *Ae. aegypti* adults in the treatment zone (1) compared to the two untreated zones (3 and 4). Our results also indicated that while few adult females emerged from the eggs from the SIT treatment zone (1), those that did were significantly larger than females from the control area (4).

EFFECTS OF FUNCTIONAL POLYMER PARTICLES ON THE FORMATION OF GOLD NANOPARTICLES AND THEIR CATALYTIC PROPERTIES

Presenter: Eyimegwu, Faith
Graduate, Chemistry

Mentor: Prof. Jun-Hyun Kim

Authorship: Faith Eyimegwu, Frank Egemole, Pascal Eyimegwu, Jun-Hyun Kim

A series of homo poly(N-isopropylacrylamide), PNIPAM, particles possessing different levels of crosslinking density was initially prepared to serve as stable colloidal hosts that can physically integrate guest gold nanoparticles (AuNPs) via the in situ reduction of gold ions. Given the precisely controlled polymer networks with crosslinkers, the formation process strongly influenced the structural features (e.g., size, shape, and distribution) and loading efficiency of the final AuNPs. The crosslinking degree of the homo PNIPAM particles also impacted the overall catalytic reactivity. In addition, copolymer particles possessing functional groups were systematically prepared to examine how these particles were selectively interacted with AuNPs to influence catalytic properties. Various reaction conditions including time, temperature, base and catalyst amount were further screened to optimize the reactivity, and recyclability of the composite particles as quasi-homogenous catalysts. Understanding the influence of host polymer networks on the in situ formation of guest metal nanoparticles, as well as their structural and catalytic properties, is important for the development of novel and practical catalysts that can be utilized in various chemical transformation reactions.

EFFECTS OF INCREASED NESTBOX TEMPERATURE DURING INCUBATION AND ANTIOXIDANT SUPPLEMENTS ON HOUSE WREN NESTLING DEVELOPMENT

Presenter: Farchmin, Paige
Graduate, Biological Sciences
Mentor: Prof. Scott Sakaluk
Co-Mentor: Prof. Charles Thompson
Authorship: Paige Farchmin

I examined how increased environmental temperature, in the context of ongoing climate change, affects the development of bird embryos, and how vitamin E, an antioxidant, may mitigate expected negative effects on nestlings exposed to higher temperatures while developing in the egg. Embryos exposed to increased temperature grow faster than those exposed to lower temperature and concomitantly increase production of reactive oxygen species (ROS) that damage proteins, lipids, and nucleic acids. One way to reduce this damage is to increase dietary intake of antioxidants. For my research, I used house wrens (*Troglodytes aedon*), small songbirds that build their nests in nestboxes during the summer on my study area in north-central Illinois. I used heating pads attached to the inside wall of the nestbox to increase nestbox temperature during the incubation period, and, after hatching, supplemented the diet of half the nestlings in heated and control nestboxes with the antioxidant vitamin E. The heating pads significantly increased within-nestbox temperatures for about 3-4 hours each morning, the coolest part of the day. I found a significant interaction between nestbox heating regime and vitamin E treatment in their effect on nestling mass, a trait that is positively correlated with survival and future reproductive success. Vitamin E supplementation led to increased nestling mass in heated nests, whereas it had the opposite effect in control nests. Heating significantly affected female behavior, with females in unheated boxes spending more time incubating their eggs than those in heated boxes.

SFL IMPACT ON STUDENTS WITH AUTISM

Presenter: Folk, Robyn
Graduate, Social Work

Mentor: Prof. Karen Stipp

Authorship: Robyn Folk

Autism spectrum disorder now affects 1 in 68 children. Boys are nearly 5 times more likely than girls to be diagnosed with ASD. Many students with autism spectrum disorder have benefit from participation in classroom interventions to help with communication, social skills, life skills, and self-care. In the high school setting these benefits can be seen in once-a-month support groups or one on one sessions, however, there needs to be interventions that may be more beneficial to students in a more frequent manner. The benefits of Strategies for Learning support group for students with the disability label of autism has been acknowledged frequently by support staff and instructors in the learning environment. However, despite staff recognition there is the question if the students feel as though having this class has made the impact in areas of self-care and social skills as it can relate back to the idea of the whole child. Data was collected from a sample of high school students with autism spectrum disorder as their disability label from HLR high school. A google form survey was given to the students that have Strategies for Learning support group in their school schedule. The survey asks students open-ended questions about what was beneficial from being enrolled in this class, and whether they see any improvements in the areas of social skills and self-care as it relates to inside and outside the learning environment. We then ask students what they feel was beneficial from being enrolled in this class and do they see any improvements in the areas of social skills and self-care as it relates to inside and outside the learning environment. Qualitative data will be coded and analyzed in order to inform future program planning.

THERE'S A DOC FOR THAT! HOLDING EMPLOYEES ACCOUNTABLE TO USE ONLINE DOCUMENTATION

Presenter: Godinez, Ertemisa
Graduate, Communication

Mentor: Prof. John Baldwin

Authorship: Ertemisa Godinez

In light of the increasing availability of information online in organizational setting, it is necessary to review how organizations can ensure that their employees are utilizing those resources to its full potential. Online documentation is any electronic media that an organization stores for their employee to access information required to accomplish their work tasks. While online documentation is designed to be easily accessible for employees, managers still report addressing numerous questions throughout the day regarding information that is already available in these online resources. Using expectancy theory, information seeking, and a ventriloquial approach to seven semi-structured interviews with managers from various Midwestern based companies, I identified communication patterns commonly used by managers to communicate expectations and accountability. While expectations are discussed when online documentation is first introduced or updated, managers use tokens of accountability continuously to motivate employees to use regularly use online documentation. Managers also use documentation as ventriloquists to communicate to employees that they are not using the online documentation as they should. These findings illuminate how ventriloquism is manifested in organizations, as well as how managers can consciously choose to act as ventriloquists to address difficult subjects that risk leading to negative relational consequences with their employee. Findings also highlight that information seeking in combination with expectancy theory can provide a framework for managers to clearly set up expectations around using online documentation that is in line with the employees' motivation and desire for timely information.

QUANTIFYING THE DECOMPOSITION OF PENNYCRESS

Presenter: Hafner, Alex
Undergraduate, Biological Sciences

Mentor: Prof. Bill Perry

Authorship: Alex Hafner, Ryan Meyer, Nicholas Heller, Bill Perry

As pennycress approaches commercialization, quantification of the ecosystem services it provides will help in quantifying its environmental benefits relative to other cover crops. When cover crops are harvested or terminated, the remaining residues decompose and release nutrients back into the soil and are available to subsequent crops. The timing and magnitude of nutrient release could reduce the amount of added fertilizer that are applied to fields. Nutrient leaching from agricultural fields may then be reduced. A decomposition experiment was conducted to calculate the rate of decomposition by measuring biomass and nitrogen loss over time of wild-type pennycress, gene-edited AOP2 pennycress relative to cereal and annual rye. Mesh bags with residue of each species of biomass were placed in two common soil types of McLean County, Illinois (N=5 per soil type) between rows of corn and left to decompose. Samples were collected every 7 days initially and intervals increased over time as decomposition rates slowed. Percent loss of biomass and nitrogen was estimated relative to time 0 samples. Initial findings indicate that decomposition rates were fastest for annual rye followed by cereal rye, wild-type pennycress and AOP2 pennycress decomposed the slowest. This experiment will allow recommendations to be made for future decomposition studies that include multiple agricultural regions and elite lines of pennycress to learn in greater detail how pennycress will function upon commercialization.

EXTRAEMBRYONIC MEMBRANES RESPOND TO MATERNAL STRESS STEROIDS DEPOSITED IN EGG YOLK

Presenter: Harders, Emily
Graduate, Biological Sciences

Mentor: Prof. Ryan Paitz

Authorship: Emily Harders

Exposure to steroids during sensitive times in development can permanently alter an individual's phenotype. During times of maternal stress, exposure to elevated glucocorticoids can have adverse effects on offspring development, like lower birth weight. However, embryos can regulate their exposure to maternal glucocorticoids by metabolizing steroids before they reach the embryo. In bird eggs, it is known that glucocorticoids are metabolized early in development, but the specific routes of metabolism remain to be deciphered. To investigate this, chicken eggs were injected with either 1 ug corticosterone or vegetable oil on day 0 and incubated for four days. Then, the yolk was sampled for quantification of steroids and extraembryonic membranes were collected for quantification of gene expression. We found corticosterone was not increased after four days of development, but metabolites 20 β -corticosterone and 5 β -corticosterone were significantly elevated in the corticosterone injected eggs. We quantified the expression of genes involved in corticosterone metabolism such as *AKR1D1* (converts corticosterone to 5 β -corticosterone) and *CBR1* (converts corticosterone to 20 β -corticosterone) in addition to a potential corticosterone responsive gene, *ACOT13*. We found high expression of *AKR1D1* and *CBR1* on day four, but no difference based on corticosterone treatment. Interestingly, *ACOT13* expression was significantly higher in eggs treated with corticosterone. In this study, we demonstrate chicken extraembryonic membranes are capable of metabolizing and responding to maternally deposited corticosterone in the yolk by day four of development. These results highlight the importance of the extraembryonic membranes in mediating the response to maternal glucocorticoids.

PROGRESS TOWARDS GENERATING DISCRETE CLUSTERS FROM Mo_6I_{12}

Presenter: Harris, Arthur
Undergraduate, Chemistry

Mentor: Prof. Lisa Szczepura

Authorship: Arthur Harris, Lisa Szczepura

A major focus of the Szczepura research group is the study of organometallic compounds, which are comprised of organic molecules bonded to a central core containing metal atoms. This study is concerned with the metal cluster core of $[\text{Mo}_6\text{I}_8]^{4+}$, which is made up of six molybdenum atoms and eight bridging iodide ligands. This cluster core is the backbone of the 2D polymeric starting material, Mo_6I_{12} . The goal of this study was to synthesize discrete molybdenum iodide clusters from Mo_6I_{12} and characterize the resulting products. Specifically, attempts were made to coordinate triethylphosphine oxide in absolute EtOH, THF, and DMF to form $[\text{Mo}_6\text{I}_8(\text{OPEt}_3)_2\text{I}_4]$, followed by a comparison of product solubilities among each of the solvents tested. Absolute EtOH appeared to facilitate the coordination of OPEt_3 the best out of the three solvents tested, as its $^{31}\text{P}\{^1\text{H}\}$ NMR spectra contained signals for OPEt_3 -coordinated products. This presentation will focus on experiments involving the attempted coordination of OPEt_3 and other ligands, towards the generation of discrete clusters from Mo_6I_{12} .

ALTERED TRANSMISSION POTENTIAL OF A BUMBLEBEE PATHOGEN ON CO-EXPOSURE TO THE FUNGICIDE CHLOROTHALONIL

Presenter: Harrod, Audrey
Undergraduate, Biological Sciences

Mentor: Prof. Ben Sadd

Authorship: Audrey Harrod, Austin Calhoun, Ben Sadd

Many pollinators, such as ecologically and economically important bumble bees (*Bombus sp.*) are experiencing concerning declines. These declines are proposed to be caused by a myriad of factors and are predicted to negatively affect natural and agricultural ecosystems. Individual stressors such as pesticides and pathogens can have a variety of negative effects, but bumble bees will often be exposed to multiple stressors simultaneously. These complex interactions are proposed to amplify detrimental effects of individual stressors, under what is known as the multiple stressor hypothesis. Suggestive evidence for this hypothesis comes from a positive association between agricultural use of the fungicide chlorothalonil and the microsporidian bumble bee pathogen *Nosema bombi*. Furthermore, a controlled infection study has shown increased *N. bombi* transmissible spore production in bumble bees exposed to chlorothalonil, indicating potential for increased *Nosema* transmission upon co-exposure. Extending the multiple stressor hypothesis regarding this system, we propose changes upon co-exposure to these stressors in individual bees will lead to altered transmission dynamics with associated detrimental consequences for the bumble bee pollinator community. We used control or chlorothalonil exposed and *Nosema* infected microcolonies to assess the effect of chlorothalonil exposure on within-colony and between-colony dynamics of pathogen infection. The results are still being collected, but we predict that chlorothalonil co-exposure increases the likelihood that an infected individual bumble bee transmits an infection to individuals within its social colony and to other colonies that it shares foraging resources with. Such epidemiological effects may explain the described association of *N. bombi* with chlorothalonil, and further inform our understanding of threats to native bee health by incorporating not only individual host infection dynamics but also between-host transmission.

COMPARISON OF DIFFERENT METHODS FOR CONTROLLING APHID POPULATIONS

Presenter: Haubein, Cailyn
Undergraduate, Biological Sciences
Mentor: Prof. Steven Juliano
Co-Mentor: Prof. Kate Evens
Authorship: Cailyn Haubein

Aphids (Hemiptera: Aphidae) are small plant feeding insects found in many gardens and farms around the world. Aphids can cause immense damage on a large variety of garden plants, from vegetables to ornamentals, which is why many land owners choose to control these pests. Many different methods can be used to control aphids home, including insecticides, dish soap, and natural predators. I was interested in the questions: Are these methods effective in controlling aphid populations and which method is the most effective?

To test for differences among these methods, I collected a total of 600 aphids from cherry tomato plants and divided them equally (50 aphids) into twelve containers. Each container had enough foliage for 24 hours and sufficient air flow. Three containers received each treatment: untreated control, pesticide (Bio-Advanced, Rose and Flower Insect Killer), dish soap (70% water and 30% dish soap), and natural predator (2 hoverfly larvae (Diptera: Syrphidae) per container). The following day, I recorded the number of aphids alive in each container. The experiment resulted in means of 56 ± 3.77 aphids for the control, 14.7 ± 1.77 aphids after insecticide, 6.7 ± 2.53 aphids with dish soap, and 12.3 ± 0.88 aphids with the natural predator. I conducted a one way ANOVA analysis on the data and it indicated that there was a significant effect of treatment ($F(3,8)=22.34$, $p=0.0003$). Individual follow up tests indicated that while the pest control treatments were not significantly different than one another, they all differed from the control.

Although reducing aphid numbers is important, it is also vital to consider the non-target effects of the methods you use. Insecticides are effective at killing pests, but are also can kill non-target organisms and continuous use of them can lead to a decline in biodiversity. Dish soap can also harm non-target organisms and when used improperly, can cause damage to the plant's cuticle. Finally, introducing a natural predator to your yard risks introducing a competitor to other native predators, and care must be taken not to introduce nonnative species. It is important to consider not only the effects on the pest, but what is best for all the organisms in the treated area.

THE EFFECTS OF QUIZLET ON LEARNING AND CONTENT RETENTION

Presenter: Hepp, Delaney
Undergraduate, Psychology

Mentor: Prof. Dawn McBride

Authorship: Delaney Hepp

With the ever-growing presence of technology in the classroom, it is important that students are provided with effective online tools. The current study was conducted to evaluate the effects of Quizlet on learning and retention. Quizlet is an online learning platform equipped with interactive tools and games to aid studying. The participants of the study were students enrolled in a psychology research methods course. Participants were encouraged to create a Quizlet study set of relevant course information/topics and use the interactive features of the site to further study the material. All participants completed a course-relevant pre-test before using the online tool, and a post-test following their engagement. It was hypothesized that the interactive, online studying would be not only preferred over other study techniques but would also improve posttest scores for those who actively engaged with their Quizlet set.

IMPACTS OF COMMUNITY GARDENS ON OVERALL HEALTH PROMOTION IN REGARD TO DIETARY BEHAVIORS AND PHYSICAL ACTIVITIES: EMPHASIS ON MODERATED MEDIATION

Presenter: Ho, Cheng Yi
Graduate, Family and Consumer Sciences

Mentor: Prof. Julie Schumacher

Authorship: Cheng Yi Ho

Introduction: The purpose of this study was to investigate how community gardening participation impacts and benefits the health of various populations on their fresh produce consumption and physical activities. This study was designed to identify innovations to reduce the barriers of participation in community gardening.

Methods: This study was approached via moderated mediation, which identifies the moderating effect on direct and indirect paths among variables. The predictor variable (X) was level of participation in community gardens, and the overall health outcome was regarded as the outcome variable (Y). Between X and Y, the variety of grown produce was considered as the mediator while the highest nutrition education was the moderator.

Results: As a result, the analysis revealed that there were no significant statistical relationships regarding moderated mediation. However, the direct moderating effect between X and Y was revealed to be statistically significant ($t = -2.2066$, $p < .05$). Another significant correlation was shown between the level of participation and the overall health outcome (coefficient = $-.2716$, $p < .05$).

Discussion/Conclusion: Overall, most regressions, mediation, and moderated mediation among benefits generated by community gardening were not significantly revealed in this study although the moderating effect of highest nutrition education was revealed. Perhaps, the statistical insignificance of the data can be explained by the difference of research settings. Other studies investigating mediation or moderation of community gardens' benefits applied intervention to the same group of individuals and therefore more apparent and clear development shown. Even though this study did not show that overall health outcome can keep improving as participation levels elevated in statistical sense, positive health impacts of community gardening were still revealed via community gardeners' perceptions. The finding of this study also showed that nutrition education has potential to be considered as moderator in community gardening to optimize disease management and prevention with a more comprehensive understanding.

KEYWORDS: moderated mediation; community gardening; disease management; nutrition education; overall health outcome; level of participation; grown produce

BREAKING DOWN A TRACER IN A SATURATED BUFFER ZONE: COMPARING THE USE OF RHODAMINE WT TO SODIUM CHLORIDE

Presenter: Hoberg, Joseph
Undergraduate, Geography, Geology, and the Environment

Mentor: Prof. Eric Peterson

Authorship: Joe Hoberg, Eric Peterson, Eli Schukow, Alhasaan Sahaad, Richard Twait

Tracer tests are a common means to discern hydrologic and transport properties of an aquifer. Conservative ion tracers, such as dissolved salts, are common choices for use as groundwater tracers, but the introduction of large quantities of salts can elevate the concentrations to acute levels for organisms and can create density driven flows. Rhodamine WT dye is widely used in karst systems but not in Darcian systems. We explored the questions “Can Rhodamine WT dye be used as a groundwater tracer in a Darcian system comprised of weathered diamicton?”, and “How does the transport of Rhodamine compare to transport of chloride?” Six (6) Kg of sodium chloride (NaCl) and 1 Kg of Rhodamine WT dye (25000 ppm) were injected into a saturated buffer zone (SBZ) via diversion box and drainage tiles. Following the injection, water samples from wells installed in the SBZ were collected and analyzed for the dye and Cl concentrations. Breakthrough curves for the dye were similar to those of Cl, confirming similar transport dynamics. Inspection of the breakthrough curves indicated the average travel time for the peak dye concentration was 12 days following injection and two days after the peak dye concentrations within all wells had lowered. Peak concentrations for Cl arrived on average 16 days after injection. Identification of the time each tracer had left the system was difficult to discern, a storm event occurring 31 days after injection will serve as the upper limit.

Breakthrough curves modeled utilizing TRAC simulated travel velocities and longitudinal dispersivities of the tested constituents. Average velocities for both Cl and dye were relatively equal, however, dye displayed high variance. Modeled Cl dispersivities are two orders of magnitude larger than the dye. Overall, the similar arrival times and breakthrough curves of the constituents suggest that Rhodamine dye can be used as a groundwater tracer in weathered diamicton. Future research and replication must be conducted in order to further explore and refine this technique.

THE RELATIONSHIP AMONG RESTING METABOLIC RATE, RER, SUBSTRATE UTILIZATION, AND STEP COUNTS IN COLLEGE STUDENTS

Presenter: Hobson, Brandon
Graduate, Kinesiology & Recreation

Mentor: Prof. Tyler Kybartas

Co-Mentor: Prof. Kristen Lagally

Authorship: Brandon Hobson, Emily Reynoso-Romero, Tyler Kybartas, Kristen Lagally, David Thomas

Low resting metabolic rate (RMR) and low physical activity (PA) levels are two factors with significant impact on the energy balance equation. These two variables can lead to a positive energy balance, which over time can lead to obesity. Understanding the relationships between these variables and respiratory exchange ratio (RER) and substrate utilization is important in understanding how a balanced energy equation can be maintained long-term.

PURPOSE: To determine the relationships among RMR, step counts, resting RER, and substrate utilization.

METHODS: Volunteer participants ranging from 19-24 years of age ($n=10$; 6 men, 4 women; 21.4 ± 1.8 y) were recruited for this study. Prior to RMR testing, participants followed a protocol requiring a 6 hour fast, no exercise for 14 hours, and no alcohol or nicotine for 2 hours. Participants reclined, awake, on a padded table in a dimly lit room for 20-25 minutes while respiratory gases were measured using open-circuit spirometry. RMR, RER and substrate utilization were determined during a 5-minute period where variation in VO_2 was less than 10%. Following RMR measurement, participants wore an accelerometer on their non-dominant wrist for at least 5 days. Step count data were averaged over days in which the participant had 6 hours of wear time or more. Means and standard deviations were determined for all variables. Spearman correlations were used to determine relationships among the variables.

RESULTS:

The mean RMR, step count, and RER of participants were 1833 ± 382 kcal/day, 13080 ± 1893 steps/day, and 0.84 ± 0.07 , respectively. Mean substrate utilization was $62.6 \pm 19.3\%$ fat and $37.4 \pm 19.3\%$ carbohydrates. There was a significant correlation between RMR and step count ($r = 0.721$, $r^2 = 0.520$, $p = 0.019$), RMR and RER ($r = -0.732$, $r^2 = 0.536$, $p = 0.016$), and RER and step count ($r = -0.817$, $r^2 = 0.667$, $p = 0.004$). Correlations between other variables were not significant ($p > 0.05$).

CONCLUSIONS: Results suggest that individuals with higher measured RMR have higher step counts and lower RER. Additionally, individuals with higher step counts have lower RER. This suggests that higher levels of PA could lead to higher RMR and lower RER, which may help with long-term energy balance.

COVID-19 IMPACTS ON LIVINGSTON COUNTY SPECIAL SERVICES UNIT'S SPECIAL EDUCATION SERVICES

Presenter: Hopwood, Emily
Graduate, Social Work

Mentor: Prof. Kate Sheridan

Authorship: Emily Hopwood

The aim of this study is to explore and describe the various ways COVID-19 has impacted services at Livingston County Special Services Unit. Participants aged 18 years of age or older and employed at Livingston County Special Services Unit as an occupational therapist, speech therapist, physical therapist, social worker, or school psychologist were invited to participate in an electronic survey. The participants' survey responses provided information on how COVID-19 impacted themselves, their clients, and the services they were providing. The findings of this study will tell us how Livingston County Special Service Unit service providers delivered remote special education services and the difficulties these service providers faced. This data is vital for Livingston County Special Services to have so we can learn from it and improve our reaction to a sudden shift to remote services in the event that it is warranted in the future. The research will also give insight to how Livingston County Special Services Unit can support their service providers. The proposed research will build on and further the knowledge base of what Livingston County Special Service Unit has learned throughout the span of the pandemic.

SOCIAL MEDIA, MICROAGGRESSIONS, AND ADOLESCENT EFFORTS TO INTERVENE

Presenter: Hynes, Keeley
Graduate, Psychology

Mentor: Prof. Brea Banks

Authorship: Keeley Hynes

High school students experience microaggressions, or subtle identity-based slights, although little is known about online microaggressions (Banks & Cicciarelli, 2020; Sue, 2010). Data was collected from 134 adolescents. We used a multiple regression analysis to examine our hypothesis that school connectedness, knowledge about school policy, and social media rumination will significantly predict participants' likelihood to intervene when witnessing a microaggression on social media. Results indicated that perceived offensiveness of the posts was the only significant predictor of adolescents intervening.

MAPPING THE AMINO ACID SEQUENCES IN THE COILED-COIL DOMAIN THAT MEDIATE DIMERIZATION OF THE KIF3A/KIF3B MOTOR

Presenter: Irwin, Samuel
Undergraduate, Biological Sciences
Mentor: Prof. Martin Engelke
Co-Mentor: Prof. Jessica Adams
Authorship: Samuel Irwin, Jessica Adams, Martin Engelke

Kinesin motor proteins are vitally important for many cellular functions such as mitosis, ciliogenesis, and transporting cellular cargo. They move these cargos along microtubules unidirectionally from minus- to the plus-end. Most kinesins are homodimers. Dimerization is mediated via an elongated, coiled-coil (CC) containing stalk domain that brings two motor domain-containing subunits together. Dimerization allows the N-terminal motor domains to walk along microtubules in a 'foot over foot' fashion. The C termini form tail domains that function in cargo binding, and motor regulation. In our lab, we study the only heterodimeric kinesin motor, KIF3A/KIF3B, encoded in the mouse genome. Previous work mapped the minimal sequences that are required for heterodimerization of the homologous *Xenopus* motor Xklp3A/Xklp3B to the C-terminal half of the CC-II and CC-III domain (De Marco et al., 2001). Another study placed a significant emphasis on the N-terminal neck-coils and highly charged region following these coils (Chana et al., 2005). Here we aim to determine the importance of different elements within the CC stalk for the heterodimerization of mouse KIF3A/KIF3B. First, we determined the location of the CC domains in the mouse kinesin using DeepCoil and COILS server. We then created various motor truncation constructs and assessed their degree of heterodimerization in protein-protein interaction assays. Successively truncating KIF3A and KIF3B from the C-terminus, we find that removing the CC-III domain impedes heterodimerization, indicating that this motor behaves similarly to its *Xenopus* homolog.

ADULT ADOPTEEES & OPENNESS: CULTURAL IDENTITY DEVELOPMENT AND CONNECTIONS WITH BIRTH FAMILIES

Presenter: Iverson, Brien
Graduate, Social Work

Mentor: Prof. Karen Stipp

Authorship: Brien Iverson

Introduction & Significance: As transracial and open adoptions are on the rise in the U.S., it is important to examine whether adoptees struggle with cultural identity development, and whether the openness of adoptions supports cultural identity development.

Methodology: A qualitative research study through a phenomenological approach was conducted to understand the lived experiences of adult adoptees. A diverse sample was asked about various adoption-related topics through a recorded guided interview. Data was then analyzed by transcribing participants' interviews verbatim and finding common themes within each.

Conclusion: The intent of this research is to help adoption professionals and adoptive parents to better support adoptee development of secure cultural identity by embracing the spirit of openness.

NEW MATH IN NIGERIA

Presenter: Jegede, Kehinde
Graduate, Mathematics

Mentor: Prof. Óscar Chávez

Authorship: Kehinde Jegede, Óscar Chávez

This paper is a historical presentation of mathematics education reform, on both the primary and secondary levels, that took place between 1962 –1977. In the 1950s and 1960s, at the end of the British Imperial rule in Nigeria, which lasted from 1900 to 1960, there was a mathematics education reform that swept not only the United States and Great Britain but many other countries. Birthed as a result of the launching of the *Sputnik*, the first earth satellite in space, in November 1957 by the Soviet Union, the reform led to the development of several school mathematics curriculum projects, such as the School Mathematics Study Group (MSG, 1959) Project, the University of Illinois Committee on School Mathematics Project (UICSM, 1958), the Greater Cleveland Mathematics Program (GCMP, 1959) in the US, and the School Mathematics Project (SMP, 1962) in the UK, among others. This reform eventually affected the school mathematics curricula and program in Nigeria, where the new programs were in place for a period of about 15 years. The following factors militated against successfully enacting Modern Mathematics in Nigeria: shortage of qualified mathematics teachers, lack of suitable textbooks, lack of laboratory provisions or space for storing instructional materials or for experimenting and trying things out, and concerns of and criticisms by parents, teachers, politicians, and mathematicians regarding poor performance of students in mathematics.

EVALUATING THE EFFECTIVENESS OF SUPPORTIVE SERVICES FOR HEAD START STAFF

Presenter: Johnson, Cierra
Undergraduate, Psychology

Mentor: Prof. Adena Meyers

Authorship: Cierra Johnson

This study involves evaluating the effectiveness of a stress reduction program provided to Head Start Staff. Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 2013) is a program designed to reduce stress, anxiety, and chronic pain. Staff members attended eight weekly classes for approximately two hours in addition to engaging in 60 minutes of mindfulness home practice each day and attending an all-day retreat between weeks five and six. Common mindfulness practices for the MBSR program include body scan, sitting meditation, lying down yoga, and bringing awareness to the present moment. The purpose of the program was to provide Head Start staff with skills and attitudes that may help reduce stress and burnout and increase self-compassion and wellbeing. Effectiveness of the MBSR program for Head Start Staff will be measured through a descriptive interpretive methodology employed by semi-structured interviews. Specifically, the interview is designed to examine whether attending the MBSR class affected the educators' job satisfaction, self-compassion, or overall experience as a school-based professional.

CLASSIFYING AND CATEGORIZING LUNAR CRATERS USING CONVOLUTIONAL NEURAL NETWORKS

Presenter: Johnston, Jamie
 Graduate, Information Technology

Mentor: Prof. Matt Caplan

Authorship: Jamie Johnston, Matt Caplan

Traditionally, lunar crater counting has been done by visual inspection of images of the moon's surface. This method is time consuming and has poor inter-rater reliability for smaller craters. Automating this process using a Convolutional Neural Network (CNN) greatly improves the speed and reliability at which surface features can be detected and classified. Using available high resolution Digital Elevation Model (DEM) images from the Lunar Reconnaissance Orbiter (LRO), we train a CNN to identify craters and classify them based on the slope of their ejecta blanket. Presently the population of small impactors is not well understood but improved detection of the smallest craters can constrain the size distribution of asteroids in the solar system. Additionally, we intend to search for small craters with novel features that are inconsistent with traditional asteroid impacts to potentially constrain the moon's interaction history with MACHO dark matter from the Galactic halo.

USE OF GEOPOLYMERS IN CONCRETE

Presenter: Kamineni, Aditya Rao
Graduate, Technology
Mentor: Prof. Pranshoo Solanki
Co-Mentor: Prof. Guang Jin
Authorship: Aditya Rao Kamineni

Geopolymer concrete is an innovative and eco-friendly construction material that can be used as an alternative to Portland cement concrete. It reduces the demand of Portland cement which is mainly responsible for high CO₂ emissions. Compared to cement concrete, geopolymer concrete has lower carbon footprint and made without cement. It is made by mixing aluminosilicate source and alkaline activator solution. This mix act as a binder and can be used for making geopolymer concrete. The use of geopolymer concrete helps to reduce the stock of wastes and also reduces the carbon emission. The main objective of this on-going research study is to: 1) conduct literature review; 2) prepare geopolymer concrete activators by dissolving recycled waste glass in sodium hydroxide solutions and recycled glass; 3) prepare geopolymer concrete specimens (1 inch x 1 inch x 1 inch cubes) and test for compressive strength; and 4) determine the quantitative relationship between the compressive strength of geopolymer concrete and percentage fly ash and recycled glass used in preparing activators. Preliminary results are encouraging and will be included in the poster presentation.

DETECTING NEURONAL SYNCHRONIZATION IN THE BRAIN

Presenter: Katuri, Gangadhar
Graduate, Information Technology
Mentor: Prof. Rosangela Follmann
Co-Mentor: Prof. Epaminondas Rosa
Authorship: Gangadhar Katuri, Rosangela Follmann, Epaminondas Rosa

Billions of neurons make up our brains where the emergence of synchronous behavior is one of the most fundamental questions in the field of neuroscience. In a system as complex as the human brain, synchronization of neuronal activity can be useful and necessary as during the sleep cycles and in consolidation of memory but can also be problematic and undesirable as in disorders such as epilepsy and Parkinson's disease. The goal in this study is to shed light on a particular type of neuronal synchronization associated with epileptic seizures that result from a central nervous system disorder characterized by abnormal brain activity. The approach proposed here consists of analyzing electroencephalogram (EEG) data containing information about neuronal electrical activity of epileptic patients before, during and after a seizure. The database includes EEG recordings of 14 patients obtained from the Unit of Neurology and Neurophysiology of the University of Siena, with electrical activity collected from 29 brain areas through electrodes placed on the scalp of the patients. The data is initially preprocessed using filters to reduce the noise level and the phase of the filtered signal is extracted using the Hilbert Transform and the Phase Estimation by Means of Frequency (PEMF) methods. The phase of each of the 29 signal is then compared over time with each of the other 28 signals to verify whether the signal have their phases in synchrony, or not. A measure of the level of synchronization is evaluated and used to produce color maps for graphical visualization of the overall behavior of the brain electrical activity. Our preliminary results indicate that neurons of certain areas of the brain tend to be more synchronous than others during the epileptic seizure. The approach considered in this work can be extended beyond epilepsy, with potential implementation to study other neurological disorders including schizophrenia and Parkinson's disease, for example.

LIMITED PATIENT RESOURCES FOR TWO IMMUNOTHERAPY CANCER TREATMENTS: THE DEVELOPMENT OF A HANDOUT

Presenter: Klann, Kalista
Undergraduate, Nursing
Mentor: Prof. Megan Rappleyea

Authorship: Kalista Klann

Oncolytic Viral Immunotherapy and Cancer Treatment Vaccines are both forms of immunotherapy, which is a treatment for cancer that teaches the immune system to attack specific cancer cells. Oncolytic Viral Immunotherapy uses a virus specific to targeting and eliminating cancer cells, and Cancer Treatment Vaccines treat patients by triggering an immune response against the cancer cells (Cancer Research Institute, 2020a). The purpose of my research was to develop a deep understanding of the treatments and determine the need for patient resources. There are currently 2 approved Cancer Treatment Vaccines (BCG live, and Sipuleucel-T) and 1 Oncolytic Viral Immunotherapy agent (T-VEC) in the U.S (Cancer Research Institute, 2020a). Additionally, about 11 clinical trials are registered for the use of Oncolytic Viral Immunotherapy and about 317 clinical trials for Cancer Treatment Vaccines, which shows the potential for growth with these treatments (National Institutes of Health, n.d.). Some of the resources I utilized to further my knowledge on the treatments included a training program provided by Oncology Nursing Society, a novel by Neil Canavan titled *A Cure Within*, and many readings from medical journals using primarily PubMed for literature searches. After completing incognito Google searches with key words/phrases related to the treatments, I found only one resource for patients. However, this resource does not contain comprehensive information over both treatments. I have made a two-sided patient handout that clearly describes what the treatments are, how they work, common side effects, and links to clinical trial information.

Keywords: immunotherapy, oncolytic viral immunotherapy, cancer treatment vaccines, patient resources

AN EXAMINATION OF BASIC BIOMETRIC VARIABLES, PHYSICAL ACTIVITY, AND STRESS MANAGEMENT EDUCATION ON HEART RATE VARIABILITY

Presenter: Kraft, Allena
Undergraduate, Kinesiology & Recreation
Mentor: Prof. Karen Dennis

Authorship: Allena Kraft

PURPOSE: Exploring the relationship between physical activity, biometric variables, and stress management training on heart rate variability (HRV) over a 16-week semester-long course that teaches healthy lifestyles and stress management.

METHODS: Students enrolled in KNR 113 Personal Fitness at Illinois State University during the fall 2021 semester were used to gather data for the study. During the 16-weeks of the study, students were given instructions to wear a university provided pedometer to track their total steps per day. KNR 113 students also participated in physical activities aimed at improving fitness, measured through pre- and posttesting. HRV measurements were taken during the pre- and post-testing using HeartMath emWave Pro software measured by a pulse plethysmograph ear sensor. KNR 113 students also completed the State-Trait Anxiety Inventory for Adults during the pre- and post-testing sessions. Weekly assignments were distributed throughout the course from HeartMath Institute to teach students stress management techniques that they could implement into their own lives. A t-Test paired two sample for means will be conducted to test for statistical significance.

RESULTS: Analyzing results.

EFFECT OF SEXUAL SELECTION ON INVESTMENT BY MALE DECORATED CRICKETS IN NUPTIAL FOOD GIFTS

Presenter: Kuna, Will
Undergraduate, Biological Sciences

Mentor: Prof. Ben Sadd

Authorship: Will Kuna, Jack McKermitt, Bert Foquet, John Hunt, Scott Sakaluk, Ben Sadd

Sexual selection arises from differences in reproductive success that are a product of variation in mating success. Sexual selection has shaped a variety of male-specific sexual traits, such as bird song and elaborate male courtship rituals, but the relative importance of sexual selection should vary across environments. In particular, the ratio of reproductively mature males to females, known as the operational sex-ratio (OSR), determines the intensity of competition for mates. The decorated cricket, *Gryllodes sigillatus*, is an ideal model system to study the effects OSRs on male sexually selective traits. Male decorated crickets have several traits that are associated with increased mating success, including acoustic signaling and the manufacture of nuptial food gifts that are presented to females at mating. Previous research has shown that increased mass of nuptial gifts leads to increased mating success, suggesting that gift size is critical to reproductive success. Using an experimental evolution approach, we explored the effect of varying OSRs on the evolution of investment in this important male reproductive trait. Male crickets were taken from replicate populations that had been kept for 20 generations under male-biased or female-biased OSRs, and were screened every other day for 21 days for the production of a nuptial gift. Gifts were extracted and weighed to obtain wet mass, and then dried to obtain a dry mass. Results are currently being analyzed, but we predict that the crickets from the male biased OSR lines will produce larger gifts than those from the female biased lines due to a greater intensity of sexual selection. This work is important because it furthers our knowledge about the evolutionary ecology of sexual selection using an accessible system with readily measurable sexual traits.

PREDATION RATES ON MOSQUITOES IN SIMPLE AND COMPLEX ENVIRONMENTS

Presenter: Lamkin, Maya
Undergraduate, Biological Sciences
Mentor: Prof. Steven Juliano
Co-Mentor: Prof. Jaclyn Everly
Authorship: Maya Lamkin, Jaclyn Everly, Steven Juliano

The use of native organisms in the biological control of mosquitoes aids in reducing the unintended consequences of current methods of larviciding, specifically in the ecosystem functioning in these environments. There are interspecific interactions that are a major part of mediating resource populations, and can be influenced by a number of biotic and abiotic factors. Within these environments, our focus were temporary wetlands and the mosquito larvae *Culex pipiens*. Predator species to mosquitoes also inhabit these areas, and the potential to use the natural predators of mosquitoes as potential larvicides, managing outbreaks of mosquitoes and the diseases they vector have been a more researched topic in recent years. We can gauge the efficacy of these biological control methods through functional response experiments, which in turn are frequently influenced by the size and complexity of the environment these species inhabit. The naiads of the damselfly genus *Enallagma* are a known natural predator to mosquito larvae, and are native to Illinois, where this research was conducted. Our experiment aimed to see if complexity of an environment would decrease predation, and we hypothesized that predation would increase until the damsel naiads reached satiation. We predicted that the data would show a Type II functional response and that more habitat complexity would result in less predation. We observed the interactions between *Enallagma* and the *Culex* larvae with a single damsel naiad per five levels of prey density (10, 20, 30, 60, 120 larvae within each container), in containers labeled simple (with no artificial detritus) and complex (with the artificial detritus), and ran functional responses on our parameters- the mortality rate of larvae after a six-hour experiment and the handling time- how much time the predator spent engaged with the prey. Preliminary results suggest a Type II functional response curve, with attack rates of *Enallagma* higher in the simple habitats than in complex. This evidence supports our conclusion that damselfly naiads are competent predators and could act as natural mosquito control. We can also support that the attack rate is more successful when density is low. This study emphasizes that the predators are more efficient at hunting when density is low, and could potentially be used as an alternative to larviciding.

DOES INDIVIDUAL QUALITY AFFECT THE PRODUCTION OF A SECOND BROOD IN HOUSE WRENS (TROGLODYTES AEDON) IN ADDITION TO TIMING?

Presenter: Leischner, Lauren
Graduate, Biological Sciences

Mentor: Prof. Pirmin Nietlisbach

Authorship: Lauren Leischner, Charles Thompson, Scott Sakaluk, Pirmin Nietlisbach

Climate change affects seasonal reproduction of birds and other organisms by raising temperatures, changing the precipitation patterns, and increasing extreme weather events, which leads to changes in food abundance and breeding season length. Some species raise two broods in a season to increase their reproductive success. However, not all individuals produce a second brood even if there would still be enough time to permit a second brood. The objective of this proposed research is to determine whether variation in individual quality, in addition to timing, explains some of the variation in production of a second brood. We will address this question in a house wren population along the Mackinaw River in north-central Illinois that is well suited for this purpose as this double-brooded species readily accepts nestboxes, providing easy access to nests for experiments. Females that nest early often have high quality territory, may be in better condition, and have an increased probability of having a second brood. It is unclear whether the production of a second brood is solely due to timing or also female quality. To test this question, we will cross-foster eggs between early, high quality females and later, low quality females. This leads high quality birds to raise nestlings later than intended. If delayed, high quality females produce a second brood, quality may affect the production of a second brood in addition to timing, suggesting that there may be a higher chance for the population to be able to adjust to future changes in the climate.

EXAMINATION OF CAREGIVER KNOWLEDGE, RECOGNITION, AND PERCEPTION OF TRAUMA RESPONSES IN CHILDREN EXPOSED TO VIOLENCE

Presenter: Lesser, Margaret
Graduate, Social Work

Mentor: Prof. Kate Sheridan

Authorship: Margaret Lesser

The aim of this study is to explore the experience that children with trauma history are having in their homes as perceived by their parents, as well as to examine these parent's understanding of their child's behavior from a developmental perspective. Safe caregivers aged 18 years of age or older, of children who have been exposed to violence and are now receiving services from The Butterfly Project at Children's Home & Aid in Central Illinois will be the participants of this study. Findings from this study will be used to inform improvements to programming at the Butterfly Project at Children's Home and Aid.

DIRECT SUPPORT PROFESSIONAL'S PERCEPTIONS OF STRESSORS AND SUPPORTS AT TAZEVELL COUNTY RESOURCE CENTER DURING THE COVID-19 PANDEMIC

Presenter: Lewis, Emmalee
Graduate, Social Work

Mentor: Prof. Karen Stipp

Authorship: Emmalee Lewis

The adverse effects of the COVID-19 pandemic have immensely impacted and challenged society in various ways. Stress and burnout frequently occur among staff who work with individuals within the Intellectual or Developmental Disabilities (IDD) population. However, as a result of this pandemic, additional pressures and anxiety have been added to the jobs performed by these professionals. Therefore, it is critical to consider these unpredictable times of the COVID-19 pandemic and its potential consequences on the mental health of those providing services to the IDD population and better prepare for the future repercussions of this pandemic. The research examined the effects of the pandemic on the mental health of Direct Support Professionals (DSP), who work with individuals with intellectual and developmental disabilities. This research utilized a mixed-methods methodology using a convenience sample of Direct Support Professionals working at Tazewell County Resource Center (TCRC) during the COVID-19 pandemic. Participants were recruited through email provided by the agency and asked to complete a voluntary and confidential survey that determined what work-related stressors they endured, what support provided by the agency was practical, and what further support could have been beneficial.

A QUANTITATIVE ASSESSMENT OF UNIVERSITY PRIVACY STATEMENTS ON READABILITY AND COMPLIANCE

Presenter: Li, Yunpeng
Graduate, Information Technology

Mentor: Prof. Yousra Javed

Authorship: Yunpeng Li

In this digital age, the notion of privacy primarily refers to the freedom that an individual should have for determining how his personally identifiable information (e.g., name, date of birth, email address, and IP address) are processed, i.e., collected, used, and disclosed.

One channel through which users' personal information is processed, is the publicly accessible websites of business and service entities. Ensuring that the users of these websites are aware of how their personal information is processed, how the accuracy of their data is maintained, how its data integrity and confidentiality is preserved is vital. These aspects are important because user information is now considered a valuable commodity. For example, business entities either analyze user information themselves or share/sell them to advertisers and researchers to best tailor commercial services to the online consumer market. Therefore, it is expected that all websites include a relevant privacy statement to ensure lawful, fair, and transparent processing of user data.

A wide amount of literature exists on privacy compliance of websites in sectors such as ecommerce, health, banking, and Government etc. However, limited work has been done on websites in the education sector. This project, therefore, takes a first step in developing a dataset of privacy statements belonging to the educational institutions. We manually collected privacy policies of top 150 universities in the United States (10 per state). These universities were selected using US News website and ISU library as the resource. We present our findings from a quantitative analysis of these policies with regards to their readability and their compliance with GDPR, COPPA, and FERPA.

PEOPLE WHO FEED THE WORLD: UNDERSTANDING U.S. FARMER POPULATION

Presenter: Lopata, Emily
Undergraduate, Agriculture
Mentor: Prof. Iuliia Tetteh

Authorship: Emily Lopata, Iuliia Tetteh

While it is known that farmers play the vital role of producing the food that we consume every day, who exactly are the people feeding the world? This study will zoom in on the U.S. farmer population using data from the 2017 Agriculture Census conducted by the U.S. Department of Agriculture. The goal of this research project is to study selected farmer characteristics to better understand the demographics of the one percent of the population who feeds us. Additionally, this study will explore how farmer's involvement in the operation and management of their farm businesses as well as the size of the farm vary by age, education, experience, race of the primary operator, etc. Graphical representations made in Excel will be used to identify and summarize trends behind the data analyzed in the study. By understanding these findings, there will be a more accurate description of U.S. farmers.

USING COARSE-GROUND RECYCLED GLASS IN GEOPOLYMER CONCRETE

Presenter: Lyons, Ashley
Undergraduate, Health Sciences
Mentor: Prof. Guang Jin
Co-Mentor: Prof. Pranshoo Solanki
Authorship: Guan Jin, Ashley Lyons

Portland cement-based products, specifically concrete, are one of the most commonly used building materials. Although, the cement industry faces important environmental issues such as the use of fossil fuels, emission of greenhouse gas, and high levels of energy consumption. To combat these issues, geopolymer concrete (GeoPC) emerges as an excellent alternative to Portland cement concrete due to its superior properties and lower greenhouse gas emissions. GeoPC is prepared from recycled industrial/municipal waste such as fly ash and waste glass. In this study, we 1) prepared **GeoPC activators** by dissolving recycled waste glass in sodium hydroxide solutions, 2) prepared **GeoPC** by using activators from step 1) and fly ash. The objectives of this study include:

- 1) investigate the relationship between dissolved silica concentration of **GeoPC activators** and
 - i) glass particle size, and ii) concentration of sodium hydroxide
- 2) investigate the relationship between the compressive strength of **GeoPC** and i) dissolved silica concentration in activators, ii) concentration of alkali in activators, and iii) alkali/silica ratio in activators

A series of bench-scale glass dissolution reactions were performed using sodium hydroxide solutions with commercially cleaned and characterized recycled glass. Reactions were performed at 95°C and intermittent mixing of 30 minutes per day where all glass particles are suspended. Concentration of dissolved silica were monitored for every 96 hours for 3 weeks and analyzed using inductively coupled plasma – atomic emission spectrometry (ICP-AES). A set of three cubes of 2.54 cm x 2.54 cm x 2.54 cm were molded for all the AAM mixtures. After molding, specimens were cured in an oven at 80±2°C for 24 hours followed by curing inside an ice chest at a temperature of 23.0 ± 2°C for 24 hours. Compressive strength was measured in accordance with ASTM C 109 test method.

Highest dissolved silica concentration was found to be at 70,000 ppm with the finest glass particle size of around 70 µm using 2M sodium hydroxide. Highest compressive strength of 41 MPa was observed with SiO₂% of 6.5 – 7%, alkali concentration of 12 M and alkali/silica ratio in activators of 0.175.

THE CRIMINAL JUSTICE SYSTEM WORKS PERFECTLY

Presenter: Maranville, Ryan
Graduate, Sociology/Anthropology
Mentor: Prof. Michael Hendricks

Authorship: Ryan Maranville

Does race impact one's treatment in the criminal justice system of McLean County, IL? If so, does that signify that the criminal justice system is broken? Using arrest data from McLean County, IL, the researcher presents findings of statistically significant racial disparity among non-white populations across several variables, including, but not limited to, bond amount, length of stay in jail, the total number of charges, and the total number of convictions. This research fills empirical gaps within existing literature by presenting and discussing a statistical analysis of arrest data in a semi-urban area in Central Illinois. Additionally, this research applies a theoretical extension of social theories in discussing the statistical findings. Using a historical approach, the researcher combines theory and data to argue for a more *multi-dimensional* strategy to the administration of criminal justice in the United States.

CLONING OF THE GENE ENCODING SULFOLOBUS ISLANDICUS GLYCEROL KINASE

Presenter: Marcheschi, Michael
Undergraduate, Biological Sciences
Mentor: Prof. Jon Friesen

Authorship: Michael Marcheschi, Jon Friesen

Over the course of this school year, I have begun research on a protein from a thermophilic archaeon named *Sulfolobus islandicus* that is a putative glycerol kinase. To make the protein we enlist the help of *E. coli* cells that are engineered to do specific tasks. We first ran a Polymerase Chain Reaction (PCR) to amplify the DNA encoding the protein. For *E. coli* to use our DNA to produce glycerol kinase we insert it into a plasmid via restriction enzymes. The plasmid we inserted our DNA into is called pET-45b, it contains multiple restriction enzyme sites and codes for ampicillin resistance. We cut our DNA and plasmid with restriction enzymes Pst 1 and Hind III and used agarose gel electrophoresis to see if we successfully cut the DNA samples. When our cut pieces are put together some of them will loosely attach, to make a stable bond we use the enzyme DNA Ligase. To see if we successfully carried out the ligation, we transform our recombinant DNA into *E. coli* and grow those cells on an agar plate with ampicillin. We then selected several colonies from each plate and performed a PCR and electrophoresis on them. The idea is that some of the *E. coli* contain our plasmid that do not have our target DNA and we can identify those colonies by analyzing the gel. Next, we grew the cells in media and took samples of those cells and extracted our plasmid from them, cut the plasmid using the restriction enzymes, and ran an electrophoresis as a double check to ensure our *E. coli* cells contain our recombinant DNA. After confirmation, we purified the rest of the DNA from the *E. coli* cells to obtain our recombinant DNA. Next we performed a transformation of our recombinant DNA into a new strain of *E. coli* (BL21(DE3)RIPL) that is designed to create proteins. We grew these cells on agar plates with ampicillin and chloramphenicol and further grew the colonies that appeared on the plate. Our future goal is to obtain, purify, and study our protein.

WORSE OFF TOGETHER: CONSEQUENCES OF MICROSPORIDIAN AND VIRUS CO-INFECTION FOR PARASITE DYNAMICS AND BUMBLE BEE HOST HEALTH

Presenter: McCormick, Elyse
Graduate, Biological Sciences

Mentor: Prof. Ben Sadd

Authorship: Elyse McCormick, Ben Sadd

Host-parasite interactions do not occur in a vacuum, but in connected networks with multiple parasites. Resulting co-infections can have important consequences for host health but also for infectious disease ecology, including disease outbreaks. However, most host-parasite studies examine pairwise host-parasite interactions, meaning we still lack a general understanding of the influence of co-infections. Furthermore, as parasite dynamics are shifting in response to global changes, and as hosts become exposed to novel parasite combinations, studies of co-infections are critical. Bumble bees (*Bombus spp.*), pollinators of ecological, economic, and conservation concern, are exposed to multiple parasites. I will study the effects of co-infection using a microsporidian *Nosema bombi*, implicated in worrying declines of bumble bees, and Israeli Acute Paralysis Virus (IAPV), an emerging infectious disease of bumble bees due to spillover from honey bees. I hypothesize that infection outcomes of *N. bombi* and IAPV will be modified by co-infection, due to changes in host allocation to immunity. Specifically, infection outcomes of host resistance and tolerance and parasite virulence and transmission potential will be altered, depending on relevant temporal interactions. *Nosema bombi* is established as a severe, larval-infecting parasite in isolation, and I predict that a time-lagged co-infection will result in a decreased immune response and thus host resistance to a subsequent IAPV infection in adults. Also, I predict co-infection will reduce host tolerance, as measured by host survival. Current results indicate that IAPV drives host mortality, with no significant effect of co-infection or *Nosema bombi*. Molecular quantification of transmission potential is forthcoming.

PREDICTING THE BEHAVIOR OF CHAOTIC NEURONS USING RESERVOIR COMPUTING

Presenter: McGinnis, Cassie
Undergraduate, Physics
Mentor: Prof. Epaminondas Rosa
Co-Mentor: Prof. Rosangela Follmann
Authorship: Cassie McGinnis, Epaminondas Rosa, Rosangela Follmann

Reservoir computing in machine learning has become a powerful tool for anticipating the behavior of complex systems. Still, it remains not a small challenge to make long term predictions in the case of chaotic neuronal activity, as opposed to the case of periodic behaviors. In this study we test three different network topologies in the context of machine learning in order to find an optimal tool for neuronal predictability. We vary multiple parameters including the size of the reservoir, the probability of edges forming, the number of edges each node had, and the regularization constant to find the best fit between real and predicted data. We tested different network topologies and used error analyses along with Lyapunov exponents to obtain measurable quantities for the reservoir's performance.

CALLING OUT FOR LOVE: EFFECTS OF VARYING SEXUAL SELECTION INTENSITIES ON REPRODUCTIVE EFFORT

Presenter: McKermitt, Jack
Graduate, Biological Sciences
Mentor: Prof. Ben Sadd
Co-Mentor: Prof. Scott Sakaluk
Authorship: Jack McKermitt, Ben Sadd, Scott Sakaluk

Sexual selection is a critical selective force that promotes the evolution of traits that enhance an individual's reproductive success. To better understand the evolution of sexually selected traits, it is important to identify factors underlying variation in sexual selection. The mating system of an organism is one key component that can influence the magnitude of sexual selection. A common proxy used to characterize the mating system is the operational sex ratio (OSR), or the number of sexually active males to sexually receptive females. In addition, individuals may modulate their trait expression depending on the environment via behavioral plasticity. Using the decorated cricket (*Gryllodes sigillatus*), we established two selective regimes under different OSRs to investigate how the intensity of sexual selection influences the evolution of calling effort, a sexually selected trait of male crickets. I also exposed males from each OSR to different levels of perceived competition from rivals, recording their calls in the presence of an experimentally muted competitor or as solitary individuals. By manipulating the perceived risk of competition, it is possible to discern if males from different OSRs modulate their calling depending on the level of competition present. This study will contribute to our growing knowledge of the evolutionary ecology of sexual selection, using a system where fitness-relevant traits favored by sexual selection and male-female interactions can be easily quantified.

LOCAL VS NOVEL PRAIRIE SOIL MICROBES: TESTING FOR LOCAL ADAPTATION IN THE RESPONSE OF LOBELIA SPICATA FROM ILLINOIS VS KANSAS

Presenter: Metternich, Sydney
Graduate, Biological Sciences

Mentor: Prof. Diane Byers

Authorship: Sydney Metternich, Diane Byers

Plant-soil feedbacks have been well described as interactions between plants and soil microbes; soil microbes associated with plant roots, acquire nutrients for plants that are otherwise unavailable. Plants quickly differentiate a soil microbial community by attracting additional conspecific microbes, and while these microbes are often mutualistic, species-specific microbial pathogens can accumulate in the soil as well, generating negative plant soil-feedbacks. Biotic factors, such as soil history, in combination with abiotic factors, such as rainfall, determine the diversity of the soil microbial community. The North American Tallgrass Prairie ecosystem has been subjected to severe habitat fragmentation. The rainfall gradient (increasing eastward) which crosses where native prairie plant populations are found, provides a unique opportunity to study the effects of varying rainfall on soil microbial communities and how these communities subsequently influence the fitness of geographically constrained plant populations. To test for plant-soil feedbacks we performed a greenhouse study that subjected *Lobelia spicata*, a perennial prairie forb, sampled from populations in Illinois and Kansas to local and novel conspecific soil microbes. Additionally, they were treated with heterospecific soil microbes differentiated by native Illinois and Kansas *Andropogon gerardii* and *Lespedeza capitata*, grown in both states. Rosette diameter and biomass are used as estimates of plant fitness. Local adaptation is expected when *L. spicata* fitness is correlated positively with the locality of soil microbes; this would provide support for positive plant-soil feedback. Negative plant-soil feedback is suspected if *L. spicata* incurs a fitness advantage when freed from conspecific pathogens.

RELATIVE ENERGY DEFICIENCY IN SPORT (RED-S) RISK FACTORS AMONG COLLEGIATE ATHLETES

Presenter: Metz, Hope
Graduate, Kinesiology & Recreation

Mentor: Prof. Kelly Laurson

Authorship: Dale Brown, Samantha McDonald

BACKGROUND: Low energy availability is a topic of concern for recreational and elite athletes alike due to its negative impact on both physiology and performance. The introduction of the Relative Energy Deficiency in Sport model by the International Olympic Committee in 2014 highlighted the widespread effects of poor fueling on an athlete's overall health. Unfortunately, RED-S is not typically detected until the athlete has already suffered significant health or performance detriments from inadequate calorie intake.

PURPOSE:

By identifying early warningsigns of RED-S development, it may be possible to intervene before the syndrome significantlyimpacts the athlete's health or performance. The purpose of this study is to examine theprevalence of risk factors associated with RED-S among collegiate athletes and evaluate thepotential need for further RED-S screening and intervention measures at the university level.

METHODS:

The subjects include collegiate athletes who participate at the NCAA Division I level. The study involves two methods of data collection: a survey and a bone density scan. The survey will be distributed electronically using Qualtrics and bone density will be evaluated by a dual-energy x-ray absorptiometry (DXA) scan.

RESULTS/CONCLUSIONS:

The results fromthe survey and the DXA scan are expected to indicate the presence of RED-S among the subjects. There will likely be athletes who have experienced many of the risk factors addressed in the survey, which indicates an energy deficiency. Those who exhibit more risk factors associated with RED-S are also more likely to report a lower bone mineral density than the athletes who report fewer or no symptoms. We hope to underscore the need for coaches, trainers, and practitioners to identify and monitor athletes who are particularly at risk for RED-S, helping to ensure the health and safety of the athletes during their collegiate careers and beyond.

EFFECTS OF WINTER CASH CROP PENNYCRESS (*THLASPI ARVENSE*) ON NUTRIENT EXPORT IN THE UPPER MIDWEST

Presenter: Meyer, Ryan
Graduate, Biological Sciences

Mentor: Prof. Bill Perry

Authorship: Ryan Meyer, Nicholas Heller, Bill Perry

Nutrient loss from row crop agriculture in the upper Midwest has become a major issue for downstream water quality. This is particularly apparent in the Gulf of Mexico hypoxic zone where economic losses exceed two billion dollars annually. The EPA has identified the Upper Midwest as one of the primary contributors to the hypoxic zone with agriculture being a major source of nutrient export. Cover crops have the potential to immobilize nutrients and reduce nutrient export to surface water while improving soil fertility and reducing weed biomass. However, cover crops are poorly implemented, particularly in Illinois in which only 3% of row crop production utilizes cover crops. The novel, gene-edited, winter cash crop golden pennycress (*Thlaspi arvense*) has the potential to provide both ecosystem services and economic incentive through biofuel production. At the Illinois State University Farm, nine 0.8ha experimental plots have been established to quantify the reduction in nutrient export from subsurface drainage caused by pennycress. Plots are independently tiled with subsurface drainage collected using ISCO sampling units on agridrains. Preliminary results demonstrate a statistically significant reduction of nitrate nitrogen in soil porewater. Pennycress did not significantly reduce nitrate nitrogen in subsurface drainage or within the soil. While results are not yet conclusive, pennycress has the potential to reduce nutrient export while also providing economic incentive which can spur widespread adoption. Pennycress implementation would provide green cover on agricultural land during the cold season when it is most necessary to have crops keeping nutrients from leaving agricultural systems.

INVESTIGATION OF FACTORS INFLUENCING THE RELATIONSHIP OF COMPETITION LIFTS TO STRENGTH LIFTS IN OLYMPIC-STYLE WEIGHTLIFTERS

Presenter: Mintun, Bronson
Graduate, Kinesiology & Recreation

Mentor: Prof. Kelly Laurson

Authorship: Bronson Mintun, Kelly Laurson

The sport of Olympic Weightlifting consists of two contested lifts, referred to as the classic lifts. These lifts are the snatch, in which the barbell is lifted from ground to overhead in one swift movement; and *the clean & jerk*, in which the barbell is lifted from ground to shoulders in one movement (the clean), and from shoulders to overhead in another (the jerk). Besides requiring great amounts of physical strength to attain success, weightlifters must also become very technically proficient in the snatch and clean & jerk to achieve the greatest competition result with their present level of strength. These movements are very technically complex and often take years of training to truly master, so weightlifting training must balance specific work on the classic lifts with foundational strength exercises such as squats, presses, and deadlifts. The purpose of this study is to examine a number of factors, primarily length of training experience in weightlifting, and determine how these factors influence the ratio of classic lift to strength lift performance. Participants will complete an anonymous survey distributed electronically to determine personal bests in the classic lifts and foundational strength lifts (front squat, back squat, deadlift, strict press, bench press, push press), as well as personal factors such as age, sex, years of experience in resistance training and weightlifting, training days per week, whether or not the athlete works with a coach, whether or not the athlete competes in weightlifting, body weight when personal records were achieved, and performance enhancing drug use status. It is the primary hypothesis of this study that as weightlifting training experience increases, performance in the snatch and clean & jerk will represent a larger percentage of the athlete's performance in squats, presses, and deadlifts. Secondly, it is hypothesized that females, lighter athletes, and older athletes will snatch and clean and jerk larger percentages of their best strength lifts. Additionally, it is expected that strength lifts will be correlated with classic lift performance, with the front squat and push press showing a stronger correlation than deadlift, bench press, and strict press.

THE APPLICATION OF COLLABORATIVE ROBOTS IN GARMENT FACTORIES

Presenter: Nguyen, Kim Phung
Graduate, Family and Consumer Sciences

Mentor: Prof. Yoon Jin Ma

Authorship: Kim Phung Nguyen, Yoon Jin Ma
Ma

Industry 4.0 (I4.0) is reshaping and transforming many business models and manufacturing versions to bring the latest breakthroughs in the development and competition of many areas such as electricity, automotive, etc. (Jin & Shin, 2021). Mainly, robotics, intelligent manufacturing, 3D printing and knitting, virtual and augmented reality, and AI are the most significant applications of the I4.0 in the fashion industry (Jin & Shin, 2021). Regarding the robotics and intelligent manufacturing sectors of the I4.0, collaborative robots (Cobots), robot models, is a new significant technology of I4.0 and can function together with humans in an uncaged environment to have a better performance in safety and productivity (Perez et al., 2019). The current research of Cobot's applications in garment factories is still at the beginning stage (Lee et al., 2021). To the researcher's knowledge, at present, academia has not yet wholly explored how Cobots can be applied nor the impact of Cobots in the garment factories based on employees' perspectives. Especially, Vietnam is potential outsourcing for many famous brands globally with thousands of textile and garment factories. Therefore, it is a significant opportunity to understand the relationship between Cobot's factors and adoption intention in garment factories in Vietnam. The purpose of the study is to explore the feasibility of Cobots in the context of Vietnam's garment factories. A preliminary study was conducted with the garment employees at the management level to develop scenarios that illustrate how collaborative robots can be applicable to the production process in garment factories. As a theoretical framework, the Unified Theory of Acceptance and Use of Technology (UTAUT) of Venkatesh et al. (2003) is employed, and three additional constructs are included in the theoretical model to explore the acceptance level of Cobot's applications based on employees' intention in Vietnamese garment factories. Using an online survey tool, the data will be collected from 150 participants who are currently working in garment factories in Vietnam. They will answer a questionnaire on a 7-point Likert scale measuring variables of UTAUT models about Cobots implementation: performance expectancy, effort expectancy, social influence, behavioral intention, anxiety, trust to Cobots, personal innovativeness, facilitating conditions, and demographic and background information. The data will be analyzed using SPSS 28.0, including exploratory factor analysis, internal reliability assessment, and simple regression. The findings will be reported at the presentation.

THE EFFECT OF WASH TIMES ON THE COTTON JERSEY FABRIC PROPERTIES

Presenter: Nguyen, Kim Phung
Graduate, Family and Consumer Sciences

Mentor: Prof. Yoon Jin Ma

Authorship: Kim Phung Nguyen

In the fashion industry, many wearers are concerned about how long their clothing can last to see whether the price is worthy. It depends on many factors, among which is the refurbishing. After every washing, the fabric properties get worse. In reality, the wearers can see that the fabric surface becomes fuzzier, more loose yarns coming out, and pilling, etc. Therefore, this project aims to figure out how much home laundry factor changes fabric performance based on the number of washing times. The experiment was applied for 100% greige cotton Jersey fabric. This fabric was washed under the standardization of home laundry test conditions of the American Association of Textile Chemists and Colorists (AATCC). The fabric tests were followed two popular primary standards in the world, including AATCC and the American Society for Testing and Materials (ASTM). In this experiment, the six tests were run utilizing the standard test methods. First, ASTM D3776 Mass Per Unit Area (Weight) of Fabric was used to measure fabric weight. Second, the water absorbency of the fabric was measured by AATCC 79 Absorbency of Textiles. Third, ASTM D737 Air Permeability of Textile Fabrics was utilized to define the airflow rate per unit area at a given differential pressure, which is normally expressed as cfm/ft² at 0.5 inch water gauge. Fourth, AATCC 201 Drying Rate of Fabrics: Heated Plate Method was used to measure the rate at which a textile specimen dries after being exposed to water. Finally, AATCC TM198 Horizontal Wicking of Textiles and AATCC 197 Vertical Wicking of Textiles were employed to evaluate the ability of horizontally and vertically aligned fabric specimens to transport liquid along or through them. For each test, the results were collected after washing three times, five times, seven times, ten times, fifteen times, and twenty times. In conclusion, this study shows different testing results between those washing times to see how much fabric properties changed over the course of washing process and figured out what factors caused those differences to think about how to improve the fabric properties and hand feel. If the fabric properties can remain good quality after every wash, the long term usage of garments can be increased to be more economical and sustainable.

THE PRESENCE OF FOOD PRESERVATIVES IN THE DIET HAS NO SIGNIFICANT EFFECT ON THE BODY CONDITION OF HOUSE CRICKETS

Presenter: Nickel, Allison
Undergraduate, Biological Sciences
Mentor: Prof. Steven Juliano
Co-Mentor: Prof. Katherine Evans
Authorship: Allison Nickel

There has been a rising demand for certified organic foods over the past decade in the United States. This trend indicates that consumers are asking more questions about ingredients in their food and what potential adverse effects those ingredients may cause. The house cricket, *Acheta domestica*, is often found living in close proximity to humans, often in or around our homes. As omnivorous insects, house crickets will eat a diverse array of available foods, and they may be therefore exposed to the additives found in human food when they eat our scraps. In this experiment we sought to test the hypothesis that food preservatives have an effect on the body condition of house crickets. We set up two treatments with eight replicates per treatment. Individuals were fed diet treatments with or without the preservative sulfur dioxide present. The crickets were weighed twice per week to track and compare the mass changes between the two treatment groups. There was no significant difference in mass change between the two treatments (two-sample t-test) and in both cases the crickets lost mass, but the group with preservatives in their diet lost 1.6x the mass lost by the control group. We conclude that our experiment did not provide sufficient evidence to show that preservatives in the diet affect the body condition of crickets. The small size of this study and other confounding variables suggest that further research on this topic is needed verify these results and determine their broader implications. Effects of added preservatives in the diet remains a topic of concern for many consumers, so it is worthwhile to investigate any potential negative effects they may cause, be it for our own health, or other organisms that are model systems for an omnivorous diet.

SYSTEMATIC CONTROL OF THIOL GROUPS ON PROTEINS FOR MANIPULATING INTERACTION WITH GOLD NANOPARTICLES

Presenter: Ogunlusi, Tosin
Graduate, Chemistry

Mentor: Prof. Jeremy Driskell

Authorship: Tosin Ogunlusi

Proteins adsorbed to gold nanoparticles (AuNPs) form bioconjugates and are critical to many emerging technologies for drug delivery, diagnostics, imaging, and other biomedical applications. A robust interaction between the immobilized protein and AuNP is essential for the bioconjugate to perform as designed. Thus, extensive effort to understand protein-AuNP interaction is necessary. Recently, our group demonstrated that IgG has a stronger adsorption affinity to AuNPs than many other abundant blood proteins, and we attributed this high affinity to the number of free thiols displayed by IgG. Here we explore a potential correlation between the number of free thiols groups present in a protein and the protein-AuNP adsorption affinity. In this study, human serum albumin (HSA) was chemically modified to introduce additional free thiols using Traut's reagent. We quantified the displacement of unmodified and thiol-modified HSA analogs adsorbed on AuNPs by IgG using complementary analytical techniques, such as dynamic light scattering (DLS), inductively coupled plasma optical emission spectrometry (ICP-OES), UV-vis spectrophotometry, and an enzyme mediated assay. We found that HSA displacement from the AuNP correlated with the experimentally measured number of accessible free thiol groups. This work provides a pathway to control the number of free thiols on a protein to facilitate the synthesis of a robust bioconjugate capable of surviving a complex biological environment.

IN WHAT WAYS DO RESTORATIVE PRACTICES IMPACT DISCIPLINARY OUTCOMES AND SCHOOL CLIMATE AT BJHS?

Presenter: Owens , Jordan
Graduate, Social Work

Mentor: Prof. Karen Stipp

Authorship: Jordan Owens

Research with Restorative Practices promotes a collaborative environment and provides student support that works well alongside with other school services. This qualitative research examines the impact Restorative Practices has on disciplinary outcomes and school climate at BJHS. The participants include teachers from each team (15) at BJHS who will complete a 30-45-minute guided interview (two per week). This study also includes existing data regarding students who have taken part in restorative mediations at BJHS. Currently results are unavailable as data collection is ongoing. The results of this study could support and enhance the use of restorative practices as a responsive rather than reactive approach to addressing disciplinary procedures and promoting a more positive school culture.

SICK TO DEATH: SCREENING FOR THE THREAT OF PATHOGENS TO THE ENDANGERED RUSTY PATCHED BUMBLE BEE

Presenter: Palmer, Justin
Undergraduate, Biological Sciences

Mentor: Prof. Ben Sadd

Authorship: Justin Palmer, Ben Sadd

In recent years, there has been an alarming decline in biodiversity. Many species vital to the wellbeing of natural and human ecosystems, and thus our lives, are under threat. Pollinator insects epitomize this problem, and numerous bumble bee species are considered “threatened” in North America. One of those species, the rusty patched bumble bee (*Bombus affinis*), has seen a sharp decline over recent decades and is considered as “critically endangered” by the US Fish and Wildlife Service and represents the first federally listed endangered bee species. *B. affinis*, native to Eastern and Midwest US, as well as Eastern Canada, has seen a reduction in range of up to 85% over recent decades. Many threats to native bees are proposed, including pathogens, pesticides and climate change, and a previous study has found higher infectious disease prevalence in declining *Bombus* species. However, there is little knowledge about pathogens in *B. affinis*. This study surveys the disease prevalence of samples recovered from identified and protected nests and incidentally found individual bees in the Midwest. Samples are characterized based on stage (larva, pupa, adult) and caste (queen, male, worker). They will further undergo DNA and RNA extraction and analysis for the molecular detection of specific pathogens, as well as screening by microscopy. This work will reveal the extent of the threat of pathogens to remaining *B. affinis*’ populations and contribute to the drafting of the recovery plan for rusty patched bumble bees.

DOES PROGESTERONE REGULATE 5 β REDUCTASE (*AKR1D1*) LEVELS IN CHICKEN EMBRYOS?

Presenter: Parks, Megan
Undergraduate, Biological Sciences

Mentor: Prof. Ryan Paitz

Authorship: Megan Parks

During embryonic development, numerous developmental processes are affected by the presence of maternally derived steroids. Exposure to maternal steroids can be regulated by metabolism that takes place in the placenta (live bearing species) or extraembryonic membranes (egg laying species). The extraembryonic membranes are thought to prevent steroid access to embryonic tissues. 5 β reductase (*AKR1D1*) is an enzyme found in the extraembryonic membranes of chicken embryos that can metabolize multiple steroids like testosterone and progesterone, but levels of this enzyme drop as development proceeds. Concurrent with the drop in *AKR1D1* levels, progesterone levels in the yolk of chicken eggs drop during first few days of development as progesterone is metabolized. Given this, we hypothesized that progesterone induces the expression of *AKR1D1*. Based on previous knowledge, we will research two questions. Do injections of progesterone increase concentrations in the yolk? Do injections of progesterone increase *AKR1D1* gene expression? Understanding the relationship between progesterone and *AKR1D1* can provide insight on how steroid metabolism is regulated during embryonic development. For this study, quantitative polymerase chain reaction (qPCR) was used to measure *AKR1D1* expression within the extraembryonic membranes. Liquid chromatography-mass spectrometry (LC-MS) measured progesterone levels within the yolk. We found that progesterone injections increased levels of progesterone in the yolk but did not affect *AKR1D1* expression. Our results indicate that progesterone is not inducing the expression of *AKR1D1*.

IDENTIFYING B CELLS IN HATCHLING AND ADULT TRACHEMYS SCRIPTA, RED-EARED SLIDER TURTLES

Presenter: Paton, Hanna
Undergraduate, Biological Sciences

Mentor: Prof. Laura Vogel

Co-Mentor: Prof. Rachel Bowden

Authorship: Hanna Paton, Allison Mool, Christen Fairrow, Whitney Hurst, Rachel M. Bowden, Laura A. Vogel

Evidence suggests there are important differences between reptile and mammalian immune strategies, yet little is known about humoral immune responses in reptilian vertebrates. Our laboratory is interested in reptile B cell development and function and our undergraduate research project involved B cell detection using flow cytometry in spleens of hatchling and adult turtles. We made use of a previously developed monoclonal antibody (HL673) that recognizes turtle light chain protein. The murine HL673 mAb was purified using a protein A affinity column and reactivity was tested by ELISA. Some of the purified antibody was biotinylated and incubated with blood and spleen samples from adult and hatchlings. Bound antibodies were detected and B cell populations identified using flow cytometry. We were able to identify B cell containing populations based on scatter and specific staining. Our results showed detection of turtle B cells using the labeled mAb in both adults and 6 week old hatchlings. Future studies will use this reagent to further investigate the distribution and function of B cells. This work was supported by NSF 1725199 and NIH 1R15AI140118 – 01.

THE EFFECTIVENESS OF MCLEAN COUNTY SCREENING, ASSESSMENT, AND SUPPORT COUNSELING SERVICES.

Presenter: Pecoraro, Calista
Graduate, Social Work

Mentor: Prof. Kate Sheridan

Authorship: Calista Pecoraro

The purpose of the proposed study is to explore and describe the effectiveness of follow-up counseling services within the Screening, Assessment, and Support Services (SASS) program at the Center for Youth and Family Solutions. The question I have developed for this study is: What effect does follow-up counseling services, provided within the Screening, Assessment, and Support Services (SASS) program at the Center for Youth and Family Solutions, have on clients? Participants will be adults aged 18 years of age or older. Participants will be invited to complete an electronic survey via Qualtrics, or paper survey. Findings from this study will be used to inform improvements to SASS crisis intervention and therapeutic services.

INTERGENERATIONAL TRAUMA

Presenter: Perkins, Tyla
Graduate, Social Work

Mentor: Prof. Kate Sheridan

Authorship: Tyla Perkins

The aim of this study is to describe the relationship between intergenerational trauma and childhood exposure to violence. Prior research has shown the correlation between maternal mental health and the mental health of their children, as well as the likelihood of children exposed to violence becoming a batterer or victim. This study proposes that intergenerational trauma is a cause of a child's own trauma, and it can be said through the findings of this study that caregivers receive mental health services alongside or before beginning the healing journey of their children. Sources of data include existing ACE surveys administered at Children's Home & Aid as well as client intake records. The data sources were completed between January 1, 2021, through December 31, 2021. Participants and intake were completed by adult caregivers aged 18 years of age and older who have children receiving mental health services through The Butterfly Project.

REGULATION OF THE INHIBITION OF TELOMERIC TRANSPOSONS VIA P38KB IN DROSOPHILIA MELANOGASTER

Presenter: Pranskevicius, Emily
Undergraduate, Biological Sciences

Mentor: Prof. Alysia Mortimer

Authorship: Emily Pranskevicius, Jayla Snell, Samuel Esterly, Alysia Mortimer

As an organism ages, their gene expression changes. One change associated with aging is loss of inhibition of transposons. Transposons are sequences of DNA that contain their own DNA and are able to change position within the genome. When transposons move, they can potentially alter the expression of surrounding genes. *Drosophila melanogaster* (fruit flies) use transposons as their telomeres, and in humans, changes in telomeres are associated with aging. So far, we have found that loss of the p38Kb gene leads to premature aging, while over-expression of p38Kb leads to increased longevity. We have also found that altering the level of p38Kb results in changes in the expression of proteins that are encoded by genes off the telomeric transposons. We hypothesize that p38Kb regulates the inhibition of telomeric transposons. To test this, we are using eye color as a reporter of transposon activation, in which red eye color indicates activation and white eye color indicates inhibition of the transposon. First, we are testing if using this reporter allows us to detect changes in transposon expression with age. We are using a collection of reporters for transposons that are located in different regions of the chromosome, such as the telomeres and centromeres. We are currently analyzing flies with these reporter lines at varying ages to see if changes in reporter expression are present.

THE DIFFERENTIAL EFFECTS OF PRENATAL EXERCISE TRAINING TYPE ON MATERNAL GLUCOSE METABOLISM AND RISK OF GDM: A SECONDARY DATA ANALYSIS OF A PROSPECTIVE RANDOMIZED

Presenter: Prostko, Stephanie
Graduate, Kinesiology & Recreation

Mentor: Prof. Samantha McDonald

Authorship: Stephanie Prostko, Samantha McDonald, Kelly Laurson, Linda May

Background: Gestational diabetes mellitus (GDM) complicates 10-12% of pregnancies worldwide and poses significant, immediate and long-term health risks to both the mom and baby. While some studies demonstrate that prenatal exercise may aid pregnant women in managing their glucose levels and decreasing the risk of GDM, nearly all these studies exposed women to aerobic exercise. As such, the effects of different exercise training types, such as resistance training and combined aerobic and resistance training are unclear. In non-pregnant populations, these exercise training types show positive, independent effects on glucose metabolism. As such, the purpose of this study is to evaluate differential effects of prenatal exercise training types during mid-to-late pregnancy on maternal glucose and risk of GDM.

Methods: This study employed a secondary data analysis using data derived from a 24+ week exercise intervention among pregnant women. At 16 weeks of gestation, women were randomized to one of four groups: aerobic training (n=50), resistance training (n=50), combined training (n=50), and stretching and breathing (n=50). All groups participated in 50-minute, supervised sessions, three times per week. The exercise groups engaged in moderate intensity exercise while the non-exercise group performed stretches and breathing movements at light intensity. Maternal fasting glucose levels were measured via fingerstick blood draws at 16 and 36 weeks of gestation, GDM diagnoses were extracted from medical records and determined via oral glucose tolerance tests performed between 24-28 weeks of gestation. We will perform multiple linear regression models and Poisson regression models with robust error variance to assess the effects of exercise training type on maternal glucose levels and risk of GDM. Potential covariates include maternal age, parity, body mass index, race/ethnicity and baseline glucose and lipid levels.

Results: We anticipate that all exercise training types will elicit lower levels of glucose and risk of GDM compared to the stretching and breathing group. Further, we posit that the resistance training group will exhibit lower glucose levels compared to the aerobic training group. Lastly, we posit the combined training group will elicit the lowest levels of glucose compared to aerobic and resistance training-only groups.

Discussion: We expect to further elucidate the potential differential effects of various prenatal exercise training types on maternal glucose metabolism and risk of GDM. Our results may better inform practitioners, exercise specialists and the like on designing and implementing more effective exercise prescriptions, leading to healthier mothers and babies during and after pregnancy.

THE USE OF BIBLIOTHERAPY IN ELEMENTARY SCHOOL CLASSROOMS

Presenter: Pruettt , Allie
Graduate, Social Work

Mentor: Prof. Karen Stipp

Authorship: Allie Pruettt

Research emphasizes the importance of social emotional learning in the education setting. It is the responsibility of educators and school personnel to provide instruction and support in this area so that students can develop adequate skills necessary to self-regulate and maintain healthy relationships with others. Bibliotherapy is an engaging and understandable approach to teach social emotional learning to school-aged children. This research examines a current practice of bibliotherapy as a form of Tier-1 social emotional intervention and its usefulness in supporting the social emotional awareness of elementary-aged students. A sample of seven elementary classes ranging from first to third grade receive weekly lessons using Bibliotherapy. A pre-test/post-test measure was administered to gather self-reported data on whether the specific intervention approach yielded an increase in overall social emotional awareness. Quantitative data will be used to determine whether Bibliotherapy led to an increase in students' ability to identify feelings in themselves and others, know appropriate strategies to use, feel comfortable sharing emotions, and feel like they are in control of their emotions. Descriptive statistics will be used to indicate students' overall understanding of the specific curriculum used for the duration of this study.

RELATIVE AGE EFFECT IN NCAA DIVISION I VOLLEYBALL

Presenter: Redman, Grace
Graduate, Kinesiology & Recreation

Mentor: Prof. Scott Pierce

Authorship: Grace Redman, Scott Pierce, Adam Kelly

The Relative Age Effect (RAE) is a phenomenon in athletics related to an over-representation of individuals born closer to an arbitrary cut-off date based on their greater biological maturity. RAE has been shown in many different countries, at many different levels, and in many different sports, but no studies have been conducted on volleyball in the United States. Public data will be collected from the websites Division I and II volleyball programs. Specifically, birthday, class, home state, athletic timing, and red shirt status will be collected for approximately 1000 male and female student-athletes. The purpose of this study is to examine two aspects of RAE in NCAA volleyball. First, to see if RAE exist at this level of volleyball related to school and club cutoffs. Second, to see the relationship between RAE and the delaying of athletes in kindergarten and the delaying of athletes through freshman redshirting at the collegiate level. Data collection is in progress. Using Chi squared goodness of fit tests analysis, we hypothesize that RAE will exist in on time athletes for both men and women's Division I volleyball. We also hypothesize that delaying athletes at either kindergarten or freshman year (red-shirting) will reduce the effects RAE in these collegiate athletes. The findings of this study will provide unique insights on the impact of RAE on the developmental pathways for volleyball athletes and provide implications for coaches and administrators on ways to potentially reduce the effects of RAE at the collegiate level in hopes to equal the playing field.

THE RELATIONSHIP BETWEEN BMI, WAIST CIRCUMFERENCE, WAIST TO HEIGHT RATIO, AND RESTING METABOLIC RATE

Presenter: Reynoso-Romero, Emily
Undergraduate, Kinesiology & Recreation

Mentor: Prof. David Thomas

Authorship: David Thomas, Brandon Hobson, Kristen Lagally, Tyler Kybartas

Obesity levels are rising in the United States, as are morbid diseases such as cardiovascular disease, metabolic syndrome, and type 2 diabetes. Ascertaining the relationship between metabolism and anthropometric estimates of overweight/obesity is important in understanding the causes of the problem. **PURPOSE:** To determine the relationship between body mass index (BMI), waist circumference (WC), waist to height ratio (WHtR) and resting metabolic rate (RMR). **METHODS:** Eighteen (10M, 8F) individuals, 19-26 years old, were recruited to participate in this study and had their HT, mass, WC, and RMR measured. HT and mass were measured on a clinical stadiometer. BMI was calculated by taking the participant's mass in kilograms and dividing it by the square of their HT in meters. WC was measured using a standard measuring tape with the measure taken at the narrowest part of the trunk between the ribs and iliac crest. WHtR was calculated by dividing the WC by the HT of the participant. RMR was assessed using a metabolic cart that measured oxygen consumption and carbon dioxide production. RMR was also divided by mass to provide relative measures of RMR based on body mass (RMR/kg). Means and standard deviations were determined for all variables. Pearson product-moment correlations were used to statistically analyze the results. **RESULTS:** Means and standard deviations for each variable were: Age 22 years + 1.7; HT 173.1 cm + 12.06; Mass 83.5 kg + 27.75; RMR 1709 kcals/d + 391; BMI 28.00 + 9.9; WC 84.7 cm + 16.7; WHtR 0.49 + 0.10, RMR/kg 21.15 + 4.07. Correlation coefficients for RMR and BMI was $r = 0.44$, $R^2 = 0.19$; RMR and WC was $r = 0.59$, $R^2 = 0.35$; RMR and WHtR was $r = 0.37$, $R^2 = 0.14$. Correlation coefficients for RMR/kg and BMI was $r = -0.65$, $R^2 = 0.43$; RMR/kg and WC was $r = -0.60$, $R^2 = 0.36$; RMR/kg and WHtR was $r = -0.68$, $R^2 = 0.46$. **CONCLUSIONS:** RMR displayed a weak to moderate correlation with all three variables when absolute measures were used. RMR/kg displayed moderate negative relationships with BMI, WT, and WHtR. The results show that, in absolute terms, RMR is related to body size with larger bodies exhibiting higher RMR scores. However, when measured in relative terms, individuals with higher BMI, WC and WHtR scores exhibited lower metabolic rates per unit of mass which would be indicative of lower metabolically active tissue.

THE EFFECTIVENESS OF MYOFASCIAL RELEASE ON OVERHEAD ATHLETES WITH POSTERIOR SHOULDER TIGHTNESS

Presenter: Richey, Breiann
Graduate, Kinesiology & Recreation
Mentor: Prof. Nicole Hoffman

Authorship: Breiann Richey, Nicole Hoffman

Context: Posterior shoulder tightness is common among collegiate overhead athletes due to repetitive overhead patterns, often resulting in altered range of motion mechanics. This may be associated with additional non-painful hypersensitive areas of taut muscle called latent myofascial trigger points (MTrPs), which have been linked to muscle imbalances and weaknesses, impaired motor recruitment, and internal rotation (IR) deficits. Evidence supports improvements in glenohumeral range of motion (ROM) and isometric strength through instrument-assisted manual therapy techniques on MTrPs in baseball players. Ischemic compression (IC) is a form of therapeutic myofascial release that can be performed by any clinician trained in manual therapy. Although improvement in ROM and isometric strength have been indicated within other regions of the body using instrument-assisted techniques, it is unknown if IC treatment of latent MTrPs will improve glenohumeral ROM and isometric strength in other overhead athletes.

Objective: The purpose of this study was to determine the relationship between short- and long-term IR and ER ROM and isometric strength measurements before and after IC treatment. Additionally, we compared the effectiveness of IC on glenohumeral ROM and isometric strength improvements between various overhead athletes.

Study Design and Setting: Single-blinded randomized controlled trial in a controlled athletic training laboratory.

Patients or Other Participants: Forty healthy Division I collegiate overhead athletes from baseball, cheer, softball, swimming, track and field, and volleyball were included in this study. To be eligible, participants must have a total arc ROM deficit of $\geq 5^\circ$ in the dominant shoulder compared to the ideal 180° for overhead athletes or deficits of $\geq 20^\circ$ of IR compared to the contralateral shoulder, and at least two latent MTrPs in the dominant shoulder infraspinatus muscle.

Intervention: Participants were randomly allocated to one of two intervention groups: IC or sham IC. Participants in the IC group completed passive IR and ER glenohumeral ROM and isometric strength measurements before and immediately after IC treatment session #1, within 24-48 hours of IC treatment session #1, and final measurements taken within 24-48 hours after IC treatment session #2. The sham IC group completed the same procedures as the IC group, except researchers did not apply manual pressure to MTrPs.

Main Outcome Measures: Passive IR and ER glenohumeral ROM, isometric strength, and pain pressure threshold (measured by a digital pressure algometer). The Kerlan-Jobe Orthopedic Clinic scores and Penn Shoulder Scores were used to determine each participant's perceived level of dominant shoulder function before and after interventions.

PROTEIN MODIFICATION AS A FACILE APPROACH TO RETAIN ACTIVITY UPON CONJUGATION TO GOLD NANOPARTICLES

Presenter: Riley, McKenzie
Graduate, Chemistry

Mentor: Prof. Jeremy Driskell

Authorship: McKenzie Riley, Evan Strandquist, Christopher S. Weitzel, Jeremy D. Driskell

Gold nanoparticles (AuNPs) have garnered wide interest over the last decades in applications such as drug delivery, biosensing, electrochemical devices, and immunoassay development due to the unique optical properties and easily manipulatable surface chemistry. Protein-NP bioconjugates have gained particular interest in physiological applications, however a complete understanding of the protein-NP interaction to maximize bioconjugate stability and function is highly desired. In this work we explore chemical modification of a protein to precisely control the number of protein thiols and evaluate the impact of thiols on bioconjugation. Specifically solvent exposed lysine residues on the model protein -chymotrypsin (ChT) were reacted with 2-iminothiolane (Traut's) to introduce additional thiol groups that facilitate adsorption to gold nanoparticles. We hypothesize that multi-point adsorption through several thiol-Au bonds will yield robust, stable bioconjugates that retain enzymatic structure/function and resist aggregation. Dynamic light scattering and UV-vis spectroscopy confirms the formation of conjugates while salt induced aggregation kinetics demonstrate the increased stability due to chemical modification. Further, fluorescence spectroscopy was used to investigate the secondary structure post conjugation and was found that native ChT loses its secondary structure upon interaction with the gold surface. Ongoing efforts are focused on quantifying the activity of the immobilized ChT. The results of this study provide additional evidence for the importance and role of free thiols in the formation of stable and enzymatically active bioconjugates.

EXONERATION COMPENSATION ACROSS THE UNITED STATES

Presenter: Rivers, Davey
Graduate, Criminal Justice Sciences

Mentor: Prof. Michael Gizzi

Authorship: Davey Rivers

Each year an unknown number of innocents are wrongfully convicted and sentenced to serve time in prison for crimes they did not commit. It can take many years for their innocence to come to light through exoneration, wasting much of their lives. These exonerees are released back into the community with nothing, often not even an apology, but many states offer legal means through which they can receive compensation for their lost years. This research provides a comparative overview of the 39 compensation statutes around the country and assesses their provisions using qualitative research methods. The research shows the significant variation in the scope of compensation provided and the process for applying for it. The primary areas of variation in the statutes are the amount of financial compensation, the processes by which compensation claims can be filed, any additional benefits, and what renders an exoneree ineligible for compensation.

SUPPORT GROUP RESEARCH

Presenter: Schultz, Jaime
Graduate, Social Work

Mentor: Prof. Kate Sheridan

Authorship: Jaime Schultz

The purpose of this study is to gather information about support groups for children of divorce and to create and implement a curriculum using the study results. The participants include parents, teachers, physicians, and community members who are invited to complete an electronic survey. Using the data collected, a curriculum will be developed and implemented at Carle Behavioral Health.

TIME IS MONEY: THE EFFECT OF LEGISLATIVE PROFESSIONALISM ON TIME SPENT FUNDRAISING

Presenter: Seeley, Max
Graduate, Politics and Government

Mentor: Prof. Michael Hendricks

Authorship: Max Seeley

Despite the promise to increase the diversity of state legislatures through better pay, increased support staff, and longer legislative sessions, professionalization has failed to increase member diversity. However, these professionalization incentives to increase member diversity have unintentionally led to more electoral competition, an increase in the number of candidates, and higher campaign costs, which have ironically crowded out candidates from underrepresented backgrounds. Since candidates for seats in professionalized legislatures face more competition and a greater need for campaign funds, I argue they will need to dedicate more time to fundraising operations. This study examines my hypothesis by surveying 533 state legislators across three states about their campaign activities' time commitments and restraints. I expect that candidates running for seats in more professionalized legislatures will dedicate more time to fundraising as a function of campaigning. The expected findings can potentially advance our understanding of the unwritten requirements placed on candidates for state legislative seats and the barriers to entry created by those requirements.

NARCISSISM AND ALCOHOL OUTCOMES: THE ROLE OF DRINKING MOTIVES

Presenter: Solka, Jake
Graduate, Psychology

Mentor: Prof. Laura Finan

Authorship: Jake Solka, Laura J. Finan

Purpose: With rising subclinical narcissistic personality traits amongst college populations (Dingfelder, 2011) it is important to understand risk factors associated with student emotional well-being. Given that young adults have the highest prevalence rates of excessive drinking and associated adverse outcomes (CDC, 2019), it is important to examine factors that contribute to this health risk behavior. Previous research suggests that subclinical grandiose narcissistic traits as well as all four drinking motives (Cooper et al., 1994) are independently related to alcohol use and associated outcomes (Kuntsche et al., 2005; Kramer et al., 2019). However, it is unclear how these personality and motivational factors work together to contribute to student alcohol use and problems. Therefore, this study examined the moderating role of drinking motives on the relationship between subclinical grandiose narcissistic traits and past-month alcohol use, of heavy episodic drinking (HED), and negative alcohol-related outcomes.

Methods: Participants were undergraduate and graduate college students from a large, Midwestern university (N=406; 81% female; Mage=20.13, SD=1.69; 10% Hispanic, 85% White). Using a cross-sectional design, participants responded to surveys about their past-month alcohol use and HED frequency. The Brief Young Adult Alcohol Consequences Questionnaire ($\alpha=.93$; Kahler et al., 2005) was used to assess negative alcohol-related outcomes. The Five Factor Narcissism Inventory–Short Form; was used to assess narcissism subtype personality traits, including grandiose narcissism ($\alpha=.87$; Lynam et al., 2014). Finally, the 20-item Drinking Motives Questionnaire-Revised was used to assess drinking motives ($\alpha = .81-.94$; Cooper, 1994). Controls included gender, age, and ethnicity.

Results: Poisson regression analyses were conducted to examine associations between grandiose narcissism, drinking motives, and alcohol outcomes. After controlling for sociodemographic characteristics, enhancement, conformity, and social motives independently moderated the relationships between subclinical grandiose traits with past-month use ($b=.20, p<.01$; $b=.18, p<.01$; $b=.24, p<.01$, respectively), as did enhancement and social motives with HED frequency ($b=.02, p<.01$; $b=.02, p<.01$, respectively).

Conclusions: Findings illustrate that targeting motivations for alcohol use as well as addressing narcissistic personality traits may prove beneficial in therapeutic services and substance use prevention activities for young people, particularly in academic settings.

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UNDERSTANDING EXPUNGEMENT OF CANNABIS-RELATED ARRESTS AND CONVICTIONS IN LEGALIZED STATES

Presenter: Swanson, Alexis
Graduate, Criminal Justice Sciences

Mentor: Prof. Ralph Weisheit

Authorship: Alexis Swanson

In recent years, the United States has become more accepting of recreational cannabis. A majority of states and the District of Columbia have either decriminalized or legalized small, personal amounts of cannabis for adult recreational use (Harman, 2021). In addition, many states and Washington, D.C. have record-clearing laws that may be applicable to cannabis arrest and convictions (Hartman, 2021). Decriminalization and legalization of cannabis have helped to decrease the number of cannabis-related arrests and convictions across the U.S. (Adinoff & Reiman, 2019). In addition, the development of policies that allow for the expungement of certain cannabis-related arrests and convictions has helped reduce collateral consequences for people who have been impacted by punitive cannabis laws (Transform Drug Policy Foundation, 2021).

For this project, expungement and record-clearing procedures applicable to cannabis arrests and convictions in twelve states and Washington, D.C. with legalized recreational cannabis prior to 2021 are reviewed and compared. In addition, a search for data kept on expungement of cannabis-related arrests and convictions within these states is conducted.

Preliminary analysis shows that expungement policy differs somewhat significantly by state. Differences in expungement policy relate to the accessibility of expungement. In addition, only one out of the twelve states examined is shown to keep a limited special index on completed expungements. Considering these preliminary findings, barriers to accessing expungement and the drawbacks of limited data kept on expungement will be discussed, including how they relate to the cannabis criminal records expungement paradox coined by Julie E. Steiner (2021) as well as the possibility for racial disparities to exist.

ESTABLISHING THE TOTAL ANALYTICAL EFFICIENCY OF SUBSTRATES EMPLOYED FOR SURFACE SWABBING PSI-MS PROTOCOLS

Presenter: Taylor, Jasmine
Undergraduate, Chemistry

Mentor: Prof. Christopher Mulligan

Authorship: Ebenezer H. Bondzie, Trevor J. McDaniel, Christopher C. Mulligan

Paper spray ionization-mass spectrometry (PSI-MS) can be used to analyze the collection of chemical residues on a surface swab. This methodology performance is affected by the transfer/collection and ionization events. Herein, the transfer/collection efficiency of a variety of paper and surface candidates have been investigated to assess the performances of diverse papers and surface swabbing.

Chemical residues, of known masses, were deposited on surfaces of interest by spotting and drying exact volumes of serially-diluted analytical standards. The paper substrates were wetted with extraction solvent and used to swab the surface residues. The substrates were then placed in the appropriate solvent in auto-sampler vials and analyzed with LC-MS (Thermo Q Exactive HRMS with UltiMate 3000). Transfer efficiency was determined by comparing calibration curves with similar analytes. The different papers analyzed varied in size, pore size, and material to determine which has maximum transfer efficiency. The different surfaces analyzed simulated possible surfaces that are likely seen in forensic or police work that may have chemical evidence. Factors were considered that could affect the transfer methods used are solvents, pressure applied to swab, etc. Ionization efficiency was determined by using known and replicated measurements of the standards and its corresponding signal intensities.

The extraction, transfer and ionization efficiency provide information to anticipate situational performance of surface swabbing PSI-MS and ideal paper substrates for specific applications.

EXPLORING THE BENEFITS OF PRECISION AGRICULTURE TECHNOLOGIES FOR FARMERS

Presenter: Tibbs, Reagen
Graduate, Agriculture
Mentor: Prof. Maria Boerngen

Authorship: Reagen Tibbs

Since its introduction nearly 40 years ago, precision agriculture technologies have promised to revolutionize the agriculture industry by improving efficiency and increasing profits through increasing yields or decreasing input costs. Precision agriculture can be thought of more than just one technology, but as a whole suite of different technologies that serve different purposes. From the very first GPS-based guidance systems of the 1980s to self-driving autonomous tractors of the future, the goal of precision agriculture has not changed. One of these benefits is the ability of farmers to conduct their own on-farm research and trials. These precision technologies allow farmers to try new production practices, and better understand how these changes affect their operations. And the benefits of precision agriculture technologies are not just limited to farmers. Researchers that are conducting on-farm research can utilize these technologies to conduct their trials. The results from these on-farm trials can then be used in research and disseminated to farmers.

However, despite these promoted benefits, the adoption rates of precision agriculture technologies have remained low throughout the United States. Farmers have yet to recognize the benefits of these technologies on their operations, especially the benefit of conducting their own research on their operations. Additionally, there is skepticism in the agriculture industry towards researchers that attempt to answer questions without consulting farmers and their knowledge. Several studies have addressed the low adoption rates of precision technologies, and ways that researchers can utilize farmers' knowledge to benefit their research. Analyzing the perceptions that farmers have of precision agriculture technologies, and the factors that affect those perceptions and adoption rates, can lead to a better understanding of the complexity of precision agriculture adoption in the United States. Furthermore, researchers can better identify the best practices for conducting on-farm research with farmers.

Keywords: Precision Agriculture, Technology Adoption, Drivers of Adoption, Farmers' Perception, On-Farm Research.

A FORMATIVE EVALUATION OF RTI/MTSS IN A MIDWESTERN HIGH SCHOOL

Presenter: Tomasson, Lauren
Graduate, Psychology

Mentor: Prof. Mark Swerdlik

Authorship: Lauren Tomasson, Mark Swerdlik

A comprehensive program evaluation of a Multi-Tiered System of Supports/ Response to Intervention program (MTSS/RtI) was implemented at a high school. A formative evaluation approach was used to assess the effectiveness of the MTSS/RtI programs. This evaluation had to be modified from its original plan due to COVID-19. Data collection included interviews with stakeholders, interviews with model secondary MTSS programs from Florida, observations of problem-solving meetings, and a parent survey. Recommendations based on researcher conclusions from data sources were provided to stakeholders at the high school.

EARLY EVIDENCE OF THE EFFECT OF ASU 2017-12 ON DISCLOSURE QUALITY OF DERIVATIVE ACTIVITIES

Presenter: Troyer, Joseph
Undergraduate, Accounting
Mentor: Prof. Madeline Trimble
Co-Mentor: Prof. Joe Johnston
Authorship: Joseph Troyer

The growth in volume of derivative positions and derivative risk management practices over the last few decades has resulted in increased complexity of derivative accounting and disclosure. As such, users of financial statements have called upon the Financial Accounting Standards Board (FASB) to update guidance to increase transparency while preparers seek clearer guidance for the application of derivative related standards. The most recent derivative accounting guidance update, ASU 2017-12, broadens instruments that qualify for hedge accounting, expands allowable hedge accounting techniques, and reduces reporting requirements by omitting the need to report hedge ineffectiveness. While these changes might simplify reporting requirements, there is a risk that the omitted disclosures are risk relevant to investors (Chen, Liu, Seow and Xie, 2020). In this paper, we examine whether the FASB achieved its goal of increasing disclosure quality. Using a hand-collected sample of twenty S&P 500 firms, we find that, on average, weighted derivative disclosure quality (DDQ) decreased following the adoption of ASU 2017-12; however, this decline was not realized for firms that chose to adopt the standards early. Our early findings suggest that FASB's proposed benefits of applying the standard update were not uniformly achieved.

RECOGNITION OF TRAUMA IN FOSTER CARE YOUTH

Presenter: Vance, Savanna
Graduate, Social Work

Mentor: Prof. Karen Stipp

Authorship: Savanna Vance

In the United States, there are nearly half a million children in the foster care system. Research regarding youth in foster care has found that the majority of children in care have experienced multiple traumas including primary attachments disrupted by removal from the care of biological parents. Because of their experienced traumas, these youth are at an increased risk for mental health issues. This research examines how child welfare professionals including caseworkers, mental health counselors, judges, attorneys, and guardians ad litem understand trauma in youth, the impact trauma has on youth, and how their understanding of trauma impacts their decision-making on behalf of these youth. This research used mixed methods. It utilized a convenience sample of child welfare professionals recruited from email addresses available to Lutheran Social Services of Illinois. Participants were asked to complete a confidential survey regarding what trauma-informed training they have received, in what ways they recognize and assess trauma in youth in care, and what they take into consideration regarding trauma when making professional decisions on behalf of youth in care.

CHILDHOOD PARENTAL DEATH EFFECT ON DELINQUENCY

Presenter: Vargas, Stephanie
Undergraduate, Criminal Justice Sciences

Mentor: Prof. Joanne Savage

Authorship: Stephanie Vargas

Some argue that the most critical period of time for a human being is childhood. Children are extremely dependent on their caregivers. Some Developmentalists emphasize the importance of the attachment bond. When a child loses his or her caregiver, it can cause development disruptions. It has been argued that when children lose a caregiver, they do not just lose the person, they lose the attachment. Losing a parent in early childhood can lead to mental and behavioral disorders. Research also shows that young children with insecure attachments are at higher risk of developing behavior problems. In this paper I will examine the literature on the effects of parental death on child behavior problems. I will also analyze these associations using data from the National Longitudinal Survey of Adolescent Health.

"FROM HOPELESS TO HOMELESS TO HIRED TO HOUSING- ELIMINATING VETERAN HOMELESSNESS AND HOUSING INSECURITY IN THE 21ST CENTURY"

Presenter: Walsh, Jeffrey
Graduate, Politics and Government
Mentor: Prof. Michael Hendricks
Co-Mentor: Prof. Carl Palmer
Authorship: Jeffery Walsh

On any given day, in the world's richest country, 1 in 4 Americans who experience chronic homelessness and housing insecurities are Veterans. Unfortunately, government initiatives from previous administrations have not directly addressed the root causes of veteran homelessness and veteran unemployment, merely throwing money at the problem. However, homelessness in the veteran population is preventable. Yet, with the proper active duty job/career training and their wealth of knowledge and experience, America's veterans can significantly contribute to the American GDP and workforce. If we can use their skills appropriately in the 21st Century civilian workplace, we would likely see a significant reduction in veteran homelessness.

In this study, I examine how the types of transferrable job skills post 9-11 veterans received during training affect their housing insecurity and homelessness once they return stateside. For my research methods, I have chosen a multi-method approach.

I will use deductive reasoning and specific research questions to learn about military job training and military jobs held by post 9-11 soldiers who rank E-1 to E-4 while on active duty. Finally, I rely on qualitative interviews of officials at the Department of Veterans Affairs regarding any trends, patterns, and insights regarding veteran job insecurity and veteran housing insecurity. All of America's displaced veterans deserve the opportunity to go from hopeless to homeless to hired to housing.

CHILD WELFARE TURNOVER AND YOUTH OUTCOMES

Presenter: Wilson, Jallah
Graduate, Social Work

Mentor: Prof. Karen Stipp

Authorship: Jallah Wilson

Employee turnover is prevalent in the private and public child welfare system. This is concerning because of the unintentional impact turnover may have on foster care youth, who have experienced the trauma of removal from their primary attachment figure. Foster care youth are incredibly vulnerable to the transition of caseworkers in the child welfare workforce because caseworkers play an integral role in the lives of the youth. Caseworkers are tasked with the responsibility of maintaining the stability, safety, well-being, and permanency of foster care youth. This study explores the influence of employee turnover on youth in care outcomes from the caseworker's perspective. At the time of the study, participants were employed with the Springfield Department of Children and Family Services as child welfare specialists/caseworkers. Existing quantitative data from two DCFS agency reports, the Permanency Headcount and Caseload report and the Permanency Caseload Threshold Details report, were analyzed for frequency of caseworker turnover. Qualitative data was gathered using semi-structured interviews conducted with 10 participants, to gather participant experiences with case transitions and give an anecdotal account of how youth in care responded to the changes in workers.

ENVIRONMENTAL SECURITY IS THE KEY TO SUSTAINABLE DEVELOPMENT AND CONFLICT RESOLUTION

Presenter: Zak, Bridget
Undergraduate, Geography, Geology, and the Environment
Mentor: Prof. Alec Foster

Authorship: Bridget Zak

Although Environmental security is still a relatively new area of study, there is a lot of evidence that suggests interdisciplinary study could be the key to sustainable development and conflict resolution for the future. Environmental security is the interrelated protection of the natural environment from threats both natural and anthropogenic, in order to prevent conflict and ensure resource stability. Through researching past environmental security missions carried out by the United States Department of Defense, there is a clear relationship between environmental security and conflict prevention and resolution. One of the leading causes of global conflicts are over natural resources like water, oil, and fertile land. The goal of environmental security is to encourage and enforce sustainability to prevent and end disputes. However, I have found that those responsible for creating conditions that produce environmental security threats are not likely to be involved in solving them. Organizations like the United Nations Environmental Programme and the United States Department of Defense are some of the leading environmental security agents, their efforts demonstrate how focus on environmental security is an innovative method of conflict resolution, while promoting sustainability

CLONING, EXPRESSION, AND KINETIC CHARACTERIZATION OF THE FLAVIN COFACTOR SYNTHESIS ENZYMES FAD SYNTHETASE AND RIBOFLAVIN KINASE FROM *SULFOLOBUS ISLANDICUS*

Presenter: Zaman, Faeq
Undergraduate, Chemistry

Mentor: Prof. Jon Friesen

Authorship: Faeq Zaman, Jon Friesen

The metabolization of riboflavin is an essential pathway in all living organisms. The coenzymes produced, flavin mononucleotide (FMN) and flavin adenine dinucleotide (FAD), are so critical to energetic metabolism that insufficient quantities of them are known to cause poor responses to several human diseases. Riboflavin is metabolized in two main steps. Riboflavin kinase first phosphorylates riboflavin using ATP to create FMN. FAD synthetase then adenylates FMN using ATP and produces the final products FAD and pyrophosphate (PPi). The FAD biosynthetic pathway has been extensively studied in both bacteria and eukaryotes, but not much in archaea. In this project, two genes from the thermophilic archaeal organism *Sulfolobus islandicus* are annotated and suspected to encode for these two flavin cofactor synthesis proteins, FAD synthetase and riboflavin kinase. The genes are amplified and cloned, and their resulting protein products are expressed in *Escherichia coli*. Agarose gel electrophoresis and sodium dodecyl sulfate-polyacrylamide gel electrophoresis are performed to check and analyze each step of the cloning and protein expression procedures, respectively. Following purification of these monofunctional enzymes, catalytic activity is tested using a multitude of assays. After investigating many reaction conditions, results were finally obtained, through phosphorus-31 nuclear magnetic resonance spectroscopy, indicating that the enzymes indeed catalyze the phosphorylation and adenylation of riboflavin. Although FAD was ultimately formed, further work is still in progress to find the best conditions for these enzymes so that their kinetic parameters may be determined.

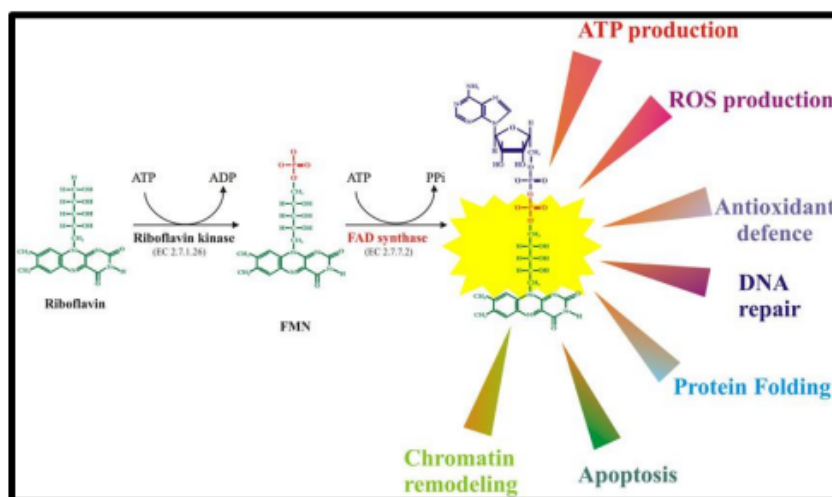


Fig. 1 Biosynthesis of FMN and FAD from riboflavin and the main functions of flavoproteins in living organisms (Giancaspero et al. 2015).

IN VITRO INHIBITORY ACTIVITY OF ANAEPHENE B AND ANALOGUES AGAINST LEISHMANIA TARENTOLAE

Presenter: Zaman, Shariq
Undergraduate, Chemistry

Mentor: Prof. Marjorie Jones

Authorship: Shariq Zaman, Juan Canchola, David Kukla, Timothee Staley, Jonathan Mills, Marjorie Jones

Amphipathic molecules such as detergents are characterized by having polar and nonpolar elements in their structure, making them effective in causing physical changes in many different substances. Some natural products have amphipathic properties that make them useful for therapeutic treatments to cure disease (1). In this study, a specific alkylphenol natural product, anaephene B, and unique synthesized derivatives of it, were tested for their inhibitory effect on the protozoan parasite *Leishmania tarentolae*. After a series of cell viability tests and enzyme assays, these test compounds have produced interesting results, showing similar potency against *L. tarentolae* as they do against drug-resistant bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA) (2). The experimental findings from this study allow for enhanced understanding of the structure-activity relationship between anaephene B and its analogues. Among the compounds tested, certain analogues were more effective than others in inhibiting *L. tarentolae*. So far, the natural product (anaephene B) and compound 7 seem to be potentially harmful to host organisms, whereas compounds 18, A, and B have shown encouraging experimental results. Depending on how well these antibiotic compounds perform against *L. tarentolae* in initial tests, more experiments may be conducted to assess whether they can be used in the formation of new therapeutics for leishmaniasis. Additional synthetic analogues will be tested in the continuation of this study.

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ASSESSING THE TOXICITY OF LEURS-I IN ESCHERICHIA COLI BL21 (DE3)

Presenter: Ziegler, Logan
Undergraduate, Chemistry

Mentor: Prof. Christopher Weitzel

Authorship: Logan Ziegler, Christopher S. Weitzel

Sulfolobus islandicus contains a duplication of leucyl-tRNA synthetase (LeuRS). These paralogs are referred to as LeuRS-F and LeuRS-I. LeuRS-F is known to be the canonical LeuRS for *S. islandicus*; however, the function of LeuRS-I is currently unknown. Past results have shown that LeuRS-I is toxic to *Escherichia coli*. We postulate that the enzymatic activity of LeuRS-I negatively influences the fitness of this model organism by promoting errors in protein synthesis by mischarging cognate leucine onto non-cognate tRNA substrates. In an attempt to determine the root cause of this toxicity, catalytic mutants of this paralog were assayed for their effects on the viability of an overexpressor strain of *E. coli* referred to as BL21(DE3). Experimental conditions tested for the plating assays included altering both the leucine content and inducer (IPTG) concentration within lysogeny broth (LB) solid supports. We speculate that increasing the leucine content will promote mischarging of the noncanonical tRNA substrates, while increasing IPTG concentrations will lead to the generation of more protein, both promoting the toxicity of wild-type LeuRS-I. Preliminary results assaying wild-type LeuRS paralogs alongside LeuRS-I mutants will be presented.

2022 University Research Symposium

Group Abstracts - Morning Session

AN EVALUATION OF USING TELEVISION SHOWS TO IDENTIFY AND APPLY DIAGNOSTIC CRITERIA OF PSYCHOLOGICAL DISORDERS THROUGH FICTIONAL CASE STUDIES

Group Leader: Auth, Sydney
Undergraduate, Psychology

Group Member: Grace Hughes, Undergraduate, Psychology

Mentor: Prof. Jeffrey Kahn

Authorship: Sydney Auth, Grace Hughes

Research shows that using visual/auditory media can help lead to better understanding and deeper processing of material learned in class (Berk, 2009). In this study, we will examine the effectiveness of how well students are able to apply diagnostic criteria of psychological disorders learned in class to fictional case studies. These fictional case studies will be presented in the form of episodes of various television shows. We expect to have no more than 86 participants as participants are students in Psychopathology who voluntarily elected to participate in this extra-credit activity. We have selected multiple options of episodes from television shows that feature different kinds of psychological disorders for students to choose from. Once they've watched the episode they selected, they will be asked to respond to a Likert scale question to determine how much students enjoyed the assignment, and open-ended response questions to demonstrate how they were able to identify the specific disorder featured in the episode they selected, and whether it was portrayed accurately to clinical criteria they learned in class, and they will be asked to provide diagnostic evidence from the show to support their claim. Students will also respond freely about how much they feel they've learned from this assignment and what improvements could be made for future classes. Students will be graded largely on the quality of their responses in order to receive extra credit, making this assignment not anonymous. We will collect a limited amount of quantitative data with responses to the Likert scale, as well as data on how many students complete it, and respond accurately to identifying the disorder in the show they watched. We will also collect qualitative data from the open-ended responses. We will evaluate how much students enjoy this type of application activity and examine how beneficial it is to their overall comprehension of course content related to diagnosis and treatment of disorders. We intend to sort through all of the qualitative data we receive from students and come to empirical conclusions about what the general response to the assignment was and whether or not this is a suitable assignment for future classes related to psychopathology.

COVID-19 RELATED STRESSORS PREDICT DISORDERED EATING BEHAVIORS AMONG COLLEGE STUDENTS

Group Leader: Baker, Andie
Undergraduate, Psychology

Group Members: Julian Ortiz, Undergraduate, Psychology; Alondra Faudoa, Graduate, Psychology

Mentor: Prof. Suejung Han

Authorship: Andie Baker, Julian Ortiz, Alondra Faudoa

Purpose: The COVID-19 pandemic resulted in rapid changes, including financial difficulties, food insecurity and increased levels of stress and emotional distress (Twenge & Joiner, 2020). These stressors contributed to increased disordered eating behaviors such as unhealthy weight control behaviors (UWCBS, e.g., Simone et al., 2020) and binge eating symptoms (e.g., Cummings et al., 2021) during the early phase of the pandemic. With the continued pandemic along with the partial recovery of daily activities, this study aims to examine (a) the current levels of Covid-19 related stress (i.e., financial difficulty, food insecurity, perceived stress, depressive symptoms) and disordered eating behaviors (i.e., UWCBS, binge eating, and eating to cope with stress) and (b) their associations. First, with limited previous research, we did not establish a hypothesis about the direction of changes; people may have adjusted to the pandemic and recovered their previous level of functioning (i.e., decreased stress and disordered eating consistent with hedonic treadmill hypothesis; Diener et al., 2006) or may have been exhausted psychologically due to the chronicity and continued uncertainty of the pandemic (i.e., increased stress and disordered eating consistent with the detrimental impact of chronic stress; Boonstra, 2013). Second, consistent with numerous studies that demonstrate disordered eating as dysfunctional coping with distress (e.g., Han & Pistole, 2014), we hypothesized that covidrelated stress would predict disordered eating behaviors.

Procedure: College students were recruited for psychology research participation credits. The study was approved by the university IRB and data collection is under way (n=51). We used the same measures as Simone et al. (2020)'s compare their mean scores on covid-related stressors and disordered eating obtained in the early stage of the pandemic with the mean scores obtained from this study. The measures include UWCBS questions, two binge eating questions, a coping subscale of the Motivations to Eat scale (Jackson et al., 2003), two items on stress, Kandel and Davies Depressive Mood Scale (Kandel & Davies, 1982), and three questions about food insecurity and financial difficulties.

Independent samples t-tests will be conducted to compare mean scores on the study variables reported in Simone et al. (2020) and obtained in our study. Multiple regression analyses will be conducted to examine associations between covid-related stressors and disordered eating behaviors.

Implications: The study findings will elucidate continued impact of the current pandemic and inform professionals who work with college students with disordered eating of the importance of addressing the role of the pandemic.

MEDIA PORTRAYAL OF FEMALE CHARACTERISTICS WITHIN DISNEY MOVIES INFLUENCING CHILDREN'S BODY IMAGE

Group Leader: Blasko, Kaitlyn
Undergraduate, Family and Consumer Sciences

Group Members: Mary Pohlman, Undergraduate, Family and Consumer Sciences;
Kehinde Ayedun, Undergraduate, Family and Consumer Sciences

Mentor: Prof. Ui-Jeen Yu

Authorship: Kaitlyn Blasko, Mary Pohlman, Kehinde Ayedun, Mollie Spoerer, Savannah Strassheim

As early as the 20th century, Disney, the company that specializes in media and film production, has been creating movies and films for young audiences. However, young girls have been more affected by the appearances of the characters within these films especially when there is not enough diversity with regards to ethnicity, body type, or overall appearance of these characters. The Disney characters are more likely to have a fair skin-tone and slimmer body frames, unrealistic to the way that a lot of young girls look in our society. Our study aims to examine whether there has been a change in the way that Disney portrays female characters in the films after the body positivity movement in 2012 and how they were portrayed in the films after 2012. A content analysis was conducted by collecting female characters of thirty Disney movies, fifteen that were shown before 2012, and fifteen that were shown after 2012. For each female character, physical attractiveness, body thinness, breast size, and ethnicity were analyzed. Results indicate that the Disney female characters after 2012 tend to show more diversity when it came to ethnicity, physical attractiveness, body thinness, and breast size. Disney has used more ethnically diverse female characters as well as a different range of body types after 2012. As female characters in Disney movies have a major influence on girls' body image, the change toward portraying more diverse beauty ideals in Disney movies will have a positive impact even though the change is slowly making progress for your audience. This study provides an insight of incorporating diversity and inclusion in media for children.

DEVELOPMENTAL IMPROVEMENTS IN CARDINAL, ORDINAL, AND SPATIAL LANGUAGE IN EARLY CHILDHOOD

Group Leader: Colwell, Alexis
Graduate, Psychology

Group Members: Michaela Hayes, Graduate, Psychology; Aaron Herr, Undergraduate, Psychology; Sarah Jacobsen, Undergraduate, Psychology; Olivia Mangini, Undergraduate, Communication Sciences and Disorders; Emily Monroe, Undergraduate, Psychology; Jadira Goss, Undergraduate, Psychology

Mentor: Prof. Alycia Hund

Authorship: Alexis Colwell, Michaela Hayes, Aaron Herr, Sarah Jacobsen, Olivia Mangini, Emily Monroe, Jadira Goss

Language is an important aspect of child development. Cardinal number words such as one, two, and three emerge before ordinal number words such as first, second, and third, though both increase with age in early childhood (Colomé & Noel, 2012). When children are less familiar with ordinal labels, it can negatively impact problem solving (Miller, Marcovitch, Boseovski, & Lewowicz, 2015). Similarly, spatial language improves from 3 to 5 years and helps with problem solving (Hund, Bianchi, Winner, & Hesson-McCinnis, 2017; Simms & Genter, 2019). One recent study compared ordinal and spatial language, finding that 3- and 4-year-old children were significantly less successful at a search task using ordinal labels than one using color labels, and their performance with spatial labels was intermediate (Hund et al., 2021). Our goal was to investigate cardinal, ordinal, and spatial language comprehension and production in one study to specify the developmental trajectory from 3 to 5 years. Thus far, 71 3-, 4-, and 5-year-old children were tested using cardinal (one, three, five), ordinal (first, third, fifth), and spatial (front, middle, back) labels, presented in counterbalanced order. Children were randomly assigned to either the Give Me or Tell Me condition and viewed a row of toy cars. In the Give Me condition, children were asked to place the appropriate car(s) into a toy garage based on the label provided by the researcher to test language comprehension, whereas in the Tell Me condition, children were asked to produce the correct label for the car(s) specified by the researcher to test language production. Analyses revealed significant developmental improvement from ages 3 to 4 years and 4 to 5 years. Children were significantly more accurate in the Give Me condition than the Tell Me condition suggesting comprehension is easier than production. Children were significantly more accurate on trials involving cardinal labels than those involving spatial labels and significantly more accurate with spatial labels than with ordinal labels. These findings are useful because cardinal, ordinal, and spatial language is important for many developmental domains, including academic success.

ALCOHOL AND CANNABIS CO-USE AND INTERNALIZING SYMPTOMS AMONG COLLEGE STUDENTS

Group Leader: Fay, Ali
Undergraduate, Psychology

Group Members: Jake Solka, Graduate, Psychology; Miranda Ellis, Graduate, Psychology; Nathan Beltran, Undergraduate, Psychology

Mentor: Prof. Laura Finan

Authorship: Jake Solka, Ali Fay, Sydney Tonkin, Miranda Ellis, Nathaniel Beltran, Aleena Mangold, Laura Finan

Purpose: With depressive and anxiety symptoms rising among undergraduate college students (Lee et al., 2021), it is imperative to understand the risk and protective factors associated with the emotional well-being of this population. One such risk factor may be use of alcohol and cannabis. Indeed, previous research suggests that both alcohol and cannabis use are independently related to symptoms of depression and anxiety (Geisner et al., 2012; Schry & White, 2013; Troup et al., 2016). Alarming, alcohol use is exceedingly common among college students (SAMHSA, 2019) and recent data suggest cannabis use has dramatically increased within this population (NIDA, 2019). The ways alcohol and cannabis co-use contribute to internalizing symptoms, however, remains uncertain. Therefore, in this study, we examined relationships between college students' alcohol and cannabis co-use and symptoms of anxiety and depression.

Methods: Participants comprised undergraduate college students from a large, Midwestern university (N = 416; 75% female; Mage = 20.23, SD = 1.52; 10% Hispanic, 83% White). Using a cross-sectional design, participants responded to surveys about their past-month alcohol and cannabis frequency. In addition, the 20-item Center for Epidemiological Studies Depression Scale was used to assess past week depressive symptoms ($\alpha = .90$; Lewinsohn, 1997) and the 7-item Generalized Anxiety Scale was used to assess past two-week anxiety symptoms ($\alpha = .94$; Spitzer et al., 2006). Controls included participant impulsivity, as assessed by the 8-item Brief Barrett Impulsiveness Scale ($\alpha = .83$; Steinberg et al., 2012), age, gender, and race.

Results: Over 80% of participants reported past month alcohol use, 42% past month cannabis use, and 39% past month alcohol and cannabis co-use. Structural equation modeling was used to conduct path analysis to examine associations between alcohol and cannabis co-use and depressive and anxiety symptoms. Results indicated that after controlling for sociodemographic characteristics and impulsivity, alcohol and cannabis co-use frequency was associated with both greater depressive symptoms ($b = 3.46, p < .01$) and anxiety symptoms ($b = 1.66, p < .05$).

Conclusion: Findings from this study highlight that targeting potential alcohol and cannabis co-use as facilitators of depressive and anxiety symptoms may prove beneficial in therapeutic services and prevention activities for young people, particularly in university settings. This indicates a step forward towards an awareness of the implications of co-use, which could lead to a foundation for intervention programs and public health resources in academic settings.

WHO'S CONNECTED TO WHOM AND HOW DO WE MEASURE IT? A SCOPING REVIEW OF SOCIAL NETWORKS OF PEOPLE WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITIES

Group Leader: Hodges, LT
Undergraduate, Special Education

Group Member: Sarah Gibbons, Undergraduate, Special Education

Mentor: Prof. Kim Fisher

Authorship: Linds Hodges, Sarah Gibbons, Kim Fisher, Clarie Stelter

Recent research indicates understanding adults with intellectual and developmental disabilities (IDD) access to social capital through social networks is important to understanding social inclusion, community participation, employment, and overall quality of life. However, it is not well understood how researchers measure social networks and to what extent they use a social capital framework to do so. Using Scrivens and Smith's (2013) social capital measurement theoretical framework and concepts of social network methodology, we conducted a scoping review of the literature on social network measurement for adults with IDD to analyze the extent to which the field uses social network data collection and analysis methods for both social network structure and social network support. In addition, we examined in which quality of life domains researchers used social networks. In total, thirty-six articles were identified. In total, 4715 adults with IDD social networks were measured. Most articles were published in Scandinavian countries, the UK, or Australia. Demographic data was limited and included only male/female genders and rarely collected data on race or ethnicity. When examining the social network structure, most researchers examined network size and composition. Fewer explored the frequency or mode of network connections and rarely examined how adults with IDD felt about their connections. For social network support, most researchers explored types of support exchanged and from whom the support originated. Rarely did researchers explore how adults with IDD felt about the support exchanged. Across all studies, only two used social network methods to collect and analyze the data and few asked adults with IDD themselves about their networks. Most studies explored social networks within interpersonal relationships or emotional well-being dimensions, not for personal development, rights, or self-determination. Recommendations include (a) presuming competence when collecting social network data, (b) using social capital dimensions and social network methodology to collect and analyze different type of social network data, and (c) using social network methods to explore other quality of life domains.

Keywords: social network; intellectual and developmental disabilities

ADOLESCENT STRATEGIES TO INTERVENE ON MICROAGGRESSIVE SOCIAL MEDIA POSTS

Group Leader: Hynes, Keeley
Graduate, Psychology

Group Members: Michelle Santana, Graduate, Psychology; Hailey Storm, Graduate, Psychology

Mentor: Prof. Brea Banks

Microaggressions are a form of racism that Solórzano and Huber (2020) argue are understood and evaluated using the basic tenets of Critical Race Theory. Research suggests that high school students experience race- and sexuality-based microaggressions, although little is known how microaggressive encounters that occur online impact adolescents. Research suggests that college-age individuals are unlikely to intervene in response to microaggressive situations, but there do not exist any studies that highlight high schoolers' responses to these transgressions. Although, there is evidence adolescents experience online victimization based on their race (Tynes et al., 2008). The researcher recruited adolescents from public high schools to assess adolescents' intervention strategies when witnessing a microaggression towards a peer on social media. Adolescents were exposed to microaggressive social media posts written by a hypothetical peer and were prompted to discuss intervention strategies they might use. These data were analyzed qualitatively.

RELATIONSHIP BETWEEN SNAPCHAT USAGE AND ANXIETY AMONG COLLEGE FRESHMEN

Group Leader: Jasinski, Luke
Graduate, Psychology
Group Member: Casey Grage, Graduate, Psychology
Mentor: Prof. Gary Cates
Authorship: Luke Jasinski, Casey Grage, Gary Cates

This study investigates the relationship between Snapchat usage and anxiety among college freshmen. Specifically, college freshmen were asked to provide their data related to total number of snaps, rate of snap, and their snaps send/receive ratio. In addition, these students were asked to complete an anxiety measure. Correlations between the above variables were calculated. Results and discussion focus on implications of understanding the relationship between social media usage and mental health. Discussion also focuses on directions for future research.

MUSIC, MOOD AND MEMORY: THE INTERACTION BETWEEN MOOD-INDUCING STIMULI AND SHORT-TERM FALSE MEMORIES

Group Leader: Martin, Amanda
Graduate, Psychology

Group Member: Maria Corea Dubón, Graduate, Psychology

Mentor: Prof. Dawn McBride

Authorship: Amanda Martin, Maria Corea Dubón

Prior research has investigated the effects of positive vs. negative mood on the production of false memories through the DRM paradigm, a procedure in which participants study list items related to a theme item resulting in false memories for the theme they did not study. Past research has shown that long-term memory false alarms are produced at greater levels among individuals in positive moods than those in negative moods. In the current experiment, we are investigating how mood, induced through music, may influence the production of short-term false memories and whether these false memories are produced at a greater rate in semantically or phonologically related lists. To examine this, participants will be randomly assigned to either a positive or negative mood-induced group. All participants will then study four-item lists of words that are semantically (meaning-based) related or phonologically (lexical-based) related. A single test item will then follow each list and will either be a studied item, unstudied item or a lure item related to all the words in the list. We hypothesize that the results will show that individuals within the positive mood group will produce higher rates of false alarms than the negative mood group; phonological lists will also produce higher levels of false alarms compared to semantic lists, especially in the positive mood condition. Sad mood should create more item specific processing, which reduces false memories for the lures. These results have implications for how negative and positive moods affect false memory.

VERTEX ALGEBROIDS AND CONFORMAL ALGEBRAS ASSOCIATED WITH SOLVABLE LEIBNIZ ALGEBRAS

Group Leader: Martin, Emma
Undergraduate, Mathematics

Group Members: Cesiley Barnes, Undergraduate, Mathematics; Josalyn Service, Undergraduate, Mathematics

Mentor: Prof. Gaywalee Yamskulna

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Vertex algebroids were first introduced in 1999 by Gorbounov, Malikov, Schechtman, and Vaintrob. Recently, vertex algebroids associated with simple Leibniz algebras were studied and classified by Bui, Jitjankarn, and Yamskulna, however there is still more to classify. The goal of our research is to study and classify vertex algebroids associated with cyclic Leibniz algebras by constructing vertex algebroids using two and three dimensional Leibniz algebras. We first investigate the vertex algebroids associated with a two dimensional cyclic Leibniz algebra, for which there are two types, solvable and nilpotent. We then move on to construct vertex algebroids from three dimensional cyclic Leibniz algebras, for which there are four types.

IMPACT OF THE PAYCHECK PROTECTION PROGRAM ON THE BANKING INDUSTRY

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A multidisciplinary team of undergraduate students researched specific effects of the Paycheck Protection Program (PPP) on the banking industry and county-level unemployment. The program helped small businesses stay afloat during the pandemic by providing low-interest loans with built-in forgiveness. The team aggregated PPP loan data at the bank and county levels and used regression analysis to answer the following questions:

- 1) Is greater county-level PPP participation associated with a lower increase in unemployment? Indeed, a 1% increase in the county-level ratio of PPP loans to the end-of-2019 county GDP is associated with the unemployment increase between 2019 and 2020 that is lower by 0.02%.
- 2) How did participating in the PPP affect banks' noninterest income and expenses?
 - a. Did banks with greater PPP participation have their noninterest expense increase. Processing many loans on a short notice is costly and drains resources, which may increase a bank's noninterest expense (e.g., salaries) in the short run. Consistent with this reasoning, a 1% increase in the ratio of PPP loans made by the bank to its pre-pandemic total assets is associated with a 0.02% increase in the bank's noninterest expense in 2020.
 - b. Did banks with greater PPP participation have their noninterest income decrease? Processing many loans on a short notice may force banks to divert employees and other resources from other services that generate noninterest (i.e., fee) income for the bank. Our findings contrast this prediction: a 1% increase in the ratio of PPP loans made by the bank to its pre-pandemic total assets is associated with a 0.05% increase in the bank's noninterest income. It may be related to higher fees generated for processing PPP loans.
- 3) Were banks with higher pre-pandemic interest expense (cost of funds) more likely to take loans from the Federal Reserve's Payment Protection Program Lending Facility (PPPLF)? The PPPLF had a fixed interest rate of 0.35%, while PPP loans had an interest rate of 1%. We find that banks with the higher pre-pandemic ratios of interest expenses relative to total assets were more likely to resort to PPPLF loans.

Based on these analyses and anecdotal evidence that many banks struggled to find resources necessary for an emergency lending program with such short notice, the team has recommended to have a centralized facility next time where both applicants and lenders would register.

HOW WE SEE OURSELVES: SELF-ESTEEM, PERCEIVED PHYSICAL ATTRACTIVENESS AND PERCEPTIONS OF BEING OVERWEIGHT

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We are a nation that emphasizes healthy self-esteem, and research indicates that there are many benefits of having a high self-esteem, including confidence, good physical and mental health, and better relationships (Seok & Park, 2021). Not everyone, however, has high self-esteem. There are many factors that contribute to having a high self-esteem, including early family experiences, acceptance from peers, and accomplishments (Cast & Burke, 2002; Schwalbe & Staples, 1991). While some of these factors contributing to self-esteem may be under people's control, other factors that affect self-esteem are not. Research has shown that one's physical attractiveness (which can be argued is somewhat out of one's control) contributes to self-esteem, with people who are more physically attractive reporting higher self-esteem (Seok & Park, 2021). Our research team (working under the direction of Dr. Susan Sprecher) is conducting secondary analyses of a few items from a large data set ($N = 8493$) collected over many years at ISU. Included in the survey distributed to the same sociology class over many years were two items on overall self-esteem (from the Rosenberg [1965] self-esteem scale), two items on self-reported physical attractiveness (e.g., "I am a physically attractive person"), and one item asking about whether one was overweight. We first extend a prior publication from these data (Sprecher, Brooks, & Avogo, 2013) but with more data collected, to examine gender and race differences in overall self-esteem, self-perceived physical attractiveness, and perceptions of being overweight. Second, and as a new contribution, we examine the association between self-esteem and self-ratings of physical attractiveness in the total sample as well as in different groups. Preliminary results indicated that men rated themselves higher on physical attractiveness than did women ($t = 7.45$; $p < .001$). Furthermore, men were less likely than women to view themselves as overweight ($t = 11.17$; $p < .001$) and men reported higher self-esteem than women ($t = 8.29$; $p < .001$). In preliminary analyses concerning race, African Americans scored higher on self-esteem ($t = 9.51$; $p < .001$) and on self-perception of physical attractiveness ($t = 13.85$; $p < .001$) than did Whites. Self-esteem was highly correlated with self-reported physical attractiveness for the total sample ($r = .65$; $p < .001$). However, perceived physical attractiveness was more highly correlated with self-esteem for women ($r = .68$; $p < .001$) than for men ($r = .59$; $p < .001$). Other results will be presented in the poster.

THE COVID-19 OUTBREAK AND DISORDERED EATING AMONG COLLEGE STUDENTS: MODERATING ROLES OF ATTACHMENT INSECURITY, EMOTION REGULATION DIFFICULTIES, NEGATIVE EMOTIONS AND PSYCHOLOGICAL NEEDS THWART

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Mentor: Prof. Suejung Han

Authorship: Julian Ortiz, Andie Baker, Alondra Faudoa

Purpose: The purpose of this study is to examine the continued effect of the covid-19 outbreak on people's perceived change in eating behaviors. Research has shown an increase in disordered eating behaviors (e.g., fasting, binge eating, purging) among college students to a significant degree (e.g., up to 70%) during the covid-19 outbreak (e.g., Coulthard et al., 2021; Zhou & Wade, 2021). We will examine whether the increase in disordered eating continues as the pandemic persists, despite some recovery of daily activities. Also, previous studies have established relational and emotional risk factors for disordered eating including attachment insecurity (e.g., Tasca et al., 2009), emotion regulation difficulties (e.g., Han & Pistole, 2014), negative emotions (e.g., Polivy & Herman, 1985), and psychological needs thwart (e.g., Han & Lee, 2017). Those may exacerbate the impact on stress caused by the covid-19 pandemic, resulting in increased dysfunctional coping behaviors such as disordered eating. Therefore, we hypothesize that students will report an increase in levels of disordered eating (i.e., dieting, binge eating, compensatory behaviors, & eating to cope with stress) compared to pre-pandemic levels of disordered eating. We also hypothesize the aforementioned risk factors will moderate such that those with the increased level of risk factors will report a much higher amount of disordered eating symptoms.

Procedure: A sample of college students at a Midwestern university was recruited to participate in an online survey of this study for a research participation/extra credit. This study has been approved by the IRB and data collection is under way (n=30). The measures included experiences in Close Relationship-Short Form (Wei et al., 2007), Difficulties in Emotion Regulation Scale-Short Form (Kaufman et al., 2015), PANAS (Watson et al., 1988), Psychological Needs Thwart Scale (Bartholomew et al., 2011), Eating Disorder Diagnostic Scale (Stice et al., 2000), Motivation to Eat Scale (Jackson et al., 2003), and a demographic form. Participants were asked to rate each item based on their perceptions of experiences before and after the outbreak of covid-19. One sample t-tests will be conducted with pre and post-pandemic scores on disordered eating measures. Multiple regression analyses will be conducted using the changed scores in disordered eating as DVs and risk factors as IVs.

STUDENT ATTITUDE CHANGES AND CURRICULAR BENEFITS FROM TWO INSTRUCTIONAL INTERVENTIONS

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Mentor: Prof. Raymond Zich

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We report on a study comparing the effects on student attitudes about science and student scientific reasoning skills of two instructional interventions applied in a single semester general education physics course. Testing indicates that students often have a poorer attitude about science after taking a science class. In addition, a goal of general science courses is to enhance scientific reasoning abilities in students. In the first intervention students watched eight short videos on physics topics and completed worksheets answering specific questions testing their comprehension of the concepts and the scientific reasoning shown. The second intervention consisted of having students manipulate 11 PhET simulations and complete worksheets based on the investigations using the simulations. The instructional interventions were applied for two control semesters, three video treatment semesters, and two PhET treatment semesters. The Colorado Learning Attitudes about Science Survey (CLASS) was used for pre and posttests to investigate changes in students' attitudes about science and Lawson's Classroom Test of Scientific Reasoning (CTSR) was used to measure student scientific reasoning skills. Findings showed overall pre to post shifts in student attitudes of 6.3% toward more expert-like attitudes, and improvements of 7% students' scientific reasoning skills with both interventions.

STUDENT PERCEPTIONS OF DIVERSITY COURSES ACROSS THE COVID-19 PANDEMIC

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The issues the Latinx community face remains to persist while attending a predominately white college environment (Garriott & Flores, 2013). The impact of the pandemic may have been magnified for students of color (Chirikov et al., 2020; Liu et al., 2020). COVID-19 lead to several issues including a lack of student and teacher engagement within online learning, continuous challenges in student life, and an overall disconnect between students and the university. Our data did not initially intend on collecting data about COVID-19, instead we intended to look at how to create more inclusive classroom pedagogical considerations for students, and particularly Latinx students. By chance, we gained student perceptions before, during, and throughout the pandemic. In this study, we identify how teaching considerations impact student perceptions by semester.

This qualitative study details the experiences of forty-two students (Latinx = 21/Non-Latinx = 21). Participants were identified through their involvement in psychology and/or policy and government classes, which focused on the unique experiences of Latinx families in society. From Fall 2019 to Spring 2021, two focus groups were conducted in each of the five classes: those who self-identify as Latinx and those who do not. Longitudinal qualitative analysis tracked the impact of pedogeological considerations towards DEI in classrooms throughout COVID-19. Coding was structured to identify changes in student perceptions based on pedagogical and university experiences by semester.

The findings from this study highlight the changes in student perception of the classroom by semester. We summarize key themes presented in each semester and detail how each subsequent semesters' classes were altered based on student perceptions. We then detail the impact of the changes. In sum, nearly all students felt a disengagement or disconnection to the university during the pandemic when transitioning to online learning. Both Latinx and Non-Latinx students detailed that Latinx students faced increased challenges as compared to Non-Latinx students while attending a predominantly White college setting during the pandemic.

Our work reflects on course pedagogical considerations during the pandemic and provides recommendations for educators and administrators for best practices moving forward. Suggestions and strategies to support Latinx students are provided for the faculty, department, and university to consider moving forward. As we begin to come back together in person, we can reflect on what has separated us. Our work supports a future with a sense of community where Latinx students feel their voices are heard and accepted on a college campus.

GAMING MINORITIES: ANALYZING THE EXPERIENCES OF NON-MALES IN ESPORTS GAMING

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Mentor: Prof. John Baldwin

This study aims to analyze the experiences of non-males in eSports gaming. Objectives include understanding the experiences of non-males and the treatment of non-males by male counterparts in eSports gaming. Current literature suggests that issues related to gender broadly plague the video gaming sector. Semi-structured interviews with seven non-male identifying participants were conducted. Emerging themes include gaming culture, communal support, friendship building, males as entry points, othering and accommodation, and representation and empowerment. Experiences varied some among assigned male and assigned female at birth participants. The results of this study have implications for future gaming and queergender research.

Keywords: eSports, gaming, gender, experience, representation, culture, othering