1
3:30-4:15PM
2nd Floor Hall

Nidhi Anugu (Human Physiology - Spring 25)
Carter Weyman (Biochemistry - Spring 25)

Mentor**(s): Masaaki Kurahashi** (Internal Medicine)

Investigating the role of platelet-derived growth factor receptor α (PDGFRα) positive interstitial cells (PIC) in gastrointestinal (GI) motility and dysmotility

PDGFRα-positive interstitial cells (PICs) play a critical role in coordinating gastrointestinal (GI) motility, yet their specific contribution to lower esophageal sphincter (LES) contraction remains underexplored. This project investigates how PICs influence LES tone, particularly in response to α1A-adrenoceptor activation. Using LES tissue, we examined the effects of silodosin, a selective α1A-adrenoceptor blocker, to assess changes in contractility. Preliminary data suggest that PICs mediate a significant portion of the α-adrenergic contractile response, acting as a critical relay between neurotransmitters and smooth muscle activity. These findings enhance our understanding of neuromuscular control in the esophagus and may inform future therapies for esophageal motility disorders.

2
3:30-4:15PM
2nd Floor Hall

Miranda Burnett (Accounting, Business Analytics -Spring 25)

Mentor**(s): Jaron Wilde** (Accounting)

The Potential Link Between Money Laundering and Tax Evasion

This paper explores the connection between money laundering and tax evasion. The central question is whether the established connection between money laundering and tax evasion describes the whole association. Money laundering and tax evasion are often linked together, particularly in anti-money laundering efforts, but there is no standard definition for this link. I explore the connection between the crimes to determine if there is a standard definition which can help crime prevention efforts. To reach this conclusion, I analyze current literature on both crimes and theory of the connection between them, as well as existing legislation. My findings are that tax evasion is often defined as a predicate offense of money laundering, but this does not explain the whole association. My research can be helpful in informing policy makers when creating legislation on money laundering and tax evasion, to strengthen worldwide prevention efforts relating to both crimes.

3
3:30-4:15PM
2nd Floor Hall

Jacob Cannon (Biomedical Engineering -Spring 27)

Mentor**(s): Kristan Worthington** (Biomedical Engineering)

Characterization of Bio-sourced Photoinitiator Systems (Bio-PhInS)

Light-based additive manufacturing, including 3D printing, is used in a variety of biomedical applications due to its precision and tunability. Despite these advantages, recent studies indicate that many commonly used synthetic photoinitiator systems (PhInS) are cytotoxic, carcinogenic, and environmentally disruptive. As a result, the development of bio-sourced PhInS has become increasingly important as industries and researchers shift towards more sustainable practices. Our overarching goal is to expand the library of efficient bio-sourced PhInS and accelerate the discovery of new bio-sourced PhInS by developing functional biomolecule screening tools. First, we characterized the photo-absorbance behavior of bio-sourced PhInS using a microplate

reader and found that even minor changes to the molecular structure caused potentially significant shifts in the maximum absorption wavelength. Based on fluorescence quenching measurements, several combinations of bio-PhInS were also determined to be promising candidates. The electrochemical behavior of some bio-PhInS combinations, as measured by cyclic voltammetry, validated the feasibility of some bio-PhInS' effectiveness and offered some clues about their photochemical reaction mechanism. To further understand the efficacy of these alternative bio-sourced PhInS, we measured the rate and extent to which they were able to instigate polymerization using photorheology, which tracks viscosity and stiffness in real-time. Some bio-sourced PhInS exhibited excellent performance by this measure, even behaving comparably to commercial, traditional PhInS. Taken together, our results speak to the promise of bio-PhInS and lay the foundation for further characterization, identification of reaction mechanism, and implementation in a wide range of light-based 3D printing applications.

4

3:30-4:15PM
2nd Floor Hall

Ian Triplett (Philosophy -Spring 25)

Mentor**(s): Cathleen Moore** (Psychological Brain Sci)

The oddball effect extends to dynamic stimuli

The oddball effect (OE) is a temporal illusion, according to which, rare stimuli (oddballs) are perceived as having a greater duration than more frequent events (standards) even when their physical durations are identical. Aside from frequency, oddballs are typically defined by their having a physical feature which varies from that of the standards (e.g. size, color, shape). In general, the greater an oddball's "oddness"⍰, the greater the magnitude of the OE. However, this relationship is not strictly linear nor is oddness the only relevant factor.

As demonstrated by Tse et al. (2004), the magnitude of the OE can be modulated by dynamics. Specifically, an expanding oddball among stationary standards induced a greater OE than a stationary oddball among expanding standards. The same degree of oddness (expanding vs. stationary) resulted in OEs with different magnitudes, suggesting that dynamics may play a special role in the OE. To test this, we replicated the serial-streaming paradigm from Tse et al. (2004) with all dynamic stimuli "" i.e. disks that continuously changed color. The oddball feature was a dynamic increase in size that either began immediately after stimulus onset (Experiment 1) or after a variable, short delay (Experiment 2).

Robust OEs were found in both experiments, confirming that (1) the OE occurs even when comparing two dynamic stimuli "" i.e. stimuli which have at least one feature which is constantly changing; and (2) that the oddball does not need to be recognized as such from the outset "" i.e. a stimulus can be identified as an oddball after the onset of stimulus presentation via the introduction of an unexpected feature change.

5

3:30-4:15PM
2nd Floor Hall

Ethan Chodur (Microbiology, Public Health -Spring 27)

Mentor**(s): Dustin Bosch** (Pathology)

Post-Transcriptional Regulation of MANPUL by Noncoding RNAs and Ribosomal Binding Proteins in Bacteroides thetaiotaomicron

Background

The commensal intestinal bacterium Bacteroides thetaiotaomicron (Bt) digests and utilizes alpha mannan, a complex polysaccharide found in yeast cell walls, using proteins encoded in a mannan polysaccharide utilization locus (MANPUL). Prior proteomic and RT-qPCR studies suggest that SusC and SusD, two MANPUL outer membrane proteins involved in alpha mannan transport, are post-transcriptionally upregulated in response to interaction with Phocaeicola dorei and Bacteroides fragilis. PULs in Bacteroides spp. are transcriptionally regulated in response to their substrates, and some are post-transcriptionally regulated by non-coding RNAs (ncRNA) and ribosomal binding proteins (RBPs).

Hypothesis

MANPUL is regulated in a contact-dependent manner by ncRNAs BTnc212 or BTnc213 and RbpA/RbpB.

Methods

Transcription of susC and susD was measured with RT-qPCR in Bt with deletion of rpbA/B and/or inducible overexpression of BTnc212/213. Bacterial growth was assessed in rich and minimal media with alpha mannan as the carbon source. SusD protein levels in Bt were assessed using a nanoluciferase complementation approach. Noncoding RNA expression was assessed with Northern blots.

Results

Deletion of rbpA or rbpB modestly reduced (1-2 fold), and overexpression of either BTnc212 or BTnc213 more markedly reduced (4-10 fold) SusC/D transcripts in Bt monocultures. Overexpression of ncRNAs slightly decreased Bt's growth in mannan minimal media. Preliminary nanoluciferase complementation experiments suggest that SusD protein is increased upon contact with B. fragilis. Expression of endogenous BTnc212 and BTnc213 is reduced upon contact with B. fragilis, a response enhanced by deletion of rbpA and rbB.

Conclusion

Our findings suggest that ncRNAs and Rbps regulate MANPUL, modulating alpha mannan utilization in Bt. Specifically, BTnc212/213 expression impairs SusC/D transcription and growth in alpha mannan media. Contact with B. fragilis upregulates MANPUL proteins, likely by reducing expression of the negative regulators BTnc212/213.

6
3:30-4:15PM
2nd Floor Hall

Kaitlyn Claypool (Exercise Science -Spring 25)

Mentor**(s): Terry Wahls** (Internal Medicine)

Adverse Childhood Experience Data for Efficacy of Diet on Quality of Life in Multiple Sclerosis (EDQ-MS)

Multiple Sclerosis (MS) is a degenerative autoimmune disease targeting a person's central nervous system. This disorder presents a wide range of neuromotor defects such as lowered cognition, tingling and numbness in the limbs, vision impairment, gait instability and more. These symptoms are due to the disease's destruction of myelin sheaths, or the nervous system's insulation on the axons or 'wiring' between the

neurons. The 162 participants in the study "The Efficacy of Diet on Quality of Life in Multiple Sclerosis"⬚ are between age 18-70 and are diagnosed with relapsing-remitting MS. They are randomized to one of three diets "" a Modified Paleolithic Elimination, a Time-Restricted Olive Oil Ketogenic, or their regular diet with supplied education resources from the American Dietary Guidelines website.

In addition to studying possible health benefits from these diet interventions, a secondary aim of the clinical trial is to identify whether a correlation exists between Adverse Childhood Experiences (ACE) and a future MS diagnosis. The participants used an Adverse Childhood Experience Questionnaire (ACEQ) through the REDCap data entry platform to report aspects of their mental and physical quality of life from birth to 18 years old. Through this project, I will compile the ACEQ data and analyze how ACE events can affect the likelihood of developing MS later in life.

7
3:30-4:15PM
2nd Floor Hall

Jae Dancer (Geoscience -Fall 25)

Mentor**(s): Benjamin Swanson** (Earth & Environmental Sci)

Groundwater Monitoring and Ecological Assessment Along Camp Cardinal Creek

Background: Macroinvertebrates are essential indicators of water quality and ecosystem health. Groundwater seepage in streams can create stable thermal environments that support various aquatic organisms. Camp Cardinal Creek, located at the south end of a planted prairie, has areas with presumed groundwater seepage, which may influence the distribution of macroinvertebrates. This study aims to identify groundwater input areas along the creek and assess their relationship with macroinvertebrate distributions.

Methods: We used a GNSS Trimble device to gather satellite topographic points by walking about 5 meters down the stream at each location, recording temperatures at given coordinates. We also used a FLIR Ignite thermal camera to create a mosaic map of the groundwater infiltration zone in one stream region using ArcGIS Pro. Finally, we conducted two rounds of macroinvertebrate surveys at four sites along the stream bed. We collected organisms from various habitats over a 50-meter stretch at each site. The spatial and temperature data were processed in ArcGIS Pro to produce a geospatial groundwater inflation map along the stream bed.

Results: Colder groundwater areas exhibited more species diversity than upstream locations. These areas also had more complex habitats, such as submerged vegetation and logs, while upstream areas were primarily streambeds with fine-grained sediments. The higher macroinvertebrate diversity in cooler downstream regions raises questions about whether temperature or habitat diversity drove these patterns.

Conclusion: The complexity of habitats in groundwater seepage zones makes it unclear if temperature alone influences species distributions.

8
3:30-4:15PM
2nd Floor Hall

Zachary Darr (Biochemistry and Molecular Biology -Spring 25)

Mentor**(s): Lori Wallrath** (Biochem & Molecular Bio)

An unbiased drug screen to treat a rare muscular dystrophy

The LMNA gene encodes lamins, intermediate filament proteins that make up a meshwork lining the inner side of the nuclear envelope. Mutations in the LMNA gene

cause three rare types of muscular dystrophy, collectively called LMNA-MD. Mutations resulting in amino acid substitutions that affect all three domains of lamins (N-terminal head, a coiled-coil rod, and a C-terminal Ig fold-like) cause LMNA-MD. Currently, there are no treatments for LMNA-MD other than symptom management. We have generated fruit fly (Drosophila melanogaster) models of LMNA-MD that recapitulate aspects of the human disease. In these models, we express mutant Lamin C (orthologue of LMNA) in the larval body wall muscles using the Gal4/UAS tissue-specific gene expression system. These larvae have reduced motility and 100% of them die at the pupal stage and never reach adulthood. We took advantage of this lethality and designed a drug screen to identify compounds that rescue this lethality. Larvae with muscle-specific expression of a mutant version of Lamin C with an arginine to a glutamine amino acid substitution at position 264 (R264Q) were used in this screen. This amino acid substitution corresponds to an arginine to glutamine substitution at position 249 in human Lamin A/C, which causes Emery-Dreifuss muscular dystrophy. This substitution alters the rod domain of the protein, which is involved in lamin dimerization. Larvae are raised on fly food containing drugs throughout their development. The resulting vials are scored for dead pupae and live adults. Clevidipine, an L-type voltage gated calcium channel blocker, partially rescued the lethality, resulting in living adult flies. This drug has been FDA approved for use in individuals with high blood pressure. To test for broad efficacy, we fed clevidipine to larvae with expressing other mutation versions of lamins that are associated with muscle disease. These include a serine to proline at position 72, an arginine to proline at position 237, and an arginine to tryptophan at position 264. All these amino acid substations affect the rod domain. In addition, we tested histidine to proline at position 545, and methionine to arginine at position 553, and arginine to proline at position 564. These amino acid substitutions affect the tail domain of lamin. In addition to Lamin C R264Q, there was partial rescue of R237P and R264W with clevidipine. These data suggest calcium dysregulation as disease mechanisms and clevidipine as a potential treatment for a subset of individuals with LMNA-MD.

9

3:30-4:15PM
2nd Floor Hall

Vanessa DeMarco (Economics, Ethics and Public Policy, Political Science -Spring 26)

Mentor**(s): Brian Lai** (Political Science)

Private Prisons, Private Interest: Examining the Campaign Contributions of Private Prisons to Pro-Life Gubernatorial Candidates

The purpose of this work is to examine whether gubernatorial candidate's position on abortion correlates with the campaign contributions they receive from private prison corporations.The rationale behind the study is that private prisons, which derive their profit from contracting with overwhelmed state and federal correctional facilities, have a financial incentive to increase US prison populations.

Through a quantitative analysis of gubernatorial candidates from all U.S. state races between 2010 and 2023, this study utilizes campaign finance data from OpenSecrets.org, alongside abortion stance data gathered from historical campaign websites, verified social media accounts, news articles, and voting histories. Candidates were coded as "pro-choice" if they expressed any documented support for increasing access to abortion and "anti-choice" if they supported restricting access.

While previous research has examined the involvement of major private prison corporations in other political spheres, namely immigration and criminal justice, no study has specifically addressed the connection between abortion policy and private prison interests. This paper seeks to fill the existing gap in research by investigating whether private prisons actively lobby for policies that could indirectly increase prison populations.

The findings reveal a significant correlation between anti-choice stances and campaign contributions from private prison corporations, suggesting that private prisons may have a vested interest in supporting candidates with restrictive views on abortion access. These results contribute to the broader conversation on the ethical implications of money in politics and offer insight into the increasing prevalence of anti-choice rhetoric in political discourse.

10
3:30-4:15PM
2nd Floor Hall

Adam Deters (Human Physiology -Spring 27)

Mentor**(s): Shujie Yang** (Pathology)

Patient-Derived Model Systems of Endometrial Cancers for Disease Modeling and Drug Sensitivity Testing

Endometrial cancer (EC) is the most common gynecological cancer in the US, with increasing incidence and mortality rates. The current survival rate lags behind compared to four decades ago (81% vs 87%), underscoring the critical need for more effective treatment strategies. The heterogeneous nature of EC contributes to varied outcomes with current treatments. This project aims to establish reliable EC models for characterizing each individual tumor, distinguish optimal drug treatment, and determine specific drug effect mechanisms for personalized therapy. We have collected 81 EC tumors and characterize them by DNA mutation and RNA-seq analysis. We implanted them in NSG mice, and 43 tumor samples have successfully grown in mice with a success rate of 53.1%. Most patientderived xenograft (PDXs) can be faithfully passaged to three generations. From the 43 PDXs, we created 11 novel PDCs. Using 2D and 3D spheroid cell culture, we screened 179 FDA-approved oncology drugs in the EC-PDC models. The drug screening results clearly highlighted several standout drugs, including cisplatin (an alkylating agent), gemcitabine (a nucleoside metabolic inhibitor), topotecan (a topoisomerase 1 inhibitor), and two topoisomerase inhibitors including idarubicin and doxorubicin. We compared the efficacy of various drug with the standard chemotherapy regimen for EC, which include carboplatin and paclitaxel. Our findings suggest that alternative drugs may offer effective treatment options for patients. By evaluating these promising drugs, we can determine the impact of different concentrations on tumor viability. The most effective concentrations for inhibiting EC tumor growth will then be tested in PDX models to simulate human chemotherapy. This multi-step approach ensures that the treatments are both safe and effective. The screened drugs have shown a significant ability to inhibit tumor cell proliferation. Additionally, using a combination of drugs may produce synergistic effects in multiple patient-derived cell (PDC) models. This combination strategy will be further tested in PDX models in the near future.

11
3:30-4:15PM
2nd Floor Hall

Charles Duffy (Theatre Arts, Psychology -Spring 26)
Connor Roberts (Psychology - Spring 25)

Mentor**(s): Isaac Petersen** (Psychological Brain Sci)

Investigating The Link Between Negative Parenting Practices and Child Inhibitory Control Across Time

Inhibitory control is a facet of executive functioning that allows one to override a predominant response. Previous research has identified negative associations between inhibitory control and behavioral problems in children. As such, it is important to identify environmental factors that influence the development of inhibitory control in children. Previous studies have surveyed parents about endorsement of physical punishment to conceptualize negative parenting. Those studies found that child inhibitory control significantly predicted later use of physical punishment and parental aggression, however, corporal punishment did not significantly predict later inhibitory control in children. It's important to identify whether other parenting practices do predict the development of inhibitory control. This study expands on ideas of negative parenting by supplementing corporal punishment with other aspects of negative parenting. This study examines broadband maternal negative parenting using the Multidimensional Assessment of Parenting Scale (MAPS). The MAPS includes dimensions of hostility (e.g. "I explode in anger toward my child"), lax control (e.g. "My child talks me out of punishing him/her after he/she has done something wrong"), and physical control (e.g. "I spank my child when they have done something wrong").

The current study used a cross-lagged model to identify bi-directional associations between maternal negative parenting and the development of children's inhibitory control. We hypothesized that maternal negative parenting would be associated with less growth in inhibitory control nine months later. Negative aspects of parenting may reduce child self-control because children might receive punishment before they are able to exercise control over their behaviors deemed as "naughty." Threats of punishment could heighten a stress response to uncertainty that can interfere with development of executive functioning. We also hypothesized that inhibitory control would be negatively associated with maternal negative parenting nine months later. As poor inhibitory control creates more demand for parents to respond to behaviors, parents may resort to being permissive or utilizing harsh punishment out of resource depletion. The sample consisted of mother-child dyads with children aged 3-7 years (N=231). Mothers completed the MAPS questionnaire and children completed a battery of behavioral tasks in the lab to measure inhibitory control (e.g. Simon Says). These tasks were then pooled into a composite score to examine overall inhibitory control skills.

Results showed that maternal negative parenting, at a given timepoint, was not significantly correlated with children's inhibitory control nine months later, even after accounting for prior levels of inhibitory control. Additionally, children's inhibitory control did not predict maternal negative parenting nine months later. Some limitations of the study include the low variability of the composite variable for inhibitory control, generally low endorsement of negative parenting behaviors, and reliance on parental self-report instead of behavioral coding of parent practices.

Future research should continue to investigate the relations between these variables by recruiting a more socioeconomically diverse sample that displays a broader range of parenting behaviors. Future research should consider the role of inhibitory control

in the quality of parent-child interactions, which may give more information to how inhibitory control influences parenting practices. Additionally, there could be differences in parent perception of child inhibitory control and the child's actual behavior. These reports should be added into the composite score of inhibitory control to have a well-rounded understanding of the child's behavior.

12
3:30-4:15PM
2nd Floor Hall

Delaney Eden (Political Science -Spring 25)

Mentor**(s): Brian Lai** (Political Science)

Research on the Detainees at Guantanamo Bay post 9/11.

In my research, I aimed at trying to figure out what factors correlated to the outcomes passed down onto those detainees that were held at Guantanamo Bay, Cuba after the events of 9/11, and why. These outcome options included being transferred and/or repatriated, being charged with a crime, or being held in indefinite detention.

13
3:30-4:15PM
2nd Floor Hall

Devin Ensley (Political Science -Spring 25)
Alliya Kazan (Political Science - Spring 25)

Mentor**(s): Frederick Boehmke | Taylor Tokos** (Political Science | Political Science)

The effect of gender of state executives during the COVID-19 pandemic

NA

14
3:30-4:15PM
2nd Floor Hall

Darby Forsyth (Biology -Spring 25)

Mentor**(s): Hans Joachim-Lehmler | Laura Dean** (Occup & Environ Health | Occup & Environ Health)

Metabolomic Alterations Induced by Heat Exposure in Pregnant Mice

Extreme heat events are intensifying worldwide due to climate change, posing public health challenges for vulnerable populations such as pregnant women. There is a critical need to elucidate how extreme heat events affect maternal physiology, fetal development, and long-term health outcomes. This study investigated the hypothesis that exposure to a simulated heat wave would disrupt metabolic processes in pregnant mice. At gestation day 10, pregnant mice were assigned to either a heat-exposed or a control group. The heat-exposed group underwent a simulated daily heatwave, where temperatures were increased from 26°C to 37°C, maintained at 37°C for 5h, and returned to 26°C each day. Control animals were maintained at 23°C. On day 5, following the final exposure to 37°C, animals in both groups were euthanized, and maternal liver, lung, serum, and amniotic fluid were collected for metabolic analysis. Based on partial least squares discriminant analysis (PLS-DA), the metabolomic profiles of heat-exposed pregnant mice differed from those of controls across all tissues. A heat map revealed distinct clustering of metabolomic profiles, highlighting significant metabolic shifts in heat-exposed pregnant mice compared to the control across all tissues. Heat exposure differently altered several KEGG pathways, such as the "Fatty Acid Biosynthesis, Elongation and Degradation" pathway in the liver and serum. "Beta-Alanine Metabolism"� was suppressed in amniotic fluid. These findings show significant metabolic adaptations in pregnant heat-exposed mice

compared to control mice and highlight the importance of further research to fully understand the implications of extreme heat events on maternal and fetal health.

15
3:30-4:15PM
2nd Floor Hall

Hannah Franke (Psychology, Linguistics -Spring 25)

Mentor**(s): Bob Mcmurray** (Psychological Brain Sci)

The Impact of Meaning-Based Priming on the Dynamics of Spoken Word Recognition

Prior work has found that the semantic relationships between two words facilitates their retrieval when presented sequentially (Meyer & Schvaneveldt, 1971), which has been robustly studied across a variety of paradigms (Huang & Snedeker, 2011; Yee & Sedivy, 2006). What is still unknown is how semantic priming impacts the dynamics of spoken word recognition""for instance, the semantics of a word could either inhibit or facilitate both relational and phonological competition dynamics of word recognition, which have been examined by many studies in spoken word recognition literature using the Visual World Paradigm (VWP) (Jeppsen et al., 2024; McMurray et al., 2010). Participants read a story that semantically primed either a spoken word, an unrelated word, or a semantic or phonological competitor. Across experiments, participants were significantly faster to fixate the spoken word following priming of a semantically related discourse (all ts > 1.99, all ps < .031), suggesting that semantic priming is indeed facilitating spoken word recognition. Participants also exhibited a significantly increased proportion of fixations to the phonologically related competitor of a primed word that was neither spoken nor pictured on the screen across items and subjects (all ts > 3.15, all ps < .002). This suggests that semantic priming facilitates the dynamics of efficient word recognition not only at the level of meaning, but at the level of mental representations of wordforms.

16
3:30-4:15PM
2nd Floor Hall

Grace Pierce (Biomedical Sciences -)

Mentor**(s): Jan Fassler | Tara Hicks** (Biology | Biology)

Using Yeast to Investigate the Role of ATP in Pathological Aggregation

Neurodegenerative diseases pose an outsized healthcare challenge with a prevalence of >7 million in the US. Aging is the primary risk factor, with one in ten individuals over 65 having an Alzheimer's diagnosis. In neurodegenerative diseases, specific proteins misfold into large solid phase condensates known as amyloids that build up in brains, especially in cases of impaired energy metabolism. Robust cellular circuits that generate energy in the form of ATP are key to a healthy brain. ATP makes at least three contributions with respect to protein aggregation. First, at micromolar concentrations, ATP is important for the energetic requirements of the cell, including enzymes that utilize ATP to drive the clearance of toxic aggregates. Second, at low millimolar concentrations, ATP can interact with the basic residues of intrinsically disordered proteins to form an intermolecular interaction network that contributes to the formation of liquid droplets, another type of condensate. Finally, at higher millimolar concentrations, ATP has hydrotrope activity, which leads to the solubilization of aggregated proteins. This may explain why ATP is maintained in cells at levels much higher than that required for enzymatic reactions, while the condensate promoting activities of ATP may explain why mild reductions in ATP levels in aging brains are problematic. We used the QUEEN ATP biosensor to investigate how

ATP affects aggregation of proteins involved in Alzheimer's (Ab42) and Parkinson's Disease (synuclein) pathologies. We found that these proteins are highly aggregated in ATP homeostasis and biosynthetic mutants having reduced ATP levels and that aggregation can be reduced by drug and genetic overexpression treatments leading to an elevation in ATP. We propose that ATP is a central leverage point in modulating aggregation in healthy and diseased brains.

17
3:30-4:15PM
2nd Floor Hall

Colin Houts (Chemical Engineering -Spring 25)

Mentor**(s): Eric Nuxoll** (Chemical & Biochem Engine)

Design and Synthesis of NIR-Fluorescent Carbon Dots for Remote Temperature Detection

Each year thousands of patients face a bacterial infection on a surgically implanted medical device. Medical implant infections are most often caused by bacterial biofilms, a colony of bacteria that has built a protective matrix making them extremely resilient to antibiotics. The current standard of care for biofilm infections is to surgically remove the infected device and reimplant a new one in a painful and frustrating series of surgeries. One promising alternative is to use a remote thermal shock applied using an alternating magnetic field to heat the surface of the medical implant and eliminate the bacterial biofilm. Current research has shown that thermal shocks at clinically applicable temperatures are effective in eliminating bacterial biofilms with and without joint antibiotic treatment. Additionally, studies have explored methods of synthesizing films that can be coated on currently used medical implants to apply the thermal shocks. However, one area that has not been studied is how to monitor and control the thermal shock temperature. Controlling the temperature is imperative to ensure the implant heats enough to eliminate the bacteria, while minimizing injury to the patient. This problem may be solved by using near-infrared fluorescent carbon dots. Human tissue is highly transparent to the near-infrared region of light enabling remote detection of carbon dot fluorescence within the body. By coating a medical implant with near-infrared carbon dots dispersed in a polymer matrix the change in fluorescence in response to temperature can be quantified to enable remote temperature detection. Remote temperature detection may enable the non-invasive and well controlled application of thermal shocks to treat medical implant infections.

18
3:30-4:15PM
2nd Floor Hall

Jack Ingalls (Nondegree Student -Spring 29)

Mentor**(s): Greta Sokoloff | Mark Blumberg** (Psychological Brain Sci | Psychological Brain Sci)

Age-dependent effects of 3-acetylpyridine injection on developing cerebellar olivary climbing fibers

Climbing fibers are axons that originate in the inferior olive (IO) and synapse with Purkinje cells within the cerebellum. Climbing fibers form glutamatergic, excitatory, synapses on Purkinje cells. VGLUT2, or vesicular glutamate transporter 2, is a protein responsible for "refilling" synaptic vesicles with glutamate and is a useful marker for climbing fiber synapses. Using immunohistochemistry, VGLUT2 proteins are fluorescently labeled and visualized, illustrating the strength of the climbing fibers

present. Climbing fibers are known to play a significant role in motor learning, however, their sensorimotor system function before motor learning occurs is not well understood. Climbing fibers begin refining their connections to Purkinje cells around postnatal day 12 (P12) but undergo substantial development and refinement until approximately P19. Harmaline and 3-acetylpyridine (3AP) can be used to pharmacologically lesion these fibers thereby cutting off communication between the IO and Purkinje cells. This poster looks at the differences in VGLUT 2 density, as a proxy for climbing fiber innervation of Purkinje cells, based on age at harmaline and 3AP injection. How does the age of the pharmacological lesion affect the overall loss of connectivity between climbing fibers and Purkinje cells.

19
3:30-4:15PM
2nd Floor Hall

Neeki Karami (Public Health - Spring 27)

Mentor**(s): Catherine Marcinkiewcz | Nagalakshmi Balasubramanian** (Neurosci & Pharmacology | Neurosci & Pharmacology)

Neurobiological Effects of Dorsal Raphe Serotonin Systems on Social Avoidance in Alcohol Use Disorders

Social interaction is a fundamental aspect of motivational behavior and overall health, often disrupted in conditions such as alcohol use disorder (AUD). Positive social bonds help mitigate stress and promote recovery, while reduced social interaction can exacerbate stress-related and depressive disorders, increasing the risk of alcohol relapse and abuse. This study demonstrates that chronic intermittent ethanol (CIE) exposure induces social avoidance in mice in a sex-dependent manner, linked to hyperactivity of serotonin (5-HT) neurons in the dorsal raphe nucleus (DRN). While 5-HT-DRN neurons typically promote social behavior, specific serotonergic pathways appear to mediate stronger social avoidance responses. Previous work from our lab identified a subset of DRN5-HT neurons projecting to nucleus accumbens (NAc) dynorphin neurons promoting social avoidance in male mice. To selectively label 5HT neurons activated by CIE, we employed the targeted recombination in activated populations (fos-TRAP) method using Fos-icreER x Ai14 mice. These mice underwent an eight-week, two-bottle choice ethanol drinking paradigm. Following 24 hours of withdrawal, 4-hydroxytamoxifen was administered to TRAP activated neuronal populations. Two weeks later, mice were perfused, brains were extracted, and sliced, and immunofluorescence staining was performed on DRN slices using TPH2 antibodies. Confocal microscopy images were analyzed for colocalization of tdTomato and TPH2 signals across the rostral-caudal axis. The analysis revealed an increased number of tdTomato+ 5-HT neurons in the caudal DRN, suggesting heightened sensitivity and hyperactivity of serotonin levels following CIE exposure. Future studies are needed to elucidate the role of caudal 5-HT neurons in the NAc circuit and downstream signaling pathways after CIE. These findings highlight serotonergic hyperactivity as a key factor in promoting social aversion and suggest that serotonin-enhancing drugs may be contraindicated for individuals with AUD.

20
3:30-4:15PM
2nd Floor Hall

Sehansa Karunatilaka (Human Physiology -Spring 25)

Mentor**(s): Kara Whitaker | Jae Myung Kim** (Health & Human Physiology | Health & Human Physiology)

The Relationship Between Perceived Social Support and Sleep Quality During Pregnancy

ABSTRACT

Social support plays a crucial role in maternal well-being during pregnancy, yet the relationship between perceived social support (PSS) and sleep quality across the pregnancy trimesters remains underexplored. Sleep disturbances are common during pregnancy and can have significant implications for maternal health and fetal development.

PURPOSE: This study aims to examine the impact of perceived social support on sleep quality across the three trimesters of pregnancy, with a focus on device-measured sleep efficiency and self-reported sleep quality.

METHODS: Participants (n = 500) were pregnant women enrolled in the Pregnancy 24/7 multi-site cohort study. In each trimester of pregnancy, they wore two devices for seven full days to assess 24-hour behavior. The Multidimensional Scale of Perceived Social Support (MSPSS) and the Pittsburgh Sleep Quality Index (PSQI) were utilized to assess PSS and self-reported sleep quality. Device-measured sleep efficiency was assessed using a wrist-worn Actiwatch Spectrum Plus as part of the 24-hour behavior assessment. The associations between PSS and sleep quality were examined separately in each trimester using simple and multiple linear regression, after adjusting for age and household income.

RESULTS: The participants had a mean age of 30.59 Â± 4.58 years, with 79.8% classified as having medium-high household income. Our findings indicate that a total MSPSS score is associated with PSQI and Actiwatch-assessed sleep quality. In adjusted models, each one-unit increase in the MSPSS score corresponded to a decrease of 0.033, 0.043, and 0.054 in the PSQI sleep quality score (p <.001), as well as an increase in sleep efficiency of 0.022, 0.036, and 0.054 (p <.05) across three trimesters. Support from family and significant others, a subscale of the MS PSS, was positively associated with increased sleep efficiency during the second and third trimesters, with high support groups showing approximately 2% higher sleep efficiency on average (p <.05).

CONCLUSIONS: Perceived social support is a critical factor influencing sleep quality during pregnancy, with sleep disturbances being common and having significant implications for both maternal health and fetal development. Poor sleep during pregnancy has been linked to complications such as preeclampsia, gestational diabetes, and preterm birth, affecting both maternal well-being and fetal outcomes. This study highlights the complex role of social support in maternal sleep health, suggesting that support from family and significant others becomes more crucial later in pregnancy. Future research should explore the underlying mechanisms and potential interventions to optimize sleep quality for pregnant individuals.

21
3:30-4:15PM
2nd Floor Hall

Emily Kelly (Psychology -Spring 26)

Mentor**(s): Isaac Petersen | Zachary Demko** (Psychological Brain Sci | Psychological Brain Sci)

Associations Between Inhibitory Control and Academic Success: Investigating Parental Attachment as a Moderator

Higher levels of inhibitory control have been shown to positively affect a student's academic success, especially in younger children. Research has shown that both higher inhibitory control and healthy parental attachment individually predict greater academic achievement. However, few studies have examined whether inhibitory control and parental attachment interact. I hypothesized that inhibitory control would have a stronger, positive effect on academic achievement in children who have secure and dependent attachment to their parents compared to children who do not have a secure and dependent attachment to their parents. This is because a strong parental attachment can support children's academic achievement through social flourishing and assistance with academics at home. The purpose of this research was to investigate whether parental attachment and inhibitory control interaction in predicting academic success.

Our sample consisted of 321 children aged 3-7 years recruited from the Iowa City area as part of the School Readiness Study. Inhibitory control was measured through behavioral tasks administered to children during lab visits which were completed at up to four timepoints, nine months apart. Parental attachment was measured using a Q-sort procedure completed by the child's primary caregiver (i.e., parent), and separate scores were used for parental dependency and parental security. Academic achievement was estimated from a mock report card submitted by the child's teacher.

Analyses were done using a multiple linear regression model in R. Results from this analysis show that, when controlling for the child's age and sex, parental security interacted with inhibitory control (β = 4.2408 , p = 0.007) in such a way that inhibitory control had a small positive association with academic achievement for children with low and medium security. The positive association between inhibitory control and academic achievement was much stronger in children with high parental security. Inhibitory control and parental dependency interacted (β = 5.1585, p = .0453) such that inhibitory control predicted greater academic achievement among children with medium and high parental dependency, but lower academic achievement among those with low parental dependency. There were also main effects in parental security (β = -2.2417 , p = 0.0376) and dependency (β = -4.1802 , p = 0.0229) individually predicting children's academic achievement.

Overall, my hypotheses were supported; parental attachment interacted with inhibitory control in predicting a child's academic achievement. Having strong parental dependency and security may bolster the benefits of having strong inhibitory control. Speculatively, children with strong parental attachment may have greater confidence and opportunity to practice and develop their academic skills due to their secure parental base. On the other hand, this research brings to light the unexpected associations between strong inhibitory control and lower academic achievement in children with low parental dependency. It is possible that children without this secure base may be more inhibited in academic settings, and refrain from practicing developing their skills. By informing teachers and parents about this interaction, society may better support students with lower parental dependency in reaching their full academic potential by scaffolding developing their independence and engagement in academic settings. Future research in this area is imperative to elucidate how best

to support children with lower parental attachment to reach their full potential for academic success.

22
3:30-4:15PM
2nd Floor Hall

Morgan Linahon (Biochemistry and Molecular Biology -Spring 25)

Mentor**(s): Hans Joachim-Lehmler** (Occup & Environ Health)

Immunohistochemical Analysis Suggests that Exposure to the PCB Metabolite 4-OH-PCB11 Affects Striatal Microglia in Male Rats

Polychlorinated biphenyls (PCBs) are no longer mass-produced but continue to persist in the environment and threaten human health. These pollutants and their hydroxylated metabolites adversely affect neurodevelopment. This study investigates the effects of a 28-day exposure to a human-relevant metabolite, 4-OH-PCB11 (3,3'-dichlorobiphenyl-4-ol), on glial cell responses in the adolescent rat brain. Polymeric implants containing 0, 1, 5, or 10% of 4-OH-PCB11 were grafted on the back of the subcutaneous cavity of male Sprague Dawley rats on postnatal day (PND) 28 and 42. After exposure, animals were euthanized, and the striatum brain region was collected for immunohistochemical analysis. Tissue sections were labeled for apoptotic cells (PSvue), microglia (Iba-1 antibody), and astrocytes (GFAP antibody). Z-stack confocal images were collected from each exposure group and analyzed for differences in microglia density, astrocyte density, and apoptosis. Morphological endpoints assessed included brain cell counts and percentage of area within the brain. Statistics included one-way ANOVA and Tukey's posthoc test for multiple comparisons. The high exposure group had a significantly reduced microglial percent area compared to all other exposure groups but showed no change in microglial cell density. Endpoints related to astrocyte density or apoptosis were not altered by 4-OH-PCB11 exposure. These results suggest a high dose of 4-OH-PCB11 causes microglia activation, where microglia undergo morphological changes in response to exposure to toxic metabolites within the brain. Future studies will analyze additional brain regions to better understand how 4-OH-PCB11 affects the developing brain.

23
3:30-4:15PM
2nd Floor Hall

Sofia Mamakos (Human Physiology -Spring 26)

Mentor**(s): Serena Gumusoglu | Brianna Blaine** (Obstetrics/Gynecology | Obstetrics/Gynecology)

The Effects of Angiotensin II on Maternal Brain and Behavior

Mood disorders in pregnancy are a growing health concern. Preeclampsia is a multi-system hypertensive disorder of pregnancy that is a leading cause of maternal and fetal morbidity and mortality. Preeclampsia is associated with cognitive dysfunction in the postpartum period and beyond. Together, mood disorders, such as Major Depressive Disorder, and preeclampsia share high rates of co-morbidity but the mechanisms linking the two are unknown. Our lab chose to investigate Angiotensin II (AngII), a vasoconstrictor and part of the renin-angiotensin-aldosterone system (RAAS), as an investigative cause of preeclampsia. To evaluate the effects of AngII on maternal health, our lab introduced AngII during pregnancy and lactation through osmotic minipumps. When the animals were roughly one-month postpartum, various behavioral tests were conducted to investigate cognition and depression and anxiety-like behaviors. Additionally, quantitative polymerase chain reaction (qPCR)

experiments were performed to investigate genetic changes in AngII-treated dams, as well as histological analyses to examine vasculature changes in the brain. Our behavioral results revealed that AngII-treated mice had significantly worse working memory, hyperactivity, and increased anxiety-like behavior. Our genetic analyses revealed stark differences in microglia and angiogenic markers in both maternal cortex and amygdala, with histological analyses ongoing. These results have important implications for the treatment of psychiatric and obstetric disorders in the postpartum period.

24
3:30-4:15PM
2nd Floor Hall

Daniel Martinez (Chemistry -Spring 26)

Mentor**(s): Scott Daly | Balaka Bhuniya** (Chemistry | Graduate College-Admin &)

Boron and Phosphorus K-edge X-ray Absorption Spectroscopy of Metal TBDPhos Complexes

Many examples of trisubstituted borane ligands have been shown to promote multi-site reactivity in metal complexes. However, there are very few examples of ligand-centered borenium ions (trisubstituted boron cations) that can be isolated. One of the substituents in a borenium ion is a neutral two-electron donor, which gives rise to a formal positive charge on boron. Consequently, borenium ions have shown to be much more effective Lewis acids compared to boranes, which has permitted their use as Lewis-acid catalysts. Our group discovered a new class of diphosphorus ligands linked to a bicyclic triaminoborane called 1,8,10,9-triazaboradecalin (TBD) to access borenium ions alongside a wide range of transition metals. Previous work on TBDPhos complexes and their reactivity indicated latent borenium ion formation in the presence of strong Bronsted acids, but the borenium ions were difficult to isolate in preliminary studies. Further exploration of TBDPhos complexes led to the discovery of [(PhTBDPhos-H)Mo(CO)4]OTf, one of the first examples of a ligand-centered borocation isolated with a TBDPhos ligand. 11B and 31P NMR data and XRD analysis confirmed the presence of the borenium ion, but quantifying the Lewis acidity of these species using conventional approaches (e.g., Gutman-Beckett method) has proven difficult. Here I describe efforts aimed at using boron K-edge X-ray absorption spectroscopy (XAS), a powerful technique which provides insights into the electronic structure of boron-containing complexes, as a method to measure electronic structure changes that correlate to enhance Lewis acidity in borenium-containing TBDPhos complexes. Complementary P K-edge XAS studies, which report on variations in metal-phosphorus bonding, will also be described.

25
3:30-4:15PM
2nd Floor Hall

Sabrina Vlk (Mechanical Engineering -Spring 25)

Mentor**(s): Lori Adams** (Biology)

Interactive STEM Activities and Lessons for Middle School

This project aims to provide hands-on, engaging STEM experiences to middle school students who may not otherwise have access to such opportunities. To achieve this goal, a series of thoughtfully designed lesson plans and interactive activities were developed. The program includes a general introductory lecture offering an overview of STEM fields, followed by four hands-on activities""each representing one of the

core disciplines: science, technology, engineering, and mathematics. This project was sponsored by the Latham Science Engagement Initiative

26
3:30-4:15PM
2nd Floor Hall

Taya Mayo (Psychology -Spring 25)

Mentor**(s): Teresa Treat** (Psychological Brain Sci)

Evidence-Based Treatment for PTSD Related to Sexual Trauma Among College Women

Sexual trauma is a prevalent issue among college students, with over 20% of women, 5% of men, and 20% of gender minorities reporting nonconsensual sexual contact via force or inability to consent during their college years. The psychological impact is substantial, as nearly 75% of survivors (in largely help-seeking samples) meet criteria for post-traumatic stress disorder (PTSD) within one month of experiencing sexual assault, and over 40% meet criteria after one year. Cognitive Processing Therapy (CPT) and Prolonged Exposure (PE) are two leading, evidence-based treatments for PTSD. Both CPT and PE are exposure-based therapies, in which the client confronts the traumatic memories directly by repeatedly describing the trauma in detail. CPT relies on written exposure while including cognitive restructuring to challenge maladaptive beliefs such as guilt and self-blame about the assault. PE relies on imaginal and in vivo exposure to reduce avoidance and fear responses. CPT and PE remain the most well-researched and effective first-line treatments for PTSD, with comparable long-term outcomes and strong empirical support. CPT may be preferable for individuals with strong cognitive distortions, whereas PE may be better for individuals with high levels of avoidance and fear-based symptoms. Despite demonstrated efficacy, both therapies have high dropout rates (~ 30%). Offering PE twice weekly has been shown to reduce attrition. Key challenges facing widespread dissemination and accessibility of CPT and PE in community treatment settings include inadequate resources to support the intensive training and supervision/consultation that are essential to effective implementation of CPT and PE, as well as some clinicians' reservations about the provision of exposure therapy. Adapting treatments like CPT and PE for diverse populations""including telehealth delivery, cross-cultural tailoring, and group formats""has been crucial for beginning to expand access, particularly in underserved or marginalized communities.

27
3:30-4:15PM
2nd Floor Hall

Andrea Medina (Psychology -Spring 26)

Mentor**(s): Amanda Mccleery | James Lopez** (Psychological Brain Sci | Psychological Brain Sci)

Association Between Facial Processing and Social Cognition in Schizophrenia

Background: Schizophrenia is a debilitating psychiatric disorder which affects the way a person thinks, acts, and feels. Beyond the devastating clinical symptoms, schizophrenia is associated with marked impairment in social information processing, a key contributor to disability. Derived from scalp electroencephalography (EEG) in response to face versus non-face visual stimuli, the N170 event-related potential (ERP) component is thought to reflect early neural processing of faces. Prior work from our lab has established diminished N170 amplitude in schizophrenia (McCleery et al., 2015), but associations with performance-based tasks of social information processing (e.g., identification of emotional states from faces) is unknown. Here, we present an

interim analysis from an ongoing study of social information processing in schizophrenia.

Methods: Individuals with schizophrenia (n= 15) and demographically-similar non-psychiatric comparison subjects (n = 8) completed an N170 activation task and two performance-based measures of face emotion identification (Bell Lysaker Emotion Recognition Task "" BLERT, Penn Emotion Recognition Text "" ER40). Group differences for N170 amplitude and face emotion identification performance accuracy and response time will be tested with independent samples t-tests, and the magnitude of associations between N170 amplitude with face emotion identification accuracy and response time will be quantified with bivariate correlations. We hypothesize that the schizophrenia group will exhibit a blunted N170 ERP amplitude, and less accurate performance and a slower response time for the face emotion identification tasks. We hypothesize that in the schizophrenia group, a larger N170 amplitude will be associated with better performance accuracy and faster response time.

Results: Data collection is ongoing; interim analyses will be presented and links to the broader literature surrounding social cognition in schizophrenia will be discussed.

Keywords: Schizophrenia, N170, ERP, face processing, face emotion identification, social cognition

28
3:30-4:15PM
2nd Floor Hall

Chidera Mitchell (Human Physiology -Spring 26)

Mentor**(s): Lori Adams** (Biology)

On Your Mind: An Alzheimer's Journey

Alzheimer's disease was first identified nearly 100 years ago and impacts an estimated 6.9 million Americans today. My grandmother died with dementia and Alzheimer's disease, sparking my interest in the disease and understanding how caregivers cope. On Your Mind: Alzheimer's disease, Dementia, and Grief was completed under the Latham fellowship to fill a gap in education of caregivers on the current progress in research on Alzheimer's and make it more accessible to the public. The magazine includes interviews with local scientists and therapists: Dr. Marco Hefti (Neuropathologist), Megan Ross (MT-BC), and Stephanie Johnson (Music Speaks, MT-BC). The magazine is a collection of practical knowledge for caregivers, like information on power-of-attorney, types of therapies, how to choose an appropriate nursing home, and how to handle grief. The magazine was distributed in the Iowa City and Des Moines area for 2 months via prints/flyers, in-person events, social media posts (LinkedIn, Instagram, Facebook), and reviewed by a focus group at the Daily Iowan. The estimated viewership reached ~700 people and feedback indicated knowledge gaps were being met. The process of creating the magazine and managing outreach can serve as a valuable reference for students and others working on grassroot media. It demonstrates the value of public-focused projects in collaboration with institutions and the need for scientific engagement in unconventional venues to reach diverse audiences.

29
3:30-4:15PM
2nd Floor Hall

Amisha Mohanty (Economics and International Relations -Spring 25)

Mentor**(s): David Cooper** (Economics)

Is being Observed Altering the Observation being made?

Most college students have never seen a retirement plan""yet long-term savings are essential for financial security. Considering the role that higher education can play in ensuring financial literacy and equipping students with decision-making tools, this research explores how different forms of "observation"⬚ might influence financial decision-making""and how that influence might be used to nudge students toward saving and making more informed financial choices.

Drawing on the Hawthorne effect""behavioral changes caused by the awareness of being observed""this study asks: Would students' financial decisions change if they knew they were being watched? Would such changes be temporary or lasting? How would different kinds of observation""by peers, authorities, or AI algorithms""differ in their impact? Which, if any, would lead to genuine mindset shifts? Further, If being observed shapes how people act, does that override free will, or simply guide it? Ultimately, do individuals' choices remain their own""even when shaped by external forces? This research seeks to answer such questions and inform university initiatives"""""policies and resources""""" that empower students to make more confident, informed financial decisions.

30
3:30-4:15PM
2nd Floor Hall

Hannah Mozena (Finance and Accounting -Spring 26)
Alexia Avila (Health Promotion - Spring 26)

Mentor**(s): Angela Charsha | Teri Schnelle** (Recreational Services | teri-schnelle@uiowa.edu)

Future of Fitness at The University of Iowa

As fitness trends continue to evolve, the University of Iowa is committed to becoming a leader in collegiate recreation. This action research project involved surveying 694 Recreational Services stakeholders, conducting focus groups, and holding one-on-one interviews with students, faculty, and staff to assess interest in new fitness offerings. The findings revealed strong support for the creation of an on-campus yoga studio, a recovery space, and an outdoor fitness facility. The data suggests that implementing these projects would not only enhance student engagement but also position the University competitively among other Big Ten schools. Recommendations to Â improve fitness offerings, expand fitness opportunities, and create a stronger sense of community among stakeholders and Recreational Services are outlined.Â

31
3:30-4:15PM
2nd Floor Hall

Palin Narsian (Biomedical Engineering -Spring 26)

Mentor**(s): Samuel Stephens** (Internal Medicine)

Metabolic changes facilitate beta-cell adaptive compensation early in Type 2 Diabetes

Small clusters of cells within the pancreas, known as islet beta-cells, regulate blood sugar (glucose) by controlled release of the hormone, insulin. During the development of Type 2 Diabetes (T2D), beta-cells adapt by increasing production of insulin to overcome insulin resistance and regain control of blood sugar. The specific adaptive

mechanisms used by the beta-cell to sense insulin resistance and undergo cellular changes to elevate insulin output are not understood, but may be extremely valuable in our understanding of how to treat T2D. To address this, our lab uses a mouse model that mimics this early adaptive response by the beta-cells. This project focuses on how changes in cellular metabolism are utilized by beta-cells to facilitate increased insulin secretion. Using real time measurements of insulin secretion, our studies revealed that enhanced glycolytic metabolism plays a major role in the beta-cell adaptive response. This is further supported by metabolomics profiling of glycolytic and TCA cycle intermediates and gene expression analysis by RNAseq. Future studies will continue to investigate key glycolytic steps and decipher their role in beta-cell adaptive compensation.

32
3:30-4:15PM
2nd Floor Hall

Saina Narsian (Neuroscience -Spring 28)

Mentor**(s): Gordon Buchanan** (Neurology)

Effects of Epothilone D on Spike-wave Discharges in a Mouse Model of Tauopathy

Tauopathy refers to a group of progressive neurodegenerative disorders characterized by the pathological accumulation of misfolded tau protein. The more prominent neurodegenerative disorders caused by tau includes Alzheimer's disease and frontotemporal dementia. Patients with tauopathy often have sleep-wake disorders, subclinical seizures, and an increased risk of seizures. The link between tau accumulation and seizures is still unclear, whose relationship we research. For our experiments, we chose PS19 mice since they have frontotemporal dementia, and their neurofibrillary tangles progress through various brain regions.

In previous experiments, we concluded that antiepileptic drugs such as levetiracetam and ethosuximide reduced the occurrence of spike-wave discharges in PS19 mice at 7 months old. If we were able to control the accumulation of tau, we suspect that we could control seizures with epothilone D (EpoD) to take a different approach to our research. To investigate the relationship of phosphorylated tau accumulation in the brain and subclinical seizures, we injected PS19 mice with EpoD. Additionally, we instrumented the mice with EEG to see if there were reductions in spike-wave discharges and stabilize the development of misfolded tau. We started the experiment when the mice were three months old and injected EpoD weekly with a dose of 3 mg/kg for ten weeks. We scored the baseline the day before the first injection and the day of the last injection six hours later. Through our data we found that spike-wave discharges increased with age in the EpoD group and the animal had the normal spike-wave discharge profiles compared to the vehicle injected group. The EpoD drug failed to slow the reduction of spike-wave discharges and stabilize tau. In the future, we look to repeat the experiment in older mice due to their strong phenotype in sleep-wake disruption disorder into the underlying mechanisms of spike-wave discharges.

33
3:30-4:15PM
2nd Floor Hall

Jack Olson (Environmental Science -Winter 25)

Mentor**(s): Benjamin Swanson** (Earth & Environmental Sci)

Evaluating Bank Erosion Mechanisms in Camp Cardinal Creek, Ashton Prairie Living Laboratory, Iowa City, IA

The University of Iowa established the Ashton Prairie Living Laboratory for students to explore environmental processes and trends. Camp Cardinal Creek flows adjacent to the constructed prairie at Ashton. The creek is incised into its floodplain and features numerous reaches with degraded channel banks. Some bank failures appear to be groundwater (pore pressure) controlled, rather than fluvial (stream flow shear stress) controlled, but it is unclear whether the changes in pore pressure are related to general groundwater flow or addition of water into the bank during high stream flow events followed by outflow when water levels recede. We intend to instrument a section of channel bank and monitor erosion, water table elevations, stream flow and stress, and the unsaturated zone hydrology to determine the primary erosion mechanism in the reach and similar reaches of the Creek. The work will provide data for students, including Jack, to gain a better understanding of stream and hydrology dynamics, and provide data for class discussions in hydrology and associated courses.

34
3:30-4:15PM
2nd Floor Hall

Anabel Perez-Brennan (Music Therapy -Spring 25)

Mentor**(s): Abbey Dvorak | Sun Joo Lee** (Music | Music)

Exploring the Effects of Therapeutic Group Singing on Young Adults

The purpose of this study is to explore experiences and benefits of therapeutic group singing (TGS) for young adults in a university setting. This study includes conducting and recording semi-structured interviews of undergraduate and graduate students at the University of Iowa who participate in Hawkeye Choir. Hawkeye Choir is a therapeutic group singing program consisting of college students in the University of Iowa's Music Therapy and UI REACH programs. UI REACH (Realizing Educational and Career Hopes) is a program in the College of Education serving students with intellectual/developmental disabilities. Through the interview process, the research team will learn more about general experiences in community singing and musical background, as well as their in-depth experiences in Hawkeye Choir. Interviews will then be transcribed and reviewed for common themes and patterns among responses. Research questions include: a) What are the lived experiences of students participating in TGS? b) How, if at all, does TGS impact self-determination in these students? c) How, if at all, does participation in TGS impact their college experience? d) How, if at all, does TGS influence the sense of community and belonging among participants?

35
3:30-4:15PM
2nd Floor Hall

Elizabeth Von Loh (Religious Studies; English and Creative Writing -Spring 25)

Mentor**(s): Brandon Dean** (Religious Studies)

The True Superstar: The Character of Judas in Jesus Christ Superstar

The 1971 Broadway show Jesus Christ Superstar and its 1973 film adaptation caused a stir upon their debuts for many reasons, including the sympathetic view of Judas Iscariot. This project proposes that Judas is not only sympathetic but also the main character within the narrative. Thus, Judas functions as the primary lens for investigating the Passion story. By examining narrative elements such as song lyrics and character psychology, the tradition of Judas in Jesus films, and surrounding context of the 1960s counterculture and "Jesus movement," this project considers

why Judas is the main character in Jesus Christ Superstar and its significance to understanding the Passion story.

36
3:30-4:15PM
2nd Floor Hall

Michael Schuster (Finance and Religious Studies -Spring 28)

Mentor**(s): Ahmed Souaiaia | Brandon Dean** (Religious Studies | Religious Studies)

Understanding China's Broad Motivations Behind Uighur Oppresion

There is a common belief that the violation of human rights in on the basis of hate. That racism, sexism and racial and ethnic supremacy is the greatest reason for violating the human rights of minorities. However, I challenge that notion. I believe that China in context of Uighur oppression is motivated by the same measures that every modern nation is driven by: economic, political, military factors and the quest for power and control are the primary motivations of China's grievances against the Uighur people.

37
3:30-4:15PM
2nd Floor Hall

Becky Selmani (Public Health Pre-Medicine - Spring 27)

Mentor**(s): Catherine Marcinkiewcz | Ruixiang Wang** (Neurosci & Pharmacology | Neurosci & Pharmacology)

Accumbal serotonin signaling tracks both appetitive and aversive stimuli

Ruixiang Wang, Zeid Aboushaar, Nebije (Becky) Selmani, Riley O McCoy, Catherine A. Marcinkiewcz

Department of Neuroscience and Pharmacology, University of Iowa

Background: The nucleus accumbens (NAcc) is arguably the most important node in modulation of appetitive and aversive information processing. While dopaminergic signaling in the NAcc responds to both appetitive (rewarding) and aversive stimuli by encoding noticeable stimuli, the function of serotonergic (5-HT) transmission in this brain region is not well understood. Recent developments in fiber photometry and genetically encoded fluorescent indicators/biosensors have made it easier to monitor 5-HT neural activity and transmission in awake, freely behaving animals with high resolution spatial and temporal tracking. In the present study, we used a wireless fiber photometry system to track accumbal 5-HT release in response to different stimuli.

Methods: First, two-photon imaging was employed to confirm the 5-HT biosensor (GRAB5-HT3.5) we would use, and its ability to detect serotonin changes. Then, male C57BL/6J mice were transduced (injected) with GRAB5-HT3.5 in the right NAcc, and fiber optic cannulae were implanted afterwards, with the fiber terminal reaching the viral injection site in the mouse. Two weeks later, wireless fiber photometry recordings were performed using the Amuza TeleFiPho system, while mice were presented with different appetitive and aversive stimuli. To quantify 5-HT transients induced by these stimuli, we computed peri-event fluorescent changes versus the

baseline (Î"F/F) and compared area under the curve (AUC) above the x-axis in the peri-event plot.

Results: In the two-photon imaging experiment, application of 5-HT to acute slices containing the dorsal raphe nucleus from mice transduced with GRAB5-HT3.5 resulted in an immediate increase in fluorescent intensity, confirming that this biosensor can swiftly detect extracellular 5-HT and emit green fluorescence signals accordingly.

In fiber photometry experiments, appetitive stimuli, like palatable food (Froot Loops) and sucrose water, led to increases in NAcc 5-HT transients. Interestingly, Froot Loops-induced rise in 5-HT transients was associated with "foraging," or appetitive behavior, but not consummatory behavior, as 5-HT transients started to drop when food consumption began.

Aversive stimuli could also trigger NAcc 5-HT responses, whether the stimuli were internal, e.g., visceral malaise caused by lithium chloride (LiCl) injections, or external, e.g., a predator odor from red fox urine. Interestingly, sucrose and quinine, stimuli with opposite valences, enhanced NAcc 5-HT transients in a similar pattern.

In addition, repeated footshocks eventually triggered a reduction in NAcc 5-HT transients (for the 5th footshock: 2 s before shock vs. 2 s after shock) perhaps because repeated footshocks constituted inescapable and uncontrollable aversive stimuli, leading to learned helplessness, a model for depression. The 2-s footshocks were preceded by 30-s loud tones (80 dB), which did not induce significant NAcc 5-HT responses perhaps because they were weak stimuli, in comparison.

Conclusions: Accumbal 5-HT signaling tracks both appetitive and aversive stimuli. Local serotonergic transmission is increased in response to both types of stimuli except when animals have learned helplessness facing repeated footshocks, after which the decreased serotonin tone aligns with the notion that depression is associated with reduced 5-HT activity.

38

3:30-4:15PM
2nd Floor Hall

Kenna Skinner (Biomedical Sciences -Fall 27)

Mentor**(s): Hanna Stevens | Michelle Chen** (Psychiatry | Psychiatry)

Effects of Chlorpyrifos and Alpha-Cypermethrin on the Adolescent Mouse Liver: Metabolic and Oxidative Stress Pathways

Pesticides like chlorpyrifos (CPF) and alpha-cypermethrin (a-cyp) are widely used in agriculture, however, epidemiologic studies show these compounds have toxic effects across human populations. Therefore, we developed a translational mouse exposure model based on real-world exposures. This study examines how CPF and a-cyp affect the liver in these adolescent mice. We focused on how the liver breaks down these chemicals and the stress it causes at the cellular level. Specifically, we look at the gene

expression of enzymes like Cyp2c29, Cyp2B10, and Cyp3a41b (for CPF) and Cyp1a1, Cyp1a2, and CES1 (for a-cyp), which are responsible for metabolizing these pesticides. Because pesticides have a proposed mechanism of causing oxidative stress, we also study genes involved in the stress response, such as Nrf2, HIF-1a, and Txnra1. The goal of this research is to understand how pesticide exposure during adolescence may affect liver metabolism and contribute to oxidative stress. These findings will provide important information on the potential long-term health risks of real-world pesticide exposure during sensitive developmental stages.

39

3:30-4:15PM
2nd Floor Hall

Piper Steburg (Speech and Hearing Science -Spring 27)
Emma Woodford (Speech and Hearing Science - Spring 28)

Mentor**(s): Mili Kuruvilla-Dugdale | Deepthi Crasta** (Communic Sci & Disorders | Communic Sci & Disorders)

Establishing Visual Analog Scale Thresholds for Dysarthria Severity: Sensitivity and Specificity Analysis

Dysarthria is a speech movement disorder of neurologic origin, often assessed using categorical (mild to severe), or continuous scales such as the 100-mm visual analog scale (VAS). While VAS scores capture subtle differences in speech impairment severity, they lack defined cut-offs for classifying speech as typical, mild, moderate, or severe. VAS scores like 15 or 60 offer little guidance for diagnostic decisions or treatment planning and require translation into clinically meaningful categories to improve its utility in clinical settings. In research, validated cut-offs would enable standardized participant grouping, support subgroup comparisons, and enhance methodological consistency across studies. Although such efforts have been made in pain and voice assessment, data-driven cut-offs for differentiating dysarthria severity levels remain scarce. To address this gap, we aimed to determine the optimal VAS cut-offs for classifying four severity levels: typical, mild, moderate, and severe, for three speech features: overall severity, articulatory imprecision, and slow rate. The study also sought to evaluate classification accuracy using sensitivity, specificity, and area under the curve (AUC) metrics across the four severity levels for each feature. Forty-four nonexperts rated 42 dysarthria samples from individuals with amyotrophic lateral sclerosis, Parkinson's disease, and healthy controls. Each listener used VAS with endpoints marked as no impairment at the extreme left and profound impairment at the extreme right. Consensus ratings from two dysarthria experts provided the reference categories. Receiver operating characteristic (ROC) analysis identified thresholds that balanced sensitivity and specificity. Optimal VAS cut-offs were established for all three features, with high classification accuracy (AUC = 0.78"–0.99) for moderate and severe dysarthria. Sensitivity was highest for these levels (â‰¥ 0.90), while specificity was notably lower for mild dysarthria (Â£ 0.65), suggesting greater perceptual overlap between mild dysarthria and typical speech across all features, presumably due to the lack of well-defined internal references for mild severity (Yu et al., 2002). Overall, the identified cut-offs help link score ranges to functional impact and support communication between clinician-patient and researcher-clinician. Future work should validate these cut-offs in larger samples and explore ways to improve classification of mild dysarthria, where distinctions are more subtle.

40

3:30-4:15PM
2nd Floor Hall

Charlotte Tesar (Psychology -Spring 25)

Mentor**(s): Sarah Ferri** (Pediatrics)

Neonatal gonadal hormone dysregulation induces social and fear deficits in wild-type mice

Social behavior is a critical function which dictates many facets of well-being, including mental and physical health, and overall quality of life. Disruption to these social processes are exhibited in neuropsychiatric and neurodevelopmental disorders such as schizophrenia and autism spectrum disorder (ASD). Research has found that there is a male sex bias in neurodevelopmental disorders, such as in ASD where males are four times are likely to be diagnosed with autism as females. The mechanism of this robust sex bias is not well understood. Here, we used neonatal injections of gonadal hormones as a novel experimental system to disrupt sex-specific developmental pathways in mice to determine their effects on behaviors relevant to ASD. We found that testosterone administration on the day of birth, which is equivalent to mid gestation in humans, induces male-specific deficits in social approach and fear memory. These deficits were only present when the injection was given on the day of birth and not at postnatal day 18. Furthermore, while testosterone injected on the day of birth did cause social and contextual fear conditioning deficits, it did not affect anxiety-like behavior on an elevated zero maze or body weight over development. Administration of D-cycloserine, a NMDAR partial agonist, which has been shown to ameliorate social deficits preclinically, alleviated the testosterone-induced social and fear deficits. Surprisingly, estradiol given on the day of birth did not lead to female or male specific social deficits which suggests that aromatization of testosterone to estradiol is not the cause of the testosterone induced social deficits in males. Brain wide activity mapping has shown altered brain activation in areas of the brain associated with social behaviors such as the medial prefrontal cortex and basolateral amygdala. Currently we are investigating the mechanisms of these sex specific vulnerabilities to social and fear deficits. These findings will aid in advancing the current understanding of how the brain is susceptible to social impairments and help identify novel treatment targets.

41

3:30-4:15PM
2nd Floor Hall

Nora Thiel (Speech and Hearing Sciences -Spring 25)

Mentor**(s): Elizabeth Walker** (Communic Sci & Disorders)

Vocabulary Growth and Reading Outcomes in Children Who Are Hard of Hearing

Children who are hard of hearing (CHH) are at risk for reading difficulties. Prior research has shown that vocabulary breadth (number of words known) and depth (the extent of word knowledge) are important for reading skills. More specifically, vocabulary breadth is correlated with word recognition abilities while vocabulary depth is correlated with reading comprehension. However, there is limited research on how vocabulary growth predicts later reading outcomes. The current presentation examines the relationship between vocabulary breadth/depth, word recognition, and reading comprehension in CHH. The first aim of the study is to determine how vocabulary growth trajectories from 1st grade through 4th grade predict word recognition and reading comprehension skills in junior high for CHH. In addition, the study aims to examine how these vocabulary trajectories predict junior high word

recognition and reading comprehension, after controlling for other factors that have also been found to contribute to reading skills (grammatical knowledge, phonological awareness, and maternal education level). All data have been collected for this study, and the data analysis is currently underway. The results obtained will help to identify factors that place CHH at a higher risk for reading difficulties, providing useful areas to target in assessment and intervention processes.

42
3:30-4:15PM
2nd Floor Hall

Adriana Castellano (Marketing -Spring 27)

Lexi Collins (Neurocience - Spring 26)

Tae Shaun Presswood (Biology - Spring 27)

Katherine Prichard (Biology - Sping 27)

Peter Nitsche (Exercise Science - Spring 28)

Mentor**(s): Maurine Neiman | Yiming Liu** (Biology | Neurology)

"Tentacle Tales: How Genome Architecture and Nutrient Availability Shape Tissue Regeneration in a Freshwater Snail"

Some organisms, tissues, and organs grow and heal much more rapidly than others. While the rate at which growth at whichever level of biological organization occurs is a fundamental biological question, we still know very little about what drives variation in the rate of growth and regeneration. Here, we address potential roles for genome copy number "ploidy"and nutrient availability as important factors in tissue regeneration in our snail model system. This work is of broad interest from the perspective of connecting the evolution of genome structure to growth rate, regeneration, and resource availability. Our in-progress experiment involves measuring tentacle regeneration rate across snails differing only in genome copy number and food availability. We are testing the hypothesis that extra genome copies facilitate healing but only when resources are adequate. We will assess whether this hypothesis is supported by evaluating whether results meet our prediction that snail tentacle regeneration will be most rapid in snails with more genome copies when food is available and slowest in these high genome-copy snails when access to food is limited. Regardless of specific outcome, this work will provide new insights into whether and how genome structure and resource availability might influence healing and regeneration.

43
3:30-4:15PM
2nd Floor Hall

Paige Wiebke (Biochemistry -Spring 25)

Mentor**(s): Lori Wallrath** (Biochem & Molecular Bio)

Mouse models of SNRNP200-associated Retinitis Pigmentosa.

Title: Novel mouse models of SNRNP200-associated Retinitis Pigmentosa.

Authors: Paige N. Wiebke, Tyler Rankin, Katie A. Fuhrmeister, Joseph G. Laird, Nathan P. Mohar, Arlene V. Drack, Lori L. Wallrath

Introduction: Retinitis Pigmentosa (RP) is a genetic condition that causes blindness due to the death of photoreceptors in the retina. Initially, peripheral and night vision is lost due to the death of the rod photoreceptors. The death of the rods is followed by death of cone photoreceptors, which results in the loss of daytime and color vison.

This can lead to complete blindness. Dominant mutations in at least 80 genes cause RP. Our research is focused on mutations that affect the SNRNP200 gene which encodes a core component of the spliceosome, a macromolecular machine that processes pre-mRNAs. Our studies include a specific point mutation that causes a substitution of Tyr at position 731 to an isoleucine. This is a rare mutation that has been called "Bigfoot" because it is rarely seen in the general population.

Methods:

Generation of mouse models: An Snrnp200Bigfoot knock-in mouse was created with CRISPR gene editing. A floxed allele of Snrnp200 was generated to provide conditional knock-out mice. Mice with floxed Snrnp200 are crossed to heterozygous Rhodopsin (rho)-icre mice to delete a portion of the Snrnp200 gene from rod photoreceptors. This conditional knockout model allows us to study eye phenotypes while preserving animal viability.

Tissue isolation and western analysis: Mice that were aged to 6-, 8-, and 10-weeks following birth were used for retinal dissections. Immediately following euthanasia, the eyes were enucleated and the retina dissected. Total protein was purified from the retinal tissue for western analysis. Two commercially available primary and secondary antibodies were used to detect the SNRNP200 protein. The westerns were analyzed using LI-CORbio imaging systems and studio.

Results: By genotyping all the viable offspring, we discovered mice homozygous for the Snrnp200Bigfoot allele were homozygous lethal. By contrast, the Snrnp200Bigfoot/+ were viable and maintained normal weight. Western analyses showed that the SNRNP200 protein levels in retina were unchanged in Snrnp200Bigfoot/+ mice at 6-weeks of age.

Given that the Snrnp200Bigfoot homozygotes are lethal, we generated the Snrnp200flox/flox mouse model. In 6-week-old Rho-Cre-/+; Snrnp200flox/+ mice, western analysis revealed that the SNRNP200 protein levels in retina were reduced to 70% compared to that of wild-type.

Conclusions: Our lab successfully generated novel mouse models of SNRNP200-associated RP. The Snrnp200Bigfoot model did not have reduced protein levels, suggesting that the amino acid substitution does not alter stability of the mutant protein. Decreased levels of SNRNP200 in the Rho-Cre-/+; Snrnp200flox/+ suggests the heterozygous rod conditional knock out was successful. The fact that 70% of the protein persists when one allele is knocked out suggest that less than the Cre recombinase might only be active in less than half the cells. Alternatively, there might be compensation by the wild-type allele by expressing more mRNA.

Future Directions: We will examine photoreceptor health and function. Using electroretinograms (ERGs), which will allow us to assess photoreceptor response to light and overall function, we will measure photoreceptor function. In addition, we will use optical coherence tomography (OCTs) to analyze the thickness of the outer nuclear layer, where the photoreceptors reside in the retina. Visually guided swim assays will be used to measure the visual navigation ability of the mice. If these mice recapitulate aspects of the human disease, they can be used as pre-clinical models.

44
3:30-4:15PM
2nd Floor Hall

Sammi Wei (Speech and Hearing Sciences -Spring 25)

Mentor**(s): Christine Shea | Wenqi Zeng** (Spanish & Portuguese)

Comparison of Mandarin Tone Perception in Heritage and Second Language Speakers.

Heritage speakers are individuals who are exposed to a language consistently during the critical period of language learning but later lose regular exposure, due to a variety of factors such as moving to a different country. Previous studies suggest, due to this unique linguistic background, heritage speakers have an advantage in learning their heritage language compared to typical second-language learners. In this study, we investigated whether heritage speakers can more accurately distinguish between tone 2 and tone 3, as well as tone 2 and tone 4, compared to a typical second-language learner of Mandarin. To test this, participants listened to a syllable, such as "ma," that gradually transitioned from Tone 2 to Tone 3 or from Tone 2 to Tone 4 and participants had to use a slider to indicate where on the continuum they placed the syllable. This allowed us to measure the use of gradient speech perception in heritage and non-heritage speaker perception of tonal differences in Mandarin. We hypothesized that heritage speakers would be more likely to demonstrate gradient perception than L2 learners because they have had more extensive exposure to tone over the course of their lives and are more sensitive to within-category differences than L2 learners.

45
3:30-4:15PM
2nd Floor Hall

Levi Rosenboom (Biochemistry and Molecular Biology -Spring 27)
Alex Steffen (Biology)

Owen Ferneding (Biomedical Engineering)

Anton Dittmer (Chemistry)

Mentor**(s): Scott Shaw** (Chemistry)

Porosity Effects on Cell Growth in 3D-printed Bioglass Structures

The purpose of the experiment is to determine the optimal porosity for cell growth in Bioglass 45S5 structures. Bioglass powder was mixed with resin and printed using a stereolithography 3D printer. Cylindrical structures were made with a height of 5mm and diameter of 10mm, each with a vertical porosity gradient. After this process, mouse preosteoblasts will be grown on the structures and cell growth will be assessed.

46
3:30-4:15PM
2nd Floor Hall

Isaac Young (Geography (GIS) -Spring 25)

Mentor**(s): Susan Meerdink** (Geogra&Sustainability Sci)

Identifying Bur Oak Blight with Satellite Imagery

Bur oak blight, a tree disease caused by a native fungus, has been severely impacting bur oaks in Iowa and other Midwestern states. My research aims to track the spread and geographic distribution of bur oak blight using satellite imagery. I use in-the-field tree surveying coupled with satellite imagery to establish statistical relationships between disease severity and how trees reflect sunlight. Identifying infected trees and

measuring the severity of their infection will allow for disease progression and spread to be tracked.

47
3:30-4:15PM
UCC-2520D

Megan Andress (Religious studies, history, and ancient civilizations -Spring 26)

Mentor**(s): Brandon Dean** (Religious Studies)

The Ark Encounter: American Recreation or Re-Creation?

The Ark Encounter is a museum and theme park in northern Kentucky which claims to be a historically accurate recreation of Noah's Ark from the biblical book of Genesis. The project was created by Answers in Genesis, a Young Earth Creationist organization focused on education for Christian Fundamentalists. A massive feat of artistic talent, the Ark Encounter can be seen from miles away, is known nationally, and draws a variety of mixed reactions - particularly for its proudly expressed belief that the earth is 7,000 years old, further denying the existence of climate change, erosion, and the big bang theory. The publicity of the Ark Encounter, as well as its overt political and religious messaging, has caused both tourists and scholars to question the exact purpose of the massive attraction. By engaging with a historical perspective and examining the social history of Christian Evangelist movements in the United States, it becomes apparent that the Ark Encounter serves as a site of pilgrimage and re-conversion for those already engaged with the fundamentalist belief system in a society which separates itself greatly from the realities of Christianity's origins in the ancient Middle East.

48
3:30-4:15PM
UCC-2520D

Misha DeBoef-Misyuk (Religious Studies and Anthropology -Spring 25)

Mentor**(s): Brandon Dean** (Religious Studies)

From Pariah to Pack: Queer Community in the Apocalyptic TTRPG

This presentation poster will explore the ways in which queer and trans people are discussed in many Christian spaces leads to feelings of isolation and self denial in a lot of LGBTQ+ Americans. This culminates in fears and lived realities of abandonment and having to refind community. The genre of queer apocalyptic tabletop roleplaying games allows for LGBTQ+ players to find community and solace by recreating the "end times" depicted by the evangelical rapture, Christian ideas of the end times and ideas of hell; and how our community will survive together through it. I will be looking at the games "Dream Askew" by Avery Adler, "Sleepaway" by Jay Dragon, and "Apocalypse Keys" by Rae Nedjadi as my three case studies. I am reading the handbooks of all three games to understand their intended purposes and inspirations, as well as getting a good understanding of their gameplay mechanics. I have reached out to the creators of these games in hopes of getting more information of their intended impact. I am also researching the experiences of LGBTQ+ people who grew up in homophobic/transphobic churches and what they teach there by reading memoirs and watching recorded church sermons.Overall, I hope to gain more knowledge of how the LGBTQ+ community uses art as a way to cope with religious trauma and build community together.

49
3:30-4:15PM
UCC-2520D

Finley Deevy (Computer Science -Spring 26)
Aditha Mukundan (Computer Science - Spring 25)

Mentor**(s): Cathleen Moore | Michael Paavola** (Psychological Brain Sci | Psychological Brain Sci)

An Interactive Virtual Reality Environment for Research on Lifeguard Surveillance

Drowning is one of the leading causes of accidental deaths in the world, especially in children. However, there is little behavioral research in this field due to the difficulty of achieving an effective balance between external validity of in-the-field conditions and experimental control. This challenge can be met using new technology in innovative ways. We developed a virtual reality environment designed to provide the look and feel of an actual swimming pool while also providing the necessary experimental control needed for accurate science. This presented a series of technical challenges that needed to be solved. These included: 1) Developing a trial-based Event Scheduler algorithm through which participants are presented with, and can interact with, stimuli in the virtual environment. 2) Enabling Input Interaction: Participants needed to interact with stimuli, which required behavioral measurement to be fast as well as accurate. 3) Generating Data Output: It was necessary to record frame-by-frame data that logs stimulus-presentation events, participant interactions, and hand and gaze (head and eye) coordinates. 4) Developing Environmental Visuals: Participants needed to feel like they were actually in a lifeguarding scenario which meant we needed to develop semi-realistic water (using a customized vertex movement shader), swimming pool, skybox, and swimmer models. Solving these challenges was instrumental in research from our lab aimed at identifying the perceptual and cognitive limitations of lifeguard surveillance.

50
3:30-4:15PM
UCC-2520D

Avery Domino (Ancient Civilizations, Classical Languages, and Anthropology -Spring 26)

Mentor**(s): Katina Lillios | Corinne Watts** (Anthropology | Anthropology)

Used It and Lost It: Use Wear on Fibrolite Macrolithic Tools

People in Central Iberia made and used macrolithic fibrolite tools throughout the Neolithic and Copper Age (5500 - 2200 BCE). Many of these tools have been found during excavations in Iberia, however, determining how they were used requires closer examination. Tool shape can tell us some things about what it was used for, but examining the wear marks on a tool offers more insight into its use. This experimental archaeology project seeks to create and use a set of five fibrolite tools and compare wear marks to similar tools found at archaeological sites in Central Iberia to determine possible uses.

51
3:30-4:15PM
UCC-2520D

Stella Gerlock (Civil Engineering -Spring 27)

Mentor**(s): Cong Wang | David Butler** (Mechanical Engineering | Mechanical Engineering)

Influence of Surface Roughness on Near Free-Surface Turbulent Wakes of Extended Bluff Bodies

Turbulent wake flows are critically important to the design of many engineering applications, including around ship hulls and offshore structures. A variety of studies have been performed on the effects of surface roughness on turbulent wake flows past bluff bodies (Achenbach 2006, Achenbach 1980, Achenbach 1970, Kashechi 2014, MichÃ¡lek 2022), primarily employing cylindrical models in subsurface measurement volumes. The current ongoing investigation extends such studies to the wake dynamics of near free surface extended bluff bodies. Two-dimensional PIV (particle image velocimetry) and three-dimension defocusing PIV are used to temporal resolve the near and subsurface wakes of smooth and rough surface piercing bodies placed in a large scale, open channel, water tunnel at Reynolds number (Re~20000). Experiments are repeated for smooth models and those with simulated macroscopic surface roughness to investigate the effect of the turbulent boundary layer (TBL) on the wake flow. Insights gained are targeted primarily at the study of seams and biofouling on the non-streamlined section of ship hulls.

52

3:30-4:15PM
UCC-2520D

Jasmine Lee (Global Health Studies -Spring 25)

Mentor**(s): Anne Kiche** (Interdisciplinary Prog)

Examining the Extent of Knowledge of Dementia and Caregiving Abilities of Southeast Asians in Iowa

This study investigated the extent of knowledge about dementia among Southeast Asian immigrants in Iowa. Dementia, a Significant public health concern, disproportionally affects immigrant populations due to factors such as, language barriers, cultural differences, lack of education, and economic constraints. This research aims to asses the level of understanding of the signs and symptoms of dementia as well identify the gaps of caregiving and exploration of cultural perspectives on dementia.

The study used a questionnaire that was conducted online. A quantitative analysis measured the knowledge levels across different ethnic and demographic groups.

53

3:30-4:15PM
UCC-2520D

Ava Martinez (Political Science & Ethics and Public Policy -Spring 27)
Jamie Martin-Trainor (Journalism & Political Science - Spring 25)

Landon McPike (Political Science - Spring 25)

Mentor**(s): Nicholas Martini** (Political Science)

Expanding Rail Infrastructure in Iowa

This paper examines the lack of support for expanding passenger rail services in Iowa over the past two decades, despite the Iowa Department of Transportation and state government efforts. It explores the reasons behind this resistance, compares approaches taken by other rural states, and discusses the potential benefits of implementing rail services in Iowa. Passenger rail could address issues such as brain drain, attract young residents, and reduce carbon emissions from long-distance driving. The paper concludes that expanding Amtrak services offers a strong foundation for improving Iowa's transit system and meeting the state's transportation needs.

54

3:30-4:15PM
UCC-2520D

Kade Tanke (Psychology -Spring 26)

Mentor**(s): Cathleen Moore** (Psychological Brain Sci)

Dissociating the roles of spatial position within the visual field and the implied destination of a moving object in the perceptual-motor congruence effect known as the Simon Effect

When responding to a non-spatial attribute of a stimulus such as its color, the spatial position of the stimulus affects the response, despite being task irrelevant. Specifically, responses tend to be faster and more accurate when the stimulus is on the same side of the responding effector (congruent) than when they are on different sides (incongruent). This effect, known as the Simon Effect, reflects processing interactions between spatial codes associated with the response and spatial codes associated with the stimulus, and has been used to study the relationship between motor affordances and visual processing. We asked whether the relevant spatial code of the stimulus is position in the visual field or whether in the case of a moving stimulus, its apparent destination, which is especially relevant to visuomotor coordination. Using virtual reality, we presented spheres that originated on the left or the right side of a virtual environment and moved toward the participant in a trajectory that headed either to the hand on the same side (straight motion) or to the hand on the opposite side (crossed motion). The spheres began as gray and changed to either blue or orange after 200ms. The task was to report the color as quickly and accurately as possible by making a left or right manual trigger response. Trials on which responses were made after the sphere crossed the midline were excluded from analyses so that regardless of the trajectory condition, stimuli appeared only on the side of origin. Responses were faster when the apparent destination of the moving sphere was the responding hand than when it was the opposite hand. This was true regardless of the side of origin. These results are consistent with the Simon Effect reflecting interactions associated with perceptual-motor coordination.

55

4:20-5:05PM
2nd Floor Hall

Anirudh Pradeep (Neuroscience Pre Med Track - Spring 25)

Mentor**(s): Songhai Chen** (Neurosci & Pharmacology)

Unveiling RACK1: a key regulator of the PI3K/AKT pathway in prostate cancer development

The dysregulated PI3K/AKT pathway is pivotal in the onset and progression of various cancers, including prostate cancer. However, targeting this pathway directly poses challenges due to compensatory upregulation of alternative oncogenic pathways. This study focuses on the novel regulatory activity of the Receptor for Activated Protein Kinase (RACK1), a scaffolding/adaptor protein, in governing the PI3K/AKT pathway within prostate cancer. Through a genetic mouse model, our research unveils RACK1's pivotal role in orchestrating AKT activation and the genesis of prostate cancer. RACK1 deficiency hampers AKT activation, effectively impeding prostate tumor formation induced by PTEN and p53 deficiency. Mechanistically, RACK1 facilitates AKT membrane translocation and fosters its interaction with mTORC2, thereby promoting AKT activation and subsequent tumor cell proliferation and tumor formation. Notably, inhibiting AKT activation via RACK1 deficiency does not trigger feedback upregulation of HER3 and androgen receptor (AR) expression and activation, distinguishing it from

direct PI3K or AKT targeting. These findings position RACK1 as a critical regulator of the PI3K/AKT pathway and a promising target for curtailing prostate cancer development arising from pathway aberrations.

56
4:20-5:05PM
2nd Floor Hall

Adrianna Segal (Neuroscience -Spring 25)

Mentor**(s): Jan Wessel** (Psychological Brain Sci)

Decoding the Neural Mechanisms of Salience Detection and Goal Updating

The ability to stop an action after it has already begun, known as inhibitory control, is rooted in the functioning of distinct frontal regions. In particular, successful inhibition relies on the activation of the dorsolateral prefrontal cortex (DLPFC) and the right inferior frontal gyrus (rIFG). While both regions are essential for action-stopping, their individual roles have been unclear thus far. Prior research has pointed to the DLPFC having a role in goal updating and maintenance in working memory. The DLPFC is often probed with a task-switching paradigm, becoming more active during "switch trials"⏃ due to the need to update the current goal. The rIFG has been consistently linked to the detection of salient stimuli and can be probed with the Posner cueing task, a classic assessment of saliency processing. In this research project, we intended to differentiate the processes of goal updating and salience detection, in the absence of inhibitory control. We created a dual-paradigm task, incorporating both task-switching and the Posner cueing paradigm. Twenty-four healthy undergraduate students completed this task while undergoing EEG recordings. We constructed two multi-variate decoders ""“ one capturing neural activity during salience detection and the other capturing goal updating. We then attempted cross-decoding to determine any interaction or shared processes. The decoders were successfully able to distinguish between cue repeats/switches ("goal updating"⏃ decoder) and target congruency ("salience detection"⏃ decoder). However, cross-decoding analysis also produced significant clustering, demonstrating the presence of an interaction between the two mechanisms. Thus, even in the absence of inhibitory control, salience detection and goal updating processes are not entirely independent of one another, at least within our experimental paradigm.

57
4:20-5:05PM
2nd Floor Hall

Emily Fultz (Psychology -Winter 25)

Mentor**(s): Susan Lutgendorf** (Psychological Brain Sci)

Utilizing Natural Language Processing to Understand Mechanisms of Personal Growth and Change in a Group-Based Virtual Intervention for Ovarian Cancer Survivors

One of the most pressing questions in current psychotherapeutic research is: what mechanisms make any particular intervention effective? The need for efficient psychotherapy is especially prevalent in cancer populations where quality of life is of high concern. In the present study, we used linguistic analysis to examine ovarian cancer survivors' language use (including the percentage of cognition-, emotion-, health-, and social behavior-related words) in a group-based virtual psychotherapy intervention in comparison with anxiety-, depression-, distress-, quality of life-, and skill-based outcomes. The sample consisted of 23 ovarian cancer survivors of different backgrounds, from whom we analyzed recorded speech from approximately 16 hours of intervention sessions each. The goals of this preliminary analysis were to examine

which group dynamics led to the most favorable outcomes following this intervention using effect sizes and to demonstrate the usability of computerized natural language processing in psychotherapeutic analysis.

58
4:20-5:05PM
2nd Floor Hall

Emma Anderson (International Relations and Political Science -Spring 25)

Mentor**(s): Brian Lai** (Political Science)

Impact of Illness and Media Attention on the Release of Wrongfully and Unlawfully Detained Individuals

Arbitrary detention is dehumanization, and using individuals as political pawns in geopolitical games endangers the safety of everyone traveling, conducting business, or living in a foreign country. Such detention is not only a violation of international law, state sovereignty, and human rights but also undermines fundamental human dignity. The research aims to understand the role of hostage diplomacy in state-to-state relations, but most notably, how hostages' health status and media attention surrounding the case impact the facilitation of their release. Using a constructed list of U.S. hostages taken since around 2010, the research aims to highlight the increasing global threat of hostage diplomacy, assess the effects of illness and media attention on their release, and understand under what conditions state actors are more likely to resort to this tactic.

59
4:20-5:05PM
2nd Floor Hall

Ella Apana-Stipe (Political Science and Ethics and Public Policy -Spring 25)
Ondrea Li (International Relations & Journalism - Spring 25)

Mentor**(s): Nicholas Martini** (Political Science)

Addressing Rural Iowa's Physician Shortage and Healthcare Challenges

Rural Iowa faces significant health challenges due to a shortage of physicians. This research report assesses the leading causes and effects of the shortage on healthcare quality and recommends both long-term and short-term policy solutions. We propose two main policy avenues: Increasing/Expanding Retention and Recruitment Programs and implementing direct institutional assistance like Telehealth.

60
4:20-5:05PM
2nd Floor Hall

Emily Bieber (Chemical Engineering -Spring 25)

Mentor**(s): Scott Shaw | Uchechukwu Akporere** (Chemistry | Chemistry)

Tracking the initial stages of film formation using Quartz Crystal Microbalance (QCM) techniques

Environmental films accumulate on various surfaces, altering their physical and chemical properties. These films influence material degradation and environmental interactions, particularly during precipitation events that can release contaminants into local water systems. Despite their significance, the mechanisms governing film formation and maturation are not fully understood. This study utilizes Quartz Crystal Microbalance (QCM) techniques to monitor the development of environmental films. By tracking resonant frequency changes via the Sauerbrey equation, mass deposition on a quartz crystal surface was quantified over time. These findings provide insight into film nucleation, offering a foundation for further research on their environmental and material science implications.

61

4:20-5:05PM
2nd Floor Hall

Melodie Bui (Human Physiology -Fall 25)

Grant Schreiner (Human Physiology - Fall 25)

Mentor**(s): Shawn Flanagan** (Health & Human Physiology)

A Literature Review: Exploring the Correlation Between Gut Dysbiosis and the Onset of Type 1 Diabetes

This literature review explores the emerging connection between gut microbiome dysbiosis and the development of Type 1 Diabetes (T1D), an autoimmune disorder marked by the destruction of insulin-producing beta cells in the pancreas. While genetic predispositions play a role in T1D, environmental factors, particularly gut microbiota imbalances, have gained attention in recent research. The review examines studies linking gut dysbiosis to immune system dysregulation, suggesting that microbial imbalances may contribute to the onset of autoimmune responses leading to T1D. Furthermore, it discusses the potential for microbiome-based interventions as an approach to preventing or treating T1D. By delving into the interplay between gut microbiota and immune function, this review highlights the need for further research to understand how gut health can influence T1D pathogenesis and therapeutic strategies.

62

4:20-5:05PM
2nd Floor Hall

Harry Bui (Science Studies (Chemistry Emphasis), U2G MPH Policy -Fall 25)

Mentor**(s): Miles Pufall** (Biochem & Molecular Bio)

The Impact of Glucocorticoid Receptor Binding Affinity on DNA Damage Formation

Transcription factors (TFs) bind DNA to regulate gene expression. Surprisingly, there is an increased frequency of nucleotide variation at transcription factor binding sites (TFBS), suggesting that TF binding is inherently mutagenic. We hypothesize that TF binding alters the conformation of DNA to enhance damage formation. To test this hypothesis, we measured damage in response to UV light for DNA sequences bound by the transcription factors Ets1 and the glucocorticoid receptor (GR). We found that binding enhanced the damageability of specific bases with the binding sequence of each TF. However, the dose-dependent accumulation of damage differed. To test whether this was due to the stability of TF binding to each DNA sequence, we measured the affinity of GR and Ets1 for each sequence by electrophoretic mobility shift assays (EMSAs). Interestingly, our preliminary data indicates that the affinity of GR for DNA is inversely correlated the enhancement of DNA damageability. We are in the process of testing Ets1 to see whether this is consistent across TFs. This suggests that loosely bound DNA is more susceptible to UV damage. This work contributes to a broader understanding of how protein binding influences DNA integrity and contributes to mutagenesis associated with cancer development.

63

4:20-5:05PM
2nd Floor Hall

Emma Chase (Business Analytics & Information Systems; Psychology -Spring 25)

Mentor**(s): Emily Campion** (Mgmt & Entrepreneurship)

Gifted and Talented Programs: Selection, Bias, and Long-Term Outcomes

Although research on career success has largely focused on proximal factors such as an individual's job-related knowledge, skills, and abilities, scholars have also begun to highlight distal predictors including early life experiences. Education, specifically

participation in gifted and talented programs, is among these early life experiences that impact career success. Gifted and talented programs aim to infuse challenge, rigor, and academic growth into the curriculum of students that show evidence of high achievement capability, while preparing them for success in their life beyond the program. This integrative conceptual review (N = 22) uncovers what influences students' enrollment in gifted and talented (G&T) programs, as well as if the program's goal of later-life student success is achieved. Drawing from psychology, education, and sociology about what influences G&T selection, as well as program success, I develop a theoretical model that aims to answer the following questions: What influences students' enrollment in G&T programs? Do students from G&T programs succeed after completing secondary education? The theoretical model reveals that a lack of educator training, an unclear definition of intelligence, assessment structures, and parental characteristics all influence the selection of a student into a G&T Program. Further, the lack of standardization in G&T programs has led to two key challenges: it makes it difficult to understand the systematic influence of these programs on student's future success and allows bias to affect the G&T student selection process. There is limited research regarding the success of these programs, however, the existing findings show a correlation between program involvement and post-secondary success; prior research struggles to isolate this relationship to the impact of G&T programs. This synthesis of current research builds a strong case for standardization and increased educator training for G&T programs. This theoretical model also highlights the need for additional research that aims to determine the overall success of gifted and talented programs.

64

4:20-5:05PM
2nd Floor Hall

Disha Chawla (Biology -Fall 26)

Mentor**(s): Hanna Stevens** (Psychiatry)

16p11.2 Deletion Alters Mid-Gestation Placental Morphology in Mice

The 16p11.2 microdeletion involves the loss of a small segment on chromosome 16 in people, impacting approximately 20 genes. This deletion is strongly associated with neurodevelopmental disorders, particularly autism spectrum disorder (ASD). As the 16p11.2 microdeletion is present in all tissues it may lead to disruptions in placental structure and function that may alter neurodevelopmental outcomes. The placenta has a critical role in the delivery of hormones and nutrients to the fetal brain development. Understanding how the 16p11.2 microdeletion affects placental morphology is important for figuring out potential mechanisms linking placental function to neurodevelopmental disorders like ASD. We hypothesize that placentas with the 16p11.2 microdeletion will exhibit structural defects that negatively impact fetal growth. Mice are able to model human 16p11.2 phenotypes when this microdeletion is introduced, making them a suitable model to study this question. In this study mid-gestation (embryonic day 14) mouse placentas were collected, fixed in formalin, and sectioned for histological analysis using hematoxylin & eosin (H&E) staining to assess morphological differences on the microscope. To assess placental morphology, sinusoidal (blood) space quantification was performed. Images were captured using a microscope, focusing on the labyrinth, junctional, and decidua zones. Both male and female 16p11.2 deletion placentas exhibited significant structural changes in the fetal region. The labyrinth zone, responsible for nutrient and gas exchange, was reduced. The junctional zone, responsible for communication between

maternal and fetal tissues, was increased. Female placentas showed an increase in labyrinth zone sinusoidal space. Placental defects caused by the 16p11.2 microdeletion likely contribute to overall fetal growth and neurodevelopment.

65

4:20-5:05PM
2nd Floor Hall

Jonathan Clark (Microbiology -Spring 25)

Mentor**(s): Jessica Tucker** (Microbiology & Immunology)

Investigating an antiviral role of angiogenin during Kaposi's sarcoma-associated herpesvirus replication

KSHV is an oncogenic human gammaherpesvirus capable of causing rare cancers in immunocompromised individuals, including Kaposi's sarcoma (KS) and primary effusion lymphoma (PEL). The lifecycle of KSHV contains a lytic replication stage, where most viral genes are expressed and infectious virions are produced, and a latent stage, where viral gene expression is minimal, and the viral DNA genome remains inside host cells as a circular episome. Understanding the molecular triggers of the switch between latent and lytic stages is highly important to the development of new antiviral strategies to combat KSHV. One protein known to promote latency is a secreted ribonuclease from the RNaseA family, called Angiogenin (ANG), a protein classically recognized to promote blood vessel formation. ANG is abundant in KS and PEL and is induced during KSHV replication. A lesser understood function of ANG is its endonucleolytic activity on tRNAs at the anti-codon loop, which produces novel small RNAs called tRNA fragments (tRFs). tRNA cleavage by ANG could inhibit viral replication due to both decreased protein translation and potential effector functions of tRFs. We have found that ANG cleaves tRNAs during KSHV replication in a PEL cell line and also restricts KSHV lytic gene expression. This data suggests that ANG could serve in an antiviral role during KSHV replication by promoting virus latency. Experimentation is also underway in our lab to investigate the effect of the addition of recombinant ANG on KSHV replication. Based on the ANG knockdown results, it is expected that adding ANG will lead to lowered virion production, which will be measured using flow cytometry. Alongside this experiment, a future goal of the project is to provide evidence that recombinant ANG is taken up by PEL cells to support experiments involving addition of ANG to cells. We confirmed by western blot that recombinant ANG enters these cells following a 24 hour ANG treatment. An ongoing experiment is to visualize recombinant ANG inside the cells through staining ANG with fluorescent antibody markers and observing it under immunofluorescence microscopy. Overall, future work will continue to explore whether infection-induced angiogenin (ANG) and its tRNA cleavage function serve as an innate immune response against the replication of Kaposi's sarcoma-associated herpesvirus (KSHV).

66

4:20-5:05PM
2nd Floor Hall

Abigail Cupp (Biomedical Sciences -Spring 26)

Mentor**(s): Donna Santillan | Mark Santillan** (Obstetrics/Gynecology | Obstetrics/Gynecology)

Investigating the Role of Decreased Fetal Movement in Predicting Adverse Pregnancy Outcomes

Episodes of decreased fetal movement (DFM) are commonly associated with adverse fetal outcomes such as stillbirth, fetal growth restriction, and fetal hypoxia. Therefore,

monitoring fetal movement is a practice that many pregnant women follow. The most common method to track fetal movement is for mothers to count the baby's kicks, with suggestions to seek clinical intervention if they track less than ten fetal movements in a two-hour window. The validity of these reports as indicators of adverse outcomes has historically been unclear due to the subjective nature of monitoring. The objective of this study was to determine if perceived episodes of DFM could be indicative of adverse outcomes for the mother and/or child. We hypothesized that perceived episodes of DFM are associated with higher rates of adverse outcomes for both the mother and child compared to the baseline population. A retrospective cohort study was performed to examine medical records of pregnant mothers who were treated for DFM at the University of Iowa Health Care from May 2009 to January 2024. The medical charts of these mothers were assessed for adverse maternal outcomes. The episodes of DFM were linked to the children of that pregnancy, and their charts were assessed for adverse infant outcomes. When compared to published population rates, the mothers examined displayed higher rates of preeclampsia (10% DFM vs. 5-7% population), chronic hypertension (8% DFM vs. 3.7% population), and diabetes (15% DFM vs. 10% population). The children examined displayed higher rates of respiratory distress (6.2% DFM vs. 1% population), patent ductus arteriosus (4.075% DFM vs. 0.05% population), sepsis (4.9% DFM vs. 0.05% population), gastroschisis (0.448% DFM vs. 0.042% population), and hypoxic ischemia encephalopathy (0.774% DFM vs. 0.17% population). These findings are clinically relevant as they display the importance of mothers tracking fetal movement throughout their pregnancy and seeking treatment following perceived episodes of decreased fetal movement.

67

4:20-5:05PM
2nd Floor Hall

Avery Dettbarn (Political Science -Spring 25)

Mentor**(s): Brian Lai** (Political Science)

The effect of race and ethnicity, political partisanship, and degree of state funding for indigent criminal defense on the provision of legal aid

The Justice Gap refers to the gap between the accessibility of legal aid resources and the number of civil legal issues that individuals in poverty have. Each state has a varying Justice Gap, and to look at this, I looked at the amount of civil legal aid attorneys per 10,000 people in poverty in each state. I look to explain what influences the Justice Gap in each state. I recorded the race, ethnicity, and identity makeup in each state, including data on the percentage of the race and ethnicity makeup in each state al ong with the percentage of LGBTQ+ individuals. Also, I collected data on the political partisanship of each state including which way a state voted in the 2020 election, the party affiliation of the governor, and whether the state has a unified government. Also, I looked at the degree of state funding for legal aid resources in each state. I hypothesize that Democratic states with Democratic governors are likely to have a lower Justice Gap. Along with this, I think more diversity in a state will also lower the Justice Gap. Finally, I think that the more funding a state provides to legal aid resources, the smaller the Justice Gap will be. The methodology I used to analyze my data is through regression where I looked at how the independent variables of identity, political partisanship, and state-funding level affected my dependent variable

of legal aid per capita, or number of legal aid attorneys per 10,000 poor people, in each state.

68
4:20-5:05PM
2nd Floor Hall

Minou Emmad (Physics, Computer Science, Math -Spring 27)

Mentor**(s): Michael Schnieders** (Biomedical Engineering)

Understanding TF-DNA Binding with Polarizable Force Fields and Constant pH MD

Understanding the molecular mechanism of TF binding to DNA is central to understanding gene regulation, particularly in disease-relevant situations. A key parameter to characterize these interactions is the binding free energy, which is a thermodynamic measure of affinity between TFs and their DNA targets. Traditionally, free energy differences are calculated experimentally in a wet lab. This is still the gold standard, but it has its limitations. The conditions must be perfect, the materials are expensive, and it is time consuming. Computational methods, particularly in fields like pharmaceutical research, offer a scalable solution for screening thousands of compounds. In this project, we aim to improve the accuracy of computational free energy calculations by integrating the AMOEBA polarizable force field with the nonequilibrium work (NEW) method, a parallelizable and computationally efficient technique, and constant pH molecular dynamics (CpHMD) to more accurately capture biologically relevant protonation dynamics. By leveraging AMOEBA's direct electrostatics, NEW's parallelism, and CpHMD's dynamic simulation of protonation state changes, we hope to achieve more predictive TF-DNA binding affinities at biologically relevant conditions.

69
4:20-5:05PM
2nd Floor Hall

Alexander Feller (Biomedical Engineering, Health Science -Spring 25)

Mentor**(s): Louis Kolling** (Neurosci & Pharmacology)

Impact of Adolescent Ethanol Binge on Pain Sensitivity and Serotonin Signaling

The critical development period of adolescence is characterized by heightened neuroplasticity. Previous studies have documented the acute effects of ethanol (EtOH) binge drinking on brain function; however, few studies investigate its influence on both pain sensitivity and microglial activation during adolescence. Serotonin (5-HT) signaling, given its known modulation by EtOH and role in pain processing, may mediate this relationship. This study seeks to examine the impact of adolescent EtOH binge on 5-HT-related microglial activation, changes in downstream 5-HT signaling, and concomitant changes in pain sensitivity.

Adolescent male C57BL/6J mice underwent varying periods of withdrawal following triweekly oral gavage of 10 mL/kg 20% EtOH or water for 4 weeks. Following EtOH binge cessation, 5-HT neuroinflammation was assessed in the two largest serotonin nuclei using immunohistochemistry and antibodies targeting 5-HT, CD68, and P2Y12. 5-HT signaling was then similarly investigated across other brain regions where 5-HT neurons densely project""raphe magnus, thalamus, nucleus accumbens, anterior cingulate cortex, amygdala, and hypothalamus""using antibodies against 5-HT and SERT. Pain sensitivity following oral gavage was assessed using the Hargreaves pain assessment at 24 hours and 3 weeks post-EtOH cessation.

Analysis of serotonin neuroinflammation revealed a significant decrease (***$p <$ 0.001) in rostral DRN 5-HT neurons at both 24 hours and 3 weeks post-EtOH cessation, as well as a significant increase (*$p < 0.05$) in rostral DRN CD68 (marker for microglial activation) at 3 weeks post-EtOH cessation. This was accompanied by significant increases (**$p < 0.01$) in rostral DRN P2Y12 at both time points. We further observed changes in pain sensitivity that persisted into adulthood following adolescent EtOH exposure. Significant increases in average pain sensitivity were observed at both 24 hours and 3 weeks post-EtOH (**$p < 0.01$, **$p < 0.01$). Examination of serotonin signaling via expression of 5-HT and SERT is currently ongoing.

These findings suggest that persistent hyperalgesia following adolescent EtOH binge drinking may be driven by changes in serotonergic function and microglial activation. These findings may also implicate serotonin signaling and/or microglia as therapeutic targets for addressing pain-related disorders in patients with a history of adolescent alcohol use.

70

4:20-5:05PM
2nd Floor Hall

Abby McLeod (Neuroscience, Pre-Medicine -Spring 26)

Mentor**(s): Joseph Glykys** (Pediatrics)

Neonatal brain hypoxia results in increased neocortical neurodegeneration

Perinatal asphyxia leads to poor oxygen perfusion, which can result in hypoxic-ischemic encephalopathy with severe lifelong neurological consequences. It is important to understand the cellular and molecular mechanisms occurring during hypoxia to develop better neuroprotective strategies. We investigated hypoxic injury to the neocortex using acute brain slices (450 µm) from C57BL/6 neonatal mice postnatal age 9 and 10. The slices were subjected to oxygen-glucose deprivation (OGD) for 10 (brief) or 20 minutes (prolonged), then re-perfused with oxygenated artificial cerebrospinal fluid (aCSF) for 6 hours. Matched control slices were exposed to only aCSF for the entire protocol duration. Through immunohistochemistry, we evaluated cleaved-caspase 3 (CC3), a marker for apoptosis, and Fluoro-Jade C (FJC), a marker for neurodegeneration between the three groups. The amount of apoptosis decreased in slices subjected to prolonged OGD, whereas there was a non-significant decrease during brief OGD compared to control. However, neurodegeneration increased with prolonged OGD, with no change observed with brief OGD. These results suggest that the main cause of cell death during hypoxia may not be apoptosis but other cell death mechanisms, such as ferroptosis, mitochondrial injury, or necrosis. Future research will compare this mouse data to human infant brain slices obtained from pathological samples with hypoxic-ischemic injury as a cause of death.

71

4:20-5:05PM
2nd Floor Hall

Claire Graham (Biomedical Engineering -Spring 25)

Mentor**(s): Michelle Howard** (Radiation Oncology)

Enhancing radiation efficacy in diffuse intrinsic pontine glioma through targeted redox dysregulation

Diffuse intrinsic pontine glioma (DIPG) is the leading cause of pediatric brain tumor-related death, with most patients surviving less than one year after diagnosis. DIPG is localized to the pons of the brain and is most commonly seen in children between 5 and 9 years old. Currently, radiation therapy is the only standard of care for DIPG, as

surgery is not considered a viable option and chemotherapeutic agents have not proven to be successful. Given such limited treatment options, innovative approaches that improve clinical outcomes are crucial. Copper (II)-diacetyl-bis(N4-methylthiosemicarbazone) (Cu(II)-ATSM) is a radiotherapeutic agent known for its preferential uptake by hypoxic tumor cells. Auranofin, an inhibitor of the thioredoxin antioxidant system, can be utilized to enhance the efficacy of radiotherapy by exploiting redox dysregulation in cancer cells. With high membrane permeability and redox potential, auranofin is a promising novel therapeutic agent for DIPG. In-vitro clonogenic dose-response experiments have shown that treatment with Cu(II)-ATSM is significantly more toxic, both alone and in combination with radiation therapy (RT), in DIPG cells than in normal human astrocyte (NHA) cell lines. It is theorized that this selective toxicity is due to the potentially hypoxic nature of DIPG tumor cells. Increased cellular uptake of Cu(II)-ATSM by DIPG facilitates the generation of reactive oxygen species, leading to oxidative stress and ultimately, cell death. We hypothesize that Cu-ATSM in combination with standard RT will decrease RT-induced toxicity of normal neural cell populations by acting as a donor antioxidant and selectively enhance radiosensitivity of DIPG cells via production of H2O2. Auranofin can further potentiate this effect by inhibiting reactive oxygen species metabolism, while simultaneously promoting ROS production, thus enhancing the overall therapeutic efficacy of the treatment.

72
4:20-5:05PM
2nd Floor Hall

Zoe Greenwood (Philosophy and Psychology -Spring 25)

Mentor**(s): Katarina Perovic** (Philosophy)

Beyond The Flicking of a Wrist: How Response Time Could Save Free Will

The question of free will is by no means a new one. It appears, on an intuitive level, that we have the ability to control and determine our actions, but is that really the case? Benjamin Libet conducted an experiment which involved tracking electrical impulses in the brain and the conscious will to act. He found that these impulses preceded the conscious will to act. These findings seem to bring free will into question. However, I don't agree that's the case. In this essay I will first introduce Libet's experiment. I then discuss what Libet takes to be the conclusions of his findings as well as how he thinks this fares for free will in general as well as moral responsibility. I then discuss Libet's argument that free will lives in the ability to veto an action, even after it has been initiated. This claim is then brought into question through a followup piece by metaphysician LÃ¡szlÃ³ BernÃ¡th as well as my personal experience involving experiments which operate on the millisecond level. I argue that Libet's findings aren't the threat to free will which they initially appear. Instead, the type of simple motor actions performed in his experiment aren't the type of conception of free will that we are after in general. Instead, free will lies in the form of deliberation and conscious decision making. I believe that free will goes beyond just the power to veto, and instead comes into play even after an action has been initiated.

73
4:20-5:05PM
2nd Floor Hall

Aden Hageman (Physics - Spring 25)

Mentor**(s): Ravitej Uppu** (Physics & Astronomy)

Resonant Spectroscopy of GaSb Quantum Dots

Quantum dots are a class of crystalline nanostructure with unique optical properties, making them a promising platform for building advanced quantum communication schemes. Novel QDs, made from gallium antimonide, could serve as comparable alternative to traditional QDs made from gallium antimonide, with the key benefit of emitting in the telecom band. This allows for easy integration into pre-existing telecommunication schemes while still maintaining high single photon purity and coherence times. To exhaustively characterize and improve the performance of GaSb QDs, it is necessary to perform resonant spectroscopy. To do this, we utilized a supercontinuum source to precisely tune the lasing wavelength, allowing us to probe the electronic states of the QDs.

74

4:20-5:05PM
2nd Floor Hall

Avery Hand (Biology -Spring 25)

Mentor**(s): Daniel Summers** (Biology)

ROLE OF SARM1 IN RELATION TO CHEMOTHERAPY-INDUCED PERIPHERAL NEUROPATHY OF HYPERSENSITIVE AXONAL CULTURES

Peripheral neuropathy is a degenerative condition consisting of damage to axons of the peripheral nervous system, resulting in loss of sensation and pain in outer extremities. This is a common side effect of drugs like vincristine, a type of chemotherapy, but can also result from conditions relating to hypersensitivity of neurons, such as Charcot-Marie-Tooth (CMT) disease. When this drug and disease are combined, it can have detrimental ramifications for the patient. We investigated the hypersensitivity of CMT-like mutant axon cultures, and attempted to knockout the executive enzyme of the degeneration pathway, SARM1, to determine if degeneration would decrease. We quantified axon damage and death using axon degeneration scores as well as calcium dyes. We found that CMT-like axons were hypersensitive to degeneration after vincristine addition, especially the D81I YARS mutant. SARM1 inhibition has shown promising results in decreasing axon degeneration in axons also exposed to vincristine, but more research needs to be done to identify whether these results are statistically significant. Further understanding the biological pathway of axon degeneration and identifying a way to decrease the subsequent peripheral neuropathy through enzyme knockout opens the door for pharmaceuticals to be made for patients going through chemotherapy treatment, and can especially help those with degenerative diseases such as CMT.

75

4:20-5:05PM
2nd Floor Hall

Emily Roberts (Microbiology & Bassoon Performance -Spring 26)

Mentor**(s): Jeremiah Johnson | Madison Bunch** (Microbiology & Immunology | Microbiology & Immunology)

Neutrophil responses to Campylobacter jejuni: investigating the role of IL-8 stimulation in Bacterial Clearance

C. jejuni is a major contributor to worldwide bacterial gastroenteritis, yet the pathogens interactions with the innate immune components are incompletely understood. During C. jejuni's highly inflammatory initial infection, neutrophils are one of the first responders, being recruited to the intestinal mucosa. This is primarily driven by the chemokine IL-8, which is secreted by epithelial cells. Though neutrophils

are equip with many mechanisms to eliminate this bacteria, such as ROS and NET production, C. jejuni demonstrates the ability to survive in the cell under certain conditions. This study aims to determine whether IL-8 stimulation enhances neutrophil-mediated clearance of C. jejuni while evaluating the role of opsonization in bacterial killing. In order to obtain these results, neutrophils will be isolated from whole human blood, and either primed with IL-8 or left unstimulated. Then, the cells will be infected with Campylobacter at various time points, and subjected to antibiotic treatment in order to eliminate extracellular bacteria. Intracellular survival will be assessed through plating. Additionally, opsonization will be examined using a capsule deficient C. jejuni mutant, and donor specific serum with varying compliment activity (heat inactivation).

76
4:20-5:05PM
2nd Floor Hall

Elleri Herman (Human Physiology -Fall 25)

Mentor**(s): Gordon Buchanan** (Neurology)

Investigating a Role of Time of Day and Serotonin On The Effects of Seizures On COâ,, Arousal in Amygdala Kindled Mice

Epilepsy is a neurological disorder marked by recurrent spontaneous seizures, with one-third of patients experiencing drug-resistant epilepsy, which increases their risk of sudden unexpected death in epilepsy (SUDEP). SUDEP is more prevalent at night, potentially due to respiratory failure. The neurotransmitter serotonin, which regulates epilepsy, sleep, and breathing, is also influenced by the time of day. Preliminary findings from our lab indicate that seizures disrupt COâ,,-induced arousal, a critical mechanism for waking, and this disruption may be more severe at night. To investigate this, we implanted electrodes in serotonin-deficient mice and their wild-type littermates to induce seizures. Mice were exposed to 7% COâ,, during sleep before and after seizures at different times of day. Our results demonstrate that seizures impair COâ,, arousal, with this impairment being significantly worse at night.

77
4:20-5:05PM
2nd Floor Hall

Jason Homann (Physics and Astronomy -Spring 25)

Mentor**(s): Jasper Halekas** (Physics & Astronomy)

Characterizing Toroidal Transformers for Use on an Electrostatic Analyzer

The OCHRE mission consists of a sounding rocket with a suite of instruments that will be launched into the cusp of the Earth's magnetosphere to investigate SOMETHING. One of these instruments is a top-hat electrostatic analyzer, which aims to measure the distribution function of the surrounding plasma. Work is presented here on the buildup and characterization of various transformers for use on the electrostatic analyzer. Finally, future directions for testing, as well as the overall mission are discussed.

78
4:20-5:05PM
2nd Floor Hall

Rijalda Husic (Ethics and Public Policy and Criminology, Law, and Justice -Spring 25)

Mentor**(s): Stephanie Dipietro** (Sociology and Criminology)

Linking Images of Color with Images of Crime: Immigration in Contemporary Society

79
4:20-5:05PM
2nd Floor Hall

Shafa Ismail (Biomedical Engineering, Neuroscience -Spring 26)
Jessica Alberhasky (Neuroscience - Spring 26)

Mentor**(s): Catherine Marcinkiewcz** (Neurosci & Pharmacology)

Spatial transcriptomics to identify genetic mediators of neuronal dysfunction in Alzheimer's disease

Background: Alzheimer's disease (AD) is characterized by neuronal dysfunction, which

may be primarily driven by the accumulation of pathological proteins. Late-stage AD is commonly associated with cognitive decline, however early-stage AD presents with depression, anxiety, and disruptions to sleep. These early symptoms may be attributed to dysfunction of serotonin-producing areas of the brain that develop tau-pathology. The Dorsal Raphe Nucleus (DRN) contains the bulk of these serotonin neurons.

Methods: We used the Visium spatial transcriptomics platform to identify differentially-expressed genes (DEGs) in the DRN of htau mice, a model for prodromal AD. We then used RNAscope and electrophysiology to validate findings of interest.

Results: The DRN of htau mice differentially expresses several AD-related genes. Transcriptomic sub-clustering of the DRN aligns with previous characterizations, identifying distinct DRN subregions. Of these, we find that the centromedial DRN is characterized by serotonin neurons that are dually glutamatergic (5HT/glut neurons). These 5HT/glut neurons differentially express ion channel genes, which may underlie the changes in neuronal activity seen in early- and late-stage AD.

Conclusions: DRN dysfunction may contribute to several prodromal AD symptoms, which may be driven by changes in gene expression. Kcna4 and Slc24a5 are currently being assessed for differential expression in 5HT/glut neurons of cognitively-normal and Braak 2 AD human brain tissue. We hope to correlate the expression of these genes with tau pathology, and determine whether 5HT/glut neurons are separately vulnerable to AD as compared to 5HT neurons of the DRN as a whole.

80
4:20-5:05PM
2nd Floor Hall

Berkley Johnson (Psychology -Fall 25)

Mentor**(s): Martin Kivlighan** (Cedu-Psych & Quant Foundations)

An Investigation on the Efficacy of Mindfulness-Based Interventions in Palliative Care Settings

Palliative care aims to enhance comfort and quality of life (QOL) for patients with serious or terminal illnesses through an interdisciplinary approach, with psychosocial support being a key component. Mindfulness-based interventions (MBIs) have emerged as promising interventions for improving both psychological well-being and QOL in this population. While MBIs align with the holistic and supportive care goals of palliative care, further research is needed to improve the implementation of MBIs across a diverse range of illnesses, populations, and clinical settings. This study aimed to evaluate the effectiveness of MBIs in improving psychological outcomes and QOL in palliative care patient populations. A literature review was conducted using PubMed and Web of Science. Search terms included: 'mindfulness', 'palliative care', and

'randomized control trial'. The search was limited to English-language articles published between 2000 and 2025. MBIs show potential as holistic interventions for patients in palliative care that can reduce overall suffering and improve QOL. Future research should focus on standardizing interventions, evaluating long-term outcomes, and expanding the representation of illness and population in study samples.

81
4:20-5:05PM
2nd Floor Hall

Malvika Khadiya (Political Science, Russian, Ethics & Public Policy -Spring 25)
Austin Sachtschale (Political Science, Russian, Ethics & Public Policy)

James Valentin (Ethics & Public Policy)

Mentor**(s): Frederick Boehmke** (Political Science)

Reviving the Past: Analyzing Unexplored Public Opinions from 1974 Des Moines, Iowa

Iowa Public Opinion and Policy Lab is a team of 20+ undergraduate students at the University of Iowa dedicated to exploring previously lost public opinion polls conducted among Iowans from 1946 to 1981. The team analyzes and organizes the data, translating the survey results into comprehensive research reports. This year's focus is a July 1974 survey. Students selected topics with contemporary relevance, such as US healthcare and inflation. They also looked at Iowans' opinions on Watergate, the 1976 presidential election, and the top problems facing the US. Students have completed converting the survey data from printed formats to digital text, cleaning the data, and preparing it for analysis. They are now in the process of analyzing the refined data and producing detailed reports alongside data visualizations reporting findings from the data. These findings will be presented alongside an explanation of the data preparation process and a summary of key insights.

82
4:20-5:05PM
2nd Floor Hall

Delaney Knutson (Nursing -Fall 25)

Mentor**(s): Barbara Stmarie** (Nursing)

Knowledge Gaps and Experiences of Family Caregivers Caring for their Older Adult at End of Life at Home

Many older adults are choosing to live at home towards the end of life rather than moving into assisted living or long-term care. Members of a health care team hope the experiences of families caring for older adults who die at home is one of peace and fulfillment, and the patient experiences a comfortable dying in a familiar setting surrounded by loving family and friends. Yet the circumstances are extremely unique and variable. The purpose of this study is to understand where the knowledge gaps exist and to explore the experiences of family caregivers when caring for the older adult at the end of life at home. There are two aims. The first aim is an integrative review, conducted by using subject terms such as end of life care, hospice care at home, caregiver barriers to provide foundational information on knowledge gaps for this project. The second aim is a descriptive cross-sectional survey to capture information from family caregivers of their experiences caring for older adults who lived at home until the end of life. This work-in-progress will provide details from previous research on caregivers' experiences caring for older adults at end of life at home, and findings from surveys will show current and local needs of family caregivers as revealed by those who lived the caregiving experience. The results of

this research will allow for a compilation of information and resources to assist family caregivers in caring for older adults at the end of life at home.

83
4:20-5:05PM
2nd Floor Hall

Alaina Lundquist (Microbiology -Fall 25)

Mentor**(s): Jessica Tucker** (Microbiology & Immunology)

Characterization of Mouse Schlafen (mSlfn) Proteins Role in the DNA Damage Response and Antiviral Proliferation

The Schlafen (Slfn) protein family is encoded by a cluster of vertebrate-specific genes and is functionally divergent. Slfns play a role in a wide variety of cellular processes, including DNA replication, cellular proliferation, and the innate immune response to viruses. Some Slfn proteins possess endoribonuclease activity in their N-terminal domain that shows a specificity for transfer RNAs as substrates. However, it is unclear what cellular functions of Slfns are dependent on this N-terminal endonuclease domain, as well as which Slfns are important for different cellular processes. In this project, we aim to explore the role of mouse Slfn (mSlfn) proteins in the growth of murine fibroblasts, as well as during infection with a murine gammaherpesvirus, MHV68. Previous data showed that MHV68 results in an increase in mSlfn2, mSlfn8, and mSlfn9 mRNA expression, as well as an increase in tRNA fragments, posing the possibility that Slfns may cleave tRNAs during infection. To study the role of different mSlfn proteins, we have taken both gene overexpression and knockout approaches. First, we overexpressed mSlfn2, 8, and 9 in NIH 3T3 fibroblasts and infected them with MHV68, but did not see a change in viral titer. Next, we have engineered cell lines that have Slfn2, Slfn8, or Slfn9 genes knocked out using CRISPR/Cas9. Slfn2, Slfn8, or Slfn9 knockouts were confirmed by long-read sequencing of Slfn loci. We then performed a growth assay to determine how cellular growth is impacted by Slfn knockout. Since prior work by other labs have implicated mSlfn proteins in cellular proliferation control in B cells, we expected an increase in cell replication in the absence of mSlfn proteins. We found that mSlfn2 knockouts had the greatest increase in growth, while mSlfn8 and mSlfn9 had a small, but detectable increase when compared to the wild-type control cell line. Going forward, we would like to further characterize these knockout cell lines for growth phenotypes in the presence of hydroxyurea and during infection by a variety of viruses.

84
4:20-5:05PM
2nd Floor Hall

Will Meiners (Physics, Astronomy -Spring 25)

Mentor**(s): John Prineas** (Physics & Astronomy)

Recombination Dynamics of Long Wave Infrared Detectors

Characterizing the recombination rates of long wave infrared detectors is paramount to understanding their dark current density and therefore detectivity. We are able to measure minority carrier lifetimes by utilizing an ultrafast pump and probe technique where a probe pulse is temporally delayed from a pump pulse excitation in order to quantify the relaxation time of minority carriers. There are three mechanisms in a semiconductor that affect minority carrier lifetime; Shockley-Read-Hall (SRH), radiative, and Auger recombination. For a certain LWIR detector, theory expected SRH lifetimes to be 100s of nanoseconds, but experimental measurements show that SRH lifetime was 16.9 ns. 9.6896e-10 cm^3/s and 4.7709e-26 cm^6/s were found to be

radiative and Auger coefficients respectively. In order to increase carrier lifetimes in a detector we need to be able to fully characterize their recombination rate using these methods. This way we can have a metric for how correct the theory was for its predicted lifetime.

85
4:20-5:05PM
2nd Floor Hall

Hope Minor (Public Health -Spring 25)

Mentor**(s): Alexandria Miller** (Molec Physiology & Biophy)

Progress in Developing an S. cerevisiae Viability Assay to Test the Specificity of a Putative TOK1 Potassium Channel Inhibitor

Despite the emergence of multi-drug-resistant yeast such as Candida auris in recent years, fungal pathogens remain overlooked in infectious diseases, resulting in limited antifungals available in the clinic. A promising approach for developing novel antifungals involves targeting ion channels, which are on the cell surface and provide accessible targets for small-molecule intervention. One potential target is the TOK1 potassium channels. These channels participate in maintaining cell homeostasis in yeast, which is critical for cell survival. Compounds that alter TOK1 activity may lead to cell death, providing a new direction for drug discovery. In conjunction with a project in the Miller lab to determine the atomic resolution structure of a TOK channel, I designed a Saccharomyces cerevisiae yeast viability assay to test a putative inhibitor of TOK1 reported to have specificity for Candida albicans TOK1. Based on prior data, I expected to observe differential growth of an S. cerevisiae knockout strain in the presence of cesium chloride. However, I observed a similar pattern of growth of a parental S. cerevisiae wild-type and TOK1 deficient strain in the presence of potassium chloride and cesium chloride at pH 4.0 and 6.0. Future directions to develop a 96-well-based liquid growth assay in varying potassium/cesium concentrations could be performed to determine whether this assay would be suitable for future TOK inhibitor specificity experiments.

86
4:20-5:05PM
2nd Floor Hall

Maryam Mohammed (International Relations -Spring 25)

Mentor**(s): Brian Lai** (Political Science)

Barriers to Healthcare Access for Refugees in the U.S.

This paper examines numerous factors that potentially affect healthcare access for refugees in the United States. It identifies several barriers that prevent refugees from utilizing healthcare resources.

87
4:20-5:05PM
2nd Floor Hall

Bailey Newberry (Health Promotion -Spring 26)

Mentor**(s): Serena Gumusoglu** (Obstetrics/Gynecology)

Maternal IL-17 Exposure Alters Behavior and Brain Gene Expression in a Pregnancy Model

Diseases of pregnancy such as preeclampsia or maternal infection increase risk of neurodevelopmental disorders in offspring. A potential mediator of this mechanism are pro-inflammatory cytokines such as interleukin-17 (IL-17). Previous work has shown IL-17 administration during pregnancy is sufficient to induce autism-like phenotypes in offspring. However, it remains unclear whether alterations in offspring

neurodevelopment are in part mediated by changes in maternal behavior. To test the maternal effects of IL-17 we conducted behavioral tests related to stress and anxiety. Additionally, we performed quantitative polymerase chain reaction (qPCR) to evaluate microglia-associated gene expression. Finally, the neocortical region of maternal brains were contoured.

88

4:20-5:05PM
2nd Floor Hall

Kenzie Newton (Health Promotion, -Winter 25)

Mentor**(s): Terry Wahls** (Internal Medicine)

Efficacy of Diet on Quality of Life in Multiple Sclerosis (EDQ-MS): Participant Demographic Information

Authors: Kenzie Newton 1; Anna Klein, BS1; Mary A. Ehlinger, BS 1; Tyler J. Titcomb, PhD, RDN1,2; Farnoosh Shemirani, PhD; Linda G. Snetselaar, PhD, RDN2; Patrick Ten Eyck, PhD3; Terry L. Wahls, MD1

1 Department of Internal Medicine, University of Iowa, Iowa City, IA

2 Department of Epidemiology, University of Iowa, Iowa City, IA
3 Institute for Clinical and Translational Science, University of Iowa, Iowa City, IA

ABSTRACT

Introduction: Emerging evidence indicates that dietary interventions reduce fatigue and improve quality of life among people with multiple sclerosis (MS). However, most of this data is from short-term trials and evidence on long-term disease progression is lacking. Therefore, the Efficacy of Diet on Quality of Life in Multiple Sclerosis (EDQ-MS; NCT05007483; IRB 202104639) is on-going to address these gaps in knowledge. The study is a 2-year randomized controlled trial investigating the efficacy of two dietary interventions, time-restricted olive oil ketogenic diet and modified Paleolithic elimination diet, compared to usual care control arm on the primary outcome of quality of life in individuals with relapsing-remitting multiple sclerosis (RRMS).

Objective: The purpose of this project is to analyze the demographic characteristics of participants in the EDQ-MS study. This analysis includes variables such as age, sex, ethnicity, education level, and other relevant sociodemographic factors. Examining these characteristics will provide insights into the generalizability of the study sample.

Methods: After informed consent was obtained, participants completed questionnaires via an online platform.

Results: A total of 162 participants were enrolled. The mean age (ï,± standard deviation) of participants was 45.5 (9.7) years old, with 87.65% of them being female. Further, 82.72% of participants were white, 7.41% were black or African American, 5.56% were Hispanic or Latino, 1.85% were American Indian, and 2.47% were mixed race. A 4-year bachelor's degree was the most prevalent education level among participants (40.12%), with a master's degree being the second most common (27.16%). Further, 12.35% of participants had an associate's degree and 13.58% had a high school diploma only. Regarding employment, 68.52% of participants were employed, 11.11% were self-employed, 2.47% were out of work, and 4.94% were

unable to work. The most common household income level of participants was $120,000 or more (36.42%). The second most common was $70,000-%79,000 (9.88%), followed by $90,000-$99,000 (6.79%). The average number of dependents in a household was 1. Eighty-seven percent of participants were right-handed. Regarding treatment, 9.26% had taken IVG or stem cell treatment, 77.19% of participants had taken a disease modifying treatment (DMT), and 56.79% were currently taking a DMT at the time of survey completion. The average BMI of study participants was 28.9 (6.4).

Conclusion: The study sample has similar sociodemographic characteristics to our previous experience conducting trials in Iowa City but due to the underrepresentation of specific groups lacks generalizability to the broad MS population. Enhancing diversity in clinical trial populations is important in understanding how the disease differs between populations and will also help in the development of more individualized treatment.

89
4:20-5:05PM
2nd Floor Hall

Jackie Ott (Human Physiology -Spring 27)

Mentor**(s): Erin Talbert** (Health & Human Physiology)

Requirement of tgfbr1 for TGF-b1 induced glycolysis in skeletal muscle cells

Weight loss in people with cancer, called cancer cachexia, leads to skeletal muscle wasting and an overall decrease in one's quality of life or survival. The increase in muscle wasting can also make it difficult to withstand the effects of cancer treatments, and there is no approved drug to prevent muscle wasting. One symptom of cancer cachexia is metabolic dysfunction. Much is known about the ability of transforming growth factor-beta (TGF-b) superfamily members to induce muscle atrophy, but less is known about the role of canonical TGF-b. Our recent work has demonstrated increased activation of TGF-b in muscle of cachectic people and animals, and we sought to understand the impact of TGF-b treatment on a system of cultured muscle fibers. We cultured C2C12 cells and differentiated them into muscle fiber-like cells called myotubes. After 5 days of differentiation, we treated the cells with 10 ng/mL recombinant TGF-b1 and re-treated the cells after 12 hours. After 24 hours, we measured glucose disappearance and lactate production in the culture media. TGF-b1 increased glucose disappearance and lactate production, suggesting increased glycolytic metabolism. TGF-b1 primarily signals through tgfbr1 and tgfbr2 but can also signal through other related receptors, and it is unknown which receptor is responsible for this increased glycolysis. Our data reveals tgfbr1 is required for the increase in glucose disappearance and lactate production tgfbr2 was not required. Taken together, we show the effects of TGF-b on skeletal muscle cell metabolism and determine the requirement for tgfbr1 for increased in glycolysis. Therefore, TGF-b may be a driving factor in the metabolic shift seen in cachectic skeletal muscle.

90
4:20-5:05PM
2nd Floor Hall

Brooke Paasch (Political Science and International Relations with a Minor in German - Spring 27)

Mentor**(s): Brian Lai** (Political Science)

Scrolling into Activism: The Impact of Social Media on Political Participation Among Young Adults in the United States

Child Soldiers: Understanding Their Plight and Gender-Specific Impacts

Scrolling into Activism Abstract: Utilizing Stata, I worked to identify the relationship, if any, between social media and its impact on those aged 21-29's political participation. I completed secondary data analysis on the World Value Survey data Wave 7 (2017-2022) to test this. Through regression, cross tabs, and p value measures, I was able to conclude that social media usage does positively impact political participation. Knowing if and how social media impacts political participation, especially in an almost completely online world, is important to know to help promote political participation across all people.

Child Soldiers Abstract: Utilizing 32 articles, 8 mentioning gender in ties with mental health outcomes, I worked to identify any differences and the relationship, if any, between gender and the mental health implications of child soldiers. I completed a meta-analysis to conclude if findings on this topic were in agreement. For the most part, I was able to conclude that there are distinct differences between genders concerning mental health outcomes but there is no clear relationship to determine if gender is the only cause for these differences. Knowing how gender impacts mental health differently, allows for rehabilitation efforts to be more catered towards those in need. If girls are more prone to experience PTSD, knowing this allows for their rehabilitation efforts to be more geared towards resources they are more likely to need.

91
4:20-5:05PM
2nd Floor Hall

Krushi Patel (Neuroscience - Spring 26)

Mentor**(s): Serena Gumusoglu** (Obstetrics/Gynecology)

Investigating microglia changes in an inflammatory model of neonatal sepsis

Neonatal sepsis is a serious blood infection that occurs in neonates, often caused by E. coli and frequently transmitted from the birthing mother during delivery. It remains a leading cause of mortality and neurodevelopmental impairment, particularly in preterm and low-birth-weight infants. Despite advancements in neonatal care, the neuroinflammatory mechanisms underlying sepsis-induced brain chnages are not well understood. Microglia, the primary immune cells of the brain, play a critical role in mediating neuroinflammation. However, the specific contributions of individual pro-inflammatory cytokines to microglial activation remain unclear. This study aims to investigate the role of key pro-inflammatory cytokines""IL-6, IL-1$\hat{I}^2$, and KC""in modulating microglial responses during neonatal sepsis.

92
4:20-5:05PM
2nd Floor Hall

Rebecca Philipsen (Biochemical Engineering -Spring 28)
Jennessa Johnson (Medical Lab Science Interest - Spring 28)

Carson Bantz (Physics and Astronomy - Spring 28)

Mentor**(s): Scott Shaw | Brianna Cannoy** (Chemistry | Chemistry)

Dicamba and Atrazine in the Water

Spectroscopic analysis of water samples to determine levels of atrazine and dicamba.

93
4:20-5:05PM
2nd Floor Hall

Isaiah Pielak (Political Science, Psychology, and Ethics and Public Policy -Spring 26)

Mentor**(s): Elizabeth Menninga** (Political Science)

Delegate Status and the Success of Peace Negotiations in Civil Conflicts

This project explores the relationship between the outcomes of dyadic peace negotiations in civil conflicts and the status of the attending delegates. It presents the hypotheses that as the status of attending delegates increases, the more likely a given negotiation is to be successful and the more likely it is that future negotiations will take place. These hypotheses are qualitatively examined through a case study of the Kivu Conflict in the Democratic Republic of the Congo and methods for potential future quantitative studies are overviewed.

94
4:20-5:05PM
2nd Floor Hall

Sophia Heller (Philosophy, Political Science -Spring 25)
Koro Castillo (Spanish - Spring 25)

Isabel Meade (French - Spring 25)

Maddie Patterson (Political Science - Spring 26)

Mentor**(s): Elise Pizzi | Sara Mitchell** (Political Science | Political Science)

Disasters, Migration, and Violence Lab: European & American Disaster Response

Our lab is working on the creation of a new dataset on government responses to disasters, focusing on geophysical, meteorological, hydrological, and climatological disasters for each country (1900-present). Using the disaster as the unit of analysis, we compile UN OCHA reports, news stories, and policy reports to generate post-disaster chronologies (3+ years) for each event. We code a variety of variables (e.g., disaster policy type, timing, scope, scale, actors, third-party restrictions). We will use this information to evaluate how government disaster responses influence the relationship between disasters, migration, and political violence. Our poster will highlight patterns and interesting case studies of disaster response by European and American countries.

95
4:20-5:05PM
2nd Floor Hall

Madelin Schwager (Biochemistry and Neuroscience -Spring 26)

Mentor**(s): Jon Resch** (Neurosci & Pharmacology)

Investigating the regulation of aldosterone-sensing neurons and sodium appetite by leptin

Excess sodium intake increases hypertension risk, while reducing sodium lowers blood pressure and cardiovascular mortality. Obesity is also strongly correlated with hypertension, but the underlying mechanisms remain unclear. Notably, obesity is associated with elevated aldosterone levels in both humans and rodents, which regulates blood pressure by promoting sodium retention and driving sodium appetite. Given that primary hyperaldosteronism""characterized by excess aldosterone secretion""is a known cause of hypertension, increased aldosterone in obesity may serve as a key link. The adipocyte-derived hormone leptin, which is elevated in obesity, is hypothesized to drive aldosterone release by acting on leptin receptors (Lepr) in the adrenal gland. However, whether leptin also influences sodium appetite through aldosterone-sensitive neurons is unknown. Our lab recently identified Lepr

expression in neurons that are uniquely sensitive to aldosterone because of their expression of 11Î²-hydroxysteroid dehydrogenase II (HSD2) and the mineralocorticoid receptor (MR). Therefore, leptin may regulate HSD2 neuron activity to control sodium appetite. To investigate this, we performed immunofluorescence to assess phosphorylated STAT3 (pSTAT3), a marker of leptin signaling, in HSD2 neurons following leptin injections. We observed a significant increase in pSTAT3 immunoreactivity in HSD2 neurons, confirming direct leptin sensitivity. Additionally, behavioral studies revealed that leptin increased sodium intake in female, but not male, non-obese mice. These findings demonstrate that HSD2 neurons are directly responsive to leptin and that leptin may influence sodium appetite in a sex-dependent manner, providing insight into the potential neural mechanisms linking obesity, sodium appetite, and hypertension.

96
4:20-5:05PM
2nd Floor Hall

Maanit Sheth (Biomedical Engineering -Spring 28)
Kyra Howieson (Biomedical Engineering - Spring 27)

Mentor**(s): Xuan Mu** (Biomedical Engineering)

Evaluating the Impact of Various Anions on Silk Aggregation: A Study Based on the Hofmeister Scale

The interactions between salt ions and silk proteins have been recognized as a central mechanism in silk spinning, one engineering marvel in nature, as well as a cornerstone for biofabrication with silk protein feedstocks for biomedical applications. The Hofmeister series categorizes ions based on their ability to precipitate proteins, yet its role in the salt ion-induced aggregations of silk proteins remains underexplored. This study investigates the impact of various anions (sodium as the cations) on the aggregation of silk fibroin, aiming to evaluate the Hofmeister scale's effectiveness in categorizing these salts. Using a range of salt solutions""NaCl, NaSCN, Naâ,,HPOâ,„, NaNOâ,ƒ, Naâ,,COâ,ƒ, and Naâ,ƒPOâ,„""we analyze the effects on silk aggregation. Our methodology includes spectroscopic analysis to assess optical changes of silk protein solutions. Preliminary results indicate significant variations in silk aggregation patterns, suggesting that the Hofmeister series may require adjustments for accurate predictions in silk protein systems. This research provides new insights into the molecular interactions between silk fibroin and anions, contributing to the broader understanding of protein aggregation and the development of bioinspired materials.

97
4:20-5:05PM
2nd Floor Hall

Anjali Subash (Marketing -Spring 25)

Mentor**(s): Bowen Ruan** (Marketing)

When Fear Meets Curiosity: The Effectiveness of Emotional Appeals in Communicating Environmental Risks

Emotional appeals are widely used, and have been shown to be effective, in communicating public health and environmental issues to the general public. This study examines the roles of fear and curiosity in conveying critical information about nitrate contamination in water. The results show that while both fear and curiosity are effective when used independently, they do not appear to work well in combination: simultaneously inducing both emotions is less effective than evoking either fear or

curiosity alone. These findings offer practical guidance for policymakers, educators, and environmental advocates on how to most effectively communicate issues of public concern.

98
4:20-5:05PM
2nd Floor Hall

Isabelle Yoder (Neuroscience -Spring 27)

Mentor**(s): Natalie Denburg** (Neurology)

Quantifying the Relationship Between Sleep Quality and Cognitive Function in Healthy, Older Adults

The objective of this study is to quantify the relationship between sleep quality and cognitive functioning in healthy, older adults. Over this 8-week study, we aim to identify specific sleep disturbances from actigraphy watch data in relation to cognitive performance data obtained from a standardized neuropsychological battery. Study participants, between the ages of 56-85 enrolled in the randomized, double-blind, placebo-controlled clinical trial, Evaluating the Disease-Modifying Potential of a Sleep Intervention for Alzheimer's Disease, were included in this study. This study utilized neuropsychological testing during the baseline assessment to evaluate attention, memory, executive functioning, language, visuospatial skills, and speed of processing. Short interruptions during the night and disruption in normal sleep patterns correlated with a decreased performance in memory, executive functioning, language, visuospatial skills, and speed of processing. Decreased activity during the day correlated with a lower performance in memory, attention, language, and speed of processing tests. Comprehensive analysis from actigraphy and neuropsychological performance has helped us quantify this relationship between sleep quality and cognitive function in older adults.

99
4:20-5:05PM
2nd Floor Hall

Grace Hahn (Communication Sciences and Disorders, Psychology -Spring 25)

Mentor**(s): Philip Combiths** (Communic Sci & Disorders)

Family Support Workers Language Sampling in Multilingual Homes

For children with multilingual backgrounds language sampling in each of their languages is best practice. However, with 94% (American Speech-Language Hearing Association, 2017) of Speech-Language clinicians being monolingual, this creates a barrier when sampling in languages other than English. This research study addresses this barrier by collaborating with a family support worker (FSW) to collect and interpret home-language samples. traditional language sample analysis results were compared to data gathered by family support workers in two forms: live transcription and estimated measures. Results for intelligibility, grammaticality, and utterance length show differences across all three types of language sampling methods. These differences will be discussed as they relate to language sampling practices with multilingual children.

100
4:20-5:05PM
2nd Floor Hall

Amukta Gantalamohini (Environmental Policy & Planning -Spring 25)
Kate Beeman (Environmental Policy & Social Justice (Spring 26)

Grace Koch (Environmental Science - Spring 26)

Abby McKeone (Environmental Policy - Spring 25)

Mentor**(s): Samantha Zuhlke | LilliAnna Scott** (Sch of Plan & Pub Affairs | Sch of Plan & Pub Affairs)

Small Town Iowa Policy Outcomes: Analyzing City-level Public Services Using Google Street View

The existence and quality of basic public services are policy outcomes that indicate the strength of a municipality's government. While measures of public services are generally well documented in urban areas, Iowa's small towns lack local-level geospatial data and analysis on city services. Smaller government entities lack the capacity to collect and maintain data on policy outcomes, and data that does exist varies between cities. Therefore, we seek to utilize Google Street View (GSV) technology in Iowa to analyze a series of visible policy metrics. Previous research indicates GSV is an efficient, low-cost, and effective tool to assess the quality of public services virtually. This study aims to apply GSV surveying to evaluate local public services (road/sidewalk conditions, local government buildings, and street furniture) in towns in Iowa with a population of 5,000 or less. The resulting dataset evaluating the quality of public services will improve small town data availability and bridge the gap between cities of varying sizes. We will produce a final policy report that discusses the viability of GSV as a surveying tool and analyzes public services between small local governments.

101
4:20-5:05PM
2nd Floor Hall

Lauren Smith (Neuroscience, Anthropology -Spring 28)

Mentor**(s): Gordon Buchanan** (Neurology)

Impact of seizures on the arousal response to CO2

Lauren Smith, Saina Narsian, Rui Li, Gordon Buchanan

One in 26 people will be diagnosed with epilepsy in their lifetime, and about 30% of these people will have refractory epilepsy, meaning that their seizures cannot be controlled by medication. Refractory epilepsy is a known risk factor for sudden unexpected death in epilepsy (SUDEP). SUDEP often happens after a generalized tonic-clonic seizure, which can cause hypercapnia and acidosis, two conditions indicating excessive CO_2 levels in the body. Hypercapnic ventilatory response is reduced after a seizure. Thus, we hypothesize that seizures also diminish the arousal response to CO_2. To test our hypothesis, we first induced status epilepticus (seizure >60 minutes) using pilocarpine in mice, causing the surviving animals to exhibit spontaneous seizures (piloTLE model). EEG, EMG, ventilation, and CO_2 levels were recorded in both seizure-naive and the piloTLE mice. Upon the detection of non-REM sleep, either room air or 7% CO_2 was delivered to the mice. Arousal latency was measured.

CO_2 exposure lengthened arousal latency amongst epileptic animals, with arousal latency being particularly increased in postictal trials. Prolonged arousal latency suggests that seizures affect the hypercapnic response, and thus the ability to oxygenate effectively after a seizure, increasing vulnerability to SUDEP. The arousal response to CO_2 is regulated by serotonin, a neurotransmitter that is also responsible for the regulation of seizures and breathing. In future experiments we hope to explore the connection between seizures, serotonin and arousal.

102

4:20-5:05PM
UCC-2520D

Brandon Alpers (Speech & Hearing Sciences -Spring 25)

Mentor**(s): Elizabeth Walker | Kellsie Busho** (Communic Sci & Disorders | Faculty/Staff)

Spatial release from masking in children with unilateral hearing loss

Despite the advent of universal newborn hearing screening and a decrease in the age at identification, children with unilateral hearing loss (UHL) continue to experience delays in diagnosis and intervention. Subsequently, children with UHL may experience challenges with language acquisition and academic achievement. Compared to children with normal hearing (NH), children with UHL face specific difficulties with listening in background noise that have a cascading effect on functional outcomes. These difficulties are likely to occur even when the target talker and competing background (i.e., masker) talkers are coming from different locations. In contrast, for listeners with NH in both ears, speech perception improves when the target talker and masker talkers are spatially separated. This phenomenon is known as spatial release from masking (SRM). The current experiment addressed the following questions: 1) How do children with UHL perform on speech perception in noise tasks compared to children with NH? 2) How do children with UHL perform on speech perception in noise tasks in aided versus unaided conditions? 3) Is there an association between degree of UHL and speech perception in noise? We tested the following hypotheses: 1) children with UHL will show less SRM than children with NH and 2) children with UHL will show less SRM in the unaided versus aided condition. The test battery consisted of a series of audiological, hearing aid (HA) verification, and word recognition measures. Twelve children with UHL (7 females) completed the test battery. Participants ranged in age from 5 to 12 years, with a mean age of 9.5 years (SD = 2.2). Preliminary results indicated that children with NH showed more SRM than children with UHL. Further, children with UHL showed an average SRM (difference between colocated and separated conditions) of 6.7 dB in the unaided condition and SRM decreased on average by 1.1 dB with a HA. The long-term goal of this study is to expand our knowledge of how to best manage UHL in children in terms of amplification devices, classroom tools, and speech therapy.

103

4:20-5:05PM
UCC-2520D

Nidhi Anugu (Human Physiology -Spring 25)
Victor Fontanez (Public Health - Spring 27)

Mentor**(s): Teri Schnelle** (-Student Services)

Resident Hall Assistant (RA) Competency and Confidence in Responding to Disclosures of Sexual Misconduct

Resident Hall Assistants (RAs) serve as critical first responders to student disclosures of sexual misconduct within university residence halls. As both accessible peer supporters and mandated reporters, RAs must navigate complex roles in providing appropriate responses while fulfilling institutional obligations. This project seeks to assess the perceived confidence and competence of RAs in handling such disclosures. Through a review of peer-reviewed literature, we examine factors that influence students' decisions to disclose sexual misconduct and explore how RA interactions shape those experiences. We will analyze current RA training objectives related to sexual misconduct response and develop an assessment tool to measure RA

preparedness. Data will be collected through surveys distributed to RAs and through focus groups we organize to gather in-depth qualitative insights. Findings will guide the development of targeted recommendations for additional training and resources, with the aim of enhancing trauma-informed, supportive, and ethical RA responses to disclosures.

104
4:20-5:05PM
UCC-2520D

Fiona Holmes (Physics, Astronomy -Spring 26)

Mentor**(s): Valerie Payre** (Earth & Environmental Sci)

EFFECTS OF GRAIN SIZE ON VISIBLE/NEAR INFRARED SIGNALS IN FELDSPAR-BEARING TERRAINS ON MARS.

The Compact Reconnaissance Imaging System for Mars (CRISM) spectrometer onboard the Mars Reconnaissance Orbiter (MRO) acquires visible/near-infrared (VNIR) reflectance signals of the surface of Mars and has detected feldspar-bearing terrains with >30-60% of feldspar in ancient regions of Mars [e.g., 1-4]. There is currently no instrument able to provide sub-mm scale images and chemical composition of these terrains, leaving geologists puzzled regarding the type of rocks these feldspar-rich rocks are: granite, anorthosite, or feldspar-rich basalts. The petrological implications behind the nature of these terrains are significant, potentially changing the vision of a crust being purely basaltic, as well as improving our understanding of the magmatic history of the planet.

CRISM measurements are sensitive to various parameters including the grain size [2,5], which might bias the mineralogy deduced from the spectral signals. It is therefore important to constrain how much the grain size can affect CRISM VNIR reflectance signals on feldspar-bearing materials. [5] showed that feldspar can be detected in basaltic rocks when they are phenocrysts and in concentrations down to 30 wt.% within plagioclase phenocryst-bearing basaltic rocks. This study explores the VNIR detection of feldspar within terrestrial samples of various textures (extrusive and intrusive), chemistry (mafic and felsic), and feldspar grain sizes to further constrain the petrology of feldspar-bearing terrains detected by CRISM on Mars.

105
4:20-5:05PM
UCC-2520D

Grace Lin (Ancient Civilizations -Spring 27)

Mentor**(s): Brandon Dean** (Religious Studies)

History in Gilead - The Handmaid's Tale

The Handmaid's Tale is a gripping story of Offred, a handmaid in the newly formed Gilead, formerly the United States. However, most don't look at the historical afterward and how this story is regarded in their history. How are the retrospective takes of these men displayed through the story itself and what does it mean in the "historical notes"? And how are we seeing this play out in our lives?

106
4:20-5:05PM
UCC-2520D

Maya Monk (Integrative Biology B.S. -Spring 25)

Mentor**(s): Heather Sander** (Geogra&Sustainability Sci)

Decadal changes in Red-Headed Woodpecker distributions in Iowa

The state of Iowa has undergone significant changes in land use in the first part of the 21st Century, particularly including the intensification of agriculture, conversion of

cropland to suburbs and the restoration of natural areas. These changes alter habitat, leading to changes in the distribution and abundance of native species. The effects of these changes, however, remain poorly documented for many species. For example, we know little about the effects of these changes on the Red-Headed Woodpecker (Melanerpes erythrocephalus), a species that is recognized as being of special concern Partners in Flight and Iowa's State Wildlife Action Plan. This study sought to identify relationships between changes in land cover and the distribution of Red-Headed Woodpeckers in Iowa. We tested the hypothesis that urban expansion has reduced occupancy rates for this species, using Red-Headed Woodpecker occurrence data for 2012 and 2022 from the eBird Basic Dataset and land-cover data from the National Landcover Database. We constructed occupancy models to identify relationships between changes in land cover (urban, agriculture, forest) and species occupancy and used the resulting model to predict species occupancy in 2012 and 2022, then compared occupancy rates to identify where the likelihood of this species changed. Results indicate that Red-headed Woodpecker occupancy is linked to landcover, with higher occupancy in woodlands and lower in urban and agricultural areas. Occupancy rates decreased in many areas of Iowa, particularly areas that experienced reductions in forest cover. These findings suggest an ongoing decline of Red-Headed Woodpeckers in Iowa. Habitat restoration and forest preservation projects in these regions could help ensure the continued presence of this species in Iowa.

107
4:20-5:05PM
UCC-2520D

Josie Norris (Psychology -Spring 26)

Mentor**(s): Teresa Treat | Solange Bolger** (Psychological Brain Sci | Psychological Brain Sci)

College Students' Cannabis Use on College Campuses

Cannabis use has increased in recent years among college students, with approximately 44% reporting using cannabis in the past year and 25% using in the past month. Among users, 73%-77% report simultaneous alcohol and cannabis use. Cannabis use is consistently higher among college men relative to college women. However, inconsistent measurement across studies "" especially of frequency, quantity, administration and intoxication "" leads to conflicting findings about cannabis use.

The current study reviews measurement approaches used to assess cannabis use and hazardous/problematic use, highlighting the Cannabis Use Disorder Identification Test "" Revised (CUDIT-R), a gold standard screening tool for assessing cannabis use frequency and detecting hazardous cannabis use. Findings from the literature review revealed limited standardized measures that assess the full breadth of cannabis use. The CUDIT-R is established as a reliable and valid tool to assess cannabis use among college students, though not comprehensive in measuring all harms and consequences related to cannabis use.

The current study also examines cannabis use frequency and hazardous use among a large sample of college students, focusing on how it varies across gender identity and levels of alcohol consumption. A large sample of college students ages 18-24 at two large Midwestern universities (N = 2824) responded to the CUDIT-R and the Alcohol

Use Disorder Identification Test, a gold standard measure of alcohol use that served as a model to develop the CUDIT-R.

Almost half of the current sample endorsed using cannabis in the past year (48.6%). Of these students, the majority (52.1%) reported at least 2 occasions of cannabis use in the past month, 43.3% met the cutoff for potential hazardous cannabis use, and 24.3% met the cutoff for potential cannabis use disorder. College men were significantly and somewhat-to-moderately more likely to report hazardous cannabis use compared to women ($p < .001$, $\eta^2 = .037$). Among those who reported cannabis use in the past year, greater levels of hazardous cannabis consumption were significantly and somewhat-to-moderately related to greater levels of hazardous alcohol consumption ($p < .001$, $r = .208$).

Future research should continue to consider the complex nature of cannabis consumption in order to measure it in a standardized and comprehensive way. As well, the breadth of harms and consequences should be evaluated further. Moreover, simultaneous alcohol and cannabis use is highly risky and growing increasingly common, thus paying attention to this growing trend is critically important.

108

4:20-5:05PM
UCC-2520D

Allison Stolte (Microbiology (Scholar Track) -Spring 26)

Mentor**(s): Wendy Maury | Paige Richards** (Microbiology & Immunology | Microbiology & Immunology)

Ebolavirus Entry Inhibited by Novel Cathepsin Inhibitors

Upon internalization of the endosomal compartment, the full-length Ebolavirus (EBOV) glycoprotein (GP) is proteolytically processed by low pH dependent proteases, such as cathepsin B and L. The proteolytically processed viral GP then binds to endosomal membrane bound NPC1, mediating viral/cellular membrane fusion events and releasing the viral genome into the cytoplasm. We hypothesize that by inhibiting cathepsins, these compounds cause EBOV to remain within the endosome and be degraded. The broad-spectrum cysteine protease inhibitor, E-64, is an effective but irreversible cathepsin inhibitor that may potentially cause adverse off-target effects. This series of four related compounds developed by Dr. Kevin Pinney at Baylor University may serve as reversible inhibitors, possibly reducing toxicity while functioning as effective antivirals.

109

4:20-5:05PM
UCC-2520D

Noah Thomas (Political Science, International Relations, Ethics & Public Policy - Spring 26)
Amira Qidwai (Internatioal Relations - Spring 26)

Alix Bushard (International Relations, Music - Spring 25)

Mentor**(s): Elise Pizzi | Sara Mitchell** (Political Science | Political Science)

Disasters, Migration, Violence Lab: Asian & African Disaster Response

Our lab is creating a new dataset on government responses to disasters, focusing on geophysical, meteorological, hydrological, and climatological disasters for each country (1900-present). Using the disaster as the unit of analysis, we compile UN OCHA reports, news stories, and policy reports to generate post-disaster chronologies (3+ years) for each event. We code various variables (e.g., disaster policy type, timing,

scope, scale, actors, third-party restrictions). We will use this information to evaluate how government disaster responses influence the relationship between disasters, migration, and political violence. Our poster will highlight patterns and interesting case studies of disaster response by Asian and African countries.

110
5:10-5:55PM
2nd Floor Hall

Fareeha Ahmad (Psychology -Spring 25)
Anuvaa Prabhakaran (Psychology - Spring 25)

Mentor**(s): Grazyna Kochanska | Juyoung Kim** (Psychological Brain Sci | Psychological Brain Sci)

Indirect Relations Between Parental Responsiveness and Preschoolers' Moral Behaviors Through Children's Positive Internal Working Models of the Parent

Positive parenting has been well-acknowledged as a foundation of children's prosocial and moral behaviors, influenced by a large body of attachment research (Eisenberg & Valiente, 2002; Kochanska, 1997). However, little is known about the developmental mechanism of such associations. We propose children's positive internal working models (IWMs) of the parent, which are mental representations of the parent being supportive, warm, and responsive, as an underlying factor linking early parental responsiveness and children's future moral behaviors.

We observed maternal and paternal responsiveness to the child at 16 months (N=194, 101 boys, 93 girls), children's IWMs at 38 months (N=175, 89 boys, 86 girls), and children's moral behaviors at 52 months (N=177, 91 boys, 86 girls) in families from a midwestern college town and its surrounding rural suburbs.

Parental responsiveness was measured during natural interactions between the mother or father and the child (e.g., free play, snack), taking into account sensitivity-insensitivity, cooperation-interference, and acceptance-rejection (Ainsworth et al., 1971). MacArthur Story Stem Battery (MSSB) was administered to measure children's IWMs of their parents based on how affectionate and helpful the parent is to the child in distressing situations. Children's moral behaviors were observed while they played impossible games without adult supervision.

In mother-child dyads, the indirect effect of maternal responsiveness on children's moral behaviors via children's positive IWM of the mother was significant. If mothers were more responsive at 16 months, their children had more positive IWMs of the mother at 3 years, which in turn led to fewer violations of the rules at 4.5 years. In father-child dyads, none of the direct or indirect paths were significant.

These findings highlight the mediating role of children's positive view of their parents in explaining the relations between early parenting and their future moral behaviors, with a particular emphasis on mother-child relationships.

111
5:10-5:55PM
2nd Floor Hall

Jaden Bartlett (Political Science, English & Creative Writing -Spring 25)

Mentor**(s): Nicholas Martini** (Political Science)

From Cornfields to Crosswalks: An Analysis of the Impacts of Rural/Urban Residency and Religious Affiliation on American Political Extremism

This study aims to answer the question of how urban vs rural residency impacts the likelihood of extreme political and ideological self-affiliation among survey

respondents in the American National Elections Study (ANES), controlling for all other common variables. Further, this study will take the findings of this initial question and compound them against a second factor "" religious importance, specifically within American Christianity "" seeking to understand how the importance a respondent places on their religion (if any) further contributes to the development of ideologically and politically extreme beliefs. My hypothesis stated that as respondents become more rural and further emphasize religious importance, their likelihood of holding extreme views will increase. My analyses were conducted by running logistical regressions of survey respondents who identified their views as politically extreme (a "1" or "7" on the self-identification scale), with the dependent variable being the respondent's residency status: either rural, small town, suburban, or urban. The set of analyses on religious importance was conducted similarly, but instead controlling for residency status and measuring the degree of religious importance as the dependent variable.

The results confirmed my hypothesis, showing that the population most likely to identify as politically extreme were respondents who resided in strictly rural areas and placed the highest importance on their religious beliefs; these respondents were over two-and-a-half times more likely to identify as politically extreme than the average respondent. The conclusion that follows is that as one becomes more rural and places greater emphasis on their religious beliefs, the more likely they are to identify as politically extreme.

112

5:10-5:55PM
2nd Floor Hall

Josh Bergthold (Computer Science, Mathematics -Spring 25)

Mentor**(s): Xueyu Zhu** (Mathematics)

Advancing Neural Network Training: Integrating Data Assimilation Techniques for Robustness under Noisy data

Ensemble Kalman Inversion (EKI) is a derivative-free optimization method applied to the training of neural ordinary differential equations (neural ODEs). In this work, EKI is used to approximate ODEs, demonstrating its power as an optimizer that is gradient-free. Noisy datasets, sampled from a linear system of ODEs, were generated to evaluate the robustness and stability of EKI in handling real-world uncertainties.

113

5:10-5:55PM
2nd Floor Hall

Andrew Burgess (Environmental Science, Creative Writing, Philosophy -Spring 25)

Mentor**(s): Corey Markfort** (Civil-Environmental Engin)

Modeling Deadly Deoxygenation Events in a Shallow Lake

Shallow nutrient-rich lakes are prevalent in the Midwest and support many critical ecosystem functions. However, nutrient-driven algal blooms and other events can cause deoxygenation in lower temperature layers. Big Spirit Lake in Okoboji, Iowa experienced a significant fish kill in July 2021. Despite the general understanding that shallow lakes are typically well-mixed and rarely stratify, Big Spirit Lake experienced several short-term stratification events before the fish kill. By combining high-frequency buoy and weather data, we aim to model the environmental conditions that contributed to this fish kill, ultimately developing a predictive framework to mitigate the risk of future events in similar shallow lake ecosystems.

114
5:10-5:55PM
2nd Floor Hall

Alix Bushard (International Relations, Music -Spring 25)

Malvika Khadiya (Political Science, Russian, Ethics & Public Policy - Spring 25)

Isaiah Pielak (Political Science, Psychology, Ethics & Public Policy - Spring 26)

Mentor**(s): Brian Lai** (Political Science)

Alternative Development and Illicit Crop Eradication

In our research project, we will provide an analysis of illicit crop substitution and alternative development programs that have been implemented around the world. Among the variables we will discuss of the consequences of cultivation, consistency of support, viable alternative industries and the level of cross stakeholder communication available to these program. In order to illustrate the effects of these variables, we will analyze case studies of countries that have attempted these types of programs to combat issues with narcotics, like Colombia and Thailand. These countries have experienced varying levels of success with crop substitution, and we'll seek to explain the factors behind those outcomes.

115
5:10-5:55PM
2nd Floor Hall

Gavin Clark (Biochemistry & Molecular Biology -Spring 25)

Mentor**(s): Ashutosh Mangalam** (Pathology)

Administration of Bifidobacterium adolescentis and Akkermansia muciniphila Results in Unique Microbiota Compositions in a pseudo germ-free mouse model

Gut microbiota dysbiosis and gastrointestinal issues are implicated in multiple sclerosis (MS)

pathobiology, yet the specific bacterial interactions and their impact on disease predisposition or

propagation is poorly understood. Previously, we demonstrated that phytoestrogens such as

isoflavones can enrich Bifidobacterium adolescentis (BA) and thus increasing the BA to

Akkermansia muciniphila (AM) ratio in the gut, thereby reducing disease severity in

experimental autoimmune encephalomyelitis (EAE) mouse model of MS. In addition, BA is

prevalent in over 70% of healthy individuals but its relative population decreases during disease

states. At the same time, AM, notably enriched in MS, which may contribute to MS

pathobiology by producing immunostimulatory microbial metabolites that can trigger both local

and systemic inflammation, potentially leading to central nervous system (CNS) inflammation

reducing self-tolerance and thus ultimately demyelination. However, the specific effects of BA

and AM in the gut, host physiology, and MS pathology remain unclear. To fill this knowledge

gap, we administered pseudo germ-free mice with either BA, AM, PBS, or BA+AM. Half (20) of

the mice were euthanized on day 25 post-inoculation, and feces, brain, spine, and intestinal

Administration of BA and AM significantly altered microbiota composition, leading to distinct bacterial profiles depending on the administered species. Moreover, the administration of BA, AM, or both influenced EAE disease severity. We further investigated whether alterations in fecal microbiota could modulate inflammatory cytokine production. Bone marrow-derived macrophages (BMDMs) were stimulated with fecal microbiota extracts, revealing that AM administration altered cytokine production relative to controls, highlighting possible immunomodulatory potential. Future studies will explore the specific microbial metabolites produced by BA and AM and their mechanistic pathways influencing immune regulation, gut barrier integrity, and neuroinflammation in MS.

116
5:10-5:55PM
2nd Floor Hall

Audrey Coleman (Biochemistry & Molecular Biology, B.S. -Spring 26)

Mentor**(s): Ronald Weigel** (Surgery)

AP-2âº Regulates Uveal Melanoma Proliferation Pathways In Vitro

Uveal melanoma is a rare cancer accounting for 3% of melanoma diagnoses that occurs in the eye. Poor prognosis is often associated with this disease as 50% of patients develop metastases and there are no effective treatments for this advanced stage. To develop therapeutic interventions, it is necessary to understand the mechanisms of uveal melanoma growth and metastasis. Prior research has shown transcription factor AP-2âº inhibits the Nucleosome Remodeling and Deacetylase (NuRD) complex leading to downstream activation of EZH2 expression, which ultimately drives cutaneous melanoma metastasis. We hypothesize that AP-2âº, encoded by the TFAP2A gene, also drives growth and metastasis in uveal melanoma. To investigate the role of AP-2âº in the mechanisms of uveal melanoma, a TFAP2A knockout (KO) was generated in uveal melanoma cell lines 92.1 and Mel202 using double guide RNA CRISPR/Cas9. A nontargeting (NT) guide RNA was used as a control. KO was confirmed using western blot analysis. The effect of TFAP2A KO on cell proliferation was assessed in vitro using the MTT assay. To further understand transcriptional pathways associated with TFAP2A in uveal melanoma, RNA was harvested and analyzed through RNA-seq. Data from RNA-seq was subsequently used to perform gene set enrichment analysis (GSEA). Analysis of the MTT assay showed significantly decreased cellular proliferation in TFAP2A KO cells compared to NT for both 92.1 and Mel202 lines ($p<0.0001$). Furthermore, RNA-seq analysis identified 5,748 genes that were significantly differentially regulated in the TFAP2A KO condition in comparison to NT ($p<0.5$). Utilizing this to perform GSEA revealed an association between the TFAP2A KO condition and decreased expression of genes involved in cell cycle checkpoints and proliferation ($p<0.01$). Additionally, TFAP2A KO was associated with an increased expression of genes driving epithelial mesenchymal transition ($p<0.01$). In vitro experiments demonstrate TFAP2A KO is related to decreased

proliferation and more mesenchymal-like genetic expression. To further investigate the role of TFAP2A in regulating proliferation of uveal melanoma, future endeavors will study in vivo models.

117
5:10-5:55PM
2nd Floor Hall

Breanna Duerr (Speech and Hearing Science -Spring 25)

Mentor**(s): Inyong Choi** (Communic Sci & Disorders)

Can we find out who's voice cochlear implant users are trying to listen to from their brain signals?

Cochlear implant (CI) users often struggle to understand speech in noisy environments. Recent studies suggest this is partly due to difficulty blocking out background noise alongside degraded sensory input. Auditory selective attention has been proposed to be a critical cognitive function that helps with speech-in-noise perception. We aimed to decode auditory selective attention from the single-trial electroencephalographic (EEG) signals of CI users to provide neurofeedback during their training of auditory selective attention. Our previous research has shown that neurofeedback training can strengthen auditory selective attention in normal hearing individuals, which resulted in better speech-in-noise perception. Based on these findings, we wanted to explore whether this approach could also benefit CI users. A critical first step was to see if we could accurately identify what individuals were paying attention to by analyzing their EEG. This was unclear due to potential changes in their attention mechanisms and interference from the CI device. Therefore, our main goal was to create a reliable and interpretable method for decoding attention from CI users' EEG, allowing for better feedback and understanding of attentional modulation during training. Our results show that auditory selective attention of CI users can be reliably decoded from only 3-second segments of their EEG signals, reaching 60% accuracy. This result represents an important first success in neurofeedback training of auditory selective attention to improve speech-in-noise perception in CI users.

118
5:10-5:55PM
2nd Floor Hall

Mia Dukle (Biomedical Sciences, Bioinformatics -Spring 26)

Mentor**(s): Hanna Stevens** (Psychiatry)

Effects of Different Prenatal Stress Models on Gene Expression in the Mouse Ventral Forebrain

Prenatal stress has been shown to have long-lasting impacts on offspring and contributes as a risk factor for neurodevelopmental disorders (NDDs) such as autism spectrum disorder (ASD) and ADHD. Increasing evidence implicates the striatum in social deficits and restrictive and repetitive behaviors, serving as a link between prenatal stress and NDDs. This project expands on previous work from the lab and identifies changes in striatal primordium--ventral forebrain-- gene expression, fetal body weight, and placental weight across multiple days of embryonic development after exposure to different prenatal stress conditions. In line with previous studies done at an earlier embryonic day, we hypothesize that factors involved in GABAergic system development have altered expression across various types of stress, revealing divergent stress impacts on striatal development. Furthermore, we expect sex differences in gene expression after exposure to stress to be maintained across time

points. To test this, we administered different stress models to time-mated CD1 dams and collected fetal ventral forebrain tissue on embryonic day 18. GABAergic system development genes, such as Erbb4, Cxcr4, Gad1, Gad2, Gabra, and Nxph1, were assessed in the ventral forebrain using standard qPCR methods, showing normalization of many changes at this later time point but with differences across models. These results address some factors underlying well-documented NDD sex differences, the relevance of different prenatal stress models, and the potential longevity of effects on offspring neurodevelopment.

119

5:10-5:55PM
2nd Floor Hall

Annika Ellis (Nursing -Spring 26)

Mentor**(s): Wen Liu | Kyu Ri Lee** (Nursing | Nursing)

Profiling Mealtime Verbal Interactions between Nursing Home Staff and Persons with Dementia

Background: Active engagement in mealtime is a common challenge for persons with dementia. Positive mealtime interactions between residents and nursing staff are crucial to engaging residents in eating. This study described characteristics and associations of verbal interactions between staff and residents during mealtime.

Methods: 261 videos of full-meal interactions were collected from a clinical trial that tested impact of person-centered care on care quality and mealtime behaviors in 38 nursing home staff and 17 residents with dementia from May through November 2022. Verbal interactions were transcribed and coded using the Cue Utilization and Engagement in Dementia (CUED) mealtime video"coding scheme.

Results: The two most frequent resident positive verbal behaviors were "expressing personal needs/preference" and "other-positive" (24.2% each). The most frequent staff positive verbal behavior was "orientation/giving instruction" (21.8%). The most frequent staff negative verbal behavior was "other conversation-negative" (65.7%), where staff was not attending to the resident directly. Decrease in the duration of staff conversations with other staff/residents was associated with increased resident positive verbal behaviors (r=-0.292, p=0.034).

Conclusions: Residents interacted with staff mostly through expressing their needs/preferences and positive responses unrelated to meals, indicating opportunities for person-centered care. Staff interacted primarily with other staff/residents, rather than the resident that staff was assigned to assist. When staff did interact with the resident, staff mostly gave mealtime-related instructions/orientation. Decreasing staff conversations with other staff/residents may increase resident positive verbal behaviors and optimize mealtime engagement. Findings confirm the importance and opportunities of staff person-centered care in promoting resident positive behaviors at mealtime.

120

5:10-5:55PM
2nd Floor Hall

Madeline Ephraim (Psychology -Spring 25)

Mentor**(s): Isaac Petersen** (Psychological Brain Sci)

Household Chaos and Parental Supportiveness are Independently Associated with Children's Sustained Attention

Children's sustained attention, the ability to maintain focus and alertness over periods of time, supports children's academic performance and behavioral adjustment. Therefore, it is important to identify factors that influence the development of children's sustained attention. Previous studies have shown that household chaos (i.e., disorganization and instability in the home) is associated with poorer sustained attention in children. Additionally, positive parenting has been shown to decrease the negative effects of household chaos on children's behavioral outcomes. Thus, it is possible that positive parenting moderates the effects of household chaos on other aspects of attention, including sustained attention. However, the moderating effects of parenting on the relation between household chaos and sustained attention have yet to be investigated. The current study examined whether supportive parenting protects against or exacerbates the negative consequences of household chaos on children's sustained attention.

Method: The sample included children (N = 231, ages 3"–7 years) and their parents. Parents reported on household chaos (the Confusion, Hubbub, and Order Scale; Matheny et al., 1995), their child's sustained attention (Attention Focusing subscale on the Children's Behavior Questionnaire; Putnam & Rothbart, 2006), and their parenting style (Nurturance subscale of the Child Rearing Practices Report; Rickel & Biasatti, 1982) via questionnaires. Sustained attention was also assessed via report by secondary caregivers (e.g., teachers, grandparents). Scores on sustained attention were averaged across raters. In addition, we assessed children's sustained attention in the laboratory, operationalized as the proportion of intervals the child spent in focused attention during a sorting task from the Laboratory Temperament Assessment Battery (Goldsmith et al., 1999).

Results: Results showed that household chaos was significantly associated with questionnaire ratings of sustained attention such that greater household chaos was associated with lower ratings of children's sustained attention, $r(557) = .31$, $p < .001$. This association did not hold when examining behavioral measures of sustained attention. Additionally, maternal supportiveness was positively associated with questionnaire ratings of children's sustained attention, $r(551) = .20$, $p < .001$. Parental supportiveness did not moderate the association between household chaos and sustained attention.

Discussion: The results indicate that household chaos may impair the development of children's sustained attention. Although maternal supportiveness was associated with greater sustained attention, maternal supportiveness did not weaken the association between household chaos and sustained attention. These findings suggest that children with deficits in sustained attention may benefit from interventions that target disorganization and instability in the home environment. Future research should investigate the effects of household chaos and supportive parenting on children's sustained attention to identify factors which weaken the effects of chaotic home environments on children's development.

121

5:10-5:55PM
2nd Floor Hall

Rachel Walenceus (Geoscience, Certificate in GIS -Spring 25)

Mentor**(s): Benjamin Swanson | Bradley Cramer** (Earth & Environmental Sci | Earth & Environmental Sci)

Monitoring seasonal variations in the soil health and chemistry at the Ashton Prairie Living Laboratory

The health of the soil is fundamental to understand when managing a prairie restoration project, as this may impact the success of the flora and fauna. Previous soil surveys at the Ashton Prairie Living Laboratory (APLL) sought to observe annual variation in the soil health and chemistry, primarily focusing on the Haney Number. However, a higher temporal resolution, such as seasonal changes, is needed to better understand annual variations observed. We sampled 43 locations at the APLL in the spring of 2024. Of the 43 sites, 23 were sampled in the fall of that same year. Samples were sent to Midwest Laboratories, where the Haney test, among other analyzes, were conducted. After normalization, our data shows an increase in the average Haney number from April to October, which likely reflects the progression of the growing season. While a "high" Haney Number is indicative of a healthy soil, proxies for prairies are not established, to our knowledge. Thus, investigations of native prairies are of interest for future soil health and chemistry surveys.

122

5:10-5:55PM
2nd Floor Hall

Melanie Flores (Speech and Hearing Science -Spring 25)

Mentor**(s): Kristi Hendrickson** (Communic Sci & Disorders)

School-Age Bilinguals: A Study of Spoken and Written Word Recognition

The majority of the world speaks more than one language and dual-language education is becoming more common in the United States, yet our understanding of how dual language learners understand, and process spoken and written language is limited. Word recognition is a central component of language and reading. The present study examines spoken and written word recognition in school-age bilinguals. We tested 31 English-dominant, bilingual children aged 11 to 13 who had been enrolled in an English-Spanish dual language immersion program in Pella, Iowa since kindergarten. The aim of the project was to examine how dominancy influences the speed and accuracy of spoken and written word recognition. To do this we used eye-tracking in the Visual World Paradigm (VWP). For this paradigm, participants heard or read a word in English or Spanish and were instructed to click the image of the word out of an array of four images. We analyzed their accuracy in choosing the target image and how fast they fixated on the target as a measure of speed of processing. For each of these dependent variables (% accuracy and fixation speed) we ran a linear regression, which included the fixed effects of Language (English, Spanish), and modality (spoken, written). For accuracy, we found a significant main effect of language (χ^2 (1), p<0.0001), suggesting that children were more accurate at identifying words in English than Spanish. There was also a main effect of modality (χ^2 (1), p<0.0001), in which children were more accurate for spoken compared to written words. Finally, there was a significant Language x Modality interaction (χ^2 (1), p=0.03) that was driven by the fact that accuracy differences between spoken and written words only occurred in Spanish. For our measure of processing speed, there was again a main effect of effect of language (χ^2 (1), p=0.003), and modality (χ^2 (1), p<0.0001), and a significant interaction (χ^2 (1), p<0.0001). The interaction was due to the fact that children were faster at processing words in English compared to Spanish, but this effect was larger for written compared to spoken words. These results suggest that dual language learners are faster and more accurate at processing

words in their dominant language, especially when they are reading. These findings demonstrate the significant differences that occur across the spoken and written modalities among children who are actively acquiring a second language.

123
5:10-5:55PM
2nd Floor Hall

Rachel Ford (Biology -Spring 25)

Mentor**(s): Andrew Kitchen** (Anthropology)

AVPR1A and Its Potential Effects on Mammalian Understanding of Vocalizations

The ability to perceive and recognize structured sound, such as music, is common across the mammalian family. Recent research suggests that the AVPR1A gene, which is best known for its association with pro-social behavior, may also play a role in musical recognition in humans. Specifically, there is evidence that our understanding of pitch, timing, and structuring may be connected to AVPR1A. Importantly, this is a trait that likely extends to other species within the mammalian class, though it remains to be determined if AVPR1A is associated with hearing to the same degree in other species. Here, we report on our investigation of AVPR1A genes from a range of mammals. We perform a phylogenetic analysis of AVPR1A sequences from mammalian species, and use the resulting tree to test for associations between evolutionary patterns of the gene, species' relative vocal sociability, and the degree of vocal interspecies communication.

124
5:10-5:55PM
2nd Floor Hall

Alayna Gallery (Biochemistry and Molecular Biology & Human Physiology -Spring 26)

Mentor**(s): Kathleen Sluka | Angela Smith** (Phys Therapy & Rehab Sci | Phys Therapy & Rehab Sci)

Signaling Pathways in Spinal Dopamine 1 Receptor Neurons

Chronic pain conditions are highly prevalent, impacting millions of people worldwide, but the mechanisms that explain the transition to chronic pain are not fully understood. The focus of this project is to better understand the mechanisms of D1 receptors and the NR2B subunit of NMDAR in the spinal cord. Research from our lab shows that spinal D1 receptors are involved in the transition to chronic pain. The D1 receptors are stimulatory and bind to dopamine from the brain, initiating an intracellular signaling cascade. This downstream signaling cascade can phosphorylate CREB to modulate gene expression or phosphorylate the NR2B subunit to increase its activity. I have optimized an immunohistochemical stain for pCREB and pNR2B in D1 receptor reporter mice and confirmed that D1 receptor expressing neurons also express pCREB and pNR2B. Staining the spinal cord of mice following induction of a chronic widespread pain model developed by our lab will allow us to observe if expression of pCREB and pNR2B increase in D1 receptor expressing cells following the transition to chronic pain.

125
5:10-5:55PM
2nd Floor Hall

Amukta Gantalamohini (Environmental Policy & Planning -Spring 25)

Mentor**(s): Margaret Carrel** (Geogra&Sustainability Sci)

Urban Heat Inequality: A look into New York City

Practices such as federal housing policies, highway infrastructure siting, and local zoning have caused spatial segregation by race/ethnicity in U.S. cities. Urban heat

effect is heavily influenced by the built environment, so this spatial segregation, coupled with a difference in urban form, has led to disproportionate vulnerability to urban heat. This study aims to explore the relationship between urban heat vulnerability"" measured by surface temperature, green space, access to home air conditioning, and the percentage of residents who are low-income or non-Latinx Black"" and the historical use of discriminatory urban practices between the New York City boroughs of Manhattan and Bronx. Historical discriminatory urban practices have affected the way non-Latinx Black and low-income individuals have experienced contemporary urban heat in these two differing boroughs. It is New York City's responsibility to combat the issue of disproportionate urban heat, and to create resiliency as urban heat continues to burden the lives of vulnerable populations. In turn, this study highlights initiatives taken on by New York City to create future climate resiliency.

126

5:10-5:55PM
2nd Floor Hall

Olivia Schuelka (Psychology and Religious Studies -Spring 27)

Mentor**(s): Brandon Dean** (Religious Studies)

The Shroud of Turin

My research will dive into the history of the Shroud of Turin, its religious significance, and if claims that it is the burial shroud of Jesus Christ is plausible or can be proven.

127

5:10-5:55PM
2nd Floor Hall

Elizabeth Gross (Neuroscience - Spring 26)

Mentor**(s): Kathleen Sluka | Angela Smith** (Phys Therapy & Rehab Sci | Phys Therapy & Rehab Sci)

Examination of A11 dopamine neuron activity in the transition to chronic pain

Chronic pain is a significant health problem affecting approximately 50 million Americans. In this project, I explored the activity of hypothalamic A11 dopamine neurons during the transition to chronic pain to better study the mechanisms behind the transition. These neurons release dopamine to the spinal cord to modulate pain pathways, making them key targets to study. We propose that increased activity of the A11 dopamine neurons facilitates the transition to chronic pain. To test this, we first split a cohort of mice into a pain group and a pain-free control group. We induced chronic pain in the pain group using our lab's acidic saline model while giving neutral saline injections to the controls. Twenty-four hours later, we perfused and prepared the brain tissue for immunohistochemical staining for pCREB, a marker of neuronal activity, and TH, a marker of dopamine neurons. I imaged the stained tissue and counted the neurons expressing pCREB and TH in A11 to determine if dopamine neuron activity increases in animals with pain. The results showed a potential difference in activity between the pain and control groups along with a possible sex difference, but more data is needed to verify these findings. I intend on running additional animals in the upcoming months at a 2-hour time point, rather than a 24-hour time point, to ascertain pCREB and TH expression at an earlier time point during the transition to chronic pain.

128
5:10-5:55PM
2nd Floor Hall

Zoe Hettinger (Neuroscience and Biochemistry -Spring 25)

Mentor**(s): Bengi Baran** (Psychological Brain Sci)

The Relationship Between Chronotype and Clinical Symptoms in People with Schizophrenia

Schizophrenia is a severe mental illness characterized by core positive and negative symptoms, along with cognitive deficits. Recent evidence reveals that disruptions in sleep-wake patterns may exacerbate symptoms. People with schizophrenia (PwS) are more likely to have an evening chronotype (Linke, 2021) but it is unknown whether evening-chronotype PwS display exacerbated clinical symptoms, as compared to their morning chronotype counterparts. The current study investigates the relations between chronotype and psychopathology symptoms in PwS and non-psychiatric controls (NC). Chronotype is evaluated using the Morningness-Eveningness Questionnaire (MEQ) and validated through wrist-worn actigraphy data which collected continuous data on sleep-wake patterns and activity levels over seven days. To measure clinical symptoms, the Generalized Anxiety Disorder-7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9) were administered to each participant. Additionally, the Brief Psychiatric Rating Scale (BPRS) was given to only PwS. We hypothesize that evening chronotype will correlate with increase psychopathology symptoms in both groups, PwS and NC. Preliminary analyses are based on 19 PwS and 6 NCs. We observed a non-significant positive correlation between MEQ and GAD-7 scores in the entire PwS sample (r=0.193, p=.390) such that increasingly morning chronotypes were associated with more anxiety symptoms. We also observed nonsignificant negative correlation between MEQ and PHQ-9 (r=-.066, p=.753), such that increasingly morning chronotypes were associated with less depression. Similarly, a nonsignificant negative correlation between MEQ and BPRS was observed (r=-.345, p=.191). These preliminary data are contradicting and nonsignificant, issues likely due to the small sample size. Like the sample size, age effects could play into chronotype as older populations normally tend to exhibit morning type more predominately. The average age for our PwS sample was 43.5 years old. Furthermore, actigraphy validation of the MEQ survey responses is still underway and may change these findings. By integrating actigraphy, self-report measures, and clinical assessments, we aim to determine whether chronotype could serve as an early indicator of schizophrenia risk and a prognostic tool for symptom progression.

129
5:10-5:55PM
2nd Floor Hall

Trevor Jackson (BA Viola Performance -Spring 25)

Mentor**(s): Jacob Michaelson | Lucas Casten** (Psychiatry | Psychiatry)

Genetic predictors of Mental Health: Comparative Analysis of Machine Learning Algorithms

Polygenic risk scores (PRS) have emerged as promising indicators for various health disorders, potentially offering valuable applications in clinical practice. Despite the significant genetic component of many mental health conditions, the relationship between PRS and mental health diagnoses remains inadequately explored. This study employs a comparative analysis of machine learning (ML) algorithms to investigate this relationship and evaluate the predictive power of PRS for mental health outcomes

using data from 1,240 individuals. We implemented and compared logistic regression and random forest algorithms using PRS data to predict self-reported mental health diagnoses. Our findings demonstrate that both ML approaches perform significantly better than chance, logistic regression achieving a mean overall AUC of approximately 0.627 compared to random forest's 0.715 for five different diagnoses. ADHD and Autism disorders had the highest prediction accuracy. The random forest analysis provided additional insights by identifying specific PRS markers that carry stronger predictive weight for certain mental health conditions. These results suggest that PRS could serve as personalized indicators to assist clinicians during the differential diagnosis stage, but are still error prone. Our comparative analysis not only highlights the potential clinical utility of PRS in mental health assessment but also provides methodological insights regarding which ML approaches may be optimal for this application. This work contributes to bridging the gap between genetic predictors and clinical mental health applications while identifying promising directions for future research in personalized psychiatry.

130

5:10-5:55PM
2nd Floor Hall

Karena Jensen (Biomedical Engineering and Music Preformance -Fall 26)

Mentor**(s): Jason Wilken** (Phys Therapy & Rehab Sci)

Reliability of Force Measurement within the Carbon Fiber Orthosis Proximal Cuff

Carbon fiber custom dynamic orthoses (CDOs) are braces used to reduce pain and improve function in individuals who have had foot and ankle injuries. They consist of a proximal cuff wrapping around the leg below the knee, a stiff posterior strut, and a footplate that extends below the foot. It is known that CDOs offload force acting on the foot and that tightness of the cuff is thought to influence how the CDO controls limb motion while walking. However, there are no established guidelines for determining optimal cuff tightness, an understanding of how cuff forces change with activity, or other information to guide patient education. This study will result in an improved understanding of the role of cuff and tightness on the effectiveness of CDOs and can be used to inform patient education, and help those that use CDOs daily.

131

5:10-5:55PM
2nd Floor Hall

Connor Junkins (Political Science, Enterprise Leadership -Spring 25)
Vanessa DeMarco (Economics, Ethics & Public Policy, Political Science - Spring 26)

Julia Anderson (Political Science, Religious Studies - Spring 25)

Mentor**(s): Nicholas Martini** (Political Science)

Combating Racial Disparity in Iowa Prisons: A Three Prong Approach

Iowa prisons struggle with racial disparity. The issue, however, is multifaceted and cannot be tackled from any one single angle. Rather, the systems that underlie the disparity must be dismantled at every stage in the criminal legal system. Our paper seeks to analyze policy options at each of these stages to take steps towards creating a more equitable system. In correcting the system that manifests the racial disparity that plagues our prisons, we will also seek greater socioeconomic justice across Iowa prisons.

Through our analysis, we have found that there are several ways to dismantle racial disparity throughout the system. In the end, our recommendation is threefold. Within

the scope of public defense reform, we suggest creating an oversight commission for state offices. In matters of jury selection, providing stricter scrutiny to peremptory strikes would help to make juries a better representation of the community. And in administrative reform, issuing guidelines for prosecutorial discretion. While these options don't solve the issue at large, they plug crucial holes in racial disparity.

132

5:10-5:55PM
2nd Floor Hall

Natalie Kehrli (Psychology B.S. -Spring 25)

Mentor**(s): Amanda Mccleery** (Psychological Brain Sci)

Exploring Physical Activity Patterns in College Students with Elevated Schizotypal Traits: A Comparison of Self-Report and Sensor Data

This project broadly aims to explore physical activity measurement and patterns among college students with and without elevated schizotypal characteristics. This study will mainly focus on the convergence between self-reported and sensor-based physical activity data. The project utilizes an existing dataset from study sites at the University of Iowa, Michigan State University, and Indiana University-Purdue University Indianapolis with approximately 202 participants prior to analysis of both self-report data via the International Physical Activity Questionnaire and sensor-based data from smartphone accelerometer-based data. The sample will be divided into two groups, high and low schizotypal characteristics. Physical activity levels will be compared between the groups, and congruence of measurement will be tested across the two methods (i.e., self-report and pedometry).Â

Elevated schizotypal traits are often associated with various cognitive and social functioning challenges, which may influence lifestyle behaviors, such as one's engagement level with physical activity. Understanding both physical activity patterns and the most reliable measurement methods in this population could provide insights into potential physical health disparities and possible interventions.Â

Statistical analyses will involve both descriptive and inferential techniques. First, Student's t-tests and effect size calculations (Cohen's d) will assess the magnitude and reliability of group differences in physical activity levels across self-report and pedometry measures. These analyses will test the hypothesis that students with elevated schizotypal characteristics exhibit lower levels of physical activity than their non-elevated peers. Additionally, bivariate correlations (Pearson's r or Spearman's rho) and intraclass correlation coefficients will be used to assess the convergence between self-reported physical activity and pedometry data, examining the reliability of self-report measures in this context. There will also be additional, exploratory analyses on correlations between physical activity measures and mood and well-being in both groups.Â

In light of past findings and literature reviews, results are expected to reveal low to moderate convergence between self-reported and pedometry measures physical activity, suggesting that self-report measures may overestimate activity levels compared to sensor-based measures like pedometry. Furthermore, it is anticipated that students with higher schizotypal characteristics will exhibit reduced objective physical activity as measured by smartphone pedometry.Â Â

This study has two main implications. First, it highlights the importance of using sensor-based measures, like pedometry, to complement self-report data in the

assessment of physical activity. Second, by linking schizotypal characteristics to physical activity levels, this project may support targeted health interventions that may serve to improve physical and mental well-being in this population.

133

5:10-5:55PM
2nd Floor Hall

Grace Koch (Environmental Science -Spring 26)

Mentor**(s): Benjamin Swanson** (Earth & Environmental Sci)

Investigating Relations Between Prairie Flora Species Diversity and Soil Haney Score

Prairie species diversity and soil quality are indicators of health and overall establishment of an ecosystem. Pre-modern anthropogenic disturbance, Iowa's dominant ecosystem was tall grass prairie. By analyzing species composition and distribution, we can begin to understand the effects of different restoration techniques for a particular area. This study aims to determine whether soil quality has a statistically significant relationship to species diversity at Ashton Prairie, in Johnson County, IA. This was accomplished by completing a percent cover vegetation survey with 21 sample points overlayed with soil health points from 2022 (Walenceus & Benton). Post survey, statistical and visual analysis was conducted utilizing the Shannon-Wiener diversity index, Excel, and ArcGIS to determine if any trends could be identified relating species diversity and soil health with significant statistical value. Further considerations were also considered during analysis, such as the composition of the seed mixture used, the time since initial seeding, weather conditions of the year and years prior, as well as other factors.

134

5:10-5:55PM
2nd Floor Hall

Kayla Kolpin (Human Physiology -Spring 25)

Mentor**(s): Erin Talbert** (Health & Human Physiology)

MEK inhibitors do not alter muscle cell proliferation

Muscle wasting in cancer has been associated with poor outcomes for many people with cancer, yet there is still no approved treatment. There is a class of drugs called MEK inhibitors that have shown potential to preserve muscle mass in clinical and preclinical data. There are four FDA approved MEK inhibitors that are used to treat cancer, raising the possibility that this class of drugs can be repurposed for treating cancer-induced muscle wasting. However, the mechanism by which MEK inhibitors preserve muscle is unknown. While skeletal muscle is a terminally differentiated tissue, muscle fibers undergo continuous repair, and this process is impaired in cancer. Therefore, we hypothesized that MEK inhibitors may alter muscle progenitor cell proliferation and improve muscle regeneration. We dosed C2C12 myoblast cells with varying drug concentrations of all four approved MEK inhibitors and measured cell number with CellTiter-Blue. We found that clinically meaningful doses of all four MEK inhibitors did not alter cell proliferation. Our dose escalation studies indicated that only binimetinib reduced cell viability at concentrations much above the typical clinical dosage. These findings are consistent with our in vivo findings of fewer centrally-located nuclei in MEK inhibitor-treated muscle, also indicating that there is no increase in muscle regeneration. Taken together, MEK inhibitors are not reducing muscle cell proliferation and are unlikely to preserve muscle mass in cancer by improving muscle regeneration.

135
5:10-5:55PM
2nd Floor Hall

Meg Krapfl (Chemistry and Physics -Spring 25)

Mentor**(s): Renee Cole** (Chemistry)

Classroom Discourse: An Analysis of Instructor Discourse Moves

Instructor facilitation affects how students interact with each other in classroom settings. With the introduction of undergraduate learning assistants (ULA) to the classroom environment, a new set of near-peer instructors are introduced to the facilitation dynamics. In this study, an introductory chemistry course with a rotating primary instructor was observed to determine the facilitation styles of each instructor, including three ULAs, during task solving periods. A Noninteractive Authoritative communicative approach was primarily used for introduction of and during tasks by all instructors, while an Interactive Authoritative approach was primarily used for closing tasks for all but one instructor. Instructor interactions with students during tasks tend to be instructor focused, and instructors take the majority of talking time available. While instructors vary their interaction patterns, they all tend to use managing techniques during the introduction or when interrupting a task and relaying techniques when closing a task. ULAs engage with students as participants by allowing them to initiate contact and balancing instructor and student talk. The next step for this research is to determine how the instructor facilitation styles affect student discourse.

136
5:10-5:55PM
2nd Floor Hall

Asya Lengel (Chemistry -Spring 25)
Thi Phan (Biochemistry - Spring 27)

Mentor**(s): Lei Geng | Renee Cole** (Chemistry | Chemistry)

Mathematical Modeling of Drug Dissolution Kinetics: New Approach for Outlier Detection and Removal

In pharmaceutical sciences, assessment of drug dissolution kinetics is crucial for developing new drug formulations, ensuring adherence to FDA regulations, maintaining consistency in drug manufacturing, and testing the shelf life of drug formulations. An essential step in analyzing experimental kinetic curves is identifying and removing outliers. We developed a procedure that utilizes leveraged residuals to detect and locate potential outliers in kinetic datasets. After detection, outliers are removed from the dataset. All data fitting and statistical calculations are performed with programs coded in MATLAB. We collected an unprecedentedly large dataset totaling 195 dissolution curves, making it possible to assess the statistical validity of our method. Compared to modeling with the original datasets, our outlier removal procedure enables the accurate recovery of kinetic parameters for dissolution curves.

This is the first proposed outlier removal procedure that uses leveraged residuals in nonlinear regression. Additionally, our research provides a general method applicable to curve fitting of kinetic and thermodynamic data, ranging from applications in biomedical to physical sciences.

137
5:10-5:55PM
2nd Floor Hall

Yiming Liu (Biology -Spring 25)

Mentor**(s): Georgina Aldridge** (Neurology)

Exploring the convergent effects of co-pathology and dendritic spine loss in neurodegenerative disease

Neurodegenerative disorders, including Alzheimer's disease, Lewy body dementia, and Frontotemporal dementia, are characterized by cognitive decline and the loss of neurons, neuron structure and neuronal function. Several brain pathological markers are used to diagnose these diseases, including the presence of misfolded protein aggregates containing amyloid, tau, alpha-synuclein and TDP-43. Studies have shown that these proteins often co-occur in the same patients, with combinations of protein pathologies being the norm rather than exception. Although protein aggregates and cell loss are used for clinical staging and pathological diagnosis, evidence suggests cognitive decline is more strongly associated with synapse loss. However, the relative influence of individual protein pathologies on synaptic loss is unknown and previous studies have often not accounted for potential co-morbid protein pathology. We hypothesized that the regional burden of phosphorylated-tau would correlate inversely with the density of dendritic spines, small protrusions that represent the major site of excitatory post-synaptic contact. To test this hypothesis, we collected fresh tissue from the anterior cingulate during brain autopsy of consecutive neurodegenerative disease donors and control autopsies. Tissue was stained using the Golgi method to visualize dendritic spine morphology and changes in dendritic complexity. In this pilot study we demonstrate feasibility in identifying a consistent population of layer II/III and layer V neurons in cingulate cortex. We performed immunofluorescence on adjacent sections using strategic dual-immunostaining, showing significant evidence of co-pathologies in this region. Finally, we evaluate the relationship between spine density, morphology and dendritic complexity to better understand potential consequences of localized and remote protein aggregation.

138
5:10-5:55PM
2nd Floor Hall

Mrithuul Prasath Madan Prasad (Biomedical Sciences B.S., Neuroscience B.S. -Spring 26)

Mentor**(s): Uday Singh** (Neurosci & Pharmacology)

Neuroanatomical and Functional Characteristics of Zona Incerta MC4R Neural Circuit in Metabolic Control

The term Zona Incerta (ZI) translates to the 'uncertain zone', reflecting the limited understanding of its function. However, new research suggests that it may play an important role in the regulation of both behavior and physiology, manifesting as differences in food intake, sleep-wake behavior, and learning/memory. During functional investigation of hypothalamic neurons expressing MC4R, a well-established obesity-associated gene, we discovered that a subset of ZI neurons express MC4Rs. To gain insights into the functional role of ZIMC4R+ neurons, we first performed anterograde tract-tracing by microinjection of Cre-dependent AAV-DIO-synaptophysin-eYFP into the ZI of MC4R-Cre+ mice, which revealed that ZIMC4R+ neurons heavily innervate brain regions involved in feeding and autonomic regulation. Based on these neuroanatomical observations, we further hypothesized that the ZI MC4R circuit is critically involved in feeding and metabolic control. To test this hypothesis, we generated MC4R-Cre+ male mice expressing excitatory chemogenetic receptor hM3Dq-mCherry or mCherry (control) specifically in ZIMC4R+ neurons. We then subjected them to comprehensive metabolic phenotyping with an indirect calorimetry

metabolic cage system (Promethion). We found that chemogenetic activation of ZIMC4R+ neurons by intraperitoneal injection of deschloroclozapine (DCZ, 0.5 mg/kg) significantly increases food and water intake, locomotor activity, energy expenditure, and brown fat temperature. These results identify the ZI as a novel candidate brain region through which the central melanocortin system might act to control ingestive behavior and energy metabolism.

139
5:10-5:55PM
2nd Floor Hall

Avery Maeder (Human Physiology -Spring 25)
Aditi Tripathy (Biomedical Sciences - Spring 25)

Mentor**(s): Bengi Baran** (Psychological Brain Sci)

Sleep Quality and Mental Health at the Beginning of the Semester as a Predictor of End-of-Semester Academic Achievement in College Freshmen

Sleep is vital for cognitive abilities and academic achievement, yet the mechanism behind this relationship is unclear, and current studies often rely on subjective sleep measurements. We hypothesized that objectively measured sleep quality and duration at the beginning of the semester would be positively related to academic achievement at the end of the semester, while anxiety levels at the beginning of the semester would be negatively related. Undergraduate participants from an Elementary Psychology course wore Actigraphy wristwatches for two weeks at the semester's start to objectively track sleep-wake patterns and completed a self-reported anxiety questionnaire. At the end of the semester, participants reported their GPA and perceived academic success. Data collection is ongoing, and preliminary analyses are based on fourteen participants (aged 18, 64.3% female). We observed a significant relationship between weekday-weekend wake up time misalignment and academic achievement such that waking up later during the weekends was related to a higher academic GPA (t(10)=2.8, p = .02), but this beneficial relationship diminished as state anxiety levels increased (interaction: t(10)=-2.7, p = .02). Similarly, greater time-in-bed (TIB) on the weekends positively predicted perceived academic achievement (t(10)=2.2, p = .049), yet higher state anxiety beginning of the semester moderated this effect, reducing its advantage (interaction: t(10)=-2.3, p = .048). These findings suggest that weekend sleep catch-up might benefit less anxious students by compensating for weekday sleep deficits, whereas students with higher anxiety levels might benefit more from consistent sleep schedules. Further plans include analyzing sleep EEG data, which, together with the current findings, will help us better understand the relationship between sleep and academic achievement.

140
5:10-5:55PM
2nd Floor Hall

Riley McCoy (Biomedical Sciences -Spring 27)

Mentor**(s): Catherine Marcinkiewcz | Ruixiang Wang** (Neurosci & Pharmacology | Neurosci & Pharmacology)

Tau pathology leads to increased activity of noradrenergic neurons, contributing to early Alzheimer's disease

The prevalence of Alzheimer's disease (AD) is a looming public health concern. The number of affected adults is projected to more than double by 2060 devoid of any medical advancements. It has been shown that the accumulation of misfolded hyperphosphorylated tau proteins (p-tau) is a cornerstone of AD. P-tau has been

observed in the locus coeruleus (LC), before it appears in other brain regions. Because the LC is the major source of brain noradrenergic (NA) neurons, we aimed to unravel how p-tau could alter activity of these neurons, which might end up negatively affecting behavior and sleep in early AD. To that end, we transduced Cre-recombinase-dependent P301Ltau in the LC of DBH-Cre mice, resulting in the expression of the pathological tau exclusively in NA neurons. 4 and 8 weeks later, whole-cell patch clamp recordings were performed in LC NA neurons. Interestingly, all LC NA neurons were spontaneously firing. P-tau expression led to increased firing frequency, compared with controls (injected with an mCherry virus) in both 4- and 8-week cohorts. Moreover, to compare excitability of LC NA neurons between groups, we held the cells at -55 mV to stop spontaneous firing and then injected currents intracellularly. No group differences were observed in rheobase, i.e., the minimum current needed to evoke action potentials (APs), at either the 4- or 8-week timepoint. Additionally, incremental currents (from 10 to 200 pA, with 10-pA steps) were injected to evoked APs. At the 8-week timepoint, frequency of evoked APs was greater in the tau versus control group, which, however, was not observed at the 4-week timepoint. Taken together, pathological tau leads to increased activity of LC NA neurons, which appears greater with longer periods of p-tau exposure, but it is unclear whether this trend continues, which we will explore in the future.

141
5:10-5:55PM
2nd Floor Hall

Abbie McLaren (Cinema, Journalism and Mass Communication -Spring 25)

Mentor**(s): Nathan Platte** (Music)

Podcasting as a Method of Film and Music Research

This project was created in order to investigate the potential of collaborative podcasting as a method for film and music research. Two episodes were created so far this academic year, and several steps went into each. The first stage consisted of ideation about what kinds of topics and films would benefit most from analysis through the form of the podcast. Once an idea was reached, students researched the topic or film further to gain contextual knowledge necessary to speak conversationally while being recorded. Students studied existing formats of film podcasts to plan and structure each episode. Based on plans, the group recorded each podcast episode. Students created reverse-outlines for recorded material and assisted with DAW editing processes to finalize episodes. This process of creative scholarship has demonstrated that podcasting has unique benefits as a form of information communication and analysis. The formal qualities of the podcast create an opportunity to illustrate examples of music in their original form""“audio""“that make conversations of analysis easier for consumers to interpret and connect with. Spoken word is able to focus on insights to audio rather than verbal description of audio. The conversation format of podcasts also allows for greater collaboration and exchange of ideas in the research process that involves all students. This work provides an example for future exploration of audio/visual media as a tool in communicating humanities research.

142
5:10-5:55PM
2nd Floor Hall

Maggie Meehan (Public Health -Spring 26)

Mentor**(s): Shujie Yang | Tianyue Li** (Pathology | Pathology)

Personalizing Chemotherapy for Endometrial Cancer: Beyond the Standard Treatment

Endometrial cancer is the most common gynecologic malignancy, with both incidence and mortality rates rising over the past several decades. While standard treatments such as surgery, radiation, and chemotherapy have been widely used, they do not work for all patients. Carboplatin and paclitaxel (Carbo/Taxol) remain the gold standard chemotherapy regimen, but many patients develop resistance, leading to disease recurrence and poor survival rates. In fact, endometrial cancer is the only major cancer type with a declining survival rate over the past 40 years, underscoring the urgent need for better treatment strategies.

One of the main challenges in treating endometrial cancer is tumor heterogeneity""each tumor behaves differently and responds uniquely to therapies. As a result, a one-size-fits-all approach is inadequate. This research aims to improve treatment outcomes by developing patient-derived models that mimic real tumor behavior, allowing for personalized drug screening. By testing multiple FDA-approved oncology drugs, we can identify effective alternatives for tumors resistant to standard chemotherapy, potentially improving survival and quality of life for patients.

143

5:10-5:55PM
2nd Floor Hall

Oliver Mize (Chemical Engineering -Spring 26)

Mentor**(s): Eric Nuxoll** (Chemical & Biochem Engine)

Thermal shock susceptibility of Staphylococcus aureus biofilms on titanium hip screw plugs

Surgical infections from biofilms are far too common with well over 100,000+ medical device infections amounting to $5 billion dollars annually. Replacement surgeries are painful, and the odds of an infection after a revision surgery are higher than the odds of an infection on a first-time surgery. An alternative to surgical removal is targeted heat delivery in situ by use of an external heat source such as an alternating magnetic field (AMF). This has shown to be successful in eliminating biofilms with use of different time and temperature combinations of heat exposure. This project evaluates this hypothesis on titanium hip screw plugs using an AMF for remote heat delivery. These conditions gave biofilm population reductions comparable to population reductions obtained from immersion trials at different time and temperature combinations of heat exposure. This treatment combined with two common antimicrobials, chlorhexidine and betadine, has shown to be preferable in reducing the biofilm population.Â

144

5:10-5:55PM
2nd Floor Hall

Ryan Nagel (Biochemistry -Spring 25)

Mentor**(s): Ronald Weigel | Colin Kenny** (Surgery | Surgery)

Investigating the Role of AP-2α in Melanomagenesis

Cutaneous melanoma is the most common cause of skin cancer-related deaths in the United States. Yet, the mechanisms of melanoma formation are incompletely understood. BRAF mutations are frequently found in melanoma; however, the precise mechanisms by which factors in the melanocyte gene regulatory network act to support subsequent melanoma formation are unknown. Prior studies have indicated that a protein known as transcription factor AP-2α is a crucial regulator of melanoma

metastasis. Mice have become the premier model for studying melanoma in vivo, and by inducing melanoma in mice with conditional knockouts, the progression of melanoma can be studied to show tumor progression. It is hypothesized that TFAP2A knockout (KO) would suppress oncogenic pathways, thus delaying tumor formation and growth.

145

5:10-5:55PM
2nd Floor Hall

Claire Opdahl (Counseling and Behavioral Health Services, Psychology - Spring 28)
Lauren Geerdes (Human Physiology - Spring 28)

Mentor**(s): Scott Shaw** (Chemistry)

Cancer Rate Correlation with Nitrate Concentration in Iowa Public Drinking Water

Nitrate contamination in Iowa's water sources poses potential public health risks, including possible increased cancer incidence. This study examines the correlation between nitrate levels and cancer rates across eight counties in Iowa. Water samples were collected and tested for nitrate concentration, then compared to cancer incidence data from Iowa Cancer In Focus Mapping. Preliminary analysis suggests a potential link between high nitrate levels and increased cancer rates, particularly colorectal and bladder cancer. While causation is not confirmed, findings underscore the need for further research and regulatory attention to improve water quality and mitigate health risks.

146

5:10-5:55PM
2nd Floor Hall

Isaac O'Toole (Biochemistry and Molecular Biology -Spring 26)

Mentor**(s): Colin Kenny** (Surgery)

Melanocyte Progenitor Cells are Sensitive to GNAQ-driven Uveal Melanoma

Uveal melanoma (UM) is the most common intra-ocular malignancy, driven by oncogenic mutations in GNAQ or its paralog GNA11 in 95% of cases. Metastasis occurs in 50% of patients, for which no effective treatment exists. In BRAF-driven cutaneous melanoma, the melanocyte master regulator MITF is required for melanoma onset. In UM, however, high MITF activity inhibits tumor onset, suggesting a context-dependent role influenced by anatomical and transcriptional environment. To investigate the role of MITF in UM, we established a model by co-delivering GNAQQ209L and CRISPR/Cas9 constructs to induce oncogenic expression in tumor suppressor-deficient zebrafish with mitfa-/- and mitfa+/+ backgrounds. Interestingly, we found that mitfa loss accelerated GNAQ-driven tumor growth, contrary to its role in BRAF-driven cutaneous melanoma. Furthermore, we identified a population of mitfa-independent melanocyte progenitor cells expressing canonical neural-crest development genes such as pax3a and tfec that exhibited enhanced susceptibility to GNAQ-driven transformation. These findings highlight the positive correlation between expanded progenitor cell population and tumor susceptibility, offering new insights for the distinct role of MITF in UM.

147

5:10-5:55PM
2nd Floor Hall

Suzi Park (Speech and Hearing Sciences -Spring 25)

Mentor**(s): Stewart Mccauley** (Communic Sci & Disorders)

Blocking effects in L2 learning: Evidence from cross-situational word learning

Learning can be modeled as a process whereby cues in the environment compete for relevance in predicting outcomes. Associations between cues and outcomes are based on how informative their relationships are over time. Cue competition studies show that when a cue is maximally informative about a specific outcome, the learning of additional predictive cues is inhibited due to the fully informative nature of the first specific cue (e.g. Ramscar et al. 2013), what is known as a "blocking effect." The present study aims to explore the potential role for blocking effects in the difficulties faced by adult learners of a second language ("L2" learners). Using a novel version of the cross-situational word learning (CSWL) paradigm, adult English speakers gradually learned associations between labels and object. Version A of the paradigm included novel images and novel sounds while Version B included novel sounds and everyday objects. We hypothesized that learners would learn novel labels for novel objects better than novel labels for familiar objects, thereby exhibiting evidence of a blocking effect. Results supported our hypothesis in that the participants had an advantage for novel objects by the end of the experiment. It can then be theorized that the difficulty of reaching native status in a second language is partially due to the high degree of informativity of having known labels for objects learned in the first language.

148

5:10-5:55PM
2nd Floor Hall

Bansari Patel (Biochemistry and Molecular Biology -Spring 26)

Mentor**(s): Gordon Buchanan** (Neurology)

Age-Dependent Chemosensitivity in APP/PS1 Mice

Alzheimer's disease (AD) is a neurodegenerative disorder marked by progressive dementia and pathological brain changes. Over 6 million Americans are affected, with numbers steadily rising. Currently, no cure exists, and available treatments only manage symptoms. AD is linked to several comorbidities, including respiratory dysfunction, yet it remains unclear whether animal models that recapitulate AD pathology, such as amyloidopathy, exhibit similar impairments. This study investigates respiratory function in the Amyloid Precursor Protein/Presenilin 1 (APP/PS1) mouse model, hypothesizing that respiratory dysfunction worsens with age and correlates with brainstem pathology. Young (2-4 months) and older (>6 months) were instrumented for EEG/EMG recording to assess sleep-wake state, allowed to recover, and presented with 7% CO_2 or room air stimuli during wake or sleep while measuring EEG and breathing. Brains were collected after trials for immunohistochemistry to examine the accumulation of amyloid plaques within the brainstem. Preliminary findings indicate that older mice show impaired ventilatory and arousal responses to CO_2, with some experiencing fatal seizures characterized by hindlimb extension. Ongoing research will expand trials in both age groups, include wild-type controls, and further examine brainstem pathology.

149

5:10-5:55PM
2nd Floor Hall

Ellie Ronnebaum (Psychology -Spring 25)

Mentor**(s): Bengi Baran** (Psychological Brain Sci)

Metabolic problems, night-eating and sleep quality in people living with schizophrenia

People with schizophrenia are at significantly higher risk of premature mortality, much of which is linked to metabolic abnormalities such as high blood pressure, insulin

resistance, and dyslipidemia. Despite evidence linking metabolic issues to sleep disturbances, few studies include objective sleep measures when examining metabolic health in this population. This study investigates the relationships among indices of Metabolic Syndrome (MetS), Night Eating (NE), and sleep disturbance in individuals with schizophrenia. Data collection is ongoing, preliminary analyses are based on 26 participants (ages 29""64, mean age=46.77) with a diagnosis of schizophrenia (n=14) and non-psychiatric controls (n=12). A multi-method approach was used, incorporating self-reported NES symptoms (NEQ), objective sleep data (actigraphy, Apnea-Hypopnea Index), and clinical metabolic indicators. Preliminary results suggest higher NES prevalence in the schizophrenia group and potential links between disordered eating and poor sleep efficiency. These findings highlight the need for future research to focus on the joint influence of sleep and eating behaviors on metabolic health, and whether targeting these behaviors can help reduce long-term health risks in schizophrenia.

150

5:10-5:55PM
2nd Floor Hall

Zoe Greenwood (Psychology and Philosophy -Spring 25)

Eva Kumsher (Psychology)

Emily Esch (Psychology)

Mason Cook (Psychology)

Mentor**(s): Cathleen Moore | Aditya Prakash** (Psychological Brain Sci | Psychological Brain Sci)

Negative Search Templates in Visual Working Memory and Visual Long-Term

Memory

We aim to characterize different mechanisms of distractor suppression across VWM and

LTM using a range of visual search tasks. Our results suggest different behavioral

consequences for VWM- versus LTM-based guidance, with only the latter leading to

proactive distractor suppression.

151

5:10-5:55PM
2nd Floor Hall

Bianca Sponseller (Microbiology and German -Spring 25)

Mentor**(s): Wendy Maury** (Microbiology & Immunology)

Identifying the mechanism of Ebola virus inhibition mediated by a novel group of small molecule inhibitors

The phosphatidylserine (PS) receptors, TIM-1 and TIM-4, serve to bind and internalize Ebola virus (EBOV) into cellular endosomes. Using in silico screening, 11 classes of potential small molecule inhibitors were identified that fit into the conserved PS binding pocket of TIM-1 and TIM-4. Initial screening of these compounds in tissue culture identified one class of compounds inhibited EBOV infection, particularly compound C776-1630. Derivative compounds were synthesized and tested for activity, identifying a series of related compounds that have strong antiviral activity. The goal of this research project is to determine the antiviral mechanism of action of this group of small molecule inhibitors of EBOV infection. To determine if these antiviral compounds compete with PS for binding to TIM molecules, we performed

indirect ELISA assays with purified soluble TIM-1. Results showed that drug C776-1630 did not inhibit PS binding to TIM-1, suggesting that the compound's antiviral activity was not mediated through this route.

We next examined if the group of inhibitors accumulated within the endosomal compartment, leading to phospholipidosis (PLD). PLD is the abhorrent accumulation of phospholipids within endocytic compartments; this is known to be induced by numerous identified small molecule antiviral drugs. Many small molecule inhibitors of EBOV infection have been shown to nonspecifically induce PLD, thereby inhibiting EBOV infection. Studies confirm that compound C776-1630 induces PLD. Tissue culture studies with synthetic derivates have shown these compounds inhibit EBOV infection, and future work will reinforce this using tissue culture in BSL-2+. Preliminary studies where cells were cotreated with our derivatives and a PLD preventor indicated that our derivates still exert a measurable antiviral effect against EBOV. Mechanistic studies have indicated that our derivatives specifically inhibit viral fusion events. We now have an assay to deconvolute PLD and specific antiviral effects, which is where future studies will continue.

152

5:10-5:55PM
2nd Floor Hall

Abbey Stoddard (Environmental Sciences (Environmental Bioscience) BS -Spring 25)
Brady Bird (Environmental Sciences/Environmental Bioscience - Fall 25)

Mentor**(s): Benjamin Swanson | Jeffrey Dorale** (Earth & Environmental Sci | Earth & Environmental Sci)

A Tale of Ten Trees: Analyzing Tree Species Diversity and Distribution Around Cardinal Creek

Tree species diversity and distribution is important to understand when evaluating ecosystem health, services, and reforestation potential. This knowledge is particularly important within Iowa as a lack of natural disturbances has increased establishment of forests across the landscape. For this study, we surveyed a secondary growth forest within the Cardinal Creek floodplain alongside University of Iowa's Ashton Prairie Living Laboratory. Within this area, a massive increase in forest cover was identified in the 1970s and 1980s through analysis of historic aerial photographs. This study aims to create an inventory of the species within the floodplain, with a goal of analyzing species diversity and distribution relative to both elevation and distance from the stream. This will be accomplished by completing a systematic survey of trees with a circumference greater than 30 centimeters using a Trimble R12i GNSS. The positional data of each tree will be compared with a digital terrain model (DTM) created from a lidar scan of the area to derive elevation information. After spatial and data analysis, profiles of each species' size, location, and elevation will be created along with a map to analyze patterns in species distribution throughout the area.

153

5:10-5:55PM
2nd Floor Hall

Beck Fitzpatrick (Microbiology -Spring 26)
Brett Wineinger (Biomedical Sciences - Spring 26)

Jason Babcock (Anatomy and Physiology - Spring 26)

Mentor**(s): Amy Ryan** (Anatomy & Cell Biology)

Structure-Function Relationships in Mucociliary Clearance: Impact of Co-Culturing CCDC40 Mutant and Wild-Type Airway Epithelial Cells In Vitro

Mucociliary clearance (MCC) is a vital defense mechanism of the human airway, with dysfunction associated with diseases like primary ciliary dyskinesia (PCD) and chronic obstructive pulmonary disease (COPD). As gene therapy advances toward clinical application, questions arise regarding the level of functional restoration required to effectively repair diseased tissues.

This study hypothesized that previously established structural and functional metrics, closely resembling those of ex vivo ciliated tissues, could be used to characterize MCC of in vitro co-cultures of CCDC40 mutant and wild-type human bronchial epithelial cells (HBECs). Parameters included cilia beat frequency, MCC efficiency, and patterning of human airway epithelial cells. Using co-culture models with mutant:wild-type cell ratios of 100:0, 75:25, 50:50, 25:75, and 0:100, we evaluated key MCC parameters, including cilia beat frequency (CBF), MCC efficiency, and epithelial cell-type distribution, after 28 days of differentiation. HBECs were labeled with CellTracker Green or Red to document initial distribution patterns before airlifting.

A progressive decline in MCC efficiency was observed as the proportion of mutant cells increased, with a steep functional drop-off occurring between 50:50 and 25:75 mutant:wild-type ratios. Specifically, MCC impairment was associated with reduced clearance speed, decreased coordination of clearance directionality, and a marked decline in overall clearance quality beyond a 50% mutant cell threshold. Interestingly, in 4 of 6 biological replicates, CBF of wild-type cells exhibited a compensatory increase in response to higher mutant cell proportions. Additionally, cell-type analysis revealed an increase in goblet cells with increasing mutant cell ratios.

These findings suggest a critical threshold of wild-type cells is required to sustain functional MCC in vitro, providing insight into the extent of cellular correction necessary for effective gene therapy in CCDC40-mutant PCD patients. Furthermore, this study establishes a framework for evaluating the impact of specific ciliary defects on MCC function and offers a predictive model for assessing genetic correction strategies and therapeutic interventions in MCC-related disorders, with potential applications in other ciliated organ systems.

154

5:10-5:55PM
2nd Floor Hall

Ellie Wojcikowski (Neuroscience -Spring 26)

Mentor**(s): Amanda Mccleery** (Psychological Brain Sci)

Heartbeat-Evoked Potentials in Schizophrenia

Disrupted interoceptive processing (i.e., perception of internal bodily signals like heartbeats) may impact emotion processing and one's sense of self and bodily agency. This, in turn, may contribute to core features of schizophrenia (Sz), including positive, negative, disorganized, and affective symptoms. In this project, we investigate the heartbeat evoked potential (HEP), an electroencephalography (EEG) event-related potential (ERP) waveform that is time-locked to the electrocardiography (ECG) R-wave peak and is thought to reflect cortical processing of the cardiac signal, or cardiac interoception (Coll et al., 2021). To date, only one prior study of HEP in Sz has been published (Koreki et al., 2024), which reported an abnormal HEP response. The aim of

this study is to replicate and extend the previous findings by testing the clinical, cognitive, and functional correlates of HEP.

155
5:10-5:55PM
2nd Floor Hall

Brenda Ramirez (Polical Science -Spring 25)
Daniela Pintor-Mendoza (Polical Science & International Relations - Spring 27)

Mentor**(s): Julianna Pacheco | Nicole Novak** (Political Science | CommunityBehavioralHealth)

The Iowa Vital Voices Project: Designing participatory action research to promote Latino civic engagement, political voice and community healthÂ

The Iowa Vital Voices Project is a community-driven research initiative that uplifts Latino voices, experiences, and data to advance civic engagement and health in Iowa.Â With prior support, including funding from the Robert Wood Johnson Foundation, the project has made significant progress in transforming community-engaged research, building trust, and developing a deeper understanding of how communities utilize their civic power.Â Through data analysis, storytelling, and community surveys, we empower communities to shape their own narratives, inform decision making, and drive meaningful change.

156
5:10-5:55PM
UCC-2520D

Jessica Alberhasky (Neuroscience -Spring 26)
Shafa Ismail (Biochemical Engineering, Neuroscience - Spring 26)

Mentor**(s): Catherine Marcinkiewcz** (Neurosci & Pharmacology)

Spatial transcriptomics to identify genetic mediators of neuronal dysfunction in Alzheimer's disease

Title: Spatial transcriptomics to identify genetic mediators of neuronal dysfunction in Alzheimer's disease

Background: Alzheimer's disease (AD) is characterized by neuronal dysfunction, which may be primarily driven by the accumulation of pathological proteins. Late-stage AD is commonly associated with cognitive decline, however early-stage AD presents with depression, anxiety, and disruptions to sleep. These early symptoms may be attributed to dysfunction of serotonin-producing areas of the brain that develop tau-pathology. The Dorsal Raphe Nucleus (DRN) contains the bulk of these serotonin neurons.

Methods: We used the Visium spatial transcriptomics platform to identify differentially-expressed genes (DEGs) in the DRN of htau mice, a model for prodromal AD. We then used RNAscope and electrophysiology to validate findings of interest.

Results: The DRN of htau mice differentially expresses several AD-related genes. Transcriptomic sub-clustering of the DRN aligns with previous characterizations, identifying distinct DRN subregions. Of these, we find that the centromedial DRN is characterized by serotonin neurons that are dually glutamatergic (5HT/glut neurons). These 5HT/glut neurons differentially express ion channel genes, which may underlie the changes in neuronal activity seen in early- and late-stage AD.

Conclusions: DRN dysfunction may contribute to several prodromal AD symptoms, which may be driven by changes in gene expression. Kcna4 and Slc24a5 are currently being assessed for differential expression in 5HT/glut neurons of cognitively-normal and Braak 2 AD human brain tissue. We hope to correlate the expression of these genes with tau pathology, and determine whether 5HT/glut neurons are separately vulnerable to AD as compared to 5HT neurons of the DRN as a whole.

157

5:10-5:55PM
UCC-2520D

Julia Correia (3D Design BFA and Music BA (violin) -Fall 27)
Tara Joiner (3D Design, Minor in News and Media Literacy - Spring 26)

Mentor**(s): Monica Correia** (Art, Art History & Design)

Seamless 3-Dimensional Woven Forms with Sustainable Materials

The global home textile market is worth $124.72 billion and is expected to grow 6.0% in the next three years. Along with these impressive numbers comes a equally shocking environmental impact. The textile industry produces an estimate of 92 million tonnes of waste globally every year. Our research aims to limit the amount of waste by fabricating a seamless 3-dimensional loom to create curvy forms. The cutting process in fabric production, the seam, generates 10-15% of the global waste. This means that 10-15% of the materials are discarded. The loom that is being fabricated in our research helps envision a new form of 3-dimensional textile while simultaneously striving to eliminate material waste. In order to further develop this research, we traveled to Mertola, Portugal over the summer to learn 200+ year old traditional weaving techniques with 3D elements. Our research will minimize the production of textile waste.

158

5:10-5:55PM
UCC-2520D

Lucy Dunning (Religious studies, Spanish -Spring 25)

Mentor**(s): Brandon Dean** (Religious Studies)

Christian Mind

This research looks at the connection between psychology and Christianity, exploring how faith and spiritual practices influence emotional well-being, personal growth, and resilience in the Christian life. It focuses on several key areas, starting with the psychological impact of prayer and how it can help improve mental health. The study also examines how Christian practices like solitude, meditation, and Scripture reading contribute to personal transformation and spiritual maturity, offering emotional healing along the way. A major focus is the powerful role of forgiveness in Christian theology. It looks at how both forgiving others and being forgiven can help heal emotional wounds, offering freedom and personal growth. The research also digs into how hope and faith impact the mind, especially during times of crisis. Christian teachings about the hope of eternal life and God's promises provide deep emotional strength and comfort when facing life's challenges. Additionally, the study explores how Christian beliefs about identity""rooted in the image of God, grace, and unconditional love""shape a person's sense of self-worth and self-acceptance, helping to build a healthier, more positive self-image. Finally, it examines the emotional and psychological healing that comes through the Christian doctrine of atonement, focusing on how understanding forgiveness through Christ helps release feelings of

guilt, shame, and unworthiness, offering believers a fresh start and a restored relationship with God.

159

5:10-5:55PM
UCC-2520D

Talula Monk (Biology (BS), Environmental Science (BA) -Spring 26)

Mentor**(s): Heather Sander | Rachel Larson** (Geogra&Sustainability Sci | Geogra&Sustainability Sci)

Urbanization and Deer Mice Health: Investigating Parasite Load and Body Condition

Agriculture and urbanization have drastically altered landscapes globally, changing resource and habitat availability for native animals and leading to loss of biodiversity and the breakdown of ecosystems. While research has begun to identify the impacts of urbanization on wild species, many species, particularly small mammals which have important impacts on biotic communities through their roles as herbivores and prey have received little study. This study investigates links between urban environmental attributes (vegetation, built environment) and health indicators (body condition, presence of external parasites) for urban deer mice (Peromyscus maniculatus) in Iowa City, Iowa, to better understand how urban environments affect the health of this species and identify implications for broader urban wildlife communities. We hypothesized that deer mice in areas with more impervious surfaces (e.g., pavement) would have poorer body condition compared to those in habitats with greater vegetative cover. We also hypothesized that the probability of deer mice carrying ticks would be higher in areas with higher canopy cover and higher white-tailed deer (Odocoileus virgianus) occupancy likelihood than in areas with more impervious cover and lower deer occupancy likelihood. To identify correlations between body condition and habitat type, we first calculated a mouse body condition index based on mouse body measurements from field-collected data, then calculated Pearson correlation coefficients to identify relationships between body condition and vegetation and impervious cover. We also combined predicted deer occupancy rates from an occupancy model with vegetation and impervious-cover data and field-collected observations of ticks on mice to construct an occupancy model to predict the likelihood of tick presence on mice. We did not find significant relationships between vegetation and impervious cover, suggesting that the health of deer mice is not affected by urban environments. However, the mouse tick infestation was linked to deer occupancy and presence of vegetation, suggesting that deer, as important tick hosts that may transport ticks among sites in cities, and vegetation are important determinants of mouse tick loads. Changes in urban environments that increase in the presence of tick hosts such as deer may thus negatively impact small mammal species by increasing their parasite loads. This finding also suggests important impacts on tick-borne disease risk in cities since deer ticks contract Lyme disease from small rodents and can then spread it to other species; thus, where deer populations are high, mice may have higher tick loads and Lyme disease may be more likely to spread to other species, including humans, elevating public health risks for people. Understanding these relationships is crucial for both wildlife management and public health strategies in urban environments.

160

5:10-5:55PM
UCC-2520D

Jacob Osten   (Bachelor of Science in Nursing -Fall 25)

Mentor**(s): Anna Krupp | Jaewon Bae** (Nursing | Nursing)

Workload Intensity Variation Across ICU Clinician Roles and Unit Types

Background: Understanding the workload intensity of ICU clinicians is crucial due to its significant impact on increased chance of errors, burnout, and higher patient mortality and hospital-acquired infections. Past studies have focused on nurse and physician workloads, often using provider-to-patient ratios or hours worked. This research addresses a gap by incorporating self-reported workload intensity across all ICU clinicians.

Methods: This study is a prospective observational study conducted in three ICUs (medical, surgical, and cardiovascular) at a Midwestern Academic Health Center. The NASA Task Load Index Tool (NASA-TLX) was used to measure workload intensity. Six dimensions (mental demand, physical demand, temporal demand, performance, effort, frustration) were rated on a scale from 0-100; where higher scores indicate higher demand. This data was analyzed using T-tests and ANOVA.

Results: A total of 157 surveys were collected over seven randomized dates. Nurses experienced significantly higher levels of physical demand ($p=.0004$), temporal demand ($p=.0196$), frustration ($p=.0092$), and overall workload intensity ($p=.0046$) compared to other ICU clinicians. Among the three ICUs, surgical ICU clinicians had the highest levels of mental demand ($p=.0227$) and overall workload intensity ($p=.0101$), while medical ICU clinicians experienced the highest levels of physical demand ($p=.0218$).

Conclusion: These findings provided a more comprehensive view of the workload intensity across the entire ICU team. Future analysis will include the addition of nurse staffing and patient census data to give insight into additional unit-level workload. Better understanding of the types of workload ICU clinicians find most demanding can be used to guide workload improvement initiatives.

161

5:10-5:55PM
UCC-2520D

Sadie Richter   (Geoscience -Summer 25)

Mentor**(s):**   ()

Feldspar on Mars through the eye of a visible near-infrared spectrometer.

Feldspar on Mars through the eye of a visible near-infrared spectrometer

Data from the Curiosity rover, as well as the Martian meteorite Northwest Africa (NWA) 7533 and its paired meteorites [1], presented groundbreaking evidence towards magmatic diversity in Martian rocks; raising questions towards the formation processes of the Martian crust [2]. The Curiosity rover found feldspar-rich rocks evolved in composition presenting SiO_2 contents higher than 53%. The Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) aboard the Mars Reconnaissance Orbiter detected feldspar-bearing units in Noachian terrains (older than 3.8 billion years old) in the Southern Hemisphere including some of evolved composition [3-4], but their petrology is still unknown due to the lack of sub-cm images and complete chemical composition. Constraining the spectral signature in

CRISM spectral range of feldspar would better constrain the petrology of the feldspar-bearing Noachian terrains, which would enlighten us towards early crustal processes.

We used visible near-infrared spectroscopy to determine how various proportions of pyroxene and feldspar alter the spectral signatures of feldspar at various grain sizes. Feldspar can be identified with a broad absorption center between 1.1-1.3 Î¼m due to Fe2+ substituting Ca2+ in the crystal lattice. We found that under the presence of mafic minerals including pyroxene, feldspar's spectral signal is overridden, as expected according to [5]. Our results also show that the grain-size of feldspar contributes to the feldspar spectral behavior in the presence of mafic minerals at the same grain size, especially shifts in feldspar absorption center towards shorter wavelengths. Future work will include SEM analyses on augite and plagioclase samples and the mixtures in their various grain sizes to explore any chemical effects on the spectral behavior of feldspar within the mixtures.

1. Humayun et al. (2013). Nature, 503(7477), 513-516.

2. Sautter et al. (2015). Nature Geoscience, 8(8), 605-609.

3. Wray et al. (2013) Nature Geoscience, 6(12), 1013-1017.

4. Payré et al. (2022) GRL, 49(21).

5. Rogers and Nekvasil (2015), GRL, 42, 2619"“2626.

162

5:10-5:55PM
UCC-2520D

Claire Stephenson (Nursing -Spring 25)

Mentor**(s):** ()

Evaluating he Role of an RN Facilitator in Enhancing ICU Liberation Bundle Implementation in the CVIC: A Multi-Site Trial Analysis

Background:

This research study will evaluate the fidelity of the RN facilitator role in the CVICU and compare perceptions of implementation to RN facilitator perceptions. The RN facilitator's purpose is to support the ICU liberation bundle, known as the ABCDEF bundle.

Evidence supports that the ABCDEF bundle is effective across diverse patient populations. A 2019 study involving 15,000 adults in 68 ICUs found that adherence to the bundle improved discharge rates, reduced mortality and ventilation needs compared to those who received fewer bundle elements (Pun et al., 2019). Despite these benefits, a study involving 76 ICU facilities identified a lack of education on the bundle, staffing uncertainty, and team disconnect hindered implementation (Balas et al., 2019).

This research, part of the multi-site trial (BEST-ICU), hypothesizes that introducing an RN facilitator dedicated to the ICU liberation bundle will overcome these barriers. Evaluating whether the RN facilitator role is being executed as intended is important for assessing impact on patient outcomes.

Methods:

Observational data was collected thru organized field notes once a month for 4-hour increments of time. Field notes were summarized, analyzed and compared with the defined facilitator role.

Results:

This study recorded a total of (insert number of hours here) hours of observational data. In the first month following the implementation of the RN facilitator role, the majority of the facilitator's time (44%) was spent coordinating communication within the ICU team. However, over the subsequent months, the facilitator's focus shifted more toward clinical facilitation, dedicating 75% of their time to providing bedside support. Throughout the (X months) observed, the RN facilitator spent most of their time assisting with early patient ambulation, including walking patients in the hallway with physical therapy support and assisting with transfers from bed to chair.

The findings suggest that the RN facilitator role is being carried out as intended, with the facilitator consistently available to support nurses and team members on the unit, without the responsibility of patient assessments.

Conclusions:

The RN facilitator role in the CVICU was implemented with high fidelity. Observational data showed a shfit in the factors focus from team communication to hands on care as time progressed. The consistent presence of an RN facilitator allowed assitance to beside nruses, helping increase implementation of the ABCDEF bundle. These findings show that having an RN factor among ICU units will help improve patient outcomes for the critical care environement.

163
5:10-5:55PM
UCC-2520D

Ellen Yandel (English and Creative Writing - Spring 25)

Mentor**(s):** ()

The Phoenix and Turtle: Metrical Binaries in Shakespeare's Most Puzzling Poem

How do readers and writers make meaning out of a poem? What are the tools that authors and critics use to construct a text? This project seeks to answer these questions by focusing attention on Shakespeare's unusual poem "The Phoenix and the Turtle." Although largely unknown and unstudied by modern readers, when it was first published it offered proof that Shakespeare was among the best and most popular poets of his time. This project combines previous scholarship on the poem, metrical theory and poetics (the structure of the verse), and comparison with other Renaissance poetry (in original and modern editions) to reveal how the poem's unique construction supplements and complicates the binary-filled tragic love story it aims to tell.

164
5:10-5:55PM
UCC-2520D

Rami Mayasa (Biomedical Sciences -Spring 25)
Miodrag Krstovic (Biology - Spring 25)

Rebecca Flint (Biomedical Engineering - Spring 28)

Mentor**(s):** ()

Impact of Heat on Physical and Physiological Characteristics of Candida albicans Biofilms

Implant-associated infections are difficult to treat and result in significant patient morbidity and mortality. These infections arise from the formation of polymicrobial biofilms on the implant surface that change the character of the cells within and protect them from antibiotics and host immune cells. The goal of this work is to better understand the relationships between biofilm mechanics and composition, heat treatment, and microorganism viability/virulence in a" ̄polymicrobial biofilm to advance technologies concerned with eliminating implant-associated medical infections." ̄" ̄We implemented a method for growing" ̄Candida albicans" ̄biofilms of dimensions sufficient for rheological (mechanical) measurements. Heat-treated biofilms demonstrated a significant decrease in mechanical properties compared to control biofilms, indicative of mechanical weakening." ̄ Cell viability counts show that heat causes a high level of cell death with our current conditions. RNA transcriptome analyses are ongoing with the goal of describing the effect of short heat pulses on the gene expression profiles of different populations within the biofilm.