Fall Student Research Symposium
Schedule of Events
October 7, 2022
Nebraskan Student Union Ponderosa Rooms

Friday, October 7, 2022

1:00 – 5:00 pm ......................... Open poster viewing, Ponderosa Rooms

2:00 – 5:00 pm ......................... Oral Presentations-Ponderosa C

5:30 – 6:30 pm ......................... Banquet
Dr. Kristen Majocha, Keynote Speaker

Undergraduate
Oral Presentation Schedule

Friday, October 7, 2022

Room: Ponderosa C

2:00 pm ----- **McKenna Cruikshank**: Creating a knock-out of the slsA gene in *Staphylococcus lugdunensis* (Mentor – Austin Nuxoll)

2:15 pm ----- **Paiton Hancock**: Correlation of Veillonella bacteria with oral health (Mentor – Dawn Simon)
2:30 pm ----- **Mackinzi Hill**: *Rhodanine-indolinone carboxylic acids as inhibitors of serotonin N-acetyltransferase* (Mentor – Allen Thomas)

2:45 pm ----- **Mackenzie Hagemeister**: Quantifying behavioral effects of known melatonin inhibitors in zebrafish (Mentor – Evan Hill)

3:00 pm ----- **BREAK**

3:15 pm ---- **Johanna McClure**: Searching for strange: Detecting abnormalities in natural scenes and radiographic images (Mentor – Katherine Moen)

3:30 pm ----- **Joel Bradley**: Civil juror awards for police interrogation tactic types - (Mentor – Krista Forrest)

3:45 pm ----- **Amy Trease**: How older adults are affected by medicare's mental health policy (Mentor – Taekyung Park)

4:00 pm ----- **BREAK**

4:15 pm ----- **Bekah Sweeney**: *The effect of Classical music on the language productivity of children* (Mentor – Whitney Schneider-Cline)

4:30 pm ----- **Dawson Helmer**: *Effects of stretching and toning on cognitive health in the aging population* (Mentor – Ladan Ghazi Saidi)

4:45 pm ----- **Zach Markussen**: *The City of Gold; a Short Story Reading* (Mentor – Brad Modlin)
Undergraduate
Oral Presentation Abstracts

Biology

**McKenna Cruikshank**
Mentor: Austin Nuxoll
Title: *Creating a knock-out of the slsA gene in Staphylococcus lugdunensis*

Staphylococcus lugdunensis is a coagulase negative staphylococcal species that has been known to cause severe infections due to the presence of a biofilm. A biofilm is an accumulation of cells that can adhere to a foreign medical device, such as a knee replacement. This study aims to determine what is responsible for biofilm formation in S. lugdunensis. Our research indicates that the biofilm in S. lugdunensis is protein mediated. More specifically, our studies have shown that the slsA gene could be a major candidate in biofilm formation. By creating a knockout of the slsA gene, we can determine if the ability to form a biofilm has decreased. This study helps us to understand the factors that play a role in biofilm formation in S. lugdunensis. Additionally, this can allow further research to develop specific drugs that can target the slsA gene and prohibit a biofilm from forming.

**Paiton Hancock**
Mentor: Dawn Simon
Title: *Correlation of Veillonella bacteria with oral health*

Veillonella is a common species of bacteria found within the human oral microbiome, particularly in association with dental caries. Thus, the presence of Veillonella within the oral microbiome may be indicative of an individuals’ overall oral health. In this study, we aim to understand the prevalence of Veillonella in healthy college-aged individuals in the US and determine if there is a correlation between prevalence and self-reported oral health. Previous studies have been conducted in a different
demographic, primarily younger children in other countries. The prevalence of Veillonella bacteria amongst adults in the United States is unknown. We are using one-step PCR to identify species of Veillonella within the oral microbiome from tongue biofilm samples. Thus far we have only examined two participants and are working on optimizing PCR conditions. Preliminary results suggest V. parvula is present in one of the two participants. We hypothesize that there will be an increased likelihood of Veillonella bacteria in individuals with lower self-reported oral health compared to those with good self-reported oral health. If a correlation does exist, it may provide insight into biological indicators of oral health. Many studies have indicated that the oral microbiome composition exhibits change in the presence of other diseases, such as COVID-19, Parkinson’s Disease, and various forms of cancer. Thus, better understanding Veillonella’s prevalence in the oral microbiome may have consequences beyond oral health.

Chemistry

Mackinzi Hill:
Mentor: Allen Thomas
Title: Rhodanine-indolinone carboxylic acids as inhibitors of serotonin N-acetyltransferase

Melatonin is produced in the pineal gland and participates in the regulation of an organism’s biological clock. Abnormal melatonin levels can disrupt the body’s sleep-wake cycle, which causes or contributes to various circadian rhythm disorders (CRD), major depressive disorder, and bipolar disorder. None of the existing treatments for CRD directly target the synthesis of melatonin. Serotonin N-acetyltransferase (arylalkylamine N-acetyltransferase, AANAT) catalyzes the rate limiting CoA-mediated step in conversion of serotonin to melatonin. Our goal is to regulate melatonin production through AANAT inhibition. As a starting point for optimization, we have selected a published inhibitor containing a 5-carbon spacer linking a carboxylic acid to a rhodanine-indolinone moiety, which has been docked in structure-based models to the CoA and serotonin sites, respectively. We replaced the 5-carbon spacer with phenyl and cyclohexyl rings to restrict rotation. We hypothesized that by reducing the spacer’s degrees of freedom and thus lowering the entropic penalty upon binding that inhibition potency will increase. The synthesis and AANAT enzymatic activity of these compounds will be presented.
Psychology

Mackenzie Hagemeister
Mentor: Evan Hill
Title: Quantifying behavioral effects of known melatonin inhibitors in zebrafish

Dysregulation in circadian rhythm is a contributing factor to many mental health disorders, including seasonal affective disorder, major depressive disorder, and bipolar disorder. There is evidence of an association between melatonin and circadian rhythm, as many individuals suffering from circadian dysregulations have abnormal endogenous melatonin levels. Serotonin N-acetyltransferase (SNAT) catalyzes the rate-limiting step of melatonin synthesis. Five efficacious SNAT inhibitors have been published with enzyme kinetic data, however, they have not been tested for efficacy in an animal model. Zebrafish are a preferred species for circadian rhythm research, due to their low cost, quick maturation, and high throughput nature. To determine changes in endogenous melatonin levels after inhibitor treatment an enzyme-linked immunosorbent assay (ELISA) was used. The high specificity of the assay allowed for the detection of minute changes attributed to the inhibitors. Behavioral testing was used to confirm phenotypic changes caused by inhibitor action. I hypothesize a significant reduction of melatonin in zebrafish treated with SNAT inhibitors after dark incubation and anticipate confirming those results using ELISA and behavioral testing. Positive results from this study will aid in future research on melatonin and contribute to the understanding of how it interacts with a living system.

Johanna McClure
Mentor: Katherine Moen
Title: Searching for strange: Searching for abnormalities in natural scenes and radiographic images

Visual Search is a basic cognitive psychology task that involves looking for a target among other irrelevant information. Though it’s mostly used in psychology for studying attention, it is also used in everyday life. For example, a simple search such as looking for your keys in your house when you’ve lost them is considered a visual search task. Doctors must use visual search to look at radiographic images for potential diagnosis for a patient. Because their line of work is extremely important, it’s important they know how to search effectively and accurately. Being able to do so accurately would help...
with reduce false diagnoses. We may be able to accelerate doctors’ training by understanding the different visual search patterns between experts (doctors) and novices (undergraduate students). Using “I-spy” or “Where’s Waldo?” games use similar cognitive processes that a doctor would use when searching in radiographic images. In both types, someone must search through irrelevant tasks to find something specific, whether it be “Waldo” or a lung lesion. The purpose of the current study was to look at search patterns, across a variety of different stimuli and measure participants accuracy in finding anomalies as well as their eye-movements while they searched. Overall, participants were slower at detecting anomalies on radiographs than natural forest scenes. Additionally, the data show that participants have an absent bias, meaning they are more likely to click the absent box if they do not see something abnormal, even if it is there. The participants were more accurate on scenes than radiographs, and there was a significant difference in accuracy for radiographs between the absent and present trials. Interestingly, participants take longer to verify that something is their target for radiographs compared to forest scenes. This suggests that participants do not immediately realize something is abnormal in a radiograph after looking at it. The future plans for this study includes recruiting medical doctors to participate as experts, and compare differences in both accuracy and attention strategies between the doctors and the novices.

Joel Bradley
Mentor: Krista Forrest
Title: Civil juror awards for police interrogation tactic types

We investigated how much a juror would award in civil court to a plaintiff who falsely confessed as a function of the false evidence ploy or FEP (Verbal, Fabricated Lab Documents), reprimand history (Present, Absent) and crime severity (Burglary vs. Murder). AMANOVA controlling for whether participant’s likelihood of falsely confessing failed to show an effect of our hypothesized variables. However, participant’s likelihood of falsely confessing was strongly correlated with punitive damages awarded to the plaintiff.
Social Work

Amy Trease
Mentor: Taekyung Park
Title: *How older adults are affected by Medicare's mental health policy*

This study explores how the mental health of older adults 65-85 is affected by Medicare’s policies. Using a qualitative descriptive method, the researchers conducted face-to-face interviews with three Medicare beneficiaries that fit the inclusion criteria. The results show that older adults’ mental health is adversely affected by Medicare policy both on a financial level and a symptomatic level. Medicare’s policies result in little money left after premiums for copays, undertreatment, the denial of treatment, and the exasperation of symptoms due to long wait times. Advocating for premium changes, copay changes, and the inclusion of bachelor-level providers can change the way Medicare beneficiaries’ mental health is treated.

Communication Disorders

Bekah Sweeney
Mentor: Whitney Schneider-Cline
Title: *The effect of classical music on the language productivity of children*

The idea that music may be a tool that could significantly impact progress in speech therapy sessions is one that has begun to be researched with much enthusiasm in recent years. Music has been proven to put young children at ease in various types of therapy, helping them to increase their productivity (Kennelly & Brien-Elliot, 2001). For this experiment, researchers asked: Does playing classical music during play increase children’s language productivity? This question was explored by measuring the Mean Length of Utterance (MLU) of the 5-year-old participants during two play sessions. Both lasted 15 minutes. During one, classical music was played in the background, while the other session had no music playing. Both participants saw a significant increase in their MLU during the session where classical music was played. Although there were not enough participants to draw strong conclusions, these results validate further research, particularly because of how the MLU increases were almost identical. Future experimentation may include shifts in the variables. For example: several different genres of music could be tested.
As the average life expectancy among humans is increasing, successful aging is becoming a critical area of study in the public health field. It is estimated that 35.6 million people lived with dementia worldwide in 2010, and the number will double every 20 years (Lan, 2015). While the odds of overcoming cognitive and physical decline in old age seem insurmountable, new research shows non-pharmaceutical intervention can improve cognitive health. The literature on cognitive health at aging is rich. One promising intervention approach is physical activity (exercise). Evidence suggests that physical activity and exercise can lower the risk of adverse outcomes associated with advancing age (Bherer, 2013). However, we need more research to determine if exercise can minimize or prevent cognitive decline in the older adult population.

Exercise falls into two categories, anaerobic, and aerobic. Aerobic exercises include exercises such as swimming, cycling, and walking, while anaerobic exercises include stretching, toning, yoga, and weightlifting. Studies have reported that both aerobic-resistance training and stretching-toning exercises improve functional mobility in adults (Desjardins-Crépeau, et. al., 2016). In addition, there is evidence that in older adults aged 64-78 years old, nonaerobic exercises (stretching and toning) have a positive impact on cognition and can slow cognitive decline (Jonasson, et al., 2017). The literature on the effect of exercise on cognitive health at aging is richer for aerobic training than anaerobic training. My study focuses on the less researched, anaerobic, branch of exercise. Older adults may not be physically able to participate in aerobic exercises due to physical decline that comes with advanced age. My goal is to find out if stretching/toning is a viable alternative to improve cognitive health in older adults. This study is a pre/post intervention. Participants include adults aged 60-80, with no neurological disorders who have access to internet. We collect a thorough case history, and assess their cognitive health using the NIH Cognition toolbox, and additional neuropsychological tests to measure executive functions prior to starting the intervention program. Participants will receive intervention on Stretching and Toning five days a week, for 30 minutes a day for six months using exercise videos that are professionally made for older adults. This is an ongoing project, and we are still waiting for The IRB (Institutional Review Board) committee’s approval.
English

Zach Markussen
Mentor: Brad Modlin
Title: The City of Gold: a Short Story Reading

Mythology and folklore are old pieces of human history that show up throughout cultures. These stories help us to understand not only the world around us but the world within us. Each old myth or folktale has something interesting and inspired to say about humanity. While many can come to say similar lessons and tales, each is shaped and changed by the culture that it originates within. This creates a dizzying array of stories told by humans about humans - even if shrouded in metaphor - that have served as inspiration for writers for hundreds of years. Tolkien was inspired by the Old English epic Beowulf in his writings of the Hobbit. C.S. Lewis looked towards Christian mythology and folklore to inspire parts of Narnia. In the end, I was inspired by folklore as well. Three caught my eye specifically: The Ghost’s Bride, a Chinese myth about ghosts and listening to your elders, El Dorado, a legend born in the jungles of South America by conquistadors that is filled with ambition and greed, and The Changeling, an ever-changing folktale from Ireland that deals with fairies and stolen children. My interest came specifically in what could be learned from these myths if a specific part of them was changed or turned on its head. From switched perspectives to slight modifications of the premise, I wrote three short stories inspired by these myths. Each keeps true to the history and text of the originals while exposing something new within them that makes not only a new, interesting story, but also a brand new perspective for the modern reader.