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2023

Abstract Book

Friday, November 10, 2023



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Designing Drone Readiness Check System Using Graph Theory

Ernesto Ascenzo

Institution: **Viterbo University**

Faculty Mentor: ***Eric Weinberg***

Discipline: ***Computer Science***

Presentation Type: ***Poster Presentation***

Abstract:

This research explores how to check the readiness of different machinery before use. This is important to ensure safe use and to control proper usage. In this research, a readiness check system is developed applying graph theory in Python coding. This poster presents the research in a nutshell.



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A screen for ammonia metabolizing bacteria

James Bates

Institution: **Waldorf University**

Faculty Mentor: ***Gary S. Coombs***

Discipline: ***Biology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

The swine industry is essential, due to high global demand for pork products. However, it faces critical waste management challenges. One significant issue is the release of ammonia (NH₃) into the atmosphere from hog house waste pits. High ammonia levels contribute to toxic air quality and accelerate the corrosion of metal roofs, leading to substantial economic and environmental costs. This high ammonia environment creates conditions that may select for potent ammonia degrading bacteria that could be cultured on an industrial scale to remedy the problems associated with ammonia buildup on hog farms. I will be presenting initial results of a screen to identify and isolate ammonia degrading bacteria strains, and quantification of selected strains ammonia degrading capabilities.



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Characterization of the Immune Response Post Growth Plate Injury

Ethan Beltrand

Institution: **St. Olaf College**

Faculty Mentor: ***Karin Payne***

Discipline: ***Cellular Biology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

The growth plate is an area of hyaline cartilage tissue located along the ends of children's long bones and is responsible for bone growth. Injured growth plate cartilage can be replaced by bony repair tissue, leading to the formation of a 'bony bar' which can extend across the growth plate. Current treatment options involve resecting the bony bar and inserting an inert material. A biomaterial that has shown promise in reducing bony bar formation in a rat model of growth plate injury is an alginate-chitosan hydrogel. The mechanism of bony bar reduction is unknown, however these hydrogels potentially have an effect on the immune response. The objective of this study is to evaluate alginate-chitosan hydrogel compositions on modulating the inflammatory response after growth plate injury. Bilateral drill-hole injuries were created in the growth plates of the proximal tibia of 6-week-old female Sprague Dawley rats. The injury site was flushed with saline and animals were left untreated or injected with an alginate:chitosan hydrogel. After fixation, tibiae were decalcified and processed for paraffin embedding. Sections (5 μm thick) were stained with anti-CD45, a leukocyte marker. To quantify the number of CD45+ cells in the injury site, a 4 mm² region of interest was drawn around the injury site and the number of CD45+ cells were counted. Data was analyzed using a one-way analysis of variance and Tukey posthoc analysis using Prism software. Quantification of CD45+ cells in intact, untreated, and 90:10 alginate-chitosan hydrogel (90:10) groups were conducted. The intact group had an average of 35.2 cells (range 20 – 47), the untreated group had an average of 555.2 cells (range 112 – 913), and the 90:10 group had an average of 121.6 cells (range 20 – 230). The untreated group was significantly different from all other groups ($p < 0.0001$), while the intact, and 90:10 alginate:chitosan groups were not significantly different from one another ($p > 0.5$). The decreased number of leukocytes in the hydrogel group suggests that the alginate-chitosan hydrogel may modulate the immune response, and this may be a mechanism of how it reduces bony bar formation. This will be further investigated by identifying the immune cells at the site of injury and whether they are located near newly formed bone



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Detection of Environmentally Influenced BDNF In Rats

Alexander Boardman

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Charlie Lawrence***

Discipline: ***Biology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

BDNF, (Brain Derived Neurotrophic Factor) is a dynamically regulated molecule involved in key brain repair and memory processes. BDNF expression has been shown to be extremely regulated and linked at low levels to psychiatric disorders in people. Additionally, one of these factors affecting mBDNF is the environment and its enrichment. Though housing of thirty rats in enriched environments, then later hippocampus and PFC sampling, measuring BDNF expression via western blot. Finding a possible difference in measurement, and another unexpected presence of other forms of BDNF getting detected via western blot. With this finding we can investigate the differences in these forms of BDNF and use other methods to verify our findings such as an ELISA. This shows us the differences made in BDNF due to the environment and allows us to try to create a model where we can investigate if the external manipulation or influence of BDNF could affect things like depression signs, or anxiety symptoms in rats, creating a model for future studies.



Wellbeing Status of the Chinese Elderly and Their Socioeconomic Characteristics

Caitlin Daniel

Institution: **University of Wisconsin- Eau Claire**

Faculty Mentor: ***Jianjun Ji***

Discipline: ***Sociology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Using a national survey data, this study is intended to examine the wellbeing of the Chinese elderly and to investigate the linkages between the wellbeing and its social economic and demographic characteristics. Based on Theory of Social Resources, Theory of Stratification, Theory of the Third Age (Peter Laslett, 1915-2001) and the framework about Third Age (Melita DeBellis), this study tests the hypothesis that wellbeing of the Chinese elderly is associated with their demographic characteristics in terms of gender, age, marital status, fertility, and socioeconomic statuses in terms of education, income, regions, religion, and psychological pressures. Chi-square significant test and Multiple Linear Regression will be used for statistical analysis along with related indicators such as Cramer's V, Pearson's Contingency Coefficient C, Tau-b, and tau-c. With a larger sample size of seventeen million, the results will shed new light on the overall wellbeing of the Chinese elderly population as well as the insight of the linkages with their socioeconomic and demographic characteristics in contemporary Chinese society. Policy implications are also addressed.



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CNA's: The Forgotten Frontline Workers

Sabrina Darden

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Matthew Bersagel-Braley***

Discipline: ***Religion and Sociology***

Presentation Type: ***Poster Presentation***

Abstract:

Certified Nursing Assistants are known as the backbone of healthcare for their work in caring for patients. This research examined how CNA's handled the emotional burden of the COVID-19 pandemic. Data was collected from 60-90 minute interviews, transcribed, and entered into a qualitative research tool known as Dedoose. We examined themes of emotion burdens, religion, feelings of support, and coping mechanisms. High themes of lack of support and high emotional burden were prevalent throughout our findings.



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ADAR1 Silencing Inhibits Thoracic Tumor Growth

Mandy Dolezal

Institution: **St. Olaf College**

Faculty Mentor: ***Robert Kratzke***

Discipline: ***Biology***

Presentation Type: ***Poster Presentation***

Abstract:

Adenosine deaminase for double-stranded RNA 1 (ADAR1) is proposed to be important in promoting lung cancer growth. In melanoma and colon cancer models, inhibition of ADAR1 by shRNA led to markedly decreased tumor growth in murine models. ADAR1 is highly expressed in lung cancers. Silencing of ADAR1 in lung cancer cells may suppress tumor growth and increase sensitivity to immune checkpoint inhibitors that may lead to additionally impaired tumor growth. For this reason, CRISPR/Cas9 was used to knockout (KO) the p110 and the p150 isoforms of ADAR1 in human and murine NSCLC cell lines. ADAR1 expression levels are induced by IFN β . To study the impact of ADAR1 loss on the IFN β pathway, cells were treated with IFN β , and immunoblot analysis was performed. Similar activation of the IFN β pathway was observed in ADAR1 KO cell lines and parent cancer cell lines. The parental and ADAR1 deleted murine NSCLC cells were used to raise flank tumors in mice. No tumor growth was observed in the flanks of genetically appropriate mice. Despite a lack of in vivo growth in flanks injected with ADAR1 KO murine cells, in vitro experiments demonstrated sustained growth for all KO cell lines. It remains to be understood why ADAR1 KO cells maintain high viability in comparison to parental NSCLC cells. Further investigation must also be done into the mechanisms for loss of tumorigenicity in mice.



Environmental Factors that Influence Heart Disease Incidence in Midwestern States

Morgan Dziondziakowski

Institution: **Saint Mary's University of Minnesota**

Faculty Mentor: ***Dr. Ben Pauli***

Discipline: ***Biology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Cardiovascular disease is the leading cause of death globally, accounting for thirty one percent of deaths annually. While there are many risk factors for heart disease such as family history, diet, and exercise, environmental factors can also lead to an increased risk of heart disease. In fact, air pollution, traffic and aircraft exposure, and tobacco use were found to lead to increased risk of developing heart disease in residents of Sweden. The goal of my research was to see if air quality, tobacco use, traffic exposure, and population size influences rates of heart disease in Midwest states. To determine if there was a correlation between environmental factors and heart disease in the Midwest, I found data on four environmental factors: air quality, tobacco use, traffic exposure, and overall population, along with the number of heart disease deaths for each county in four states in the Midwest (IA, IL, MN, WI). I then conducted four linear regression tests comparing each of the environmental factors to the number of heart disease deaths per county for all four states. Based on the regressions, I found that tobacco use and air quality had the highest correlation with heart disease deaths in the Midwest. The environmental factor showing the least amount of correlation was traffic exposure. My research shows that some environmental factors may influence the risk of heart disease in the Midwest. With this research in mind, improving air quality and decreasing tobacco use among populations would be beneficial in reducing the risk of these environmental factors influencing heart disease in the future.



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Mental Illness Stigma: Prevention and Treatment in Colleges

Hannah Erdmann

Institution: **Viterbo University**

Faculty Mentor: ***Dr. David Saunders-Scott***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

Mental illness as well as stigma surrounding mental illness is extremely prevalent in the college population, leading to decrease in students seeking help. Due to this, exploration into the reduction of mental health stigma, treatment of common mental illnesses in colleges, and application into colleges is extremely important. To do this, we conducted a literary analysis of past research on the following subjects: Common mental illnesses in college students, evidence-based treatment modalities for these mental illnesses, how to implement treatment into schools, how to encourage help-seeking behavior, mental health stigma presentation and prevention in colleges, and finally how to prevent mental illnesses before it presents. Results showed that the most common mental illnesses in college students included Major Depressive Disorder, Generalized Anxiety Disorder, Obsessive-Compulsive Disorder, Substance Use Disorders, and eating disorders. This led to exploration of treatment methods specific to these disorders, examples including exploration of CBT for multiple diagnoses, medications such as SSRIs, and even exercise-based therapies. Exploration of mental health stigma resulted in finding that educational interventions and contact with those with mental illness are the most effective ways of decreasing stigma. While exploration of possible applications of these findings in colleges was conducted, further research is needed to determine best practices for application of treatment and stigma-prevention into schools.



Understanding Shakespeare's *The Tempest's* Caliban and Prospero through Postcolonialism and Disability Studies?

Maddie Feldhake

Institution: **Viterbo University**

Faculty Mentor: ***Victoria Holtz-Wodzak***

Discipline: ***English***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Postcolonial studies and disability studies both offer different venues to analyze Shakespeare's *The Tempest*, and specifically, the character Caliban. This presentation explains some of these connections between these theoretical approaches and the play. Regarding the characters Caliban and Prospero, postcolonialism views Caliban as a stand in for the colonized and Prospero, who enslaves and abuses Caliban, as a stand in for colonizers, whereas disability studies within the social model of disability views Prospero's behavior as a stand in for the behavior and society that the nondisabled holds toward the disabled. This project ultimately concludes that while both are useful ways to examine the power dynamics between Prospero and Caliban, for my project I will require a narrower focus.



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Screening Human Dental Plaque for Bacteriophage Specific to *Streptococcus mutans*

Jensen Gabora

Institution: **Waldorf University**

Faculty Mentor: ***Gary S. Coombs***

Discipline: ***Microbiology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Streptococcus mutans (S. Mutans) is bacteria most found in the human oral cavity, and it plays a key role in the formation of dental plaque. There is little information about S. mutans phages to date, there are only two known phages for S. mutans bacteria thus far found in research. Bacteriophage that targets S. mutans is potentially of value for prophylaxis against dental carries without harming other natural bacteria. We are taking the novel approach of searching for phage in dental plaque rather than in saliva and we have also recruited volunteers of different nationalities to determine if phage is more prevalent in certain areas, cultures, or bloodlines in the world. Participants have been recruited and we expect to have data to present by the date of the conference.



Gene Expression Profiling of Nociceptor Related Genes in the Inflamed Oral Mucosa

Sophie Gannon

Institution: Saint Mary's University of Minnesota

Faculty Mentor: *Dr. Claudia Preston*

Discipline: *Biology*

Presentation Type: *Oral presentation (10-12 min presentation, 3-5 min Q&A).*

Abstract:

Background: The body is innervated by a network of nerves. Sensory neurons detect external stimuli which are interpreted in the central nervous system (CNS). Nociceptors are specialized sensory neurons that detect pain stimuli. Certain genes regulate neuron activity, including the ones directly associated with pain. The goal of this study is to identify genes associated with nociceptors within the oral mucosa that are caused by inflammation. **Methods:** Gene expression profiling was performed using a dataset (GSE77459) from the National Center for Biotechnology Information (NCBI). The data was analyzed using NCBI's GEO2R interactive web tool. A Benjamini & Hochberg false discovery rate method was performed, and threshold significance was set at adjusted p-value (adj. p) ≤ 0.05 and fold change (FC) ≥ 1.5 and ≤ -1.5 . GeneCards website was used to find updated annotations for various genes. AmiGO 2 from the Gene Ontology database was used to find the neuronal and CNS-related genes and utilized a Venn diagram analysis to find genes from the significant list. **Results:** A total of 152 neuron-related genes were significantly upregulated (adj. p ≤ 0.05 , FC ≥ 1.5), and 160 were downregulated. Functional enrichment analysis of the significant genes was performed using Reactome pathway database analysis tool, and the neuron-related genes stressed by inflammation were identified. Enriched neuronal functions that were associated with significantly downregulated genes due to inflammation included transmission across chemical synapses, protein-protein interactions at synapses, synaptic adhesion-like molecules, and neuroligins and neurexins. Voltage-gated potassium channels was the enriched neuronal function within the significantly upregulated genes. **Conclusions:** This preliminary study can help inform the development of better treatment options for people experiencing oral discomfort, especially pain linked to inflammation. The next steps of this study will include further gene prioritization to identify specific molecular biomarkers and verify if they can be drug targetable.



Psychological Profiles in Patients with Fibromyalgia and Arthritis

Kjerstin Halverson

Institution: **Luther College**

Faculty Mentor: ***Loren Toussaint***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

As of 2023, chronic pain is present in an estimated 20% of all US adults and continues to increase in prevalence (NIH Study Finds High Rates of Persistent Chronic Pain among U.S. Adults, 2023). Fibromyalgia (FM) is a disorder characterized by chronic and widespread musculoskeletal pain, typically with accompanying sleep disturbances, severe fatigue, muscular stiffness, joint pain, and mood or emotional disorders. "Arthritis" refers to more than 100 disorders in which one or more joints experience pain, stiffness, or swelling. Both disorders have significant mental health implications for patients, and evidence suggests that various psychological traits can indicate positive or negative outcomes. Given the involvement of psychological factors in rheumatic conditions, it is important to consider both positive and negative indicators of psychosocial experience when treating patients. Identifying different traits correlated with different levels of well-being could allow clinicians to more accurately individualize treatments and predict outcomes for specific cases. Additionally, these psychological profiles could aid in developing new treatment protocols to lessen the psychological distress often associated with poorer outcomes. In the present study, surveys of 892 patients at the Gasteiner Heilstollen were analyzed using latent profile analysis (LPA). We identified four main psychological profiles: life dissatisfaction, high well-being, suboptimal well-being, and very poor well-being. Between the four profiles, we identified significant differences in age, self-forgiveness, and gratitude. There were also significant differences between the groups based on disorder. Self-forgiveness and gratitude both serve as significant indicators of well-being in our population, which suggests that psychological interventions involving these factors could be beneficial in treating patients.



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Predictors of Conspiratorial Thinking: Authoritarianism, Threat, and Bullshit Receptivity

Elyse Hartman

Institution: **Viterbo University**

Faculty Mentor: ***Michael Parker***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

This study examined predictors of beliefs in general and specific conspiracies in a correlational design. Data were collected from participants online through the Prolific website (N = 251). We measured conspiratorial beliefs, attitudes about right (RWA) and left-wing authoritarianism (LWA), perceived threats to freedom and identity, need for cognitive closure, need for cognition, receptivity to pseudo-profound bullshit, and self-compassion. Results indicated that RWA was positively correlated with conspiratorial beliefs, but only when perceived threat to freedom was also high. Receptivity to pseudo-profound bullshit was also strongly related to conspiratorial thinking. Contrary to our hypotheses, LWA was negatively related to conspiratorial beliefs, but this may be due to a potential bias in the measurement. As predicted, LWA was related to perceived threat to identity. Implications of the results are discussed.



Diversity Audit of Picture Books and Accessible Representation in The Alice Hagar Curriculum Center on the University of Wisconsin - La Crosse Campus

Adeline Hendrix

Institution: **University of Wisconsin- La Crosse**

Faculty Mentor: ***Teri Holford***

Discipline: ***Librarian Studies***

Presentation Type: ***Poster Presentation***

Abstract:

Children's books are mirrors for youth to see themselves reflected within the characters and stories. Children's books also function as windows that can help children peer into the lives of others outside of what they have been exposed to already. With over half of America's K-12 system being nonwhite and with the clear benefits of diverse literature, it would be expected to see an increase in representation in children's picture books; however, according to the CCBC (Cooperative Children's Book Center, part of UW-Madison's School of Education), which compiles data on diversity in children's books yearly based on literature submissions, the state of diversity in children's picture books is abysmal. Inspired by the conclusions drawn by the CCBC, I am working with Teri Holford to conduct similar research on campus at the Alice Hagar Curriculum Center in Murphy Library. Our research is an audit that allows us to weed out irrelevant books in our collection, create statistics on cultures and topics represented in our library, identify gaps in the picture book collection, and give us the tools to create a children's library with adequate diversity. There are 42 categories we are taking note of, including the title, publishing year, and the type of characters shown in the book. We expanded categories beyond race, religion, and disability and added categories to reflect other typical (or not) family and life situations like adoption, elders, incarceration, refugees, immigration, etc. I am creating a searchable web database with the metadata generated to be used by anyone interested in refining picture book searches based on predetermined searchable access points, meaning various cultural, community, or circumstantial variables such as African American, Native American, Latinx, Asian, Muslim, LGBTQ+, Disabilities, Socio-economic factors, displaced people, etc.



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Oncolytic Reovirus Modulated Angiogenic Inhibition in Breast Cancer

Megan Huss

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Luke Bussiere***

Discipline: ***Biology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

The average five-year survival rates for metastatic (spreading) vs. localized forms of breast cancer are 25% and 98%, respectively. Current localized treatment regimens are relatively successful. However, individuals with metastatic breast cancer have poorer prognoses indicating the necessity for alternative treatment methods. One alternative treatment currently being tested in clinical trials utilizes reovirus therapy (Pelareorep). Reovirus is an oncolytic virus, which preferentially infects and/or kills cancerous cells while leaving healthy tissue unscathed. Cancerous tissue commonly lacks an immune response, thus making it more susceptible to viral infection. Meanwhile, the immune response within healthy tissue inhibits viral spread. Our study focuses on how reovirus modulates angiogenesis, which is the process by which new blood vessels form. Angiogenesis is a critical factor in the progression and spread of cancer. For individual cells to detach from a tumor and travel throughout the body, there must be available vasculature. Experiments were performed to determine how reovirus infection influenced levels of pro-angiogenic markers. Results indicated evidence of significant inhibition of the pro-angiogenic transcription regulator HIF-1 α , but also an interesting up-regulation of pro-angiogenic factor VEGF and ANG-2 mRNA. Therefore, further research is needed to identify the mechanism by which reovirus therapy may be able to serve as an effective treatment for patients with metastatic breast cancer.



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qPCR Method Creation to Measure ykkCD Induction by Guanidine

Marin Jacobson

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Scott Gabriel***

Discipline: ***Biochemistry***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Antibiotic resistant bacteria pose a significant and increasing threat to human health and clinical outcomes. Bacteria utilize various mechanisms of resistance to antibiotics, such as utilizing efflux pumps to actively expel antibiotics from the cell. An operon in the bacterium *B. subtilis*, ykkCD, is believed to produce an efflux pump with an unknown inducer. This research aimed to develop a qPCR method to measure ykkCD induction by guanidine in native *B. subtilis* bacteria. This research is important to developing a better understanding of the various mechanisms by which bacteria are resistant to modern antibiotics to be used to improve clinical outcomes for patients.



Predicting Healthy Eating Behaviors: The Interaction between Self-as-Doer Identity and Perceived Behavioral Control

Katelyn Kelley

Institution: **Winona State University**

Faculty Mentor: ***Amanda Brouwer***

Discipline: ***Psychology***

Co-authors/Presenters: ***Ashley Lenarz, Abree Dieterman, Hannah Dunlavy, & Melisandra McLaughlin, Amanda Brouwer (not presenting)***

Presentation Type: ***Poster Presentation***

Abstract:

More than 41% of US adults are obese and only 1 in 10 are meeting recommendations for fruit and vegetable intake. Health behavior theories like the Theory of Planned Behavior (TPB) can be utilized to better understand healthy eating intentions and behaviors. Perceived behavioral control (PBC; one's perception of the control over health behaviors) predicts healthy eating intentions and behaviors and may be important in promoting healthy eating behaviors. The self-as-doer identity, an identity which describes oneself as the doer of a behavior, also predicts healthy eating. However, how the doer identity affects the relationship between PBC, and healthy eating behaviors is understudied. Therefore, we hypothesized that the relationship between PBC and healthy eating will differ, depending on the degree to which one sees oneself as a doer of healthy eating behaviors.

Participants (N=312; Mage=32.15, SD=12.55) answered questions about healthy eating, self-as-doer identity, and PBC. Moderation analyses were conducted to determine whether self-as-doer identity moderated the relationship between PBC and healthy eating.

PBC, self-as-doer, and the interaction term contributed approximately 9.13% of the variance in healthy eating, $R^2=.091$, $F(3, 304)=10.19$, $p<.001$. The addition of the interaction term did not contribute a significant amount of variance in healthy eating above and beyond PBC and self-as-doer, $\Delta R^2=.0004$, $\Delta F(1, 304)=.13$, $p=.72$. Self-as-doer identity ($b=1.88$, $t(304)= -5.45$, $p<.001$) individually predicted healthy eating; PBC did not.

Self-as-doer identity, and not PBC, predicted healthy eating. Perhaps the emphasis of doer identity in overcoming challenges to healthy eating limits the impact of PBC. Additionally, individuals may choose different priorities (e.g., saving money or time) over healthy eating even though they perceive control over their eating options, thereby limiting the role of PBC. Results demonstrate that self-as-doer identity alone predicts healthy eating. Future research could implement experimental designs and use objective measures of eating behaviors.



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Religious Factors as Motivators for Healthcare Ethics

Mira Kendall

Institution: **Viterbo University**

Faculty Mentor: ***Emily Dykman***

Discipline: ***Theology, Ethics***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Healthcare ethics (HCE) is a study in the field of ethics that specifically looks into issues in health care. As with all ethical divisions, HCE is influenced by a wide variety of factors. This study looks at how different facets of religion (age, denomination, devoutness to religion) influence an individual's code of ethics regarding healthcare. Topics included were euthanasia, animal testing, abortion, gender affirmation surgery, in vitro fertilization, surrogacy, and genetic testing. A survey was conducted to ask a diverse crowd of individuals about healthcare ethics and their religious background.



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The Interaction of Stress and Environment on Social & Play Behavior

Mikaela Kennedy

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Charlie Lawrence***

Discipline: ***Neuroscience***

Presentation Type: ***Poster Presentation***

Abstract:

Play behavior is an essential part of adolescent development. Environmental stress can affect how behavior develops, by impacting the physiological development of the brain and increasing the risk of psychological disorders, such as anxiety and depression, which follows into adulthood. Social animals, such as rats, demonstrate play behavior in adolescence, much like humans. This study was done in attempts to see how factors, such as mild chronic stress, can affect how animals interact socially; particularly how they play and socialize with one another. In this study, a group of rats was divided into groups that would live in an enriched environment or a standard environment. These groups were exposed to mild stress, biweekly, and social play interactions were then observed and recorded. Social preference testing was also observed during this study, in attempts to see how the stress effected what type of environment they would prefer.



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Potential of Captopril and Olmesartan to Decrease Radiation Induced Pulmonary Fibrosis

Madisen Klink

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Susanna Driscoll***

Discipline: ***Biology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Purpose

Radiation therapy is a standard treatment for lung cancer, but as a side effect can cause fibrosis to develop in up to 43% of patients. The median survival after diagnosis of pulmonary fibrosis is only 2.5-3.5 years, which makes finding an effective prevention crucial. A potential solution to effectively prevent fibrosis may be using ACE inhibitors and ARBs. Angiotensin converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs) are medications that are currently used to manage heart failure and decrease hypertension, but have been shown to additionally decrease the development of fibrosis. The purpose of this research is to determine the efficacy of using captopril (an ACE inhibitor) and olmesartan (an ARB) to prevent radiation induced pulmonary fibrosis.

Materials and Methods

Rat lung fibroblast cells were grown and treated with captopril or olmesartan. After incubating for 24 hours, the cells were irradiated at 5 or 10 gray and left to incubate for 3 days. A fluorescent agent was added, and the cells were analyzed using flow cytometry to determine the amount of fluorescence caused by the presence of reactive oxygen species (ROS), which are an indicator of fibrosis that are induced by radiation.

Results

Flow cytometry results yielded no visible difference between irradiated and non-irradiated cells when it was expected that the irradiated cells would have higher levels of fluorescence, meaning an increased presence of ROS. Additionally, there was no visible difference in ROS levels between the different treatment groups when it was expected that the cells treated with captopril or olmesartan would show decreased ROS levels.

Conclusions

Although the results were not as expected, the procedure used to detect ROS likely worked as there was a visible increase in ROS levels seen in the hydrogen peroxide control. It is hypothesized that flow cytometry was performed later than the optimal window to observe elevated ROS levels following irradiation, meaning that the ROS induced by irradiation were likely already broken down and thus were not able to be detected. Future research will account for this by performing flow cytometry within 10 hours of irradiation. Continuation of this research will lead to a better understanding of how ACE inhibitors and ARBs may prevent radiation induced pulmonary fibrosis in patients receiving radiation therapy.



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The Effects of Clothing on the Decomposition of Mice

Makenna Kriske

Institution: **Saint Mary's University of Minnesota**

Faculty Mentor: ***Dr. Ben Pauli***

Discipline: ***Biology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Postmortem investigation is used to evaluate a person's cause and time of death. Factors such as temperature, water, predation, and health of the body can speed up or slow down decomposition. Variables like these can make identifying time and cause of death difficult. Clothing specifically can alter the rate of decomposition because it better protects the body from decomposition than skin alone. This experiment was conducted to determine how different clothing affected the decomposition in of mice. Fifteen mice were placed into five cages. Each cage had an unclothed control mouse, one mouse wrapped in denim, and one mouse was wrapped in cotton. The cages were placed approximately 100 meters apart from each other on the forest floor on the Saint Mary's University of Minnesota campus. Weights of the mice were taken before and after decomposition. The five cages were left outside for one week and checked on daily. Animal and insect predation were observed. The Total Body Score was used to distinguish postmortem changes and quantify decomposition. The results of this experiment showed that there was no significant difference between mice wearing clothes and unclothed mice according to the total body score. There was also no significant difference in the weight change of mice due to clothing type. Predation by animals drastically altered These data making the results difficult to interpret. This study provided insight on the effects clothing has on the decomposition of mice. Future studies could look at the differences between other fabrics, different outdoor environments, or the effects of buried corpses.



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Effects of Paroxetine on Sign-Tracking

Liam Kubitschek

Institution: **Winona State**

Faculty Mentor: ***Dr. John Holden***

Discipline: ***Psychology***

Co-author/Presenter: ***Brandon Yates, Cassidy Bos (not presenting)***

Presentation Type: ***Poster Presentation***

Abstract:

Sign tracking plays a crucial role in research involving addiction. Therefore, researching drugs with potential to reduce sign tracking could contribute to our understanding of relapse. We have found serotonergic drugs to be effective in reducing sign-tracking in previous studies. Paroxetine, brand names Paxil, Pexeva, and Paxil CR is a selective serotonin reuptake inhibitor commonly used to treat a number of psychiatric disorders. The goal of this study is to determine whether paroxetine will reduce impulsivity measured by interaction by the control stimulus.

Data was gathered for sign tracking rats under different doses of paroxetine by measuring the number of times the subject interacted with the control stimuli (lever) which was associated with delivery of a food pellet. The number of interactions indicates the level of impulsivity the rats are experiencing; therefore, fewer interactions indicates the drug reduces impulsivity. The study is designed to model the experience of an addict exposed to environmental cues associated with addiction that pose a risk for relapse. Repeated measure ANOVA showed a significant omnibus effect, but individual post-hoc tests were not significant. We plan to add more subjects over time to achieve statistical significance.

Keywords: sign tracking, Sprague-Dawley rats, paroxetine, classical conditioning, SSRI



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UNDERGRADUATE
RESEARCH SYMPOSIUM

Transformation Through Learning Spanish at Viterbo University

Alisha Lozenski

Institution: **Viterbo University**

Faculty Mentor: ***Jesus Jambrina***

Discipline: ***Linguistics***

Presentation Type: ***Poster Presentation***

Abstract:

Reflections of a student's time spent abroad studying a foreign language: Numerous studies have demonstrated the effectiveness of learning a foreign language in an immersive environment compared to non-immersion. This non-traditional student and ESL teacher will compare advantages of both and will share personal testimony of where she has witnessed the most progression in both herself and her students. Hear first-hand accounts of how integration into a new country and adaptation to a new culture taught this student that culture gives weight to language and transforms the learning experience. Discover the impact of travel and insights gained through second-language acquisition in the country of origin. Recounts of self-exploration, introspection, and adventures throughout Europe will be interwoven with explanations of how this experience compares to her prior years living in Europe before enrollment at Viterbo University. Student will discuss skills learned throughout her years at Viterbo and how her second-language acquisition experiences abroad have added to her passion for neuroscience and psychology as she explains the neurological benefits of learning a second language. Uncover a story of self-discovery, innovation, breakthrough, and tremendous growth, both in language proficiency skills and in self-concept.



Comparison of CD4 T Cell Activation Between Protein and Peptide Antigens

Emma Miller

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Chris Mayne***

Discipline: ***Biology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Autoimmune diseases can occur with an immune response targeting the host's cells, or the symbiotic bacteria within the host. Autoimmunity can lead to healthy cell death, and diseases such as inflammatory bowel disease, Type I diabetes, and many more. Research is needed to determine how protein and peptide antigens can play separate roles that contribute to autoimmunity. Our research attempts to create an in vitro model to compare equimolar protein and peptide antigens to begin exploring the role of antigen processing and loading in activating T cells and how this leads to autoimmunity. While the results of our data were inconclusive, it provides the initial proof of principle to design future studies comparing protein and peptide antigens to examine their role in immune responses.



Digging Up Earth's Solution to Antibiotic Resistance

Jerica Mueller

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Luke Bussiere***

Discipline: ***Biology***

Presentation Type: ***Poster Presentation***

Abstract:

Antimicrobial resistance (AMR) has been identified by the Center for Disease Control and Prevention (CDC) and the World Health Organization as one of the most severe threats to public health. AMR is associated with millions of deaths each year, escalating because of many human-induced factors. Some of these contributing elements include the overuse of antibiotics in agriculture, inappropriate prescription of clinical antibiotics, and the accumulation of resistance through pollution. Considering the variety of angles that have contributed to the evolution of resistance, it must also be mitigated through a plethora of both preventive and reparative measures. Preventative strategies already being implemented include the encouragement of vaccines, education of proper prescription usage, restrictions on use in livestock, and much more. Although preventative strategies are helpful in slowing the spread of resistance, the only way to save the lives of those actively dealing with antibiotic resistant infections is through identification or creation of new antibiotics. While new antibiotics are needed, they are often costly to make or identify, and over the last 13 years only 17 antibiotics have been approved by the FDA for human use. Our research strives to alleviate this need by looking for antibiotics from the soil, as many active antibiotics have been extracted from soil microbes. Soil samples from around the Viterbo campus were collected and the soil bacteria was isolated. Thirty-one of the 224 isolated bacterial colonies showed characteristics of antibiotic production, with three isolated colonies producing an antibiotic against both a gram positive (*S. epidermidis*) and a gram negative (*E. coli*) bacterium. These three colonies were characterized through a series of biochemical tests and were then sequenced via 16s rRNA Sanger sequencing to determine the genus of each isolate. Further research will allow for the isolation and evaluation of the antibiotics produced by these bacteria. This research demonstrates the ability of community soil bacteria to aid in the discovery of new antibiotics as a reparative measure in the global antibiotic resistance crisis.



Authoritarian Sportswashing – A Qualitative Case Study Using Soft Power Theory

Noah Nelson

Institution: **Viterbo University**

Faculty Mentor: **Dr. Kwangho Park**

Discipline: ***Sport Diplomacy (Sport Management)***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Many nations have employed sports as a means of 'sportswashing,' which refers to the practice of using sports events, teams, or athletes to divert attention from, or improve the reputation of, individuals, organizations, or countries associated with controversial or negative actions. This leveraging of sports for political influence is characterized as 'soft power,' defined as cultural and political actions that contribute to a country's influence in geopolitics.

For example, Saudi Arabia, an authoritarian country, has made significant sport-related investments exceeding \$100 billion, encompassing various popular sports such as LIV Golf with the intent of concealing their misdeeds and enhancing their international image. Therefore, this study specifically examines the impact of sportswashing on the politics of authoritarian countries, with a primary focus on Saudi Arabia, Qatar, and China.

To accomplish the purpose of the study, we employed a qualitative research method, utilizing one of the nine case study techniques established by Gerring (2017): most similar technique. Like the name of the method, the backgrounds or situations of the cases chosen in this study should be similar (i.e., authoritarian countries) as the control variable. The independent variables are the relative level of financial investment in sport and the diversification of sports invested in by each country. The dependent variable represents the outcomes of the sportswashing attempts.

By comparing these cases, we found that Saudi Arabia and Qatar, which have made substantial investments and diversified their sports portfolios, have experienced significant sportswashing outcomes, while China, which has comparatively lower investment and diversification in sports, exhibits a lower degree of sportswashing.

In conclusion, the theory of soft power has been validated through the results of this study indicating that the level of investment in and diversification of sports significantly influences the outcomes of sportswashing and its impact on politics.



CNAs and Emotional Strain During COVID-19

Alexis Oestreich

Institution: **Viterbo University**

Faculty Mentors: ***Tyler Flockhart, Dr. Matthew Bersagel-Brayler, Dr. Jennie Anderson-Meger***

Discipline: ***Sociology***

Presentation Type: ***Poster Presentation***

Abstract:

It is the responsibility of Certified Nursing Assistants (CNAs) to complete activities of daily living with residents in assisted living facilities, nursing homes, and hospitals. CNAs have vital jobs in the world of medicine and are relied on by nurses and residents alike. The job of a CNA is difficult, but with the added pressures and restrictions of COVID-19, their job became much more dire. Long hours, PPE, and being witness to patient suffering has created emotional strain for college-aged CNAs. Data has been collected through interviews with college aged CNAs from the Midwest and Southeast on what has been the primary emotional impacts while working as a CNA during COVID-19. With this data, primary themes have been deduced. These themes include organizational, individual, and interpersonal impacts on the participants emotional wellbeing. It was found that overworking, seeing patient suffering, and institutional neglect were the main sources of emotional strain. Ways to improve emotional strain include developing individual coping strategies, creating institutional support, and providing training on emotional maintenance during required CNA training.



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UNDERGRADUATE
RESEARCH SYMPOSIUM

The Effects of Exercise on Cardiometabolic Variables in Previously Sedentary Individuals

Alexandria Powell

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Maria Morgan-Bathke***

Discipline: ***Biology***

Presentation Type: ***Poster Presentation***

Abstract:

The leading cause of death in the United States is heart disease.² Low-density lipoprotein cholesterol (LDL) is known to be associated with cardiovascular disease and high-density lipoprotein cholesterol (HDL) is associated with a lower risk of cardiovascular disease.⁴ LDL cholesterol has been shown to decrease with exercise, and inversely HDL has been shown to increase with exercise.⁶ VO₂ max refers to how much oxygen the body can absorb while exercising at max effort³ and was another variable of interest. This variable is an indicator of heart health.¹ Exercise has also been shown to increase VO₂ max.⁷ The last variable of interest was body mass index, a measure of body fat that takes into account both height and weight.⁵ Higher adipose tissue has been shown to decrease HDL⁸, therefore, increasing the risk of heart disease. However, there are few studies on how healthy sedentary individuals react to exercise. There is also a gap in information about pre-menopausal women. It was hypothesized that the results would bring variables in healthy ranges, closer to those of an in-season athlete. This study assessed individuals who did not exercise more than two times a week for 30 minutes. During these assessments' lipids, VO₂ max, and BMI were looked at. Participants then completed a six-week exercise intervention of low-intensity exercise. After the intervention, the same assessment was completed. The data was then compared to data of in-season Viterbo athletes who underwent the same assessments. Due to the lack of participation, the study is still in the beginning stages. There is not enough data to elicit statistically significant data points and further research is needed.



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UNDERGRADUATE
RESEARCH SYMPOSIUM

The Use of Scripture in Catholic Education

Gabby Ramsey

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Sean Martin***

Discipline: ***Religious Studies and Theology***

Presentation Type: ***Poster Presentation***

Abstract:

When attending a Catholic grade school, you can expect to have certain elements of scripture within the curriculum. How it is used and the value it holds is what I will be discussing. I spoke with two middle school religion teachers in the Milwaukee area and discussed their individual approaches to scripture in the classroom. The discussions were guided through the lens of the historical critical method of analyzing scripture, which looks at more than the surface of scripture and dives into the history, narrator and audience of the scripture piece. Although I only spoke to two teachers, I got two very different perspectives but they were both extremely valuable. One teacher formally uses scripture as the basis of their curriculum, while the other tends to focus on scripture when it can connect to students lives and takes a more “hidden” approach. Both of these approaches to scripture can prove to be very valuable in their own right. A more formal approach to scripture can allow students to understand the Catholic church in a more structured manner. The “hidden” approach can cater more to students personal lives and help them understand the Catholic church in the context of their current lives. Both of these teachers also seemed to have the historical critical method in mind with their curriculum. This research can help inform the bigger picture of scripture and Catholic education. There is no perfect method and looking at different perspectives of scripture education, creates better Catholic educators.



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UNDERGRADUATE
RESEARCH SYMPOSIUM

Intercultural Competency Development Through Extracurricular Activities at University of Minnesota Morris

Kiley Rodarmel

Institution: **University of Minnesota- Morris**

Faculty Mentor: ***Windy Roberts***

Discipline: ***Spanish***

Presentation Type: ***Poster Presentation***

Abstract:

Spitzberg and Chagnon (2009) define intercultural competence as “the appropriate and effective management of interaction between people who, to some degree or another, represent different or divergent affective, cognitive, and behavioral orientations to the world.” The University of Minnesota Morris has stated that intercultural competency is a valuable student outcome. Within the Spanish language program at UMM there are several programs that aim to meet this student outcome. In this project with Professor Roberts, we use existing frameworks of intercultural competence to aid us in exploring the impact of these programs on the development of student intercultural competence here at UMM. To do this, we use the ideas of what literature suggests intercultural competence is and perform a content analysis with excerpts of final reflection papers of anonymous student interns from the Jane Addams Project. We argue that involvement in the Jane Addams Project, and other cultural extracurricular activities, improve the intercultural competence of students through intercultural interactions and personal reflection. Could these experiences be a way to enhance student self-awareness and appreciation of other cultures? Providing the students with more culturally engaged activities, like the Jane Addams Project, might be the answer to improve ways to interact with people of different backgrounds and learn communication, effective management, and teamwork skills. All these skills are necessary to become a better global citizen and interculturally competent. From this project, our goal is to have a better understanding of how to help students become more interculturally competent.



Assessment of Gene Expression Profiling and Functional Prioritization of Nuclear Envelope Genes in Alzheimer's Disease

Emma Schuster

Institution: Saint Mary's University of Minnesota

Faculty Mentor: *Dr. Claudia Preston*

Discipline: *Neuroscience*

Presentation Type: *Oral presentation (10-12 min presentation, 3-5 min Q&A).*

Abstract:

Background: Alzheimer's disease affects millions of people each year. The pathology of this disease is not yet fully elucidated, making it difficult to develop effective therapeutic treatments and cures. Current literature hints to involvement of the nuclear envelope in the molecular mechanisms behind multiple neurodegenerative diseases. This study focused on unveiling transcriptomic changes of genes coding for nuclear envelope-associated proteins in brains from patients with Alzheimer's. **Methods:** A previously submitted dataset (GSE173955) was utilized for transcriptomic analysis using the National Center for Biotechnology Information's (NCBI) GEO2R interactive web tool. This dataset contained RNA sequencing on hippocampal samples from 8 Alzheimer's patients and 8 control patients. A Benjamini-Hochberg false discovery rate method was performed, and threshold significance was set at adjusted p-value (adj. p) of < 0.05 . Functional enrichment and gene prioritization was performed using Reactome and the Database for Annotation, Visualization, and Integrated Discovery (DAVID) analysis tools. Additionally, protein-protein interactions were predicted using K-means clustering within the STRING database. **Results:** Gene expression analysis yielded 1,165 significantly upregulated and 1,299 significantly downregulated genes (adj. p < 0.05). Of these, 37 upregulated and 63 downregulated genes were shown to be associated with the nuclear envelope. Reactome and DAVID analyses indicated that the most enriched functions were linked to genes coding for nuclear pore complex proteins (nucleoporins). Upregulated nucleoporin (Nup) genes were NUP98, NUP160, and NUP188, with fold changes (FC) of 1.22, 1.57, and 1.37, respectively. RAE1 and SEH1L were downregulated (FC of -1.35 and -1.56, respectively). **Conclusion:** These preliminary results suggest nucleoporins and other nuclear envelope-related proteins play an important role within the molecular mechanisms of Alzheimer's disease. The next steps of this study will include immunohistochemistry and imaging analysis to visualize how the protein expression of these prioritized genes is localized in brain tissue.



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UNDERGRADUATE
RESEARCH SYMPOSIUM

Environmental Justice and PFAS Contamination

Andrew Sherman

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Andrew Hamilton***

Discipline: ***Philosophy***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Per and polyfluoroalkyl substances, otherwise known as PFAS [along with related chemicals such as PFOS] pose a serious risk to the environment as well as human beings who come into direct contact with high doses of these chemicals. Recently, the city of La Crosse along with the Wisconsin DNR have come forward with evidence showing PFAS contamination on French Island [the township of Campbell]. This qualitative research aims to explore the history of PFAS chemical compounds through a multidisciplinary lens: a detailed history of PFAS will be given, as will an overview of regulations surrounding the family of chemical compounds. Then, a brief history of PFAS contamination within La Crosse will be examined, and finally the most recent event will be explored within a framework of environmental justice.



The Consumption of Black Walnut Extract Does Not Impact The Production of IL-10 By Murine Splenocytes

Emma Steele

Institution: **Saint Mary's University of Minnesota**

Faculty Mentor: Dr. ***Debra Martin***

Discipline: ***Biology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

When the body senses a disruption in homeostasis, inflammation can be the reaction to injury, infection, or irritation. As an immune response, inflammation can introduce redness, pain, warmth, or swelling and may be caused by autoimmune disorders, acute inflammation, or exposure to toxins. This study aimed to determine whether the consumption of black walnut extract increased IL-10 production by splenocytes. Mice were fed either black walnut extract or distilled water daily for 5 weeks. Splenocytes were isolated from the mice and incubated with or without LPS to induce IL-10 production. An was used to measure the concentration of IL-10 produced by the splenocytes. Results indicated that LPS stimulation caused a significant increase in IL-10 production by splenocytes isolated from both groups of mice. There was no significant difference in the concentration of IL-10 produced by LPS-stimulated splenocytes isolated from mice fed black walnut extract versus distilled water alone. The consumption of black walnut extract did not enhance IL-10 production by splenocytes.



CNAs, Religion, and COVID

Mary Streveler

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Jennie Anderson-Meger***

Discipline: ***Sociology***

Presentation Type: ***Poster Presentation***

Abstract:

The COVID-19 pandemic brought many changes to all aspects of life as people learned to live with this deadly disease. It changed many occupations, particularly for those in health care. Certified nursing assistants (CNAs) had to continually show up and take care of their residents despite the ever-increasing stress and fear. Previous research highlighted the importance of spirituality in the mental well-being of CNAs. This current research project dives deeper into understanding what components of spirituality are important in helping CNAs cope with increasing death and stress factors in their work lives. Data for this research was collected in a qualitative format through interviews of CNAs that were then transcribed and later coded. When analyzing the data, increased focus was placed on the data about spirituality and how it played a factor within CNAs' lives. The research highlights the importance of religion in an ever-changing world as many CNAs turned to spirituality for coping. These findings indicate how spirituality gave many CNAs something to turn to when stressed and helped them through their most challenging times even when they came from varying belief backgrounds and upbringings.



How Chronic Unpredictable Stress Affects Non-Hippocampal Learning

Amanda Tranberg

Institution: **Viterbo University**

Faculty Mentor: Dr. ***Charlie Lawrence***

Discipline: ***Neuroscience***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Chronic Unpredictable Stress affects problem solving abilities, behavior flexibility, and has been linked to depression disorders. It is important to understand the link between chronic unpredictable stress and depression disorders because of recent findings. Recent research has found a gene called BDNF, brain derived neurotrophic factor, that has been correlated to depression disorders. My research project looked at how chronic unpredictable stress affected the pre-frontal cortex in relation to problem solving and behavior flexibility. This study used an operant chamber to test behavior flexibility based tasks. 10 male Long-Evans Derived rats were used in this study, 6 of which were exposed to chronic unpredictable stressors. The data was collected in the operant chamber using the program, Raspberry Pi. Analysis of the data included looking at the perseverance of the experimental group. High perseverance was found in the experimental group which indicated that chronic unpredictable stress affected learning new tasks. Chronic unpredictable stress is still being studied as to how it relates to depression disorders such as looking at BDNF.



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UNDERGRADUATE
RESEARCH SYMPOSIUM

Gene Expression Profiling of Epigenetic Regulated Genes in Female Monozygotic Twins with Discordant Diagnosis of Breast Cancer

Haley Wangen

Institution: Saint Mary's University of Minnesota

Faculty Mentor: *Dr. Claudia Preston*

Discipline: *Biology*

Presentation Type: *Oral presentation (10-12 min presentation, 3-5 min Q&A).*

Abstract:

Background: The incidence and death rates of female breast cancer have been significantly increasing worldwide in the past 30 years. Epigenetic-related alterations have been known to play a key role in solid tumor pathogenesis. Here to investigate the effects of epigenetic differences associated with breast cancer, we used a discordant monozygotic twin approach to unveil potential molecular markers associated with regulation of transcription in breast cancer diagnosis. **Methods:** A previously uploaded dataset (GSE37965) from the NCBI Gene Expression Omnibus (GEO) website was used for analysis. It contained DNA-methylation sequencing for 39 sets of identical female twins with breast cancer discordant diagnosis. The significance threshold was set at adj. $p \leq 0.05$ and fold change (FC) ≥ 1.1 or ≤ -1.1 in breast cancer compared to controls. NCBI BLAST software was used to identify names of the significant candidates. Functional enrichment analysis and gene prioritization was performed using Reactome Pathway Database Analysis tool and STRING interaction network database. **Results:** Our analysis unveiled 28 genes were significantly down-regulated and 17 were significantly up-regulated (adj. $p \leq 0.05$). Further prioritization analysis identified four significant genes: DLG2 (FC = -1.123), THBS4 (FC = -1.105), NLGN4Y (FC = 1.107) and COL4A2 (FC = 1.117). Functional enrichment analysis revealed that the changes in regulation of these genes from healthy to cancerous tissue have direct impacts on pathways associated with neurexins and neuroligins, protein-protein interactions at synapses, and signaling by platelet-derived growth factor (PDGF). **Conclusions:** Preliminary results suggest that epigenetic variations of specific genes that have transcription regulation and tumor suppression functions might play a key role in the onset of breast cancer. Future directions will include a network biology study to unveil protein-protein interactors associated with our prioritized genes and determine if any of them can be used as druggable targets for treatment of breast cancer.



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UNDERGRADUATE
RESEARCH SYMPOSIUM

The Effect of Atrazine and the Circadian Rhythm on Mice Insulin Levels

Hanna Widdes

Institution: **Saint Mary's University of Minnesota**

Faculty Mentor: ***Dr. Debra Martin***

Discipline: ***Biology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Atrazine is one of the most commonly used herbicides in the world. Recent unpublished data suggests chronic atrazine exposure may influence blood glucose levels. It is unknown if the change in glucose levels is due to less glucose being taken up by the gut or if changes in insulin levels influence glucose uptake by the cells since insulin and blood glucose levels are directly related. Circadian rhythm is also known to affect blood glucose and insulin levels. This study aimed to determine if atrazine exposure and the circadian rhythm affect mouse serum insulin levels. The mice were exposed to 0 ppb, 3 ppb, 30 ppb, and 300 ppb atrazine via their water for 15 weeks and housed in 12-hour light and dark cycles. Serum was harvested at 6 different Zeitgeber time points to account for the circadian rhythm. Insulin levels were measured for each atrazine treatment at each time point using an Ultra Sensitive Mouse ELISA Kit (Crystal Chem). Then, a two-factor ANOVA was run to determine the differences in insulin levels based on the two treatments.



Mapping Futures: Exploring Structural Functions of Socioeconomic Status (SES) in Emerging Adulthood's Career Trajectories and Achievements through the Ecological Systems Theory Lens

Draven Williamson

Institution: **Viterbo University**

Faculty Mentor: ***Dr. William (Bill) R Bakalars***

Discipline: ***Psychology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

This literature review explores the multifaceted influence of socioeconomic status (SES) on emerging adulthood outcomes through the lens of Ecological Systems Theory. Using Stephen Antonopolis's novel view of SES as distinct structural features this review further emphasizes the need to analyze individual socioeconomic conditions rather than viewing SES as a unitary construct. Urging a nuanced perspective of income, education, family wealth, and prestige as distinct entities and their relationship on specific populations of interest. Through the Ecological Systems Theory framework, the review illuminates the intricate interplay between these variables and their impact on behaviors and achievements of emerging adults. Additionally, the review examines the enduring impact of childhood socioeconomic adversity on future career trajectories, stressing the importance of early interventions. Young adults from lower SES backgrounds, when equipped with robust support systems, showcase remarkable resilience. Navigating emerging adulthood involves mastering skills essential for independence, including forming meaningful connections and solidifying one's identity. This exploration is intricately woven within the influence of SES variables. Exploring the interplay between personality traits, intersectionality, and structural functions of family SES, this review unveils their predictive power on emerging adulthood outcomes. This review highlights the need for future research into the predictors of specific SES outcomes in specific populations of interest. This analysis offers vital insights for policymakers, educators, and researchers. By recognizing the nuanced impact of SES on various aspects of emerging adulthood, this review advocates for targeted interventions, equal opportunities, and tailored support systems. Through a comprehensive analysis of existing research, this review synthesizes diverse findings to illuminate the complex relationship between SES and career outcomes during the transition to adulthood.



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UNDERGRADUATE
RESEARCH SYMPOSIUM

Chromium's Effect on Weight Loss and Cardiometabolic Parameters

Andrea Wink

Institution: **Viterbo University**

Faculty Mentor: Dr. ***Maria Morgan-Bathke***

Discipline: ***Nutrition Science***

Presentation Type: ***Poster Presentation***

Abstract:

Obesity has become an epidemic in the United States. Many comorbidities can arise from poor metabolic health, such as diabetes mellitus, CVD, and several forms of cancer.

Chromium is a trace mineral that has been shown to increase lean body mass and decrease body fat in several studies [1,2][3]. The goal of this proposed research study is to determine whether supplementing chromium picolinate or consuming the naturally occurring form found in broccoli is beneficial in:

- Improving lean body mass
- Improving metabolic health

This proposed study used the organic form of trivalent chromium (found in broccoli and the supplement). The supplement contains both chromium and picolinic acid. This picolinic acid allows for better absorption (as many supplemental compounds are not as bioavailable as those found in food) [4].



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UNDERGRADUATE RESEARCH SYMPOSIUM

Mindful Matchmaking: Understanding the Connection Between Personality and Successful Roommate Relationships

Blayre Wisneski

Institution: **Luther College**

Faculty Mentor: ***Loren Toussaint***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

Matching college first-years with appropriate roommates is important to support the academic, psychological, and physical well-being of students. Traditionally, questionnaires have been used to match roommates. Today, some students use social media platforms to find a roommate. The academic literature disagrees about the influence of personality on roommate relationships. Some studies suggest personality is not predictive of roommate success, while others found specific facets of personality can predict positive outcomes. The current study aims to increase the understanding of the relationship between roommate personality differences and roommate satisfaction to improve roommate matching methodology.

176 first-year roommate pairs from three private liberal arts colleges participated in the study. The roommates were assessed individually during the first, second, and third quarters of the academic year. The assessments included measures of the big five personality traits, forgiveness, roommate satisfaction, psychological symptoms, and somatic symptoms. Dyadic data analysis compared the roommate satisfaction values to personality traits between roommates. We found that differences in the big five personality traits did not contribute to significant differences in roommate satisfaction between roommates. Interestingly, differences in forgiveness and the presence of physical symptoms correlated significantly with roommate satisfaction. No significant correlations with roommate satisfaction were found in waves two or three of the study. Given the lack of significant correlations between personality differences and roommate satisfaction, it seems like personality traits are not an effective way to match roommates. Educational institutions and college students should potentially focus more on academic interests, co-curricular activities, and lifestyle similarities when assessing roommate compatibility.



CNAs: Religion, Work, and Death

Kaitlyn Wrage

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Matthew Bersagel-Braley***

Discipline: ***Cultural Studies***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Imagine that it is June 2020, COVID-19 in the U.S. is new and running rampant throughout hospitals and nursing homes. Who are the dedicated and overlooked CNAs that provided direct care to patients in a time of staffing shortages, lack of respect, and high exposure risk? My project investigates not only the challenges of particularly young adult CNAs who worked during COVID-19 protocols, but also what coping methods, resources, and education that schools and community organizations can provide to better support CNAs and increase the quality of patient care. In order to obtain results, I examined 10 interviews of young adult CNAs in the U.S. The interviews were recorded, transcribed, and finally coded in Dedoose Qualitative Research Program. My codes were analyzed and compared to the codes and themes perceived by my faculty mentor. I gained insight into the religious patterns of young adults that utilized faith as a coping mechanism while working as a CNA. Additionally, I examined CNA perceptions regarding the death of their patients and how their perceived worldview frequently misaligns with their reaction towards components of dying (e.g. afterlife, suffering, comfort). As a result of my participation in this project, I gained knowledge of the resources that CNAs need in order to decrease staff burnout and turnover.



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UNDERGRADUATE
RESEARCH SYMPOSIUM

A Meta-Analysis of the Prevalence of Cancer in Firefighting Comparing the United States and select European Countries

Cameron Zimmerman

Institution: **Viterbo University**

Faculty Mentors: ***Dr. Charlie Lawrence, Dr. Luke Bussiere, and Dr. Sheldon Lee***

Discipline: ***Biology***

Presentation Type: ***Oral presentation (10-12 min presentation, 3-5 min Q&A).***

Abstract:

Firefighting is known to be an extremely dangerous occupation that has injured and killed many. Most of the risks are easy to see such as the fire itself, building collapse, and explosions. Firefighters accept these risks to potentially save civilian life's, however, there is an unseen risk that is killing thousands of firefighters. Recently it has been shown that firefighters are getting cancer at 9% higher rates than the general population and have a 14% higher chance of dying from cancer. We will be comparing the US and European fire services because they have different procedures when fighting fires and the US utilizes many synthetic materials to build their buildings. Analyzing cancer incidence between the two groups will give us an idea if one fire service is practicing safer procedures. Peer reviewed articles were collected from Google Scholar specifically looking for European or US structural firefighters that developed cancer from the occupation. Also, any cancers related to the 9/11 terrorist attacks were excluded as this would create an uneven skew in the data. After the data was collected, a statistical analysis was completed to see if there was a statistical difference between the two groups. A standard incidence ratio (SIR) and 95% confidence interval were used to interpret the data. The SIR estimates the cancer rates of a general population and then looks at what the cancer rates should be among the population of firefighters if it was a "normal" amount. It is the ratio of observed number of cases with the expected number then multiplied by 100, 100 would mean the cancer incidence was at the expected value. The results of this study could be used to analyze the practices of both fire services and adjust them to create the safest working environment possible. Future work could look at more specific types of cancers and where incidences are high and low. Looking at this could show us where certain policies may be effective in preventing certain types of cancer.