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RESEARCH SYMPOSIUM

2024

Abstract Book

Friday, November 15, 2024



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CNAs Coping Through COVID

Julia Aleckson

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Tyler Flockhart***

Discipline: ***Psychology***

Presentation Type: **Poster Presentation**

Abstract:

Due to the nature of their job, especially through the COVID-19 pandemic, Certified Nursing Assistants (CNAs) have endured emotional, social, and spiritual challenges. Through interviewing college aged CNAs about their experiences during the COVID-19 pandemic, insight can be made into how their religion and support systems helped them cope through the difficulties of their job. These interviews can inform policy that better supports creating networks for CNAs while also giving them a safe place for to share their experiences.



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Characterization of the Transcriptional Inducer for the YkkCD Operon In *B. subtilis*

Gabriella Antonelli

Institution: **Viterbo University**

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

Discipline: ***Biology***

Presentation Type: **Poster Presentation**

Abstract:

Antimicrobial resistance in a wide range of bacteria pose a significant threat to the human population. By investigating the transcriptional control mechanisms, specifically in the guanidine-I riboswitch in *Bacillus subtilis* bacteria, it can possibly lead to a stronger understanding of pathogen's abilities to overcome antimicrobial toxicity, known as antimicrobial resistance. Through the binding of a specific antimicrobial, guanidine, the guanidine-I riboswitch can turn on proteins that produce an efflux pump mechanism to expel of the toxic compound out of the cell. With this evolved capability, *b. subtilis*, along with many other microbes, are able to continue spreading and thriving in various environments.



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Similarly Shared effects on Relaxation and Stress Reduction Between 4 Different Relaxation Techniques

Harrison Arnold

Other Presenters and/or Contributors: ***Esther Bitijula, Abigail Doffing***

Institution: **Luther College**

Faculty Mentor: ***Dr. Loren Toussaint***

Discipline: ***Psychology***

Presentation Type: **Poster Presentation**

Abstract:

As the popularity of relaxation techniques are on the rise for both clinical and practical use, various research formats have demonstrated the capacity for relaxation techniques, such as mindfulness meditation practice or progressive muscle relaxation, to relieve symptoms of stress and induce states of relaxation. However, a recent focus has been on how or whether different techniques present higher efficacy in inducing relaxation or if they are similar in their stress reduction capacities. This interest of study may stem from various considerations, such as the time constraints some techniques impose, or even just the simple preference of some to engage in certain techniques over others. The questions then arise: can one become more relaxed using a certain technique over another? Are mainstream, popular techniques like mindfulness meditation not all that they are made out to be, compared to other techniques? Or are they better? Finally, does it even matter what relaxation technique you choose, or should you just choose one you like and can engage in? Trying to answer these, we have thus investigated whether mindfulness meditation, progressive muscle relaxation, guided imagery, and breathing differ in their capacities to reduce stress and induce feelings of calm and relaxation in college students. It was revealed that the 4 techniques do not vastly differ in their abilities to reduce stress and relax students, and most students scored similarly on post-intervention stress and relaxation measures regardless of the relaxation technique employed. We propose, then, that the decision for engaging in a relaxation technique need not lie in one's efficacy over another, but in choosing one at all and engaging in it!



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Beyond Words: The Impact of Gratitude Writing on Mood, Spirituality, and Stress

Kendall Clausen

Other Presenters and/or Contributors: ***Jalen DenHartog, Tobia Snow***

Institution: **Luther College**

Faculty Mentor: ***Dr. Loren Toussaint***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

In times of stress, the tendency for our aspects of well-being, such as happiness, to decline becomes default. There is a need to find better ways to maintain and increase well-being in everyday life. The purpose of this study is to assess the effects of writing a gratitude letter in both spiritual and secular settings on levels of stress, spirituality, gratitude, and mood. In this study, participants were recruited via social media and tasked with writing a gratitude letter in either a secular or spiritual context or they were tasked with writing a food journal. With the use of Qualtrics, data was collected regarding levels of gratitude, spirituality, stress, and overall mood. It was hypothesized that these groups would show impacts on mood, stress levels, spirituality, and gratitude. The analysis largely confirmed the hypothesis, showing gratitude is related to less stress and negative affect and more positive affect and spirituality.



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The Effect of TBX2 on Expression of EphB2 and EphB3 in the Zr.75.1 Breast Cancer Cell Line

Sophia Duran

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

Faculty Mentor: ***Dr. Matt Rowley***

Discipline: ***Biology***

Presentation Type: ***Oral Presentation***

Abstract:

Members of the T-box family, a group of transcription factors, are characterized by a segment of approximately 200 amino acid residues known as the T-box, which serves as a DNA binding site. T-box transcription factor 2 (TBX2) is a key member of this family, primarily involved in growth and development. It acts as a cell death repressor that bypasses cell growth control. During development, TBX2 plays a crucial role as a transcriptional repressor, particularly during germ layer formation, and is mediated by the repression of target genes stimulated in the mesendoderm by transactivating T-box proteins. Overexpression of TBX2 has been linked to various cancers, including breast cancer, pancreatic cancer, and melanoma. Previous research has shown that this overexpression of TBX2 inhibits Erythropoietin-producing hepatocellular (Eph) receptors EphB2 and EphB3. Eph receptors are the most prominent known family of tyrosine kinases in humans and are vital for processes such as tissue organization, synaptic plasticity, and vascular development. An overexpression of these Eph proteins has also been associated with cancer growth. In this study, TBX2 was overexpressed within the Zr.75.1 mammary epithelial cell line, and the expression of EphB2 and EphB3 was analyzed using real-time PCR (RT-PCR). This research will provide more insight into the roles of TBX2 in cancer growth.



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Smart-Mirror Applications

Jacob Dykman

Institution: **Viterbo University**

Faculty Mentor: ***Prof. Ric Harned***

Discipline: ***Embedded Systems***

Presentation Type: ***Poster Presentation***

Abstract:

This project explores the development of a smart mirror using a 27-inch 1920x1080 IPS monitor and a Raspberry Pi 5. The mirror functions as an embedded system, integrating light and motion sensors to offer a responsive user experience. Built on the MagicMirror platform, the device displays real-time information such as weather, calendar events, and notifications, while incorporating Google Assistant and Spotify for enhanced interactivity. The mirror's motion detection system allows it to automatically sleep when no presence is detected, optimizing energy efficiency. This embedded system exemplifies a multi-functional, user-friendly interface that enhances both convenience and aesthetics in daily environments.



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Socioeconomic Status During Upbringing and Academic Performance as a College Student

Erin Farina

Institution: ***Winona State University***

Faculty Mentor: ***Dr. Trisha M Karr***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

The purpose of this study is to see if childhood socioeconomic status (SES) can be used as a predictor for both objective academic performance and perceived academic performance in college. Recruited from the psychology pool of a Midwestern university, participants (n=296) completed an anonymous Qualtrics Survey, approved by WSU IRB, consisting of researcher-developed questionnaires and adapted standardized measures. Participants answered questions about their access to resources growing up, provided information about their grades and study habits, and rated themselves on a scale regarding performance and effort put into schoolwork. Data were examined using inferential statistics to evaluate the relationship between childhood SES and college-aged academic performance. This study found that childhood SES predicts academic performance in college. Implications of this study suggest that students from lower SES backgrounds may require additional support services comparable to their higher SES classmates.



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Mediation of Myofibrotic Development Through the Angiotensin System

Benjamin Fleuchaus

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Luke Bussiere, Dr. Susanna Driscoll***

Discipline: ***Cellular Biology***

Presentation Type: ***Oral Presentation***

Abstract:

Radiation-induced Pulmonary Fibrosis is a common side effect incurred during radiation treatments given to patients with oncolytic growths in the thoracic region. Pulmonary fibrosis is primarily the result of lung fibroblasts undergoing myofibrotic development to build scar tissue and inhibit the diffusion of oxygen through the areola. Past in vivo studies conducted in rats were able to identify Angiotensin Converting Enzyme (ACE)-Inhibitors as potential candidates to be used as a preventative for the myofibrotic development caused by radiation injury. The studies were unable to identify the specific mechanism ACE-Inhibitors affected to achieve these results. This study was conducted on rat lung fibroblasts in an in vivo model to fill that gap, treating cells with ACE-Inhibitors or Angiotensin Receptor Blockers (ARBs) prior to exposing them to 10 Grays of radiation. The cell samples were then counted using immunofluorescence with a tag for α -Smooth Muscle Actin (α -SMA). Prior studies showing α -SMA to be a targetable indicator expressed by myofibroblasts. The tagged α -SMA provided a visual indicator to see the striations characteristic of myofibroblasts to distinguish them from normally functioning fibroblasts. Data collected from the in vitro model showed a decrease in myofibrotic development in the treatment groups in both the irradiated and non irradiated tests and the most noticeable being in the ACE-Inhibitor treatments with a 17% reduction. This suggests the ACE-Inhibitor's mediation of the angiotensin system plays a role in the medication's ability to prevent lung injury caused by radiation and supports that ACEs likely play a role in myofibrotic development. Additional studies should be conducted to investigate more details on the role ACE-Inhibitors play on myofibrotic development.



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The Relationship Between Social Mobility Beliefs and Attitudes Surrounding Inegalitarianism

Jack Fritz

Other Presenters and/or Contributors: ***Victor Oluwa***

Institution: **Luther College**

Faculty Mentor: ***Dr. Loren Toussaint***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

This study aims to determine the relationship between people's views of social movement potential and their attitudes toward inequality. Specifically, by looking at Social Mobility Beliefs (SMB) and Support for Inegalitarian Attitudes (SIA), we predicted a negative relationship in that more significant beliefs in social mobility would be associated with weaker attitudes toward inequality. Using a Pearson product-moment correlation coefficient analysis, results challenged our hypothesis by showing a moderate to strong relationship $r(255) = .572, p < .01$, indicating that people who believed in social mobility as being malleable also had stronger attitudes toward inequality. These results suggest that people who believe in the potential for upward social movement may attribute the possibility to individual attributes and influences. In other words, social movement is an individual's responsibility dependent on their abilities, efforts, and merits. Although one would expect social mobility beliefs to be accompanied by an inverse relationship to supporting inegalitarian attitudes, our results suggest otherwise, indicating the need for future research to determine causal variables.



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Investigating the Relationship Between Attitudes Toward Wealth and Authoritarianism: A Correlational Analysis

Jack Fritz

Other Presenters and/or Contributors: ***Victor Oluwa***

Institution: **Luther College**

Faculty Mentor: ***Dr. Loren Toussaint***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

The present study investigates the correlational relationship between views of Right-wing Authoritarianism (RWA) and attitudes toward favoring the poor over the rich. The study aims to comprehend better how economic beliefs are connected to social ideologies and attitudes. The RWAmni_scale was used to measure participants' views toward right-wing authoritarianism, a term associated with submissiveness to authority and aggression toward various people. With a sample of 255 participants, results demonstrate a strong negative correlation ($r = -0.357$, $p < .001$) between RWA and attitudes toward wealth, suggesting that individuals with greater support for the poor are likelier to display lower authoritarianism attitudes. These findings underscore the intricate relationship between people's views of social and economic concerns and their level of authoritarianism. Many factors may contribute to this relationship, including economic context, social identity, and empathic views of others. Future research may explore cultural and demographic variables to develop a more exhaustive understanding of the relationship.



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Self-as-Doer Identity, Goal Orientations, and the Theory of Planned Behavior: Predicting Whole Grain and Low-Fat Dairy Consumption

Esther Gauerke

Other Presenters and/or Contributors: ***Madeline Bersch, Hannah Casselman, Abree Dieteerm, Megan Ekern, Katelyn Kelley, , Ava Krolnik,***

Institution: **Winona State University**

Faculty Mentor: ***Dr. Amanda M. Brouwer***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

Adults under consume whole grains (WG) and low-fat dairy (LFD), leaving them susceptible to multiple diseases. Components of the Theory of Planned Behavior (TPB) predict intentions and behaviors to eat healthy, including WG and LFD. The self-as-doer identity also predicts healthy eating. The more a person identifies as a doer, the more they will participate in role-related behaviors. However, it is unclear how the orientation of the self-as-doer identity affects WG and LFD consumption and whether self-as-doer identity predicts healthy eating. It was hypothesized that avoidant and approach self-as-doer identities would predict WG and LFD consumption beyond TPB constructs. Participants (N=383) completed a writing activity and survey with demographics, healthy eating, TPB constructs, and self-as-doer identities. A hierarchical linear regression was conducted to determine if self-as-doer identity predicted healthy eating beyond the TPB. TPB and self-as-doer identities contributed 6.2% of the variance in WG consumption and 4.7% in LFD. Self-as-doer identities contributed an additional 2.5% of the variance in WGs beyond the TPB, but did not contribute beyond TPB for LFD. Approach doer identity and attitudes were individual predictors of WG. Intentions was a predictor of LFD. Results indicate that seeing oneself as a doer of healthy eating predicts WG but not LFD consumption beyond TPB. Adopting approach, rather than avoidant, orientations may lead to increased WG consumption. Approach orientations may help individuals choose WG foods rather avoiding "bad" foods. Given the availability and access of LFD, participants may not have needed the additional motivation that a doer identity provides to engage in this behavior. Generalizability is limited, as participants were mostly young and healthy. Reporting may have been inaccurate, as it was retrospective and self-report. Researchers could utilize an experimental design with real-time data collection and investigate the influence of nutrition education on doer identities in future studies.



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The Wizards of Tolkien: Integral Ecology and Technocratic Paradigm

Aidan Greene

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Vickie Holtz***

Discipline: **Theology**

Presentation Type: ***Oral Presentation***

Abstract:

The writings of English Fantasy author J.R.R. Tolkien contain strikingly similar ideas on the environment to those present in the writings of Pope Francis. Specifically, I focus on Francis' environmental paradigms as laid down in his encyclical letter on the environment, *Laudato Si*, and their relation to the philosophies of the characters Gandalf and Saruman in Tolkien's *The Lord of the Rings*. With examination of these parallels, it is possible to see the perennial truth that these two authors see in the Catholic faith driving their care for creation as well as the increasing applicability of the warning contained in the fall of Saruman the White. Through Saruman Tolkien illustrates an excellent case study of what Pope Francis would later define as the Technocratic Paradigm: an anthropocentric yet dehumanizing view of creation fragmenting human experience. This manifests in Saruman's corruption of the environment and perversion of his role as steward of Isengard. However, an alternative view that Francis would later title Integral Ecology is offered and demonstrated in Gandalf. Through the holistic approach of Tolkien to his faith and relationship to creation, Gandalf is shown as an enlightened steward of all Arda and its inhabitants caring for their physical and spiritual well-being. This comparison illuminates the ecological teaching of the Catholic faith as well as provides practical, relatable models of the ideas present in *Laudato Si* making the work more accessible.



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Connecting clinically observed metabolic deficiencies to protein structure and function

Megan Gregory

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

Faculty Mentor: ***Dr. Todd Weaver***

Discipline: ***Biochemistry***

Presentation Type: ***Poster Presentation***

Abstract:

Human fumarase (FH), an enzyme in the citric acid cycle, is an essential component in the metabolic pathway that fuels the human body. When the FH enzyme is mutated, previous clinical cases have shown a decreased quality of life likely caused by the deficiency of FH function. To better understand the specific impacts this mutation had on the structure and function of FH, circular dichroism, non-denaturing gels, and Michaelis-Menten kinetics were conducted. These experiments resulted in the findings that this variant had quaternary structure, which is crucial to enzyme functionality. However, this variant also had significantly diminished catalytic abilities in comparison to the normal FH. This decreased catalytic ability results in a buildup of fumarate in cells which may cause decrease cellular functions such as DNA repair. Overall, this clinically observed mutation has highlighted the importance of conserved structure and function for essential metabolic enzymes and therefore the human body.



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UNRAVELING THE ROLE OF FETAL MATERNAL MICROCHIMERISM IN THE DEVELOPMENT OF PLACENTAL INSUFFICIENCY

Elizabeth Groothausen

Institution: Saint Mary's University of Minnesota

Faculty Mentor: ***Dr. Claudia Preston***

Discipline: ***Biology, Molecular Biology, Bioinformatics***

Presentation Type: ***Poster Presentation***

Abstract:

Background: Fetal Maternal Microchimerism (FMc) is the process of transplacental bidirectional cell transfer between mother and fetus. Fetal cells in a mother's circulation have been linked to alterations in various tissues including placental insufficiencies such as preeclampsia and intrauterine growth restriction (IUGR). The molecular mechanism behind the association between placental disease and FMc, and the potential risk associated to the fetal gender, are still not fully elucidated. The goal of this study is to identify genes in mothers' placenta that differ between male and female fetuses and determine if their function is detrimental or beneficial to placental health. **Methods:** Gene expression profiling was performed using a previously submitted dataset (GSE35574) from the National Center for Biotechnology Information (NCBI) and GEO2R webtool. Dataset included placental tissue from pregnant patients with preeclampsia and IUGR, with male (n=19) and female (n=37) fetuses. Significance threshold was set at adjusted p-value (adj. p) < 0.05 and fold change (FC) > 1.25 and < -1.25. Functional enrichment analysis of the differentially expressed genes (DEGs) was performed using Reactome pathway database analysis and DAVID functional annotation webtools. Lastly, protein-protein interactions (PPI) analysis and gene prioritization was completed using the STRING database and Cytoscape. **Results:** Gene expression analysis yielded 429 significantly upregulated genes and 416 significantly downregulated genes for males, and 135 up and 120 downregulated in females compared to controls. Enrichment analysis revealed "FCGR3A-mediated phagocytosis" and "Protein folding chaperone" as the two most enriched functional pathways in males, compared to "RHOJ GTPase cycle" and "emp24/gp25L/p24 family/GOLD" top pathways in placentas of female fetus. **Conclusion:** This preliminary analysis sheds light on the differences in functional pathways associated to placental insufficiency in pregnancies with male and female fetus. Analysis unveiled primary focus on pathways related to placental antibody transfer in males compared to females.



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How Reovirus Can Help Reduce Cancer Aggression

Ellie Groth

Institution: **Viterbo University**

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

Discipline: ***Biology***

Presentation Type: ***Oral Presentation***

Abstract:

Breast cancer is the most common cancer in women, with advanced stages posing significant challenges due to metastasis and a poor prognosis. Because it facilitates angiogenesis in hypoxic environments, hypoxia-inducible factor 1-alpha (HIF-1 α) is a critical regulator of the progression of cancer. By targeting HIF-1 α , therapies could limit the aggressive spread of breast cancer cells. The Type-3 Dearing (T3D) strain of Mammalian Orthoreovirus (MRV) has been shown to suppress HIF-1 α in breast cancer cells, potentially improving the efficacy of current treatments. However, the mechanisms behind viral inhibition of HIF-1 α remain unclear. This study investigates how stress granules (SGs), formed during viral infections as part of the host cell's integrated stress response, affect MRV's impact on HIF-1 α levels. Using both wild-type and UV-inactivated MRV, we assessed how SG formation and inhibition influence HIF-1 α levels in infected breast cancer cells under hypoxic conditions. HIF-1 α levels decreased with UV-inactivated MRV but recovered some after stress granule prevention. These findings indicate that SGs may play a role in viral regulation of HIF-1 α , but are not solely responsible for its inhibition due to non-significant data. More research is needed to understand the viral mechanisms involved, which could lead to the development of new cancer therapies targeting HIF-1 α .



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Loving Thy Neighbor: The Church's Role in Supporting Local Communities

Caleb Hanson

Institution: **Viterbo University**

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

Discipline: ***Theology***

Presentation Type: ***Oral Presentation***

Abstract:

The United States Catholic Churches have the status of 501(c)(3) which allows them to be tax-exempt. Because they have this tax-exempt privilege and the funding of these sites comes from community support, these churches should have the moral obligation to give back to the communities to which they belong. The study explores three non-diocesan churches in the La Crosse area to investigate how they give back to their community by observing different ministries that each church offers. The study is viewed through the lens of someone in poverty in need of support. The different ministries are then compared to the ideas shared by Henri De Lubac in *The Mystery of the Supernatural*.



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Identifying Antibiotics from Bacteria in the Mouth

Gabe Holderby

Institution: **Viterbo University**

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

Discipline: ***Biology***

Presentation Type: ***Oral Presentation***

Abstract:

Antibiotic resistance is a vastly growing health concern all over the world. Attributing to over five million deaths a year, it is crucial that new antibiotics are discovered in order to save people from bacterial infections. Without new antibiotics, resistant microbes are predicted to kill as many people worldwide as cancer by the year 2050. In order to slow the rapidly increasing antibiotic resistance new antibiotics need to be identified. Microbes that are in close proximity are likely to produce antibiotics as a way to carve out space and obtain nutrients. Other researchers have investigated the soil microbiota, but we have turned our attention to the oral microbiota. The oral microbiota is composed of 1000's of different species of pathogenic and nonpathogenic bacteria. The research consisted of extracting bacteria from six chewing gum samples. Thirty six unique colonies were found with fifteen of those being possible antibiotic producers. Three of the fifteen (GH1, GH2, and GH3) were of high interest because of their ability to inhibit the growth of one or more known bacteria (*E. coli*, *P. aeruginosa*, *S. epidermidis*, and *S. mutans*). These samples were isolated to ensure only one bacteria species was present. Using genomic sequencing it was concluded that GH1 and GH2 are of the *Bacillus* genus while GH3 is of the *Pseudomonas* genus. Biochemical identification tests such as Gram staining and mannitol salt agar, determine the characteristics of the bacteria. Coupling the genomic sequencing with biochemical test, the likely species of GH2 is *B. halotolerans*, GH3 is likely *P. aeruginosa*, while GH1 remains inconclusive. It is not yet known what antibiotic material these bacteria are producing so further research is needed. GH1, GH2, and GH3 are a start to expanding the knowledge of the search for new antibiotics. This work and future work will provide needed antibiotics to slow the growing concern of antibiotic resistance.



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Ethical Necessity of Anesthetics in IUD Insertion: Patient Autonomy and Non-Maleficence

Matthew Jones

Institution: **University of Wisconsin- Green Bay**

Faculty Mentor:

Discipline: ***Bioethics***

Presentation Type: ***Oral Presentation***

Abstract:

Intrauterine devices (IUDs) are an effective and widely used form of contraception. However, their insertion often involves significant pain for patients, frequently underestimated by clinicians. This paper argues that providing anesthetics during IUD insertion is an ethical necessity because of the biomedical ethical principles of patient autonomy and non-maleficence. Through analyzing clinical studies and bioethical frameworks, this paper argues that pain management is necessary to respect patient autonomy, as pain experienced during IUD insertion deters some individuals from choosing this form of contraception. Additionally, the absence of analgesics is an omission that causes preventable harm, violating the principle of non-maleficence. The risks associated with anesthetic therapies, such as paracetamol and paracervical blocks are minimal compared to the physical and psychological discomfort of IUD insertion. Therefore, using anesthetic protocols as a standard operating procedure is both ethically sound and necessary to support patient-centered care in women's reproductive health.



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Active Learning in Organic Chemistry: Fun Ways to Improve Students' Knowledge

Jaime Kelly

Institution: **Viterbo University**

Faculty Mentor: **Dr. Valeria Stepanova**

Discipline: **Organic Chemistry**

Presentation Type: **Poster Presentation**

Abstract:

Active learning allows students to interact with the professor and other students through activities. We hypothesized that active learning in organic chemistry can deepen students' metacognition levels and improve material retention. Organic chemistry is a required advanced class for students interested in health-related professions. While there are reports on active learning implementations in other fields, examples connected to organic chemistry are limited. In this study, we focused on synthetic transformations, structural correlations including nuclear magnetic resonance (NMR) spectroscopy, and vocabulary. The summative assessment was organized within the framework of two learning objectives. The study was conducted in two phases. Phase I was conducted in Spring 2024, (CHEM 340, 9 students), and Phase II in Fall 2024, (CHEM 240, 16 students). Phase I had students with one semester of exposure to organic chemistry. For our research purposes, we studied their perspectives on different active learning exercise designs targeting the topics listed above. The designs included Scavenger Hunt, Crossword, and Bingo. Data collection included summative assessments using in-class exercises (ICEs), quizzes, and exams. Formative assessments included self-assessment surveys. In phase II, the students had two semesters of general chemistry with minimum organic chemistry exposure making them considered novices. The particular focus in this phase was on NMR spectroscopy. NMR-type problems are puzzle-solving problems where students apply critical thinking to organic molecules. Students were exposed to a passive learning model of NMR followed by an assessment of their cognition. Then students were taught through active learning and assessed again. The summative assessment was done in stages to monitor retention throughout the semester. The data collection included an online quiz, ICEs, and an exam. We anticipate continuing data collection throughout the rest of the semester on knowledge retention. Here we present our analysis of collected data for each phase of the study.



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Synthesis and Catalytic Studies of M-Tetraphenylporphyrin Complexes for Transfer Hydrogenation

McKenzie Kidd

Other Presenters and/or Contributors: *Devyn Scott*

Institution: **Waldorf University**

Faculty Mentor: *Dr. Bharat Bhattarai, Dr. Damien Culver, Dr. Long Qi*

Discipline: **Chemistry**

Presentation Type: **Poster Presentation**

Abstract:

Macrocycle synthesis and their catalysis has been an area of science that has remained open-ended for decades. Looking further into successful synthesis of macrocycles and knowing their catalytic activities in different types of reactions would allow us further insight into developing novel and effective catalysts. Such an advancement could provide great strides in various industries across the economy. This research focuses on the synthesis of macrocyclic ligands and metal ions and exploring their catalytic efficiency in transfer hydrogenation reactions. Here, we synthesized Tetraphenylporphyrin(TPP)-metal complexes (M-TPP) of Fe, Co, Ni, and Zn. Then, we investigated the catalytic efficiency of those complexes in transfer hydrogenation reactions using different substrates: phenylacetylene, diphenylacetylene, and benzaldehyde. We also tested the catalytic activity of structurally related complexes, metal-phthalocyanines (MPhthalocyanines, M = Fe, Co, Ni, Zn) with the same substrates. Throughout the process, Mphthalocyanines did not catalyze transfer hydrogenation reactions in our reaction conditions. However, M-Porphyrin Complexes showed interesting results. Zn-TPP did not catalyze the transfer hydrogenation reactions, whereas Co-TPP had moderate activity and Fe-TPP and Ni-TPP completely reduced our substrate, benzaldehyde to benzyl alcohol. Further, we investigated the optimal reaction conditions for the catalytic hydrogenation reactions of M-TPP. We varied the substrate concentration, bases, base concentration, reaction temperatures, and reaction times.

This internship has allowed me to widen my knowledge of not only my chemistry knowledge but also my expertise around lab equipment and research. There are countless pieces of equipment that I now understand how to use and why they are used. Finally, the independence that was demanded of me has allowed me to grow more confident in myself as a person rather than just a student. I highly recommend the VFP program for those looking for a rigorous internship that promotes independence and academic growth.



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Effects of Trazodone on Sign-Tracking

Liam Kubitschek

Other Presenters and/or Contributors: ***Brandon Yates***

Institution: **Winona State University**

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

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

Trazodone is a serotonin-based agonist and reuptake inhibitor most commonly used as an antidepressant and anti-anxiety medication. Trazodone is unique as it has sedative-like properties but is used in the treatment of depression and anxiety or the comorbidity of the two. Trazodone mechanism of action is outlined as the 5HT_{2A}, H₁, and alpha 1 adrenergic receptors. Trazodone's properties raise questions as to whether it could reduce impulsivity in animal subjects. Such results could have implications for the addiction recovery process by interrupting the drive to use substances. Reducing the potential of relapse during the recovery process eases recovery and raises success rates.

Sign-tracking behavior is quantified using operant chambers in a process used to measure the degree of impulsivity in animal subjects. The two treatment conditions, low dose and high dose were separately compared to the saline group. The results in both low and high-dose conditions were significant compared to the control conditions. This suggests that Trazodone may have utility in reducing the risk of relapse.



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Glutamine Levels and their correlation with Alzheimer's disease

Micneya Landeros

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Kelsey McLimans***

Discipline: ***Biology- Neuroscience***

Presentation Type: ***Oral Presentation***

Abstract:

Alzheimer's disease (AD) is the most prevalent form of dementia, affecting over two-thirds of individuals aged 65 and older. It is marked by progressive neurodegeneration, as a cause of gray matter atrophy and glucose metabolism impairment. Glutamine has been identified as a potential neuroprotective factor in AD, with studies suggest it reduces oxidative stress and neuroinflammation early on. This study aims to analyze the relationship between glutamine serum levels with gray matter volume and glucose uptake in individuals with AD. Using data from the the Alzheimer's Disease Neuroimaging initiative (ADNI), voxel wise regression modeling with SPM12 were conducted to assess regional relationships. Results showed a positive correlation between grey matter and glutamine serum levels across multiple clusters ($P < 0.05$), particularly in the frontal and temporal lobes. However, a negative correlation was seen between glutamine serum levels and glucose uptake in the right insula ($P < 0.05$). Since AD is often identified in later stages of cognitive loss, finding biomarkers like glutamine that are implicated in structural and metabolic alterations in the brain may present opportunities for an earlier diagnosis and more focused interventions intended to slow down the disease's course.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Long-Term Effects of in-utero Atrazine Exposure on Blood Glucose Levels and Circadian Rhythm

Kirstyn Larson

Institution: **St. Mary's University of Minnesota**

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

Discipline: ***Biochemistry***

Presentation Type: ***Oral Presentation***

Abstract:

Atrazine (ATZ) is a widely used herbicide linked to disruptions in metabolic pathways and health effects in animals and humans. This study investigated the impact of chronic in-utero and post-utero exposure to various concentrations of ATZ (0, 3, and 30 ppb) on glucose regulations in female mice over a 24-hour circadian cycle. Measurements included body weight, fasting glucose levels, glucose tolerance test, and blood glucose levels. Results showed that ATZ exposure decreased mean body weight, altered glucose tolerance, indicated differences in blood glucose between treatment groups (using Anova one-way with a P value < 0.05), and reduced overall blood glucose with age. Overall, the data suggests chronic ATZ exposure, particularly at higher levels, may dysregulate metabolic pathways involved in glucose metabolism. Understanding these effects is essential for assessing the potential health impacts of environmental ATZ exposure.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

The Short-Term and Long-Term effects of Fireworks on the Memory of Lab Mice

Leah LeBrun

Institution: **St. Mary's University of Minnesota**

Faculty Mentor: ***Dr. Benjamin Pauli***

Discipline: ***Ecology***

Presentation Type: ***Oral Presentation***

Abstract:

Humans' effect on organisms physically, socially, and biologically can have large-scale consequences. Noise is one environmental stressor impacting organisms' metabolic, internal, and physical functions. Noise high in decibels especially causes disturbance in animal behavior. Fireworks are one example of high-decibel noise that causes behavioral and reproduction changes in wildlife. This experiment examined the effects of fireworks noise on mice's short-term and long-term memory. Ten mice (CD-1) were used, 5 in the control group and 5 subjected to firework noise. On randomly selected days for one month, a recording of fireworks was played through speakers for the experimental group. After 30 days, both groups were tested using a Barnes Maze to see if firework noise affected memory. The mice were first tested during a training day then 24 hours later the mice were tested again for short-term memory and one week later the mice were tested a final time to assess long-term memory. There was no significant difference in the short-term or long-term memory of the lab mice in the experimental versus the control group. Noise exposure at higher decibels has been proven to affect wildlife. However, in this experiment, the firework noise may not have been loud enough to affect memory. The impact of noise exposure on the larger community depends on a wide array of factors including the type of exposure and the effect on individual species. Therefore, future study design should revolve around multiple species impacted by fireworks and a high decibel level should be used.



Late, 3d transition metal complexes of bis(diphenylphosphino)methane

Connor Lehner

Institution: **Winona State University**

Faculty Mentor: **Dr. Joseph K. West**

Discipline: **Chemistry**

Presentation Type: **Poster Presentation**

Abstract:

Complexes of bis(diphenylphosphino)methane dichalcogenides (dppmE₂, E = O, S, Se) have been prepared for Co(II), Ni(II) and Cu(II) by combination with respective nitrate salts. These ligands are relatively unexplored for 1st row transition metals – with no existing reports of metal complexes for dppmSe₂. All obtained complexes were paramagnetic precluding characterization by NMR spectroscopy. An array of methods have been employed to ascertain the structural and electronic forms of all obtained complexes as both tetrahedral and octahedral geometries, corresponding to systems with two or three ligands, respectively, are plausible. Additionally, Co(II) complexes, as d⁷ systems, could be found in either high spin or low spin configurations. All complexes have been characterized by magnetic susceptibility, IR spectroscopy, and mass spectrometry. Initial forays into computational modeling and X-ray crystallographic analysis are also underway.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Development of a Hybrid Synthetic and Computational Teaching Lab Exercise Featuring Budotitane

Kezia Lemke

Institution: **Winona State University**

Faculty Mentor: ***Dr. Joseph West***

Discipline: ***Chemistry***

Presentation Type: ***Poster Presentation***

Abstract:

Budotitane is notable for its reported activity against cancer cells as well as its array of geometric structural options. Preparation of this complex has been implemented in an upper-level inorganic chemistry course. In this exercise, students synthesize budotitane, bis(1-phenyl-1,2-diphenylbutandionato)bis(ethoxy)titanium(IV), and subsequently characterize it via ¹H NMR and IR spectroscopies as well as mass spectrometry. Computational modeling has been utilized to predict the most energetically favorable form as well as to generate modeled spectra for comparison to experimental results.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

The Effects of Social Exchange Theory on Mate Poaching

Aryn Marble

Institution: **Viterbo University**

Faculty Mentors: ***Dr. Tamera Hill***

Discipline: ***Psychology***

Presentation Type: ***Oral Presentation***

Abstract:

This abstract explores the effects of social exchange theory on mate poaching, with a particular focus on the role of narcissism. Social exchange theory posits that individuals assess relationships based on a cost-benefit analysis, seeking to maximize rewards while minimizing costs. In the context of mate poaching—the act of pursuing someone already in a relationship – narcissistic traits often amplify this cost-benefit evaluation, as narcissists are drawn to relationships that boost self-esteem and perceived status. Narcissistic individuals may engage in mate poaching because they view the act as a source of validation and social reward, aligning with the theory’s principle that relationships are evaluated for personal gain. Narcissism contributes to heightened attraction to individuals in committed relationships, as the perceived challenge and exclusivity increase the narcissist’s sense of accomplishment and social value. The research reveals that narcissists tend to disregard moral or social costs in pursuit of these rewards, as they prioritize personal fulfillment over relational ethics. Moreover, narcissistic mate poachers often employ manipulative tactics, including flattery, attention, and self-enhancement, to increase their appeal. This behavior not only affects the targeted individuals but also has wider social implications, leading to strained trust in relationships and affecting overall relational stability. Understanding these dynamics through the lens of social exchange theory underscores the importance of addressing underlying personality traits like narcissism in relationship counseling and highlights how cost-benefit calculations drive complex interpersonal dynamics in romantic settings. This theoretical framework aids in comprehending the motivations behind mate poaching and its psychological impact on individuals and relational outcomes.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Understanding the Effects of Environmental Factors on Rates of Depression and Anxiety using Geomedicine

Nathan Meyers

Institution: **St. Mary's University**

Faculty Mentor: ***Dr. Benjamin Pauli***

Discipline: ***Biology***

Presentation Type: ***Oral Presentation***

Abstract:

The acceleration of modern medicine has prompted new questions into mental health alongside physical health. Within the past decade the number of mental health cases such as anxiety and depression have been on the rise. Understanding the contributing factors to this mental health crisis and their detection is crucial for research. Emerging applications such as Geomedicine use technology and existing data to identify hotspots for specific health concerns and identify potential causes or correlations with the data. Looking at mental health cases in relationship to environmental factors might uncover possible correlations in which mental health is affected. This study was focused on all of the counties in Minnesota. Data of existing depression and PTSD rates were collected by each county in Minnesota. Statistical analysis was run to measure the correlations between mental disorders (depression and PTSD) and external environmental factors which included air pollution, water pollution, income, social media use, and population density. It was found that some factors had higher correlations than others, the highest correlation being among air pollution and income. Higher Air pollution showed an increase in depression cases while higher income saw a decrease in PTSD cases. It should be noted, however, that many of the results, though significant, showed low predictive power. Therefore, some factors may be associated with playing a role in the number of cases of depression and PTSD but only in combination with a number of other variables. Measuring factors for mental health can be complex to pinpoint, this is because there are so many factors that go into mental health disorders. This study however adds to our understanding of how external factors can influence our mental health.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Habitat Choices of the White-Tailed Deer

Jared Mitchell

Institution: **Saint Mary's University**

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

Discipline: ***Environmental Biology***

Presentation Type: ***Oral Presentation***

Abstract:

White-Tailed deer (*Odocoileus virginianus*) live in different habitats based on foraging availability, reproductive availability, and avoiding human confrontation. Since white-tailed deer are herbivores, we might expect them to favor heavily vegetated areas, such as; thick brush, and heavily wooded areas. White-tailed deer populations have a crepuscular tendency, resulting in them to generally be more active near dawn and dusk. Generally snow conditions inhibit their travel movements. To further explore the effects of environmental characteristics on deer behavior, we tested to see if there are any relationships between deer activity and habitat, time of day and snow conditions. We used 9 game cameras in 3 different habitat types (woods, tallgrass, and farm fields) and recorded the number of pictures of deer by habitat type, time of day and whether snow was present. Time of study was done from March-April. We found that deer displayed selection for field habitats. There was no interaction between habitat and time of day or habitat and snow conditions. The snow did not affect the deer's behavior when it came to it being present or not. This may be due to the snow not being deep enough. Due to foraging tendencies for white tailed deer they have ready food access through the field habitat. These data show that there was more activity within the field habitat compared to the other habitat types. Since there is more open field and less cover, that leads to more foraging for the deer.. Therefore, deer prefer field habitat even with snow. However, snow and the time of day did not affect habitat selection of deer.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

No-nonsense Guide to Sing Loud through Acoustic Science!

Lukas Nederloe

Institution: **Viterbo University**

Faculty Mentor: ***Prof. Daniel Johnson-Wilmot***

Discipline: ***Music***

Presentation Type: ***Oral Presentation***

Abstract:

While Operatic voice teachers throughout generations have churned out successful opera singers who can drown out orchestras, the scientific reason why voices can be so loud is often steeped in mystery to all but the most esteemed vocal science pedagogues. “Filling up the resonant cavities of your head,” “Biting the apple,” and “drinking in the sound,” these are all terms that, for the majority of people taking operatic voice lessons, are relatively common. But what do they mean? Can you really “drink” your sound? Will increasing the size of resonant cavities in your head increase your volume? Does “biting” the metaphorical apple taste more like a Honeycrisp or a red delicious? These terms act as a comprehension obstacle for people who aren’t immersed in classical voice jargon. This research aims to ask a simpler question with comprehensible answers: How do we sing loud? The current Guinness World Record for the Loudest Mezzo-Soprano sung note is 113.8 dB – the volume of a rock concert. Online software to measure voice harmonics in tandem with general sound acoustic science, this question can be answered. A result of this research is easily comprehensive ways to look at how somebody sings operatically, and loudly. Pitches between 1,000-2,000Hz frequencies are scientifically “louder” to the human ear. That is around the C6 on a piano keyboard to C7 (Typically the pitch range of a police siren). There is scientific evidence that singers who sing in octaves ranging from C4-C5 (middle C on a piano to an octave above) can incorporate aspects of these sounds into their singing, thus boosting the perceived volume. This research focuses on lower voices, ones typically called tenors, basses, or baritones.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Using Ignatian Spirituality for Discernment in the 21st Century

Madison Olson

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Emily Dykman***

Discipline: ***Religious Studies***

Presentation Type: ***Oral Presentation***

Abstract:

Graduating from college and entering the world of adulthood can be a stressful time and many students find themselves not knowing what the next step to take is. In my research I observed the potential value of the use of Ignatian Spirituality and how it can help college students make big life decisions. I examined Saint Ignatius's *Spiritual Exercises* and began the process of translating it for the searching young adults of today. Discernment is often difficult to understand and incorporate into contemporary lives. This research project offers an updated framework that can assist in helping college students see the relevance of these practices in their decision-making process.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Reflection and Outlook on Daily Living

Carmen Ortiz

Institution: **Viterbo University**

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

Discipline: ***Psychology***

Presentation Type: ***Oral Presentation***

Abstract:

The purpose of this research is to see how reflection overtime affects people. Specifically, whether reflection correlates with a better outlook on daily life through daily ratings and language used in the reflection. Additionally, if employment status has any impact on rating or language. Seventeen participants, at a small private midwestern university, were given a form asking for employment status, with options of full-time, part-time, or adjunct, the date, what they did that day, rating the day out of ten (1 - This has been the absolute worst day of my life, it can't get any worse than this; 10 - This has been the absolute best day of my life, it can't get any better than this), and why they rated the day that number. This research lasted two weeks, with collection being split into one-week segments. The hypothesis is that, over time, the numerical ratings during the first week will average out to be lower than the averages during the second week. In addition, faculty and staff working full-time will show the most improvement in average scores, part-time workers will have an increase in average numbers but not as much as full-time workers, and those working as adjuncts will have a slight increase in average scores before the numbers plateau.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Effects of Atrazine on MSTN Protein Expression in *Mus musculus* Gastrocnemius Muscle

Francis Perroud

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

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

Discipline: ***Biology***

Presentation Type: ***Oral Presentation***

Abstract:

Atrazine, the second most widely used herbicide in the U.S., poses environmental and health risks due to its persistence in water supplies. Identified as an endocrine disruptor, atrazine has been linked to metabolic disorders such as obesity, insulin resistance, and type 2 diabetes. Recent studies indicate that prolonged atrazine exposure elevates levels of TGF- β 1, a cytokine that regulates cell growth and apoptosis and is known to induce the expression of myostatin (MSTN), a critical regulator of muscle growth and metabolic homeostasis. This study explores the link between atrazine exposure and MSTN protein expression, where atrazine-induced upregulation of TGF- β 1 could lead to myostatin overexpression, potentially causing muscle atrophy and metabolic disorders. To investigate this, three groups of male and female *Mus musculus* were exposed to varying concentrations of atrazine (0 ppb, 3 ppb, and 30 ppb) for three weeks in utero and five weeks postnatally. MSTN protein levels in gastrocnemius muscles were analyzed using immunoblotting. Contrary to expectations, males exposed to 0 ppb showed significantly higher myostatin levels than those exposed to 3 ppb ($p < 0.0001$) and 30 ppb ($p = 0.0025$), and higher levels than females in the 0 ppb group ($p = 0.0004$). No significant differences were observed among female groups. These findings highlight a sex-dependent sensitivity to atrazine. This study suggests a complex interaction between atrazine and muscle-regulating pathways, warranting further research into its implications for muscle development and overall health.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

The Role of DHCR24 in Cholesterol Synthesis Regulation in Hepatocellular Carcinoma

Francis Perroud

Institution: **St. Mary's University of Minnesota**

Faculty Mentor: ***Dr. Ewa Bielczyk-Maczyńska***

Discipline: ***Oncology***

Presentation Type: ***Poster Presentation***

Abstract:

Liver cancer ranks as the sixth most prevalent cancer globally, with 850,000 new cases reported annually, 85-90% of which are due to hepatocellular carcinoma (HCC). Unlike other major cancers in the U.S., HCC stands out as the only one whose mortality rate has not decreased over the past 50 years, underscoring the pressing need for more effective diagnostic and therapeutic approaches. This study explores the role of 24-dehydrocholesterol reductase (DHCR24), a key enzyme in cholesterol biosynthesis, whose overexpression has been linked to poor prognosis in HCC patients. We employed siRNA reverse transfection to knock down DHCR24 expression and evaluated its impact on two critical pathways: TGF- β signaling and Liver X Receptor (LXR) signaling. Gene expression was quantified using RT-qPCR, and functional assays were performed to assess changes in cell migration and proliferation. Our results show that DHCR24 knockdown modulates TGF- β target gene expression and significantly inhibits cell proliferation. Contrary to expectations, LXR target gene expression and cell migration remained unaffected. These findings suggest that DHCR24 knockdown suppresses HCC cell proliferation through the TGF- β pathway, independently of LXR signaling. This study paves the way for potential new therapeutic strategies targeting DHCR24 in HCC. Further research is needed to elucidate the precise mechanisms linking DHCR24 to TGF- β regulation and cancer progression.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Understanding Scripture: The Role of Historical Critical Method in Adult Faith Formation

Gabby Ramsey

Institution: **Viterbo University**

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

Discipline: ***Religious Studies***

Presentation Type: ***Oral Presentation***

Abstract:

The historical critical method aims to give a rich understanding of the Bible that includes look at historical context, authorship, audience, and setting. This approach has value in faith formation and allows for RCIA candidates to have a deeper understanding of the faith of which they are about to become. In my research I explored resources to determine where historical critical method already exists in adult faith formation, specifically the Rite of Christian Initiation for Adults or RCIA programs. I spoke to three Catholic adult faith formation directors and evaluated their methodologies and resources to find examples of the historical critical method. I placed the methods into categories and evaluated those categories to determine which resulted in stronger historical critical strategies. This research highlights the value and importance of the historical critical method in adult faith formation. It also shows that the historical critical method can be accessible for all Catholics to give them a strong foundation for their faith.



7 RIVERS

UNDERGRADUATE RESEARCH SYMPOSIUM

Riley Ruud

Institution: **St. Mary's University of Minnesota**

Faculty Mentor: ***Dr. Molly O'Connor***

Discipline: ***Psychology***

Presentation Type: ***Oral Presentation***

Abstract:

Video games are increasing in popularity and violent content. Previous research links violent video games to both aggressive thoughts and behaviors. Additionally, some studies suggest potential moderators between violent video games and violence, such as moral disengagement. This study examines potential moderators between violent video games and aggressive thoughts or behaviors within a specific population of undergraduates. The variables being examined for moderation include moral disengagement, stress, and academic achievement.

My dataset consists of responses from the student population at my college, and demographic data, such as age, race, and other features, have already been collected. Each participant completed a questionnaire that asked for basic demographic information. Multiple scales were used to operationalize the variables, including the Perceived Stress Scale, Aggressive Behavior Questionnaire (AGQ), Violent Ideation Scale (VIS), Moral Disengagement Scale (MDS), Academic Achievement Scale (AAS), and Violent versus Nonviolent Videogame Classification Scale. These scales are either formalized or based on previous research examining violent video games. Previous studies show a link between violent video games and aggressive affect (both physical and thought aggression). Moral disengagement is suggested as a potential moderator between violent video games and aggression; however, earlier studies did not use a precise scale to measure moral disengagement. The study also explores stress and academic achievement as potential moderators between violent video games and aggression.

Participants were recruited from university classes across various fields of study. Each participant was given a link to the survey and had the option to participate. Although data collection has already been completed, analysis techniques, including one-way ANOVA and bivariate correlation, will be used to determine the significance among multiple correlated variables. The predictions are that the relationship between violent video games and aggression (both physical and thought) will be significant, with moral disengagement serving as a substantial moderator. Stress and academic achievement are expected to be insignificant as moderators between violent video games and aggression; however, relationships between stress, academic achievement, and general video game play are likely to be significant.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Antibiotic Producers in the Soil

Emma Schoen

Institution: **Viterbo University**

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

Discipline: ***Microbiology***

Presentation Type: ***Oral Presentation***

Abstract:

As scientists dig into the reasons behind growing antibiotic resistance, they have uncovered an imminent threat to human health that is both urgent and alarming. Antibiotic-resistant microbes pose a serious threat to the population because they inhibit the efficacy of antibiotics and lead to untreatable infections. If resistance spreads to more and more microbes, human health will suffer greatly. Thus far, this research project has discovered antibiotic-producing microbes in the soil in various locations throughout Southwest Wisconsin. Biochemical tests have been run to determine the class of soil-derived bacteria that produce antibiotics. The genus and species of two bacteria have been identified through genetic sequencing. With this data, future research will identify the minimum inhibitory concentration and effectiveness of the soil-derived antibiotics in comparison to clinically used antibiotics. Despite advances in antibiotics over the past 70 years, a need to identify or synthesize new antibiotics persists, demonstrating the need for further research. This study's findings will contribute to this goal, offering new ways to combat antibiotic resistance and improve human health.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Stability and function of a Salmonella copper resistance protein with changes to a linker region

Ellie Schneider

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

Faculty Mentor: ***Dr. John May***

Discipline: **Biochemistry**

Presentation Type: ***Poster Presentation***

Abstract:

Copper ions are used in a variety of ways for its antimicrobial properties. However, bacteria can resist copper's antimicrobial properties by using a number of mechanisms. In *Salmonella enterica*, a protein named DcrB aids in copper resistance. Previous research indicates that mutating two residues in DcrB in a region that links a small N-terminal beta hairpin to its core structure causes the protein to have decreased function. The overall goal of this research is to better understand how the protein DcrB functions in copper resistance. If these residues in DcrB can be identified as a critical element of its functionality, we will be one step closer to understanding how the copper resistance protein works. To investigate the stability of the non-functional mutant, DcrB D57A M58A, we used differential scanning fluorimetry and circular dichroism. We found that detergent decreased the melting temperature. We also found that with or without the presence of copper ions, the mutant protein remained structured up to 95 oC, and that the mutant has more alpha helical character than wild type DcrB. This finding is significant, given the location of the 2 residues in a linker region rather than an alpha helix or beta sheet. The findings highlight a critical role for D57 and M58 in the structure, stability and function of a bacterial copper resistance protein. This research was made possible by grants from UWL's Undergraduate research and creativity program.



Synthesis and Catalytic Hydrogenation of Iron-Chloride Porphyrins

Devyn Scott

Other Presenters and/or Contributors: ***McKenzie Kidd***

Institution: **Waldorf University**

Faculty Mentor: ***Dr. Bharat Bhattara***

Discipline: ***Chemistry***

Presentation Type: ***Poster Presentation***

Abstract:

Our experimental work with metal porphyrin and phthalocyanine complexes aligns with the DOE's mission to advance scientific knowledge and support energy-related research. Specifically, the focus on catalytic reactions has implications for energy efficiency because catalysts play a crucial role in developing efficient chemical processes, which can lead to more sustainable energy production and use. There are also implications for advanced materials as research into metal complexes contributes to the development of new materials with potential applications in energy storage, conversion, and other technologies. There are also environmental components as efficient catalysts can reduce the environmental footprint of chemical processes by minimizing waste and improving reaction efficiency.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Engaging in Understanding: On Today's Catholic Young People

Amber Stemper

Institution: **Viterbo University**

Faculty Mentor: ***Dr. Emily Dykman***

Discipline: ***Theology***

Presentation Type: ***Oral Presentation***

Abstract:

Assumptions of children and young people shape how we interact, teach, and engage with them. Catholic Youth Ministers must examine their understanding of the questions and experiences of young people to create meaningful and life-giving practices. This research brings to light the complex questions and experiences of today's young people, aiming to go beyond assumptions and engage in understanding. Through the practice of document analysis, common themes emerged such as the assumptions of who the youth are by adults, the needs and questions of the youth, and the transforming effects of adults who care. It was clear that young people need adults who notice, listen, and care. Young people carry bundles of questions about who they are, where they belong, and what their purpose is. It is vital to understand and accompany young people through these pressing questions and guide them to the life-giving answers of Jesus. These answers include the truth that they are created in God's image, are adopted as God's children, are designed for relationships, and are given unique gifts to live out their call today.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

A Family Dog's Effects on Personality: How Childhood Dog Ownership Effects Personality in Young Adulthood

Mikayla Strand

Institution: **Winona State University**

Faculty Mentor: ***Trisha Karr***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

This current study was focused on evaluating if owning a dog during childhood affects the owner's personality in young adulthood. Participants in the study consisted of psychology students from a Midwestern university. The participants were given a survey consisting of a demographic questionnaire along with a Big 5 personality assessment. Data was analyzed using inferential statistics. Major findings demonstrated that owning a dog within the family did not affect personality, however, the amount of care a child provided for the dog increased extraversion and conscientiousness scores within young adulthood. These findings explain how ownership of a dog throughout childhood benefits personality across the lifespan, encouraging conscientious and extraverted traits within the owner.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Student Comprehension and Evaluation of Price Gouging and Fairness

McKenzie Sullivan

Other Presenters and/or Contributors: ***Brett Lubetski***

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

Faculty Mentor: ***Dr. Lisa Giddings, Dr. James Szymalak***

Discipline: ***Economics***

Presentation Type: ***Poster Presentation***

Abstract:

While standard economic theory posits that the priority of a firm is to maximize profits, behavioral economic theory suggests that humans are hard-wired to appreciate fairness. In the hypothetical perfectly competitive market taught in an introductory economics course, firms do not make profits, but in the real world, market power sometimes allows firms to make profit, and a lot of it. Inflation and the rising cost of living continuously cause concern among the electorate and proved to be common topics in the 2024 election. Some explain the rising prices as leftover consequences of pandemic supply shocks while others claim firms exploit market power through price gouging and other unfair pricing practices. Given human bias toward fairness, anti-price-gouging legislation tends to be a popular response in inflationary times. Proponents assert that anti-price-gouging laws ensure consumers have access to essential goods at fair prices. This research proposes to first conduct a survey about prices, inflation, and price gouging, as well as an experiment measuring attitudes toward fairness to better understand student comprehension and beliefs. Second, we will examine existing anti-gouging laws and litigation to determine how fairness in the economy translates in the legal environment.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Precision Immunotherapy: Development of a Dual Nanobody Based Chemically Self Assembled Nanorings (CSANs) to Eradicate Trop2+ Solid Tumors

Isabel Torcivia

Institution: **University of Minnesota**

Faculty Mentors: ***Dr. Carston Wagne***

Discipline: ***Macromolecular Chemical Biology***

Presentation Type: ***Poster Presentation***

Abstract:

The current immunotherapies targeting the over-expression of a single tumor antigen have difficulty eliminating diverse tumors. Targeting the correct tumor antigen without affecting healthy tissue and the tumor's ability to escape treatment often reduce the effectiveness of these therapies, leading to tumor recurrence. New treatments with the ability to target multiple antigens have demonstrated remarkable anti-cancer potency leading to significant tumor eradication, as well as reducing off-target effects of healthy tissue. Our research team has previously developed chemically self-assembling nanorings, or CSANs, that can direct cell-to-cell interactions with T cells and cancers expressing specific tumor antigens without genetically altering the T cells. These multivalent CSAN constructs have proven effective in generating T-cell cytotoxicity using various tumor biomarkers. Their precise killing ability can be regulated using the FDA-approved trimethoprim, a significant factor in ensuring the safety and regulatory approval of our proposed treatment. Here, we report our progress towards the development of an α TCR-1DD- α Trop2 to target TROP2+ cancer cells. Moreover, our pioneering α TCR-1DD- α Trop2 protein, which integrates a specific construct within a single protein monomer, represents a significant leap forward. This innovation opens the door to the creation of CSANs with multiple targeting ligands, offering a promising strategy to combat tumors from multiple angles.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Investigating the Distribution of Resistance and its Relationship with the Temperature of a Thermistor.

Mengxing Wang

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

Faculty Mentors: ***Dr. Mohammad A. Aziz***

Discipline: ***Mathematics, Physics and Computer Science***

Presentation Type: ***Poster Presentation***

Abstract:

Thermistors are widely used in temperature sensing due to their ability to change resistance with temperature. In this study, we first aimed to investigate the distribution of resistance data by fitting various statistical distributions, including exponential, gamma, Weibull, log-normal and some recently developed skew-normal distributions. Secondly, using the best fitted distribution, we search for the best fitted model to establish a relationship between temperature and resistance of the thermistor.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Increasing Interest in Undergraduate Counseling Minor

Julia Weiner

Institution: **Luther College**

Faculty Mentors: ***Dr. Joseph Breitenstein***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

Counseling degrees have not typically been available at the undergraduate level. The offering of counseling courses prior to graduate school may stimulate interest in counseling career paths and better prepare potential graduate students of counseling programs. The addition of a Counseling Minor at Luther College was instituted during the 2022-2023 academic year. The minor was created through a partnership between the Psychology and Social Work departments, with the objective of offering an accessible addition to any undergraduate majors that are looking to become a counselor or are interested in other helping professions. While the number of declared counseling minors has increased since the program's introduction, some areas of undergraduate study have not been reached. This project seeks to increase the number of declared counseling minors in these underrepresented majors through the use of new counseling-specific promotional materials and academic advising materials for prospective and recently admitted students. Materials were developed using the ACA Five Core Professional Values; APA, CSWE, and CACREP guidelines; and major-related academic organizations, professional organizations, and Luther-specific learning objectives.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

How Vocal Acoustics Inform the Teaching of Treble Voices

Ellyn Werner

Institution: **Viterbo University**

Faculty Mentors: ***Prof. Daniel Johnson Wilmot***

Discipline: ***Music***

Presentation Type: ***Oral Presentation***

Abstract:

We are consistent sound consumers, and singers are required to be detailed sound technicians. Singing is comprised of many frequency waves which harbor frequency peaks, or vocal formants. These waves interact with our vocal tract, bounce around in the air, and eventually hit our eardrums. From the eardrum vibration, the listener can understand many qualities about the sound, including the pitch, volume, and vowel the singer was singing. This project investigates how understanding the acoustics of voice production, particularly for treble voices, can inform vocal instruction. Treble voices—those singing in higher frequency ranges—present unique challenges regarding vowel clarity and timbre shift, which vocal acoustics can help address. Regardless of personal voice type, vocal acoustic pedagogy provides foundational insights into working with any singer, enabling a deeper understanding of how sound functions across instruments. As singers, voice teachers, and choral directors, we strive to achieve the most efficient voice production. Through understanding vocal acoustics, we can more effectively teach and guide singers toward our desired auditory outcomes. This project aims to clarify the science of sound and proposes three instructional methods grounded in vocal acoustic pedagogy.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Emotional Concerns Among the Older Adult Population in Zamora, Spain: Spain Nursing Students' Perspective

Kaylie Wiedmeyer

Institution: **Viterbo University**

Faculty Mentors: ***Prof. Vickie Heiser***

Discipline: ***Nursing***

Presentation Type: ***Poster Presentation***

Abstract:

Students from Viterbo University traveled to Zamora, Spain for a language immersion experience in May of 2024. In this group, student Kaylie Wiedmeyer along with Viterbo faculty member Vickie Heiser worked with the nursing school in Zamora to learn more about the emotional concerns of the older adult population in Zamora while also learning about the programs and interventions in place through the nursing school aiming to combat these concerns. Heiser and Wiedmeyer were able to work with the nursing students and faculty directly by sending an anonymous survey to students in the nursing program in Zamora asking in depth questions about the emotional concerns that they have observed among the older adult population in Zamora and also what they are doing or will do as future nurses to care for these emotional needs. The research conducted reflected the answers that were submitted by the nursing students and allowed for analysis of the emotional concerns along with further insight on what is being done to remedy these concerns among the older adult population.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Moral Distress: Perspectives of CNAs during the COVID-19 Pandemic

Kaitlyn Wrage

Institution: **Viterbo University**

Faculty Mentors: ***Dr. Matthew Bersagel Braley***

Discipline: ***Ethics and Healthcare***

Presentation Type: ***Oral Presentation***

Abstract:

Certified nursing assistants are the backbone of personalized healthcare in the United States. Prior to the COVID-19 pandemic, CNAs experienced moral distress from occupational challenges. This study investigates how college-aged CNAs both experienced and coped with heightened moral distress during the COVID-19 pandemic. This research aims to gain knowledge regarding what services and education should be altered or added to healthcare programs to reduce the severity of moral distress. Information was derived from coding of qualitative transcripts from qualitative interviews with CNAs. Analysis was informed by literature about moral injury and moral distress. All interview subjects experienced everyday moral challenges. Additionally, the research suggests that the lack of resources and higher rates of mortality during the pandemic had a lasting impact on CNAs in the form of moral distress. Interactions with friends and family, support from co-workers, and participation in spiritual traditions emerged as coping mechanisms for CNAs during the pandemic. The emotional/moral distress endured by CNAs was worsened by the COVID-19 pandemic. Knowledge of moral strain will allow healthcare education programs to better prepare their students for the challenges of the workplace and influence healthcare systems to improve employee resources.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

Sign/Goal Tracking in Sprague Dawley Rats

Brandon Yates

Other Presenters and/or Contributors: ***Liam Kubitschek***

Institution: **Winona State University**

Faculty Mentors: ***Dr. John Holden***

Discipline: ***Psychology***

Presentation Type: ***Poster Presentation***

Abstract:

Paroxetine is a selective serotonin reuptake inhibitor (SSRI) used in the treatment of multiple conditions such as depression, obsessive compulsive disorder, anxiety disorders, and more. Paroxetine's mechanism of action blocks the serotonin reuptake transporter to increase the concentration of synaptic serotonin, in addition to showing affinity for specific receptors (muscarinic, adrenergic alpha and beta, D2, 5-HT2, and H1) that contribute to its antidepressant effects. Paroxetine's properties merit further investigation on whether it would be effective in reducing impulsive behaviors in animal subjects. Significant results may have implications for those suffering from addiction in general by interrupting the impulsive drive to use a given substance, ideally reducing the odds of a relapse episode during the recovery process to raise the overall chance of success.

Sign-tracking is linked to impulsive behaviors, and our study utilizes operant chambers designed to measure the degree and frequency of sign-tracking behaviors. We utilize three categories of treatments: a saline control group, a low dose of 10 mg/kg of Paroxetine, and a high dose of 20 mg/kg. Additionally, we supplement our data with the data from our pilot study where the total number of subjects prevented a confident conclusion. Our study now has enough data to show statistical significance in the reduction of sign-tracking behavior when comparing the control group to both the low dose and high dose groups, suggesting that Paroxetine may have usage in aiding the addiction recovery process.



7 RIVERS

UNDERGRADUATE
RESEARCH SYMPOSIUM

The dose effect of sugar sweetened beverages on vascular function and metabolism post exercise

Jonah Zoschke

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

Faculty Mentors: ***Daniel Freidenreich***

Discipline: ***Exercise Sport Science***

Presentation Type: ***Poster Presentation (shared session with students of a similar discipline).***

Abstract:

Previous research has determined that ingestion of large doses of glucose and sucrose decrease macrovascular function and increase risk for metabolic disease due to decreases in nitric oxide (NO) bioavailability. In contrast, the effects of carbohydrate on microvascular function are mixed. A 50g dose of sucrose has shown no effect on microvascular function while 75g of glucose increased microvascular function. It is also known that acute moderate-intensity bouts of exercise improve vascular function via the shear stress release of NO and can ameliorate the negative effects of sucrose. However, the upper limit of sucrose intake at which exercise can no longer provide a protective effect is unknown. Nine young, healthy runners were recruited. Subjects completed an acute moderate-intensity bout of running at 65% of their VO₂ max for 30 minutes. Immediately after, 50g, 75g or 100g of sucrose mixed with water were provided to the subjects in a randomized order. Pre and post-supplementation microvascular tests were performed using near-infrared spectroscopy. Metabolic changes in carbohydrate and fat oxidation levels were monitored using a metabolic cart. Carbohydrate oxidation increased while fat oxidation decreased from 30 to 60 minutes after supplementation, independent of sucrose dose. Muscle oxygen reperfusion (MiRep) significantly increased immediately and 60 minutes after beverage consumption, independent of sucrose dose. These results showed no dose effect of sucrose on carbohydrate oxidation, fat oxidation, and microvascular function. The powerful protective effect that exercise has on microvascular function against sugar consumption may be important to reduce the risk of metabolic disease.

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We look forward to seeing you next year!