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| Do Altered pH Levels Affect the Shell Growth of Trachemys scripta elegans (red-eared slider turtle)? |
| *Lexi Albert*  Institution: Saint Mary's University- Minnesota |
| Faculty Mentor: *Benjamin Pauli* |
| Discipline: *Environmental Biology*  Presentation Type: *Oral Presentation* Presentation Location: *Brophy Center 123 and Zoom* |
| Abstract:  Ocean acidification is taking place due to changes in climate, land use, and the composition of terrestrial biospheres influencing the amount of absorbed CO2 into bodies of water. Changing pH levels in water, particularly marine, have significant impacts on species that require water to live. Sea turtles, in particular, are experiencing a lack in shell growth due to ocean acidification. While changes to pH are affecting marine species, few studies have investigated the impacts on freshwater species. Red-eared sliders (*Trachemys scripta elegans*) were studied to see the impacts of altered pH levels on shell growth. Carapace length, width and depth were measured to gather information about the turtle’s shell growth in environments with pH levels of 6, 7, and 8. The results suggest that shell length was impacted by altered pH levels as there was a difference in the shell growth between the pH levels of 6 and 7. Carapace width and depth were not affected by pH levels of 6 and 7. The depth is the important measurement as a thicker depth allows turtles to buffer lactic acid into the shell better by releasing larger amounts of carbonic buffers from the shell into extracellular fluid and trading that with lactic acid that settles within the shell. This study illustrates that freshwater pH levels can affect terrestrial species, which could lead to changes within ecosystems as turtles are considered predators and prey. |





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| Rural Minority Groups Access to Health Care and COVID-19 |
| *Alyssa Back, Aubree Schmitz and Michelle Chavez Escalera*  Institution: Viterbo University |
| Faculty Mentor: *Robin Haugh* |
| Discipline: *Nursing*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  This presentation discusses the impact of COVID-19 on minority groups in rural communities. In general, rural communities can face deficiencies in health care due to fewer physicians, limited services, low funding, more people with a self-care disability, and more uninsured people. Many minority groups have struggled to find healthcare that is affordable and effective within these rural communities. With the COVID-19 pandemic these deficiencies are amplified for many minority groups. Healthcare leaders and government officials need to realize and understand that the healthcare system can be defective for minorities within the Unites States. This literature review revealed the impact that COVID-19 has on access to health care for minority groups. Findings revealed five recurring themes: geographical variation can limit access to health care for minorities in rural communities, many do not have adequate insurance coverage, are at higher risk of contracting COVID-19 due to their living conditions, live below the poverty line, and have preexisting conditions that make them more susceptible to COVID-19. |





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| EXTERNAL EXPOSURE TO CHLORINE-TREATED WATER DOES NOT ENHANCE AN INFLAMMATORY RESPONSE IN AN ANIMAL MODEL |
| *Mariah Bell*  Institution: Saint Mary's University- Minnesota |
| Faculty Mentor: *Jeanne Minnerath* |
| Discipline: *Biology*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 201 and Zoom* |
| Abstract:  Chlorine (Cl) is commonly found in swimming pools to help kill bacteria, however excessive exposure to chlorine-treated water can often cause inflammation. The purpose of this study was to further examine the effects of external exposure to chlorine-treated water on an inflammatory response in mice. To do this, mice were bathed daily for thirty minutes in chlorine-treated water (treatment group) versus sodium chloride-treated water (control group) for four weeks. Inflammation was induced by injecting the left hind footpads of the mice with Complete Freund’s Adjuvant (CFA). As a control, saline was injected into the right hind footpads of the mice. At various time points post-injection, the thickness of the footpads was measured, and a change in footpad thickness was an indication of an inflammatory response. Results indicated that injection of CFA did cause significant inflammation in the footpads of mice bathed in sodium chloride-treated water and mice bathed in chlorine-treated water at all time points tested. However, there were no significant differences in the swelling of the CFA-injected footpads of mice bathed in sodium chloride-treated water versus chlorine-treated water at nine of the ten time points tested. These findings indicate that external exposure to chlorine-treated water did not enhance an inflammatory response in *Mus musculus*. |





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| Behavioral Effect of Acute Kombucha Exposure in Rats After Prolonged Alcohol Exposure |
| *Jessie Benson*  Institution: Viterbo University |
| Faculty Mentor: *Dr. Charles Lawrence* |
| Discipline: *Biology*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 201 and Zoom* |
| Abstract:  Alcohol Use Disorder (AUD) is one of the most prevalent substance use disorders. Of individuals who undergo treatment, about 60% will relapse after six months. One predictor of relapse is withdrawal-related anxiety. Recent research has demonstrated the possible role of the gut microbiome in both AUD and anxiety. The gut microbiome contains trillions of microorganisms that impact metabolism, hormone production, and potentially behavior. Excessive alcohol consumption, however, causes a dysbiosis of the gut microbiome, which can have implications on overall health and behavior. Probiotics and fermented foods have been researched for their therapeutic effects in reversing dysbiosis and reducing anxiety. The current pilot study investigates the potential anxiolytic effect of a short-term kombucha treatment on rat models with prolonged exposure to ethanol. A modified Drinking in the Dark model was used to model binge drinking and includes a four-day post-ethanol kombucha treatment. Anxiety behavior was observed before and after ethanol and kombucha exposure using an open field test. Preliminary results indicate that acute treatment with kombucha has a slight impact on the open field variables, which may indicate decreased anxiety behavior, though no definitive conclusions can be made due to a small sample size. Future directions for this research include increasing the sample size and analyzing if changes in anxiety behavior correlate with changes in the microbiome. |





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| Telemedicine Helps to Expand Medical Care in Rural Areas |
| *Brigid Berns, Maria Miller and Stephanie Stiemke*  Institution: Viterbo University |
| Faculty Mentor: *Robin Haugh* |
| Discipline: *Nursing*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  This presentation focuses on how telemedicine helps to expand access to medical care in rural areas. Telemedicine can assist in making care more affordable, specialized, value-based, and available to anyone.  Evidence shows that many people in rural areas do not have access to affordable and quality care due to where they live. They struggle to get to hospitals due to not being able to travel or not having a means to travel. Recipients of telemedicine can receive the right care, at the right place, at the right time. Telemedicine can make it easier to access specialized care for many different diseases. The utilization of telemedicine can help patients to receive value-based care by allowing them access to healthcare readily.  Telemedicine can also help to increase the affordability of healthcare while increasing the value of the healthcare being received.  Telemedicine has many benefits for everyone, but especially for people in rural or underserved communities. |





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| Prevention of Sport-Related Injuries of Collegiate Dancers: A Systematic Review and Meta-Analysis |
| *Nyah Brooks*  Institution: Viterbo University |
| Faculty Mentor: *Jim Evans* |
| Discipline: *Sport Science*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Dance is a growing and popular collegiate sport and a performing art that pushes individuals and teams to their physical limits.  A recent study found that the monthly injury proportion ranged from 23% to 43%.  Additionally, another study found that 80% of dancers had at least one injury a year which affected their ability to perform compared to a 20% injury rate for rugby or football players.  The purpose of this study was to examine the effects of physical training to prevent or reduce sport-related injuries in competitive, collegiate dancers.  A systematic review and small-scale meta-analysis were conducted.  PubMED, MEDLINE, ScienceDirect, and CINAHL were the primary database sources.  Indexed terms such as training, fitness, dance injury, and prevention were used to search the databases.  Articles were screened using the priori design.  The small-scale meta-analysis was conducted based on the amount of injuries per 1,000 hours and 1,000 dance exposure hours.  Systematic review results did not achieve the initial purpose of this study.  Dance medicine is a growing area of sports medicine with heterogeneous research studies on various topics.  Based on the meta-analysis results, 1.81 injuries occur per 1,000 hours and 1.39 injuries occur per 1,000 dance exposures.  With the physical demands that dancers endure, the possibility of injury is very high.  Unfortunately, many dancers continue to dance through injuries which inhibits the recovery and healing time.  Dancers must be proactive in maintaining their physical health; steps need to be taken to prevent injuries from occurring rather than needing to recover from the injury. |





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| Photocatalyzed [2+2] Cycloaddition of Diels-Alder Adducts |
| *Damien Burke*  Institution: Winona State University |
| Faculty Mentor: *Dr. Thomas W. Nalli* |
| Discipline: *Chemistry*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  The Diels-Alder [4+2] cycloaddition reaction was first discovered in 1928 and remains a very important synthesis in organic chemistry to this day. A Diels-Alder reaction of α-Phellandrene and p-Benzoquinone to form a tricyclic adduct (1) is currently done at Winona State University in a teaching lab. This tricyclic adduct contains a double bond that can allow for an intramolecular [2+2] photocycloaddition to form a cage compound (2). Traditionally this reaction requires intense UV radiation from a Hg Arc Lamp. The goal of this research was to use a photocatalyst and visible light to perform the intramolecular [2+2] cycloaddition of the Diels-Alder adduct so as to allow it to be applied to a teaching lab. With this, students can obtain experimental evidence to prove the Diels-Alder reaction form the endo diastereomer. Reactions were carried out in a NMR tube with (1), 4,4’-dichlorodibenzalacetone as the photocatalyst in dichloromethane. The 1H NMR spectrum showed 100% conversion with visible light exposure from 60W LED lights within one hour. The product was purified by rotary evaporation and trituration with toluene. It was then characterized via 1H, 13C, COSY, and HMQC NMR as well as IR and melting point. |





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| EXTERNAL EXPOSURE TO CHLORINE-TREATED WATER DOES NOT INCREASE PRODUCTION OF THE PRO-INFLAMMATORY CYTOKINE TUMOR NECROSIS FACTOR ALPHA (TNF-ɑ) IN MUS MUSCULUS |
| *Erica Camarato*  Institution: Saint Mary's University- Minnesota |
| Faculty Mentor: *Dr. Jeanne Minnerath* |
| Discipline: *Biology*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 201 and Zoom* |
| Abstract:  Chlorine is a common chemical used in swimming pools to kill pathogens including bacteria. Previous research has shown that human exposure to chlorine can cause an increased inflammatory response as measured by an increase in pro-inflammatory cytokine production. The purpose of this study was to determine whether external exposure to chlorinated water comparable to that found in a swimming pool would affect production of the pro-inflammatory cytokine, tumor necrosis factor-alpha (TNF-ɑ), in mice. To do this, mice were bathed daily for 30 minutes in saline-treated water baths (control) or chlorine-treated water baths for two weeks. Splenocytes were then isolated from the mice and were stimulated with lipopolysaccharide (LPS) to induce production of TNF-ɑ. TNF-ɑ levels were then measured using an immunosorbent assay. It was found that LPS-stimulated splenocytes from mice exposed to chlorine-treated water baths produced more TNF-ɑ than LPS-stimulated splenocytes from control mice, however this increase in TNF-a production was not statically significant (p=0.191). Therefore, it can be concluded that external exposure to chlorine-treated water does not increase production of the pro-inflammatory cytokine TNF-ɑ in a mouse model. |





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| Impact of an Enriched Environment on Dendritic Length and Spine Density of Neurons in the Rat Hippocampus |
| *Rileigh Campbell*  Institution: Viterbo University |
| Faculty Mentor: *Dr. Lawrence* |
| Discipline: *Neuroscience*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Chronic stress increases the likelihood of mental disorders such as anxiety and depression as well as producing negative physiological changes in the brain. Enrichment and enriched environments have been shown to reduce the negative effects of chronic stress. Further, enriched environments increase resiliency through attenuation of the negative physiological actions of chronic stress. Animals raised in standard housing environments lack many opportunities for sensory stimulation and do not develop the same resiliency to chronic stress as seen in an enriched environment. Stress resiliency is defined as achieving a positive outcome in the face of adversity. For this research, I conducted a meta-analysis that examined the impact of an enriched environment in the brain, specifically dendritic length and spine density of neurons in the hippocampus. The purpose of this study was to confirm consistency across various research articles before continuing with this area of research. Data was obtained from many peer reviewed research articles that examine these physiological structures. The results confirmed that an enriched environment can increase dendritic length and spine density of neurons in the rat hippocampus. |





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| Examining the forgotten music of Vítězslava Kaprálová |
| *Megan Cichon*  Institution: University of Wisconsin - Stevens Point |
| Faculty Mentor: *Susan Bender* |
| Discipline: *Music*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Born in 1915, Czech composer and conductor Vítězslava Kaprálová lived a tragically short life, dying at the age of twenty-five years old. After her death in 1940, her work was largely forgotten in the music community. In recent decades, there has been revived interest in her, thus bringing to light a substantial collection of original compositions for a variety of genres. As a guide to Kaprálová’s body of work, this comprehensive index includes each work’s title, the year it was composed, the instrumentation, the author of the text of vocal works, as well as details of the work’s first performance. Featured alongside this index is biographical information about the composer, which includes additional information regarding some of her most important compositions and achievements. Since her re-discovery, her legacy has expanded beyond music. Inspired by Kaprálová’s achievements and vast body of unknown works, The Kaprálová Society was founded in 1998 by Karla Hartl with the goal to build awareness of women’s contributions to musical life. This presentation takes only a brief glimpse at the composer who has inspired over two decades of research on women in music. |





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| Effects of the Anti-Malarial Drug Mefloquine on Locomotion in Rodents |
| *Audrey Diesslin*  Institution: Winona State University |
| Faculty Mentor: *John Holden* |
| Discipline: *Psychology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Mefloquine is an anti-malarial drug commonly used for both treatment and prevention of the disease. It has been historically favored due to its long half-life only requiring weekly doses for prophylaxis. Mefloquine has been associated with several psychiatric side effects including depression, worsening of PTSD, anxiety, mania, hallucinations, and the emergence of psychosis. Past research on mefloquine has produced contrasting results. Some research suggest mefloquine produces a manic effect while other research denotes a depressive effect. This study looked at the effect of mefloquine on locomotion over a 26-hour period in order to provide further insight to the contrasting effects this drug can have on behavior. We hypothesized that early administration would result in reduced locomotion, while increased locomotion would become present later on. A locomotion tracking device was made using an infrared motion sensor and an Arduino sending the information to a laptop. After habituation to the recording system and injection process, the trial began by giving all subjects an intraperitoneal injection of either corn oil alone or mefloquine dissolved into corn oil. Subjects locomotion was recorded over the next 26 hours. Separate ANOVA tests during the light and dark hours found a group by time interaction in both cases. This led to several T-tests showing statistically significant results for hours 0-6, 12-14 and 24-26. These results demonstrated decreased locomotion during the beginning of the trial and increased locomotion later on in the timeline. This supported our hypothesis that that early administration would result in reduced locomotion, while increased locomotion would become present later on. This study supports the proposition that the use of mefloquine can have severely negative effects of both depressive and manic behavior. |





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| Ab initio simulations of hydrogen in palladium and copper |
| *Evan Espelien*  Institution: Viterbo University |
| Faculty Mentor: *Emily Schiavone* |
| Discipline: *Engineering*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Palladium is a common metal used to separate hydrogen from other gases in a gas mixture. Once the concentration of hydrogen in palladium reaches a certain level, the metal begins to warp and crack, shifting from its alpha-phase structure into its beta-phase structure. Lattice parameters define the length of side in a unit cell of a material. A common material used in alloys with palladium is copper. One of the main benefits to creating a copper-palladium alloy is that using copper would make fabricating the alloy cheaper. We use Quantum Espresso to calculate a lattice parameter for palladium of 3.96 angstroms and a lattice parameter of 4.17 angstroms for PdH. We found the lattice parameter of copper to be 3.63 angstroms. In the future, we will create PdCu alloy cells to simulate the formation of hydrides and study their properties. |





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| Predicting the Effects of Climate Change on Bat Activity in The Driftless Area |
| *Klaus Friedli*  Institution: Saint Mary's University- Minnesota |
| Faculty Mentor: *Benjamin Pauli* |
| Discipline: *Environmental Biology*  Presentation Type: *Oral Presentation* Presentation Location: *Brophy Center 123 and Zoom* |
| Abstract:  As climate change increases as a threat to wildlife, many species are already showing responses to the climatic variability of increased droughts, thermal stress, and more severe climatic events. Wildlife responses to climate change include shifts in migratory ranges, changes or decreases in habitats, and changes in hibernation cycles. Bats are known to be vulnerable to a changing climate because of their hibernation and torpor states. However, how bats will be impacted by climate change within the unique geological area in North America’s midwest, the Driftless Area, remains unknown. Our objectives were to determine if climate predicted activity of bat species in the Driftless Area and predict how patterns of bat activity may change with changing climate. Locations of bats in the Driftless Area were obtained by recording echolocation calls during June, 2018. We then used a habitat suitability modeling platform, MaxEnt, to model the climatic habitats of bats for June 2018. We used air temperature, temperature, specific humidity, precipitation, and specific humidity as potential predictors of bat activity. Climate variables were able to reasonably predict activity of 3 of the 6 species studied. Our models suggest that temperature, wind speed, and precipitation were particularly important in predicting bat activity for those species. Notably, wind speed was a significant predictor for all 3 of the species with predictive models and precipitation was for 2. Predictions of how climate change will affect bat habitat in this area was species-specific. This study helps create a baseline for further research on bats within the Driftless and how they will be impacted by climate change. |





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| Stressed Out and Under Pressure: Decision-making in the Healthcare Field |
| *Bailee Golisch*  Institution: University of Wisconsin, La Crosse |
| Faculty Mentor: *Dr. Ellen Rozek* |
| Discipline: *Psychology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Healthcare environments are universally acknowledged to be stressful, with the constant need for professional decisions to occur within time constrained, pressure-inducing environments. The purpose of this study is to investigate the influence of pressure on intuitive decision-making in health-related scenarios. All participants completed a demographic questionnaire and a State Trait Anxiety Inventory. Half the participants were then presented with four healthcare scenarios under pressure in a randomized order; the other half completed the same scenarios without pressure. There were 40 participants (85% female) between the ages of 18-49 (M = 20.1, SD =5.0) and primarily Caucasian (65.31%). There were no significant differences in demographics or anxiety between the conditions (p = .071). The decisions and response time were recorded for each scenario. The included frequency tables illustrate the patterns of responses for the pressured and non-pressure conditions. On average, the pressured condition had longer response times (M = 2.03, SD = 1.31) than the non-pressure condition (M = 2.52, SD = 1.23). Based on these data, the pressure condition did have an influence the outcomes of the decision-making task. |





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| Songs You Know By Heart: How Meaningful Musical Memories Challenge Everything We Know About Neurodegenerative Disorders |
| *Connor Hagarty*  Institution: Viterbo University |
| Faculty Mentor: *Dr. Diana Cataldi* |
| Discipline: *Neuroscience and Music*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  How can someone have such advanced dementia that they cannot speak cohesively, yet can sing every single word of all their favorite songs? Musical engagement has been an ideal alternative form of therapy for a long time, yet we are just now understanding the neuroscience behind it all. This research will highlight different types memory and if or how they are affected by degenerative neurocognitive disorders, detail brain structures spared by plaque deposition in response to musical stimulation, and cover the clinical significance of music therapy. Attendees will ideally be able to recognize the importance music therapy has on cognitive functioning throughout the lifespan, and be able to articulate simple ways to integrate music therapy into daily cares. |





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| How Mixed Media Portrays Powerful Women: Queen Elizabeth I​ |
| *MacKenzie Hanson*  Institution: Viterbo University |
| Faculty Mentor: *Susan Cosby Ronnenberg* |
| Discipline: *English*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  My research is focused on the depiction of powerful women in various forms of media,  focusing specifically on Elizabeth I. I have concentrated my research on major motion pictures, television, historical fiction novels, and portraits created during or directly after Elizabeth’s life. Throughout my research I have noted that although these depictions fluctuate in tone and intent, all of the iterations that I have concentrated my research on depict her as “strong,” “weak,” or “transcendent.” When the queen is “strong,” she is depicted as being a strategic queen both in politics and rhetoric, but is also shown as having a domineering personality. “Weak” characteristics are shown through Elizabeth’s “feminine” traits, such as her love towards others. When Elizabeth behaves as transcendent she is neither masculine or feminine, but monarchical as her knowledge and power comes from a higher force and any gendered behaviors she exhibits are due to her transcendence. In my research I analyze how these iterations of Elizabeth I reflect numerous societal beliefs about women in positions of power and how differing characterizations of Elizabeth depict a larger illustration of the female experience. |





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| AN EXPLORATION INTO THE SIX STINGRAY POPULATIONS OF 15 SITES IN CLEARWATER, FLORIDA |
| *Alyssa Haram*  Institution: Saint Mary's University- Minnesota |
| Faculty Mentor: *Dr. Debra Martin* |
| Discipline: *Environmental Biology*  Presentation Type: *Oral Presentation* Presentation Location: *Brophy Center 123 and Zoom* |
| Abstract:  Stingrays are of the class Chondrichthyans and are vulnerable to the commercial fishing practices in the Atlantic and Pacific Oceans. Because of this, research is needed to understand and predict the distribution of these species. In this study environmental predictors were compared to see if there was any significance in a small habitat range at 15 sites in Clearwater, Florida. Data was collected by the Costal Marine Education Research Academy looking at six ray species caught from the years 2016-2020. Catch data was compared in ArcGIS Pro and IBM SPSS to find significance between the six species catch location, depth, water surface temperature, and sex of each species. |





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| Personality Factors in Selecting Psychology as a College Major |
| *Molly Hedrich*  Institution: Winona State University |
| Faculty Mentor: *Dr. Trisha Karr* |
| Discipline: *Psychology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  The number of people choosing to select psychology as a major in college is growing substantially year after year. Psychology is often thought of as a helping career. As a result of this, the individuals pursuing a degree in psychology are largely more female dominant. The purpose of this study was to investigate an all-encompassing analysis about what kind of people (the women and the small percentage of men) choose psychology as a college major. This study was exploratory by nature. The Big-Five Inventory (BFI-2) was utilized to assess the personality traits of a sample of psychology majors and non-psychology majors from a small, midwestern university. Participants completed an online survey that included the BFI-2 and a multitude of other variables that were being measured. An independent samples t-test was then used to examine group differences on personality traits among majors and non-majors. It was found that differences in personality traits were relative to college major. The findings indicated that there were a majority of female psychology majors over male psychology majors. The psychology majors reported higher scores for the trait of openness than non-psychology majors, *t* (279) = 3.33, *p <* .05. They also scored higher on the depression scale (*M* = 12.51, *SD* = 3.39) compared to their counterparts (*M* = 10.79, *SD* = 3.73). The primary bulk of the sample of psychology majors were upperclassmen in college. Given that psychology is a growing field, specific personality traits appear to cater to those in this career path. Future applications should aim to expand on the current results by including a larger sample of college students (both psychology majors and non-majors). |





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| A Comparative Analysis of the Antibacterial Efficacy of Silver Containing Personal Care Products |
| *Elizabeth Henriksen*  Institution: Viterbo University |
| Faculty Mentor: *Catherine Wright* |
| Discipline: *Microbiology*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 201 and Zoom* |
| Abstract:  With the United States Food and Drug Administration banning 19 antibacterial agents commonly found in person care products in April 2020, there is a need for a new way to effectively eliminate unwanted bacteria from our skin’s surface. Silver has been used since ancient times to minimize bacterial growth due to its intrinsic antibacterial properties; however, it has not been studied specifically within personal care products. In this study, the antibacterial efficacy of silver in personal care products was compared to that of products without silver through a Kirby-Bauer Disk Diffusion Test. Additionally, the number of bacteria (*Staphylococcus epidermidis*) remaining on the microfiber cloth 24 hours after exposure was also observed. Silver-containing products were the only treatment to produce a zone of inhibition during the disk diffusion test and left the least amount of *S. epidermidis* remaining on the microfiber cloth. |





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| Effect of Triadimefon on Goal-Tracking and Sign-Tracking Behaviors in Mice |
| *Wesley Holm, (Audrey Diesslin, Ze Tsuen Ng, Paige Johnson- not presenting)*  Institution: Winona State University |
| Faculty Mentor: *John Holden* |
| Discipline: *Psychology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Triadimefon (TDF) is a fungicide that functions as an indirect dopamine agonist, a function also present in drugs like cocaine and amphetamine. Past studies have noted the particular neurotoxicity of TDF in animals. We hypothesized that mice would produce more unconditioned stimulus-targeting behaviors (goal-tracking), and conditioned stimulus-targeting behaviors (sign-tracking), if under the influence of TDF than if in a placebo group. Subjects were labeled by cage number and color marked on tail. They spent one day in habitualization, one day in magazine training to learn the hopper, and five days of conditioning. Behaviors were recorded by mugging of the lever (sign-tracking), and sticking their head in the hopper (goal-tracking). We found that TDF significantly reduced trials with sign-tracking behavior and latency in goal-tracking behavior. We also found that TDF significantly increased trials with goal-tracking behavior as well as number of goal-tracking behavior events as a whole. This supports our hypothesis that TDF would generally produce more goal-tracking behavior and less sign-tracking behavior. This informs us about the potential that TDF has in classical conditioning and how our behaviors change and associate. Further research is needed to find the exact implications of TDF usage in both animals and people. |





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| Two Words, One Job: The Modern Impresario |
| *Nathan Janzen*  Institution: Viterbo University |
| Faculty Mentor: *Mary Ellen Haupert and Daniel Johnson-Wilmot* |
| Discipline: *Music*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 134 and Zoom* |
| Abstract:  An “impresario”, or opera manager, has had one of the most multifaceted job descriptions in music history. It has born differing duties, characteristics, and even names across musical ages, reaching all corners of the g`lobe as a position essential to one of the greatest art forms, opera. One of the first to bear the torch was Claudio Monteverdi, a servant of the Gonzaga family in 1607. He paved the way for composers such as Rossini and business leaders like Effie Ober, beginning an evolving tradition which culminated in the modern industry featuring titans such as Rudolf Bing, who now manage millions in assets and oversee hundreds of shows every season. The role of the impresario has defined the history of opera itself, growing and changing with the demands of location, culture, and musical era to give the world the art form it knows and loves today.  *Two Words, One Job: The Modern Impresario* is a journey to discover what it means to be “modern”, to be a curator of art, and to lead. It follows past and present lives to uncover how an occupation can grow with the art form it preserves. It combines the perspectives of business, musicology, and artistic performance, featuring interviews with contemporary opera leaders and windows into the lives of past professionals, to answer one overarching question:  “What does it mean to be a ‘modern impresario’?” |





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| The role of vitamin D in graft versus host disease |
| *Hannah Krause*  Institution: Viterbo University |
| Faculty Mentor: *Chris Mayne* |
| Discipline: *Biology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Hematopoietic stem cell transplant (HSCT) is often used to treat hematologic cancers or autoimmune diseases that may be genetic or otherwise resistant to treatment. However, a major obstacle of HSCT is graft versus host disease (GVHD), which occurs when donor derived immune cells attack genetic differences in the host’s major and minor histocompatibility antigens. Coupled with co-stimulation from cell damage due to radiation, chemotherapy, or infection, antigen presentation of HLA mismatches occurs, resulting in activation of T cells. In acute GVHD, this mostly results in tissue damage from cytotoxic T cells and NK cells. In chronic GVHD, profibrotic cytokines are produced by macrophages, Th2 and Th17 populations leading to fibrosis and scarring. Vitamin D is a hormone most commonly known for its effects on calcium homeostasis but has also shown immunomodulatory effects in several contexts. Specifically, vitamin D may promote a tolerance of the donor-derived immune system to its new environment by suppressing APC and T cell activation, inhibiting production of proinflammatory cytokines and alloreactive antibodies, and promoting expansion of regulatory T cells. This suggests that vitamin D supplementation post-HSCT may aid in the prevention and treatment of GVHD. |





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| Predicting Vigorous Physical Activity: The Self-as-Doer Identity and Self-Determination Theory |
| *Taylor Kruse, Megan Reis, Thomas Carlson, and Jenna Dale*  Institution: Winona State University |
| Faculty Mentor: *Dr. Amanda Brouwer* |
| Discipline: *Psychology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Being physically active has many physical and mental health benefits, yet only 53.3% of adults are meeting the recommended guidelines for physical activity (CDC, 2018). Psychosocial interventions focused on motivation have had some success in promoting physical activity (PA). Research on the self-determination theory (SDT) finds that being internally motivated (vs. externally) predicts PA. A newer construct, the self-as-doer identity, has also been found to predict PA. The self-as-doer identity is the idea that a person will engage in behaviors that they identify in, even and especially when they are the more difficult option. Research has not, however, explored whether the self-as-doer identity can predict PA, especially vigorous PA, above and beyond the SDT. Methods: Participants were 60 (10 men and 48 women) college students who completed a survey with questions related to demographics, self-determinism, self-as-doer identity, and exercise behaviors. A hierarchical linear regression model was conducted to determine if self-as-doer identity predicted vigorous PA above and beyond self-determination variables. Results: SDT and self-as-doer identity accounted for 60.5% of the variance in PA behaviors, R2 = .605, F(1,49)=7.01, p=.01.The self-as-doer identity predicted an additional 5.6% (ΔR2=.056, F(1,49)=7.01, p=.01) of the variance in vigorous PA above and beyond all other SDT variables. Discussion: The self-as-doer identity adds to our knowledge about what predicts PA, especially vigorous PA. Calling oneself a doer of physical activity has potential to motivate one to engage in vigorous PA and might be especially helpful for those who are lacking motivation to be physically active. The self-as-doer identity could be generalized to other health behaviors, but more research is needed. Additional causal research is needed to determine whether the self-as-doer identity could be utilized in clinical work as a specialized program to promote a healthier lifestyle. |





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| Analysis of the Environmental Impact of Synthetic Methods Towards Curcumin and Curcuminoids |
| *Nico Lang*  Institution: University of Wisconsin-La Crosse |
| Faculty Mentor: *Dr. Valeria Stepanova* |
| Discipline: *Chemistry*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Curcumin is a naturally occurring compound that has gained a great deal of attention in recent years for its biological effects. Curcumin and curcuminoids have shown potent biological effects, including anti-inflammatory, antimicrobial, and more. However, the extraction of curcumin from natural sources produces a mixture of compounds with varying amounts of curcumin, requiring extensive purification. Due to the medicinal importance of curcumin and curcuminoids, several synthetic methods have been developed. Such synthetic methods can be categorized based on the energy source and reaction conditions used. Energy sources used include conventional heating and microwave heating, where reaction conditions include solvent-based and solvent-free. We have previously reported synthetic methodologies for curcumin and curcuminoid synthesis involving conventional and microwave heating under solvent-free conditions. To determine if our synthetic methods provide an improvement to other methods of curcumin and curcuminoid synthesis, a comparable study was performed assessing the environmental impacts of our reported synthesis with commonly used synthetic methods. Herein I present my findings and demonstrate the improvements that our synthetic methodology provides. |





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| Ab Initio Simulations of Hydrogen in Palladium and Vanadium |
| *Andrew Lepage*  Institution: Viterbo University |
| Faculty Mentor: *Emily J Schiavone* |
| Discipline: *Engineering*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Pure palladium has limits to the concentration of hydrogen it can reach before expanding or warping. The warping is due to changes in the lattice parameter, or changes in the length of a side in the cubic unit cell of a material, as the material transforms into a new phase. Previous studies show that adding vanadium to palladium decreases the lattice parameter. We use Quantum Espresso to calculate a lattice parameter for palladium of 3.942 angstroms. We calculate the PdH lattice parameter is 5.97% larger than bulk palladium. We find the lattice parameter for vanadium is 2.998 angstroms. Vanadium has a different crystal structure than palladium. In the future, we will determine how changing the percentage of vanadium in palladium affects the formation of hydrides and identify the ground state interstitial site for H in PdV. |





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| Does age predict outcome after multiligament knee reconstruction for the dislocated knee? 2- to 22-year follow-up |
| *Nate Levy (Aaron Krych, Mario Hevesi, Patrick Reardon, Ayoosh Pareek, Michael Stuart, Bruce Levy- not presenting)*  Institution: Saint Mary's University- Minnesota |
| Faculty Mentor: *Dr. Debra Martin* |
| Discipline: *Biology*  Presentation Type: *Oral Presentation* Presentation Location: *Zoom and BRC 123* |
| Abstract:  The purpose of this study is to determine whether age is a predictor of outcome in patients who sustain a knee dislocation (KD) and are treated with multi-ligament knee reconstruction. It was hypothesized that increasing age will negatively affect patient reported outcome scores (PROS). 125 multi-ligament knee injuries (MLKI) associated with KD were surgically reconstructed between 1992 and 2013 and evaluated with two validated knee ligament rating systems, the IKDC and Lysholm scores, at a median follow-up of 5 (range 2–22) years. Patient demographics including age were then analyzed with respect to IKDC and Lysholm scores using rank sums and pair-wise rank sums analysis for continuous variables and Chi-square analysis for categorical variables. 125 patients (96 males and 29 females) with a mean age of 31 (range 11–62) years at the time of surgery were included. At final follow-up, patients ≤30 years old compared to >30 years old obtained higher patient reported outcomes as measured by the IKDC (73.3 vs. 61.9; *p* = 0.01) and Lysholm scores (76.9 vs. 68.5; *p* = 0.04). No confounding variables including gender, injury mechanism, injury pattern, injuries to the peroneal nerve, popliteal artery, meniscus, or cartilage accounted for differences in outcome scores between the two groups. Based on current available literature, this study represents the largest cohort with the longest follow-up reported on MLKI to date. In conclusion, patients >30 years of age that undergo multi-ligament knee reconstruction for KD have inferior patient reported outcome scores compared to those ≤30 years of age. However, successful multi-ligament knee reconstruction can still be obtained in this age group. |





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| The Moral Philosophy of Iris Murdoch and Restorative Justice |
| *Bridget Matott*  Institution: Viterbo University |
| Faculty Mentor: *Matthew Bersagel-Braley* |
| Discipline: *Philosophy*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 134 and Zoom* |
| Abstract:  The aim of my research is to answer the question ‘what does Iris Murdoch’s moral philosophy look like in practice?’ My analysis follows a two-step progression. First, I articulate the moral philosophy of Iris Murdoch and draw attention to her key ideas of ‘attention,’ and ‘imagination,’ as well as her views on the purpose of moral philosophy and how art and beauty pertain to ethics. My analysis of Murdoch draws chiefly from a collection of her essays titled *The Sovereignty of the Good*. Secondly, I provide a brief overview of restorative justice practices to show how Murdoch’s moral philosophy can be applied practically. I focus on how Murdoch’s ideas are latent in the practices and values of restorative justice and offer concluding remarks that expand both restorative justice and Murdoch’s moral philosophy to everyday life. The writings of Howard Zehr, who spearheaded the restorative justice movement in the United States, and Amy Levad’s *Restorative* *Justice: Theories and Practices of Moral Imagination* have been key to my understanding and articulation of restorative justice. My analysis should answer my initial question by showing that Murdoch’s moral philosophy has immediate practical application in a) tacitly underpinning restorative justice practices, and that b) through and with restorative justice Murdoch’s moral philosophy has broader implications as a ‘way of life.’ |





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| The Anatomy and Physiology of Homosexuality in Christianity |
| *Megan Messa*  Institution: Viterbo University |
| Faculty Mentor: *Emily Dykman* |
| Discipline: *Religious Studies*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 134 and Zoom* |
| Abstract:  This presentation will discuss the complex nature of homosexuality in Christianity through a dialectical approach, that is a discussion employed to investigate people’s ideas, theories, or opinions. The focuses for this broad topic will be the true nature of decisioning-making in Christianity and in churches, and the effects of these decisions, specifically around the topic of homosexuality. The researcher and presenter will challenge the audience to look deeper into the system of homosexuality in Christianity in a similar way to that of a nurse assessing the anatomy of a body system, while continuing to recognize the effects, that is the physiology, of said system in our world and lives today. |





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| Consumption of Tea Containing Probiotics Does Not Impact Production of the Anti-Inflammatory Cytokine Interluekin-10 in Mus Musculus |
| *Lauren Meyers*  Institution: Saint Mary's University- Minnesota |
| Faculty Mentor: *Dr. Jeanne Minnerath* |
| Discipline: *Biology*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 201 and Zoom* |
| Abstract:  Inflammation occurs when an unwanted foreign bacterium enters the body, triggering a white blood cell response causing redness, heat, swelling, and pain. The human body contains a variety of pro-inflammatory and anti-inflammatory cytokines that are produced during inflammation. The anti-inflammatory cytokines, such as Interleukin-10 (IL-10), are produced to limit the production of pro-inflammatory cytokines. Probiotics are cultures of living microorganisms that exhibit multiple health benefits to the immune system involving cytokine production. Probiotics have been proven to reduce inflammation by enhancing the production of IL-10, particularly the lactic acid bacteria (LAB) probiotics strains. The objective of this study is to further explain the effects of LAB probiotic strain *Bacillus coagulans* GBI-30, which is found in some teas, on inflammation by studying the production of the anti-inflammatory cytokine IL-10 in LPS stimulated murine splenocytes. Mice were treated using oral gavage of either regular or probiotic tea daily for two weeks. Splenocytes were harvested and incubated with or without lipopolysaccharides (LPS) to induce the production of IL-10, which was measured using a cytokine IL-10 immunoassay. The results showed that LPS significantly increased IL-10 production in splenocytes (regular: p= 0.045; probiotic: p= 0.047). LPS-stimulated splenocytes from mice treated with probiotics and regular tea showed comparable results with no significant difference (p= 0.977). Consumption of probiotic tea did not increase IL-10 probiotics as hypothesized. |





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| Anti-van der Waerden Number of Graph Products |
| *Joe Miller*  Institution: University of Wisconsin-La Crosse |
| Faculty Mentor: *Nathan Warnberg* |
| Discipline: *Mathematics*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  A graph is a collection of points which are connected by lines. For example, the Facebook graph is a graph such that every person is a point and two points are connected by a line if the two people are friends. In our research, we color each point in a graph and then look for certain rainbow structures. By rainbow, we mean every point in the structure is colored differently. An example of a rainbow structure in the Facebook graph would be if three people were all friends with each other and their corresponding points were different colors. This would create a rainbow "triangle" in the Facebook graph.  Specifically, we are looking at a certain class of graphs, which we call graph products. This research is an extension of a past undergraduate research project that says all graph products have a rainbow structure when 4 colors are used. We want to determine which graph products have a rainbow structure when using exactly 3 colors and which have a rainbow structure when using exactly 4 colors. |





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| Creating an Anti-Racist Education: How Books Foster Identity and Empathy in Readers |
| *Miranda Myszka*  Institution: Viterbo University |
| Faculty Mentor: *Dr. Jackie Herbers* |
| Discipline: *Education and Psychology*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 134 and Zoom* |
| Abstract:  After numerous racist crimes and abuses against African Americans in recent years, many educators are looking to implement an anti-racist curriculum in their schools. To create an anti-racist curriculum, diverse stories are an effective tool to validate the reader’s identity and foster empathy. This comes after the Cooperative Children’s Book Center (CCBC)’s annual report revealing that white authors (and white characters) continue to be published more than diverse authors. Using Dr. Rudine’s “mirrors and windows” metaphor, this presentation will stress how children must see their identities represented in the books they read and how children must read about people different than themselves. When children read about different perspectives, neuroscience shows that reading creates empathy. Overall, this presentation aims to show how literature validates the reader’s identity and fosters empathy by humanizing diverse populations—a goal of an antiracist curriculum. This research was conducted through Viterbo University’s Summer Research Fellowship during the Summer of 2020. |





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| Atomoxetine Reduces Sign- and Goal tracking |
| *Ze Tsuen (Zach) Ng*  Institution: Winona State University |
| Faculty Mentor: *Dr. John Holden* |
| Discipline: *Psychology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Sign-tracking as a classically conditioned behavior is of interest due its relationship to impulsivity and addiction. Atomoxetine is shown to increase extracellular levels of norepinephrine in the frontal cortex of the brain, the area of the brain that plays a role in inhibiting behavior. A dose of 3mg/kg of atomoxetine or saline solution was administered to Sprague-Dawley rats (order of administration was counter-balanced), and atomoxetine was found to reduce sign- and goal-tracking behavior. The reduction in both behaviors suggest that atomoxetine may have lowered not only incentive salience but perhaps the overall value of the reinforcer. |





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| Age, Marital Status, and Forgiveness, Meaning, and Trauma in Armenia |
| *Aaron Nguyen*  Institution: Luther College |
| Faculty Mentor: *Loren Toussaint* |
| Discipline: *Psychology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  This study investigates the main effects and interactions of age and marriage to the various levels of forgiveness and meaningfulness in life in an Armenian population. This study was part of the Meaningful World Project, consisting of 354 Armenians, 97.5% of which had university-level of education. Measures used were the Harvard Trauma Questionnaire, the Meaning in Life Questionnaire and the Forgiveness Subscale of the Multidimensional Measure of Religiousness/Spirituality. It was hypothesized that both aging and marriage would induce positive main effects and interactions on all variables measured. Statistical analysis demonstrated that an interaction between old age and marriage was related to higher levels of forgiveness in all criteria, a lower level of perceived trauma and a higher level of meaningfulness in life. This research emphasizes the main effects and interactions of aging and marriage had on various levels of forgiveness, meaningfulness in life and perception of trauma; nevertheless, more research is still needed to generalize the findings. |





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| Perceived level of health and associated factors in an epidemic |
| *Sharayu Phanse*  Institution: Luther College |
| Faculty Mentor: *Loren Toussaint* |
| Discipline: *Psychology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  This research examines the database collected by the WorldValue Survey in China before and after SARS virus which was declared an epidemic by WHO in 2003. The scale of the virus strain was similar to the COVID-19 pandemic, also known as the Coronavirus. The purpose of this research is to investigate the factors that might be affected due to epidemics contributing to individual perceived level of health. The study hypothesized that all of the factorcs, specifically perceived level of happiness, perceived level of life satisfaction and perceived level of freedom would demonstrate decreases after the epidemic, which would affect the individual level of health. The dataset used included World Value Survey wave 4 (China 2001) and World Value Survey wave 5 (China 2007). The dataset included 1000 participants from WVS 2001 and 1991 participants from WVS 2007. Research results elaborate the extent to which the epidemic caused people to feel more ill and its effects still lingered after it had ended. |





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| A Review of the Literature on the Effects of Cannabidiol on Sleep |
| *Rylea Ranum*  Institution: Luther College |
| Faculty Mentor: *Dr. Loren Toussaint and Dr. Ann Vincent* |
| Discipline: *Psychology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Cannabidiol (CBD) is a chemical derived from hemp plants and it is one of two prevalent cannabinoids in therapeutic use today, the other being Δ9-tetrahydrocannabinol (THC).  CBD differs from THC in its lack of psychoactive effects, making it less controversial for therapeutic use than THC. While there is an ample amount of research surrounding the effects of CBD in pain management, the effects of CBD on sleep disorders are less well understood.  The aim of this review is to collect and summarize existing research on the possible therapeutic effects of CBD on sleep.  Pubmed, PsycInfo, Science Direct, CINAHL, Embase, EBSCO, and MegaFILE were the databases used to collect relevant articles for this review.  Eligible articles included all articles which assessed the effects of CBD as either a primary or secondary objective.  Eligible types of CBD included pure forms of CBD as well as drugs which consisted of CBD in combination with other substances, such as THC in the case of the drug Sativex.  Most reviewed articles cited the effects of CBD on sleep as a secondary objective.  The results of a majority of reviewed articles (including case studies, clinical trials, and surveys) suggest CBD may have positive therapeutic effects on sleep quality, though more research on the topic is needed using objective measurements to assess effects on sleep quality. |





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| Mental Health and College Students: Does Mental Health Impact Academic Performance? |
| *Megan Reis (Molly Hedrich and Emy Newman- not presenting)*  Institution: Winona State University |
| Faculty Mentor: *Dr. Trisha Karr* |
| Discipline: *Psychology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Change can bring upon many different feelings ranging anywhere from extreme excitement to utter fear. College is a generally an intense change for the typical college student. This change often can trigger different stressors and challenges which can lead to poor mental health. The primary aim of this study was to assess the relationship between current university enrolled students’ mental health alongside their grade point average and absenteeism. It was hypothesized that students with symptoms of anxiety and depression would also report a lower grade point average, in addition to unexcused absences. A sample of (N=296) female and male students from a Midwestern university, completed an online survey exploring the following variables: anxiety, depression, G.P.A., and absenteeism. Independent samples t-tests were used to look at group differences by unexcused absences reporting symptoms of anxiety and/or depression and grade point average. Findings indicated that students who skipped class for an unexcused reason, reported a lower grade point average and scored higher on both anxiety and depression scales. Moving forward, proper assessment of mental health with an adequate treatment plan tailored to the specific student struggling with anxiety and/or depression may decrease the rate of absenteeism along with improving their grade point average. |





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| Happiness Marketing: An Exploration of How Happiness in Advertisement Influences Student Enrollment Intent |
| *Maya Roberts*  Institution: Viterbo University |
| Faculty Mentor: *Tiffany Smith* |
| Discipline: *Marketing*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  According to The U.S. Department of Education, National Center for Education Statistics (2019) the number of enrolled college students fell every fall from 2010 to 2016, dropping from 20.6 to 19 million. Each student becomes more and more important as college enrollments decline, causing marketers to seek to differentiate their institutions by re-examining campaigns, target markets, and advertising strategies. The college decision making process, like many decisions, is often influenced by emotion. This pilot survey was used to test the proposed research design and instrument validity in a smaller sample to determine feasibility for a larger future project. The future project will explore ways in which the specific nature of happiness messaging in college advertisements influences enrollment intent consistent with theoretical expected self-conceptions of happiness. Many successful companies, such as Disney and Coke, have used happiness in marketing campaigns to capture customer attention. To better understand how happiness can be used in higher education marketing, an extensive literature review was conducted that determined three commonly accepted levels of happiness. These three levels included hedonic, emotional state theory, and eudemonia. Using these definitions, along with a curated database of happiness related advertisements and taglines, phrases were grouped based on their association to one of the three definitions. Lastly, the phrases were paired with corresponding imagery to create an advertisement for each definition. |





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| Effects of a Plant Based Diet on Metabolic Markers in Overweight Individuals |
| *Pauline Schlais*  Institution: University of Wisconsin - La Crosse |
| Faculty Mentor: *Dr. Karen Skemp* |
| Discipline: *Nutrition*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  With two thirds of adults in the US either overweight or obese, feasible means of weight loss and improving general health is essential for the populace. Research shows that excess adipose tissue has been correlated with a myriad of metabolic diseases, such as insulin resistance and chronic inflammation. These diseases may result in damaging and irreversible effects within the body. Following a plant-based diet has demonstrated to have a greater impact on weight loss than an omnivorous diet (Turner Mcgrievy, et al., 2015). Additionally, they demonstrate a reduction in the amount of inflammation within the body when compared to current diets recommended to those with cardiovascular disease (Shah, et al., 2018). Incorporating a plant-based diet may result in an improvement within the metabolic functions within the body. A plant-based diet eliminates meat, dairy, and any animal derived substances, which is atypical from the Western diet. In this study, seven participants were divided and adhered to a plant-based diet and calorie restricted diet for the duration of the 4-week study. Pre- and post- study, the participant’s weight, BMI, blood pressure, blood glucose, cholesterol levels, waist and hip ratio, and body fat percentages via air-displacement plethysmography were taken. Each week, weight, BMI, blood pressure, waist and hip ratio, and blood glucose were measured. A decrease in total cholesterol was seen in the plant-based group and both groups showed a significant decrease in weight and BMI. Based on the results, plant-based diets may be beneficial in lowering cholesterol levels and both plant-based diets and calorie restricted diets may aid in weight loss and overall BMI. Limitations of the study include the insignificant number of participants. Future studies should focus on increasing participants and duration to gather more data on the changes in metabolic markers of plant-based diets. |





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| Hybrid Computational Synthetic Study of Asymmetric Curcuminoids |
| *Cullen Schull*  Institution: University of Wisconsin- La Crosse |
| Faculty Mentor: *Dr. Valeria Stepanova, Dr. Joseph West* |
| Discipline: *Chemistry*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Naturally occurring curcumin has unambiguously been determined to have high biological activity in multiple instances. Researchers have discovered curcumin contains anti-inflammatory, anti-aging, and anti-proliferative effects. With such pharmaceutical promise, curcumin contains several limitations, including high decomposition, low solubility, and low absorption. Through synthetic modifications, curcumin-like structures, termed curcuminoids, with specific attachments display superior bioactivity. Our research aims to create an effective microwave synthesis of asymmetric curcuminoids using acetylcyclohexanone and various aldehydes. Our research includes a synthetic-computational hybrid methodology to mechanistically determine how curcuminoid synthesis works to obtain desired product formation. Our goal is to minimize waste and energy consumption and develop a new class of curcuminoids with this strategy. Computational modeling was conducted at the B3LYP/6-311++G\*\* level of theory and optimized in both gas and solution phase. To the best of our knowledge, there are no reports on the implementation of a hybrid method towards this goal. Here we report our findings and demonstrate the complexity of the formation of unnatural, asymmetric curcuminoids. |





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| Use and Benefits of Data Analytics Among Small Businesses in the Midwest |
| *Trevor Stevens*  Institution: Viterbo University |
| Faculty Mentor: *Jim Evans* |
| Discipline: *Business Analytics*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  The primary purpose of this study was to determine how organizations in the Coulee Region use business analytics. Survey respondents answered questions about their firms (e.g., size, industry). They were given five definitions—one for overall business analytics and four subdimensions of data acquisition and processing (DACQ), descriptive analytics (DESC), predictive analytics (PRED), and prescriptive analytics (PRES). Finally, they answered questions related to firm performance and business process performance. Thirty-one individuals responded to the survey. Overall, the mean rating for use of business analytics was 3.81, on a five-point scale. The highest subdimension was DESC (m = 3.89) followed by DACQ (m = 3.19), PRED (m = 2.93), and PRES (m = 2.85). Therefore, while the respondents reported their businesses used analytics fairly frequently, their use seemed mainly focused on descriptive analytics. Additionally, it was estimated that use of business analytics was moderately correlated with both firm performance (r = 0.48) and business process performance (r = 0.56). This suggests that Coulee Region businesses should seriously consider whether investing in analytics can benefit their organizations. Finally, Welch’s two-sample t-test revealed that small businesses, defined as those with fewer than 500 employees or annual revenue below $5 million, used business analytics significantly less than non-small businesses (t = 3.60, p = .002). This result is not surprising, since many of these larger businesses are greater resources and may be older or more established. One major limitation of this study was the difficulty in finding willing partners and survey participants during the COVID-19 pandemic. Future research will expand the geographic scope of the study, as well as the types of businesses surveyed, in hopes of getting more results. |





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| Evaluation of Mason Bee (Osmia spp.) Preference for Size and Shape of Nesting Tube and Assessment of Mortality Due to Predation and Parasitism |
| *Trevor Warzynski (Thomas MacGregor-not presenting)*  Institution: Viterbo University |
| Faculty Mentor: *Ted Wilson* |
| Discipline: *Biology*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 201 and Zoom* |
| Abstract:  Bee diversity is an important consideration when discussing crop pollination. When it comes to the difference between wild and managed bees, there is a significant increase in seed production with an increase in bee diversity (Blitzer *et al.* 2016). Therefore, finding the optimal, artificial housing for mason bees (*Osmia spp.*) was one of the goals of this preliminary research. This was studied by using various hole sizes and hole shapes to determine if there was a preference. Another goal of this study was to investigate what other insects would utilize the mason bee housing to understand their relationship and interaction with mason bees. The results of this study identified novel trends between hole sizes and shapes along with parasitoid and predation. With the findings of these trends, we advocate for variations in data collection methods to allow for better data yields. |





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| BIOACCUMULATION OF 17ɑ-ETHINYLESTRADIOL IN POOL 6 OF THE MISSISSIPPI RIVER |
| *Mackenzie Waters*  Institution: Saint Mary's University- Minnesota |
| Faculty Mentor: *Dr. Debra Martin* |
| Discipline: *Biology*  Presentation Type: *Oral Presentation* Presentation Location: *Brophy Center 123 and Zoom* |
| Abstract:  Human synthetic hormone use has varied physiological and environmental impacts, but recent studies have shown that low concentrations of synthetic hormones are problematic for aquatic life. In particular, synthetic estrogens like 17ɑ-ethinylestradiol (EE2) have an impact on organisms through endocrine disruption. When these synthetic estrogens enter the bodies of fish and other aquatic organisms, they have been shown to feminize males of the species, leading to lowered mating capability and hence, lower populations. This study aims to consider whether the water treatment plant in Winona, MN is a source of synthetic estrogens in the Mississippi River by taking water samples from Pool 6 of the Mississippi river above and below the water treatment plant. There was found to be no significant difference in the water above and below the wastewater plant which is the expected source of synthetic estrogens in effluent (n=12, p=0.150). The relationship between depth of water and concentration of EE2 was also considered because studies have shown EE2 to bioaccumulate in sediment at the bottoms of bodies of water. There was found to be no significant difference between concentration of EE2 in deep and shallow water at the locations sampled (n=12, p=0.166). This study showed no significant difference between the samples, but future research may build off of the methods presented in this paper and through a larger sample size be able to produce results that further examine these relationships. |





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| Demoralizing Food |
| *Laura Weidemann*  Institution: Viterbo University |
| Faculty Mentor: *Matthew Bersagel Braley* |
| Discipline: *Philosophy*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 134 and Zoom* |
| Abstract:  This presentation attempts to deconstruct the moral discourse around what food we ought and ought not to eat. By de-moralizing food, this project challenges binary moral language, like good or bad, which too often describes food as if they were inherently one thing or the other. It is imperative for us to question this pattern because it leads us to: (1) overlook the nuance and complexity that shape our food choices and (2) reinforce social and personal stigma related to food choices. This presentation examines historical examples of moral discourse about food, shows how that language underlies our contemporary food choices, and serves as a prompt for a renewed moral imagination in thinking about our relationship to food. |





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| Impact of Oil on Seed Dispersal in Ants |
| *Grace Wilson*  Institution: Saint Mary's University- Minnesota |
| Faculty Mentor: *Dr. Moni Berg-Binder* |
| Discipline: *Biology*  Presentation Type: *Oral Presentation* Presentation Location: *Brophy Center 123 and Zoom* |
| Abstract:  Certain species of plants and ants engage in a mutualistic relationship called myrmecochory. Myrmecochory involves a plant that bears a nutritious reward (elaiosome) for the ants who disperse its seeds. This relationship is common among native species in the temperate deciduous forest. Previous research has demonstrated that oleic acid in the elaiosome elicits a carrying response in ant species. This study explored how olive oil, which contains oleic acid, impacted native ant seed selection in southeast Minnesota. Over the course of 20 days during the fruiting season of Sanguinaria canadensis (bloodroot), bloodroot seed depots (n=20 depots) were prepared with either 10 seeds treated with oil (n=10 depots) or control (n=10 depots). The pairs of depots (treated and control) were placed at 10 different locations and offered to ants. Every two days between the hours of 0900-1100, the number of missing seeds were counted and the missing seeds were replenished so that each depot totaled 10 seeds every two days. Ants significantly preferred the seeds manipulated with olive oil that contained oleic-acid. The results of this study indicate that ants may have the ability to determine between higher and lower oleic acid concentrations within the elaiosome, which can affect their carrying response and alter seed dispersal patterns. |





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| The Dunning-Kruger Effect in Education and Politics |
| *Jared Wilson*  Institution: Viterbo University |
| Faculty Mentor: *Dr. David Bauer* |
| Discipline: *Psychology*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 134 and Zoom* |
| Abstract:  The Dunning-Kruger Effect states that most people overrate their level of performance on a given subject, and only those that perform at the highest-level fail to demonstrate this overconfidence. Higher performers tend to have more metacognition in their subject, which allows them to know the limits of their knowledge, while the worst performers do not know how little they know. Individuals measured in Kohlberg’s “Stages of Moral Development” present a kind of metacognition at later stages, as one must cognitively break down moral thoughts and decisions. Moral judgment was measured using the Defining Issues Test (DIT-2), which uses Kohlberg’s theory as a base. Previous studies have also shown that higher levels of education are linked to increased moral judgment, preference for higher stages of moral judgment in Kohlberg’s theory, and decreased self-assessment. With this research, I hypothesized that participants with increased education would have stronger moral judgment, participants would have a difference between perceived and actual performance, and participants with more education would have more accurate self-predictions across quartiles of performance. An ANOVA was run on level of education by moral judgment, and on perceived and actual moral judgment. A repeated measures ANOVA was run on the interaction between level of education, moral judgment, and quartile of performance. There was a statistically significant difference between level of education and moral judgment (*F*= 6.05, *p= 0.016, η*2=0.059) as well as between perceived and actual moral judgment (*F*= 178.37, *p*=0.001, *η*2=0.665). There was no statistically significant interaction between Level of Education, Moral judgment, and Quartile (*F*= 0.03, *p*=0.992, *η*2=0.001). These results are consistent with the previous findings on moral judgment increasing with level of education and with the existence of the Dunning-Kruger Effect. I was unable to find any evidence for level of education decreasing or mediating the Dunning-Kruger Effect. |





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| The Relationship between Obesity and Cognitive Functions |
| *Kaelan Wilson and Carina Hansen (Latasha Smith- not presenting)*  Institution: Luther College |
| Faculty Mentor: *Loren Toussaint* |
| Discipline: *Psychology*  Presentation Type: *Poster Presentation* Presentation Location: *Zoom* |
| Abstract:  Obesity is a public health concern on the rise in the United States. This current study was conducted using the NHANES III data to observe if obesity has an effect on cognitive functions. It then expanded upon obesity by looking deeper into the specific factors that obesity affects such as Serum iron (FEP), Serum Ferritin SI (FRPSI), Hematocrit (HTPSI), Erythrocyte Protoporphyrin SI (EPPSI), C-reactive protein (CRP), (GHP), Mean Cell Hemoglobin SI (MCPSI), TIPSI, Red blood cell count (RCP), and (RWP) that might also have a link to how obesity affects cognitive processes. The NHANES III study was a cross-sectional survey including 6-16 year old children that used the Wechsler Intelligence Scale for Children (WISC-R) and Wide Range Achievement Test-Revised (WRAT-R). Each participant had their BMI measured, as well as a blood sample taken. The cognitive processes measured were digital span, math, block design and reading. The purpose of this study was to delve into the effect obesity has on these cognitive processes. It was found that BMI had a significant negative correlation with all of these cognitive processes except for reading (which had a small but significant positive correlation). Obesity was correlated with several biomarkers such as serum iron, but not hemoglobin SI. These biomarkers were, in turn, correlated with cognitive function, especially serum iron and red blood cell count. Several linkages through the analyses suggest that obesity disturbs biomarkers which then in turn disturb cognitive functioning. For instance, obesity is negatively correlated with the biomarker serum iron which was negatively correlated with cognitive functions (specifically digit span and reading). Another example is, red blood cell count which was negatively correlated with block design and math. This study supports areas of future research looking at iron levels and inflammation as a possible mediator between obesity and cognitive functions. |





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| Rainbow solutions to x+y=z in [m]x[n] |
| *Laura Zinnel (Kean Fallon, Joe Miller, Nathan Warnberg- not presenting)*  Institution: University of Wisconsin-La Crosse |
| Faculty Mentor: *Nathan Warnberg* |
| Discipline: *Mathematics*  Presentation Type: *Oral Presentation* Presentation Location: *Reinhart Center 134 and Zoom* |
| Abstract:  Consider the equation x + y = z and the set of integers [n] = {1, 2, 3, . . . , n}. A solution to the equation is a set of three integers that satisfy the equation. For example, {2, 5, 7} is a solution in [8] but {3, 8, 11} is not a solution in [10] since 11 is not in [10]. Now we are going to color each integer in [10] and let r = red, b = blue, g = green and y = yellow. 1 2 3 4 5 6 7 8 9 10 r b r b g g y r y b Once a set of integers has been colored we can describe a rainbow solution. A rainbow solution is a solution where each element in the solution is a different color. Thus, (3, 4, 7) is a rainbow solution and (1, 3, 4) is not. The problem we will be discussing is how to use as many colors as possible in the set [m] × [n] while avoiding rainbow solutions. Solutions in [m] × [n] are sums of ordered pairs of integers. For example, {(2, 3),(1, 5),(3, 8)} is a solution to x + y = z in [4] × [8] since each of the first components are in [4] and each of the second components are in [8]. However, {(2, 3),(1, 5),(3, 8)} is not a solution in [4] × [5] since 8 is not in [5]. |

