

2024 Ramaley Research Celebration Program and Book of Abstracts



April 18, 2024

Welcome Remarks: President Kenneth Janz
8:55 AM and 12:55 PM - Kryzsko Commons Ballroom
<https://openriver.winona.edu/rca/2024/welcome/>

Poster Sessions - Kryzsko Commons Ballroom
Session 1 – 9:00 to 11:00 AM
Session 2 – 1:00 to 3:00 PM

Panel Discussion – 1:30-2:30 PM – Kryzsko Solarium

Oral Sessions – 10:00-11:00 and 1:00-2:00 PM - Kryzsko Oak Rooms E/F

Videotaped Oral Presentations: <https://openriver.winona.edu/rca/2024/ondemand/>
These will also be displayed continuously in Kryzsko Oak Room G

Faculty Research Presentations – 11:00-12:40 Kryzsko Oak Rooms E/F

Note: Instructions for student presenters can be found on page 3 of this program.

Welcome to the 2024 Ramaley Celebration!

This year marks the 18th anniversary of the first Ramaley Celebration featuring student presentations of their research and creative achievements. At Winona State, research and creative achievement is highly valued as an integral part of the educational process and because of this every spring semester a day (now known as RCA Day) is set aside to celebrate this. Furthermore, the wonderful diversity of the student presenters, their projects, and the disciplines represented all provide a strong reminder of the distinctiveness and breadth of scholarship across the entire WSU community.

We are also pleased to note that in addition to the Ramaley Celebration and other events on April 18, numerous other presentations of students' creative scholarship are scheduled throughout the week. These include senior shows for Studio Art/Art Teaching/Design students and Music Department hosted performances and recitals. Please see [the WSU Events Calendar](#) for more information.

The Ramaley Celebration Planning Committee and RCA Day All-University Committee owe thanks to George Micalone and Phil Steffes and the Student Union staff for their help with logistics in Kryzsko Commons. The Celebration is made possible by funding provided by the WSU Office of Academic Affairs and we also thank the WSU Administration for its continuing support through the funding of Research and Creative Projects grants to our students.

We also thank the WSU Digital Learning Commons for their sponsorship of this year's poster sessions.

Thank you to the WSU Psychology Club for their assistance with the logistics for the Celebration. We thank them very much for their interest and support!

To all of our student presenters: Thank you very much for presenting at this year's celebration and congratulations on your accomplishments!

To the faculty mentors: Thank you for including students in your continuing research and creative scholarship!

To the rest of the WSU Community, please come and examine the work of our student/faculty research teams and help us acknowledge and celebrate their accomplishments!

Sincerely,

The RCA Day All-University Committee: Kristine Benjamin, Darrell Newton, Begum Aybar-Damali, Samantha Eckerson, Amanda Brouwer, Kendall Larson, Thomas Nalli, Brenda Canar, Patti Gangl, Tom Hill, John Holden, Eric Kerr-Anderson, Amanda Pruka, Trung Nguyen, Ted Reilly, Steph Stango, Kara Lindaman, Karen Schroeder, Katie Barofsky, Tyler Treptow-Bowman, DeAnna Goddard

Instructions for Student Presenters for the 2024 Ramaley Celebration

Pre-Recorded Oral Presentations

Use [Kaltura Capture](#) to record your 10-20 minute PowerPoint slide show or poster. Instructions on how to submit your file to the event website can be found at

<https://libguides.winona.edu/openriver/rcainstructions>

In-Person Oral Presentations

Plan for a 15-minute presentation followed by a 5-min period for questions. For PowerPoint presentations, you can either use your own laptop if it has the Airtame app installed on it or bring a thumb drive with your file on it and use the session moderator's machine.

Presenting Your Poster

You will be assigned a poster number in the program which indicates the location to set up your poster. There will also be a check-in desk just inside the main entrance to Kryzsko Ballroom. The check-in desk will be staffed by student volunteers from the WSU Psychology Club who will be able to assist you.

You should check in and put up your poster sometime between 8:30 and 9:00 am for the morning poster session (Session 1) or between 12:30 and 1:00 pm for the afternoon sessions (Session 2). Clips, poster boards, and easels will be provided. Posters need to be taken down immediately after the end of each session 11:00 am for the morning sessions and 3:00 pm for the afternoon sessions.

- You will be assigned to be with your poster during either the first or second hour of each session; Session 1a at 9:00-10:00 am, Session 1b at 10:00 am, Session 2a at 1:00-2:00 pm, and Session 2b at 2:00-3:00 pm. **You are expected to be with your poster for the entire duration of your assigned session.**
- **All posters should be set up and available for viewing for the full two hours of the morning/afternoon sessions.** For example, if you are assigned Session 1a, then your poster should be displayed from 9:00 am to 11:00 am and you need to be standing in front of it from 9:00 am to 10:00 am.

This event is usually very well attended so plan on a lot of great interactions with other students and faculty.

Other

We strongly encourage you to check out other students' presentations when you are not assigned to be presenting yours.

Thank you for your participation, and we look forward to seeing you at the Celebration!

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Session 2, 1:00-3:00 PM (2A presenting at 1:00-2:00, 2B presenting at 2:00-3:00)

Posters should be on display for the entire two hours of each session!

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Panel Discussion – Solarium – 1:30-2:30

Panel Members	Dept	Description
Dr. Adam Beardsley, Assistant Professor	Physics	Research and creative achievement continue to broaden in new and exciting ways. This panel discussion aims to explore the current landscape through the experiences of students, staff, and faculty working to advance research, efforts to increase equity, and future trajectories in academia and beyond.
Danilo Bojic, Associate Professor & Doctoral Student	Art & Design and Education	
Heidi Hanson, Undergraduate Student	Comm Studies	

Tyler Peil, Tutoring Graduate Assistant & Graduate Student	Leadership Education	
Dr. Emily Ruff, Associate Professor	Chemistry	
Renee Stowell, Advisor	Fulbright Program	

Faculty Research Presentations – Oak Rooms E/F

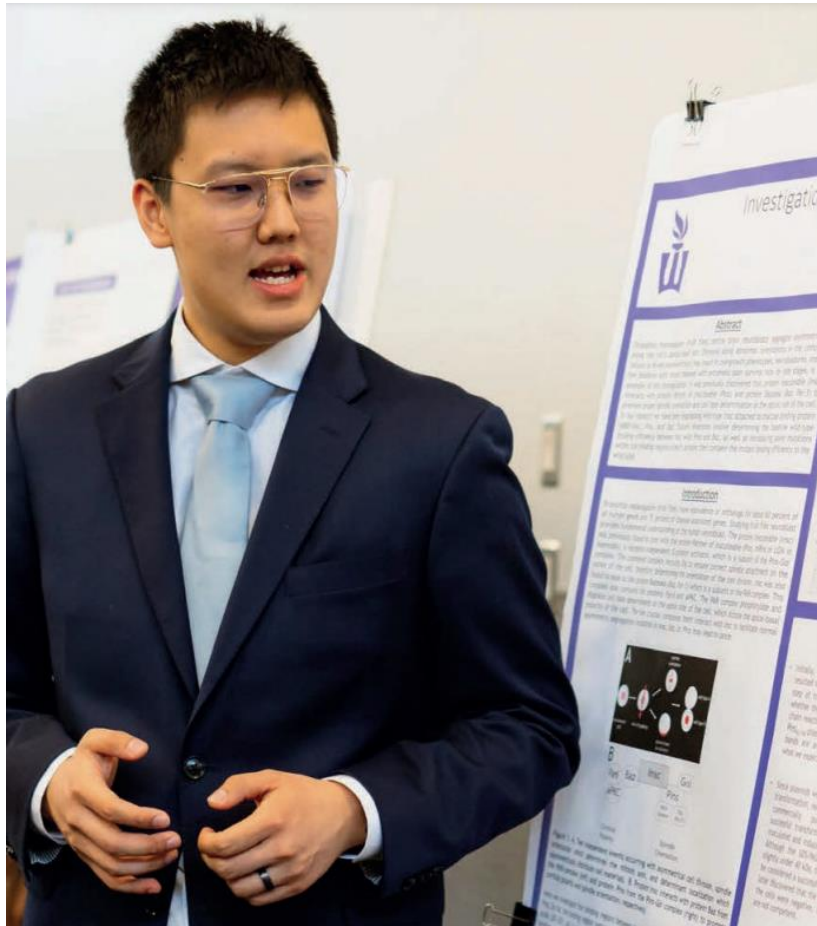
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11:40	Joseph West	Chemistry	A Field-specific Analysis of Gender and Racial Biases in Generative AI	69
12:00	Kim Radtke	Health, Exercise & Rehabilitative Sciences	Effect of SARS-Cov2 on Collegiate Athlete's Aerobic Capacity, Pulmonary Function, and Cardiac Rhythm	70
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ABSTRACTS



Art & Design

Berlin: Shifting the Paradigm Student Exhibit

Arin Hendrickson and Abigayle Suchla

Student Co-authors: Kendal Banes, Isabella Battis, Jadyne Bennett, Jakob Connelly, Stephanie Dasbach, Abigail Hawkey, Rayline Joens, Luke Krzyszkowski, McKenna Miller, Olivia Nojd, Kaylee Olson, Simon Pell, Laurel Rau, and Emily Solhjem

Faculty Mentors: Danilo Bojic and Tyler Treptow-Bowman

Danilo Bojic and Tyler Treptow-Bowman, took a group of 16 students from four departments for 18 days to Berlin, Germany. As a synthesis of the faculty-led study away program, students were tasked to reflect on their experiences and emotions and develop creative pieces as part of a group exhibit. The goal is to explore Berlin and the transformation through the lens of messaging that Germany used to shift the paradigm following the Nazi Regime with an incorporated critique of white supremacy and ethnic cleansing. Additionally, in this collaborative program students were exploring the enticing shifts in visual communications that have transformed a nation.

Berlin was selected not only for its age-old architecture and art, but to reflect the nuances of a culture shaped by war, fascism, and communism. The program highlights human achievement, struggles, and empowerment. Berlin: Shifting the Paradigm examines Central Europe's cultural, social and artistic achievements, and humanity's ability to overcome tragedy. For this exhibit, students were asked to interpret the meaning of a "reflective piece," and to produce creative, original work while working together in groups of four. These guides reflect the history, art, and architecture of the locations, and how students personally responded to these sights and experiences.

Biology

Assessing the Biological Integrity of a Driftless Brook Trout Stream

Colby Menden and Ian Wildeman

Community Partner: Gerald Modjeski

Faculty Mentor: Neal Mundahl

The goal of this project was to assess the biological integrity of Miller Valley Creek by assessing fish community, invertebrate community, and habitat distribution. Five one-hundred-meter sections were assessed covering upstream and downstream portions. Fish were collected using a backpack electrofisher, with measurements for weight (g) and total length (mm) taken using a balance and bump board. Invertebrates were sampled using a Hess sampler and individuals were counted for analysis. Measurements of habitat were taken visually or with a meter tape to include substrate, fish cover, and stream width, which were then compared between sites. Using these measurements taken in the field, mortality rate, condition factor, average size for each year class, and age class distribution was determined, alongside forage availability and the biological integrity of the invertebrate community in the system. Habitat and substrate were compared between sites to determine if habitat is sufficient to provide large Brook Trout cover, and to rear sufficient forage for their growth. It was found that there is a reproducing population of Brook Trout present in Miller Valley Creek, alongside adequate forage for

their growth, however habitat was found to be inadequate in many cases to sustain a population of large-sized Trout.

Bat Survey of Winona

Hailey Christensen and Morgan Winter

Faculty Mentors: Amy Runck and Noah Anderson

Two bat detectors were placed at Garvin Heights and West Lake Winona to test bat activity in Winona, Minnesota. It was hypothesized that there would be a higher activity of bats at West Lake Winona than there would be at Garvin Heights. It was also hypothesized that high moonlight illumination would impact bat activity in a negative way. After data analyses were performed, it was found that bats were more active at West Lake Winona than at Garvin Heights. Based on the data analyses for moon light illumination and bat activity, there is no pattern common to all species, but each species reacted differently to the moonlight.

Characterization of Bacteria and Fungi in Hotel Bathroom Products

Madie Clarke, Regan Feit, and Rebecca Nachreiner

Faculty Mentor: Kimberly Evenson

Refilling hotel products and storing open products in bathrooms are excellent conditions for bacterial growth. Bacteria accumulate in frequently touched surfaces and thrive in warm, moist, nutrient-rich environments. Bathrooms are also the perfect breeding ground for microbes to flourish. Not all bacteria are bad for our health, but it would be beneficial to know what microorganisms can be found in cosmetic or cream products that are used on a daily basis. This is especially important when bacteria or fungi are known pathogens.

This study evaluated and classified bacteria and fungi in shampoos and body lotions using Trypticase Soy Agar (TSA) and Potato Dextrose Agar (PDA) plates. A sample of Neutrogena body lotion was diluted 1/10,000 before plating 100 μ L. A sample of La Coupe Aragon Oil Complex Shampoo was diluted 1/1000 before plating 100 μ L. The diluted products were then incubated at 37°C, and bacteria were characterized by microscopy and various microbiological tests.

A few different species of bacteria were discovered in the shampoo and body wash: *Bacillus cereus*, *Mycobacterium phlei*, and *Staphylococcus lugdunensis*. Molds were also detected. Additional testing will be done in the future since additional microbes could potentially grow at different temperatures, and on other types of media.

Detection of Lyme's Disease caused by *Borrelia burgdorferi* in *Ixodes scapularis* using a PCR Multiplex and Real-Time PCR

Emily Dittman and Bethany Basile

Faculty Mentor: Kimberly Bates

Ixodes scapularis (deer ticks) are a vector for the bacterium *Borrelia burgdorferi* that is known to cause Lyme's Disease in animals and humans (*Homo sapiens*). In the past few years, there has been an increase in the prevalence of Lyme's Disease cases throughout the midwestern United States indicating that many ticks have been infected with *B. burgdorferi*. Using *I. scapularis* DNA samples collected from white-tailed deer (*Odocoileus virginianus*) in the spring of 2006 from Buffalo County, WI and Winona

County, MN, both traditional and real-time PCR methods were used to test for the presence of the *B. burgdorferi* organism in the ticks. A multi-plex protocol was developed using traditional PCR that amplified both the OspA protein in *B. burgdorferi* and the 16S rRNA gene in *I. scapularis*. Real-time PCR was used to amplify the RecA gene in *B. burgdorferi* and the ITS2 gene in *I. scapularis*. Together, these two methods were used to compare the accuracy and reliability of each method for detecting ticks infected with *B. burgdorferi*. In this discussion, the results of each of these methods will be analyzed.

Microbiological Study of Used Cosmetic Products

Macy Priest and Rachel Przybilla

Faculty Mentor: Kimberly Evenson

The bacterial and fungal load in commercial creams and cosmetic products -was examined. This research aimed to identify pathogenic microbes, their toxin production, and their potential impact on product integrity. Our tests showed bacterial growth in the beauty products Cetaphil Facial Cleanser, CereVe moisturizing lotion, and Maybelline facial powder. Several microbes were characterized: a gram-positive bacteria identified as *Bacillus cereus* as well as an unknown gram-negative bacteria. In addition, the fungus *Fusarium* was observed. These microbes might be commonly observed in beauty products, but theoretically many different species of bacteria could grow in this type of environment.

Molecular methods used to identify a new species of *Dictyocaulus* (Family *Dictyocaulidae*) in white-tailed deer.

Garit Wollan and Elisa Quevedo

Faculty Mentor: Kimberly Bates

Lungworms (*Dictyocaulus*) are a type of parasitic nematode found in the lungs of vertebrates and can cause life threatening diseases to their host(s). *Dictyocaulus* is a type of lungworm found in cattle (*Bos taurus*), deer (*Cervidae*), goat (*Capra aegagrus hircus*), sheep (*Ovis aries*), and horses (*Equus caballus*). The purpose of this study was to use DNA analysis to distinguish between different species of *Dictyocaulus* among cattle, white-tailed deer (*Odocoileus virginianus*), and red deer (*Cervus elaphus*). Adult lungworms were collected from the lungs of cattle from research farms in Missouri, Wisconsin, and Mississippi, from the lungs of red deer from a research farm in New Zealand, and from the lungs of legally harvested white-tailed deer from Minnesota. DNA was extracted from individual lungworms using 10% Chelex. In past studies, amplification of the internal spacer 2 (ITS2) region, amplification of the major sperm protein 1 (MSP1), and cyclooxygenase (COX-1) have all been amplified via PCR and sequenced to determine the molecular difference between the species. After amplification, gel electrophoresis was then used to visualize the quality of the amplification of the desired gene. From past studies, we were able to obtain a range of species from *D.v. biontis* to *D. eckerti* using MSP1, COX-1, and ITS2. The newly sequenced DNA were aligned using Mega 10 and GenBank to determine species. ITS2 was used to identify *D. eckerti* in the red deer and the white-tailed deer. Additionally, the MSP-1 sequences identified *D.eckerti* in red deer and white-tailed deer as well. COX-1 identified that the red deer was *D. viviparus* whereas the white-tailed deer was *D.capreolus*, and *D. viviparus*. Preliminary data suggest that red deer and white-tailed deer may harbor the same species of lungworm.

Morphology of Trematodes in Gadwall Ducks (*Mareca strepera*) Found in the Mississippi Valley: Parasitology Class Project

Annika Lensch, Ethan Gjervik, McKenna Baker, Elizabeth Haumont, and MiVang Xiong
Faculty Mentor: Kimberly Bates

Gadwall ducks (*Mareca strepera*) are commonly found in lakes, ponds, and marshes west of the Mississippi River in summer months. A Gadwall duck is considered a dabbling duck which feeds on aquatic plants floating on the water's surface occasionally feeding on insects, crustaceans (crayfish, crabs), and small fish. Trematodes are a commonly found parasite in the gastrointestinal tract of many species of ducks. The ducks used in this study were legally collected and donated by hunters from Buffalo City, Wisconsin along the Mississippi River. This study will focus on identifying trematodes found within Gadwall ducks such as *Echinostoma*, *Zygodontomyxa*, and other different species of trematodes yet to be identified. With these parasites, their morphological features will be identified and measured. Some key morphological features consist of size, shape, internal organs, and mouthparts. To visualize the parasites' physical features, they will be stained with carmine and mounted onto a slide. After this procedure, a microscope digital camera (AMScope) will be used to visually enhance their features, so that they can be compared to literature figures. Finally, once morphological features have been compared, the parasites can be confirmed as a specific species of trematodes. A confirmation of taxonomy will be determined using PCR.

No-Go Decay Maintains the Fidelity of the Translating Pool of mRNA in Response to Physiologically Produced ROS

Caroline Westmoreland
Student Coauthor: Emily Cianflone
Faculty Mentor: Scott Segal

No-Go Decay (NGD) is a highly conserved quality control mechanism which allows for the degradation of damaged mRNA on which ribosomes have stalled during translation. The Dom34p/Hbs1p complex acts to remove stalled ribosomes and it promotes cleavage of damaged mRNA. The 5' fragment produced from this cleavage is degraded by the cytoplasmic exosome 3' to 5'. Whereas the 3' fragment is localized into P-bodies containing the exonuclease Xrn1p which is responsible for degrading mRNA in the 5' to 3' direction. Despite significant knowledge of NGD mechanistically, little is known as to why this quality control mechanism is conserved. Previous work showed that activation of NGD can be observed by using engineered mRNA substrates that elicit ribosome stalls, or by eliciting the presence of reactive oxygen species (ROS) using oxidants that are not physiological. Reactive oxygen species cause damage to mRNA resulting in the formation of 8-oxo(G) bases, which have been shown to cause ribosome stalls during translation and activation of NGD. Aerobic glucose metabolism is known to generate intracellular ROS which could cause 8-oxo(G) base formation in mRNA and an increase in NGD. By stressing yeast during diauxic shift or under glucose limiting conditions, where yeast perform aerobic respiration, we show that NGD is activated and there is a subsequent increase in P-bodies. Furthermore, general translation is attenuated. To combat damage brought on by ROS, eukaryotic cells express superoxide dismutase proteins. These proteins are highly conserved and act as scavengers that catalyze the breakdown of ROS into H₂O₂ and O₂. Yeast express two conserved Sod proteins, Sod1p which localizes to the cytoplasm, and Sod2p which localizes to the mitochondrial matrix. In strains lacking Sod1p or Sod2p we also see activation of NGD, an increase in P-body assembly, and a decrease in global translation. Taken together, the data shows that increases in physiologic ROS result in upregulation of NGD. Our work suggests that

NGD acts to maintain the fidelity of the translating pool in response to physiological ROS, and that could be why this mechanism is conserved.

Post Rehabilitation Analysis of Stream Habitat and Brown Trout in Cedar Valley Creek

Ashlynn Leonard and Emma Ehlers
Faculty Mentor: Neal Mundahl

A section of Cedar Valley Creek went through a rehabilitation process that was intended to improve the trout habitat as well as to reinforce banks, deepen the stream, and narrow the channel. We took brown trout (*Salmo trutta*) counts and did habitat analyses at five locations (each 50 m long), in the restored stream section of Cedar Valley Creek during fall 2023 to compare to pre-rehabilitation data collected in 2022. A backpack electrofisher and nets were used to collect brown trout via a single-pass removal sampling process. All trout were measured for total length (mm) before being released back into the stream. Habitat assessments at each site included measurements of stream depth, current velocity, width, percent of riffle, pool, or run, substrate type, and fish cover. At multiple locations the improvement project achieved its goal, as some sites were significantly deeper, as much as 127% deeper in section 2, narrower, as much as 45% narrower in section 2, or had more vegetation, whereas others did not result in significantly different values to meet the rehabilitation project objectives. Total abundance of trout increased from 16.3% to 107.7% across the sites from 2022 to 2023. Young-of-year numbers increased significantly between the two years, but adult numbers did not. Overall, the goal of increased abundance of brown trout in Cedar Valley Creek was achieved.

Prevalence of *Acanthocephalan* Species in Dabbling Ducks in the Western Wisconsin Region

Kelli Beall, Abby Nelson, Juanita Dewald, and Bethany Basile
Student Co-author: Sydney Taylor
Faculty Mentor: Kimberly Bates

The phylum acanthocephalan is home to over 1100 species of intestinal parasites that inhabit the small intestines of vertebrates. Waterfowl are known definitive hosts of *acanthocephalans* and 52 species have been reported specifically in ducks. Determining the most common species of acanthocephalan in local waterfowl is an important step in discovering possible impacts of infection and, subsequently, prevention. Acanthocephalan samples have been collected from duck dissections conducted by Winona State University Students over the course of five years (2019-2024). The ducks were donated by hunters and all donated ducks were gathered from western Wisconsin. Using these samples the most prevalent species of acanthocephalan in dabbling species ducks will be determined. The method of identification of acanthocephalans used is DNA extraction and PCR amplification using COX-1 and 18s primers. The amplified DNA will be sent to an outside facility for DNA sequencing which will identify the species of *acanthocephalan*. The DNA sequence will be compared to known sequences in GenBank as well as proboscis morphology using a dichotomous key for further verification. Using both methods the most prevalent species of *acanthocephalan* present in dabbling ducks in the western Wisconsin region will be determined.

Prevalence of parasitic infections between green-winged teal and wood ducks

Shirley Kukowski, Bibhuti Jayswal, Cindy Ramirez, and Elizabeth Schmidt
Faculty Mentor: Kimberly Bates

Dabbling ducks such as green-winged teal (*Anas carolinensis*) and wood ducks (*Aix sponsa*) are some of the most common duck species in the Minnesota and Wisconsin territories. These species are known as dabblers because they eat food on or above the water's surface. These surfaces may harbor parasites which the ducks can unintentionally ingest. This study's purpose was to compare the parasite prevalence and intensity between these two species and their sexes to see which species is more vulnerable to parasite consumption and infection. This can explain how dabbling duck species can obtain parasites based on their different feeding and migratory patterns. Twenty-eight green-winged teal and thirty wood duck carcasses were collected and dissected to find the total amount of internal and external parasites occupying their host duck. For this study a pivot table and t-test were used to determine statistical differences for infection prevalence. Initial analysis revealed that females were more vulnerable than males to be infected, and green-winged teals are the most susceptible out of the two species overall to be infected with internal and external parasites.

Quantifying Differential Expression of Hemoglobin Genes in Tiger Salamanders (*Ambystoma tigrinum*) in Response to Environmental Hypoxia

Lincoln Hall and Hadley Phillips

Faculty Mentor: Amy Runck

The ability to alter phenotype in response to environmental changes, termed phenotypic plasticity, has significant implications for how an organism responds to environmental stressors. Salamanders (order *Urodela*) offer a unique opportunity to investigate this phenomenon because their oxygen transport needs vary greatly depending on whether they are aquatic or terrestrial. For aquatic individuals, one significant potential stressor is decreased dissolved oxygen in the water (hypoxia). Previous studies have shown salamanders alter expression of hemoglobin genes during metamorphosis, but it is not known if these genes are also differentially expressed as a response to hypoxia in aquatic salamanders. Salamanders of the genus *Ambystoma* express two isoforms of the α subunit of hemoglobin, α major (α M) and α minor (α m), of which α m has higher oxygen affinity but is expressed at a lower level in terrestrial salamanders. The present investigation utilizes RT-qPCR to compare relative expression of α M and α m in a neotenic population of tiger salamanders (*A. tigrinum*) at varying dissolved oxygen levels. These results will help determine if increased oxygen-binding of hemoglobin under hypoxic conditions is caused by differential expression of these globin genes. This research was performed for a Biology Capstone project.

The Prevalence and Intensity of Parasites in Dabbling versus Diving Ducks

Lane Colestock, Shirley Kukowski, Grace Lockefer, and Mark Raihle

Faculty Mentor: Kimberly Bates

Ducks (*Anatidae*) are a common semi-aquatic bird throughout most of America. With ducks' eating habits, they are often targets for a range of internal and external parasites. There are two main types of ducks often differentiated by their eating habits: dabblers and divers. The purpose of this study was to compare the prevalence and intensity of parasites found in dabbling vs diving ducks. The ducks in this study were legally harvested and donated by hunters from various counties in Wisconsin. There was a total of 163 ducks analyzed in this study using necropsy to extract both internal and external parasites. Further research is being performed to conclusively identify parasites from these ducks and to use that data to determine if there is a difference in parasite activity between dabblers and divers.

Business Administration

Navigating the Game: A Study of NIL Opportunities for Division II Student Athletes

Olivia Gamoke

Faculty Mentors: Stephanie Schartel Dunn, Marcy Faircloth, and Jason Kight

Significant implications for the landscape of college athletics in the United States are on the line as schools and students navigate Name, Image and Likeness (NIL) endorsements and policies. Headlines and commentary focus on NIL endorsement implications at the most competitive - Division I - college programs. This paper reveals how NIL endorsements are unfolding in the Division II and Division III college athletics. Through quantitative research of current Division II college athletes nationwide, this paper aims to analyze the prevalence and types of NIL endorsements in this group, understand the degree to which student athletes support current NIL policies, and the personal impact NIL endorsements have on these student athletes. The findings of this study reveal valuable insights into this large but unstudied population.

Chemistry

Synthesis, characterization, and exploration of binding mode preference for the complex of iron with the antibiotic cefdinir

Kaylee Beyer, Nathan Gentner, Alexander Gibbs, and Meagan Kaufenberg-Lashua

Faculty Mentor: Joseph West

Cefdinir is a common antibiotic used to treat an array of bacterial infections of the upper respiratory system. A common side effect observed in patients with high iron diets (typically formula-fed infants and supplemented geriatrics) is a distinctive non-bloody red stool. This has been attributed directly to complexation of iron(III) by cefdinir. This has only been loosely confirmed and the actual structure of the complex has never been identified, though speculations have been proposed. We have sought a hybrid computational-experimental approach to uncovering the actual iron-cefdinir complex. Structure modeling results using Orca are presented alongside results obtained for synthesized complex including magnetic susceptibility, NMR, mass spectrometry and UV-visible spectroscopy.

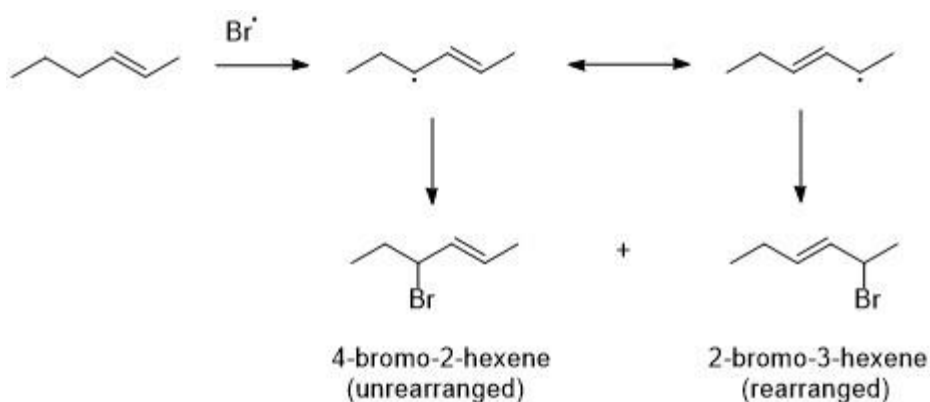
Allylic Rearrangement in NBS Bromination Reactions

Devann Harris and Bryanna Wichner

Faculty Mentor: Thomas Nalli

The allylic bromination of alkenes using N-bromosuccinimide (NBS) is a useful and selective substitution reaction, in which bromine radicals abstract hydrogen from the alkene to form a resonance-stabilized radical intermediate. However, allylic rearrangement can be a consequence of the intermediate's two resonance structures. Some literature sources imply that NBS bromination gives only one major product from asymmetrical alkenes, e.g., 2-hexene and 2-heptene, even when they should form equally stable but non-equivalent resonance contributors. In this research, bromination of *trans*-2-hexene was performed using cyclohexane as the solvent, and the products were analyzed using GC-MS to determine

if only one product, 4-bromo-2-hexene, is formed or if allylic rearrangement also occurs to give 2-bromo-3-hexene. Additionally, 1-hexene and 3-hexene were reacted with NBS to provide support for our peak identifications in the case of *trans*-2-hexene. The experimental data aligns with resonance theory with two major products, 4-bromo-2-hexene (50%) and 2-bromo-3-hexene (32%) relative to smaller amounts of six other monobrominated products. As expected, 1-hexene yielded 1-bromo-2-hexene (56%) and 3-bromo-1-hexene (10%), and 3-hexene yielded both 4-bromo-2-hexene (58%) and 2-bromo-3-hexene (41%). Both reactions also demonstrate the occurrence of allylic rearrangement. All of the reactions also yielded a small amount of bromocyclohexane. The data provides strong evidence that NBS bromination of non-symmetrical alkenes always yields two major products, consistent with resonance theory, and contrary to some literature references.



Analysis of Protein Content in Commercial Protein Powders

Allison Dunham

Faculty Mentor: Jonathon Mauser

This study aimed to experimentally determine the protein content present in various commercial protein powders. The protein that is consumed from these dietary supplements can be used to aid in the structure and function of the human body. This experimental determination of protein content present in protein powders was accomplished through the creation of both a Bradford Faculty Mentor: standard and a BCA standard. These standards were compared against the protein powder solutions created using both a Bradford and BCA assay. The actual protein content present in the protein powders of interest was then analyzed using a standard curve created from the standard it was tested against. The percent error of the protein content present in the samples were as follows in the Bradford assay were 83.5-89.5% indicating the labels overstate the protein content by nearly a factor of two. The BCA assay used confirms this with similar percent errors ranging from 81.1-101.1%.

Analysis of Rabies Neutralizing Antibody Titers in the Feline Population of Winona County

Olivia Hendrickson and Jensen Christensen

Faculty Mentor: Jonathon Mauser

Canine rabies vaccination, vital for both animal and human health, is well studied and understood. In contrast, our understanding of feline rabies vaccinations, particularly with those that have a compromised immune status, is much less comprehensive. The purpose of this project is to enhance our current knowledge of feline vaccination states through a surveillance study on the feline rabies antibody titer in Winona County's cat population. Specifically, we seek to explore the relationship between an individual feline's immune status and their active anti-rabies antibody titer. To achieve this, we conducted a bicinchoninic acid (BCA) protein assay to determine the total protein composition in each sample. Afterwards, an ELISA (enzyme-linked immunosorbent assay) was performed to assess rabies antibody titer levels in each sample. In this presentation, we share our findings and will show how this data correlates with the feline's immune status.

Chloride Contamination in Natural Water Sources

Isabella Dusbabek

Faculty Mentor: Jeanne Franz

Chloride contamination in natural water sources is a prominent problem throughout the United States. In Midwestern and Northeastern regions of the country, the most snowfall is experienced along with the highest rates of chloride contamination. With expanding levels of infrastructure development and ever-growing human population there is an increasing need to use de-icing road salts during icy or snowy months. Run off due to rising spring temperatures transfers salt into nearby bodies of water where it dissolves and breaks up into free sodium and chloride ions. A consumable level of chloride in water is 250 ppm, any specimen assessed above this value is considered to be impaired. Weekly samples were taken from 15 varying locations along Burns Valley Creek, Pleasant Valley Creek, and Garvin Brook over the duration of February and March. A chloride ion selective electrode was used to obtain measurements from these specimens with the addition of an ISAB. Examination of these samples displayed stable values of chloride across all individual testing sites due to the lack of snowfall this winter. The collected data further suggests consistent use of de-icing road salt in winter months is responsible for chloride contaminated run-off recorded in past years.

Computational Investigations of *o*-Arylimino-substituted Benzoic Acids

Reuben Koo, Bonnie Ni, Reyna Olson, and Rachel Swanson

Faculty Mentors: Hannah Leverentz-Culp and Joseph West

o-Arylimino benzoic acids present a range of speciation possibilities arising from conformational and tautomeric options of the acidic hydrogen. In polar protic media, it is plausible that the hydrogen atom of the carboxyl group could also be found attached to the nitrogen of the imine group, thus creating a zwitterionic iminium carboxylate. All plausible forms were modeled to determine relative energetic favorability. Moreover, UV-visible spectra were modeled by TD-DFT methods for all forms enabling subsequent comparison with experimentally obtained spectra.

Determination of Aqueous Solubility of *o*-Aryliminobenzoic Acids and Associated UV-vis Spectroscopic Analyses

Luiza Cruz, Noah Duszynski, Regan Stefanoni, Madisson Watts and Robyn Williams

Faculty Mentors: Jeanne Franz and Joseph West

Chemical and electronic properties of *o*-aryliminobenzoic acids were investigated. Aqueous solubilities were determined by acid-base titrations. UV-visible spectra were collected in water and octanol to facilitate future studies. Both pK_a and UV-vis spectra were correlated to substituent changes to attempt to ascertain effects, if any, of electron-withdrawing and -donating groups on acidity as well as absorption spectra. Modeling results were analyzed in the context of substituent (electron-withdrawing and electron-donating) effects.

Developing an Enzymatic Assay for Wine Analysis

Taylor Pagel

Faculty Mentor: Jonathon Mauser

During malolactic fermentation (MLF), malic acid is fermented into lactic acid by the bacteria *Oenococcus oeni*. During this process, malic acid is then converted into lactic acid, converting sour flavors in the wine to buttery. Here we present an enzymatic method to determine the malate/lactate ratio of wines during MLF. Fresh juice samples had detectable amounts of malate, while wine samples had mixed results, as expected. MLF was initiated in a freshly fermented pre-MLF sample of St. Pepin wine and a decreasing trend of malate over time was detected, as predicted. This was compared to increasing levels of lactate in the sample which showed the ratio of malate to lactate throughout the MLF process. This method presents a quick method to effectively assess MLF status during the fermentation process.

Investigating Chemotherapeutic Resistance in Glioblastoma Multiforme A

Katrina Yaeger

Faculty Mentor: Jonathon Mauser

Glioblastoma (GBM) multiforme A is a highly variable, grade four cancer that affects the glial tissues of the brain and spinal cord. Cancer cells, including GBM, have purine metabolism markers that make them distinguishable for biochemical research, marked through the rate limiting step in the conversion of inosine monophosphate (IMP) to guanosine triphosphate (GTP), catalyzed by inosine monophosphate dehydrogenase (IMPDH). Cell cultures for both 3T3 cells, used to study normal cell cycles, and GBM cells were grown and replicated, until sufficient cells existed to extract the desired proteins. These proteins were then run through a gel electrophoresis apparatus, followed by a Western Blot analysis to immunostain the proteins, before subjecting them to various antibodies. Three different antibodies were used: actin, a biomarker for GBM prognosis, p53, a tumor marker and suppressor, and Ras, a guanosine nucleotide binding protein. Following the antibody treatments, the GBM proteins and antibodies were subjected to chemotherapy drugs, to observe if there were any changes in overall protein concentration.

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

Connor Lehner

Faculty Mentor: Joseph West

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.

Making Mutations in a VRK1 Plasmid

Madeline Thoemke

Faculty Mentor: Emily Ruff

One of the most common types of mutations is point mutations, which change a single amino acid, sometimes by changing a single nucleotide. These mutations can cause the protein to fold incorrectly or change how it interacts with other molecules. This research used biochemistry methods to prepare mutated proteins to simulate their behavior in the body. Mutations in the protein VRK1 were chosen for this project. VRK1 is present in human tissues and influences cellular division and RNA processing VRK1 mutations P79L, A66G, and R219I have been linked to neurological disorders and were chosen for this project. Our procedure used biochemistry techniques and the Quikchange Lighting site-directed mutagenesis kit to mutate a plasmid used to prepare recombinant mutant proteins. Other research has shown that these mutations can have harmful effects on health, such as the P79L mutation leading to developmental delay[1], or the A66G mutation leading to muscular atrophy[2]. Future studies with these mutant proteins may provide insight into how these genetic disorders are caused, potentially leading to new treatment options.

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Refining a Home Built Raman Spectrometer

Nathan Gentner

Faculty Mentor: Jennifer Zemke

In 2018 student Rick Dorn and Dr. Jennifer Zemke built a Raman spectrometer using 3D printed components, some purchased optical components, a laser pointer and parts repurposed from old, unworking instruments from the chemistry department. The goal of this previous project was to allow students to work with free space optics to create a working instrument within the Physical Chemistry II laboratory; however, the original design of the spectrometer had a few drawbacks: one is that each component of the instrument has too much freedom for the system to be adequately aligned and used within a 4-hour laboratory period. Thus, the system must be improved, and the alignment streamlined for it to be a viable component of the chemistry curriculum. The overall goal of this project is to

streamline the alignment and enhance the performance of our home-built Raman spectrometer by redesigning specific component mounts and making adjustments to the optical line.¹ Raman spectra of various substances including benzene, toluene and aqueous potassium ferricyanide will be collected and compared to previous spectra to evaluate design improvements.

Ruthenium Metal Complex Interaction with DNA of Tumor Cells

Danielle Baca

Faculty Mentor: Hannah Leverentz-Culp

In this project, computational chemistry was used to dock variations of (*p*-Cymene)Ru(curcuminato)chloro (Ru-cur) in DNA strands to find the best affinity for potential anti-cancer drugs. The Ru-cur complex has been chosen as the metal anticancer complex because it is not very toxic, selective for cancer cells, and has ligand exchange kinetics similar to those of platinum. First the geometry of the Ru-cur complex was optimized via a quantum mechanical method. The GAMESS program was used for this portion. Once the geometry of the complex was optimized, docking programs were explored to find the best docking poses and binding energies for the complex in DNA strands. Promising positions of the complex was refined using molecular dynamics programs such as Charmm. The methods used to dock and evaluate variations of (*p*-Cymene)Ru(curcuminato)chloro in a DNA strand required the use of the Minnesota Supercomputing Institute (MSI) high-performance computing (HPC) resources. These resources were necessary for the optimization of the Ru-cur complex at a higher level of theory as well as the docking procedure itself, which required many configurations of this complicated system to be generated and evaluated. Preliminary data has currently been collected to find the best affinity for the Ru-cur complex in DNA strands, but final data has not been collected. Experimentation of the topic is still ongoing and further data will be released in the future.

Synthesis and Characterization of Bidentate Imino-Carboxylate Ligands Based on Anthranilic Acid and Their Homoleptic Chromium(III) Complexes

William Burke, Sofia Gorjestani, Ava Nelson, Kristine Osorio, and Sarah Vang

Faculty Mentor: Joseph West

Condensation of anthranilic acid and a series of para-substituted benzaldehydes has provided an array of new arylimino-substituted benzoic acids. Deprotonation of these species has provided the carboxylate derivatives that have been applied as bidentate, monoanionic ligand to synthesize homoleptic, tris complexes of Cr(III). The ligands and the Cr(III) complexes have been characterized by mass spectrometry, IR spectroscopy and melting point analysis. Magnetic susceptibility and X-ray crystallography have been applied when relevant and possible. Additionally, computational modeling has been utilized to determine geometric preference for all chromium complexes.

The Adsorption of Methylene Blue by Activated Carbon from Spent Coffee Grounds by Microwave-induced Phosphoric Acid Activation

Kaylee Beyer

Faculty Mentor: Jennifer Zemke

Spent coffee ground (SCG) based activated carbon was prepared by microwaving spent grounds and activated using phosphoric acid. The conditions of the experiment were 5 g of ground, sieved, brewed,

and dried beans with 5 mL of phosphoric acid in a 300W microwave for 20 min. The effects of varying molar concentration of phosphoric acid (3.26M, 6.51M, 9.77M, and 13.02M) had on the amount of activated carbon created was determined. To characterize the activated carbon, the point of zero charge (pHpzc) measurement was taken. Various concentrations of methylene blue dye were made at the pHpzc with activated carbon. Using a UV-Vis, the amount of dye that was absorbed by the activated carbon was determined. The SCG activated carbons were then compared to two types of activated carbon on the market.

Use of Zinc Sulfanilic Spectrophotometry in a High School Chemistry Lab for Nitrate Analysis of Community Water Quality

Solomon Simon

Faculty Mentor: Jeanne Franz

This study examined four separate water quality analysis methods for high school chemistry students to detect nitrate levels in drinking water. The study selected one of the methods for students to use for analysis of nitrate levels in their school district. The sulfanilic acid, naphthylethylenediamine (NED) spectrophotometry method was selected due to the reagent's low toxicity, and also its accuracy. The zinc sulfanilic NED method was adapted to better fit into a 47-minute lab period. Students proceeded through stations in order to facilitate a complex procedure, and also increase testing accuracy. The four methods studied included the cadmium reduction method using a color wheel, cadmium reduction method spectrophotometry, direct U.V. absorption spectrophotometry, and zinc, sulfanilic acid, NED spectrophotometry. Two of the methods were found to have low accuracy: color wheel cadmium reduction, and direct U.V. absorption spectrophotometry. The accuracy tests found that: 36% of the chemistry students using the color wheel cadmium reduction method were within 2 mg/l of the nitrate standard, 77% of the students using the cadmium reduction spectrophotometry were within 2 mg/l of the standard. 73% of the students using sulfanilic acid, NED spectrophotometry were within 2 mg/l. The student testing found that seventy percent of the Buffalo City, Wisconsin residential well samples the students analyzed, using sulfanilic acid, NED spectrophotometry, exceeded safe level of 10 mg/l nitrate; with detected levels as high as 62.2 mg/l.

Voltametric Analysis of tris(aryliminocarboxylato)chromium(III) complexes

Emma Davis, Collin Handke, Natalie Olsen, and Leighton Stouffer

Faculty Mentors: Jennifer Zemke and Joseph West

Homoleptic chromium complexes bearing *o*-arylimino carboxylate ligands have been prepared. These complexes have been subjected to voltametric analysis and measured potentials have been correlated to their varying substituent effects. Complexes bearing ancillary aryl -CN, -NO₂, -COOMe, -F, -Cl, -OMe and -NMe₂ groups displayed measurable potentials. Preferred geometric isomers for each structure were utilized to model both oxidation and reduction energies using chromium(III) picolinate as a reference.

VRK1 Mutants and Implications for Kinase Stability and Activity in Neurodegenerative Disorders

Madelyn Degenhardt

Faculty Mentor: Emily Ruff

Vaccinia-related kinase 1 (VRK1) is a serine/threonine kinase that contributes to the regulation of mitosis, the DNA damage response, and other processes. Point mutations within the VRK1 sequence are associated with a variety of rare complex neurodegenerative disorders. Previous research suggests this may be due to changes in kinase activity and/or structure and stability, leading to downstream defects in Cajal body assembly. The D263G variant was identified in patients with hereditary spastic paraplegia. The missense mutation R321C has been detected in patients showing probable signs of ALS including lower extremity weakness and motor neuron lesions. Both mutants are on the surface of the C-terminal lobe of the kinase. This study focuses on understanding the impact of these mutations on protein stability and ligand binding affinity. The mutations were produced in a His-tagged VRK1 construct plasmid which was then transformed into *E. coli*, allowing for the overexpression and purification of the specific mutated VRK1 proteins. The stability and secondary structure of the protein were analyzed using circular dichroism (CD), and the protein's ligand binding ability was evaluated using differential scanning fluorimetry (DSF) with both nucleotides and kinase inhibitors. Results were compared to the wild type VRK1 protein and results for previously studied VRK1 variants.

What Does AI Think a Chemist Looks Like? An Analysis of Diversity in Generative AI

Meagan Kaufenberg-Lashua

Other Coauthors (Non-WSU): Jaime Kelly and Dr. Valeria Stepanova (Viterbo University)

Faculty Mentor: Joseph West

With the advent of generative AI technologies has come myriad concerns, one of which is the possibility of biases in terms of race and gender. Testing this in a focused way presents many challenges. We have sought to explore the realities of these biases within the microcosm of our field, chemistry. Using several well-known AI image generators, we have prompted for images of chemists with a generic prompt. Students' perceptions of the gender and racial categorizations of each AI-generated chemist were surveyed to provide pseudo demographics of the generated population. This data has been analyzed alongside students' own perceptions of what a chemist looks like to provide comparisons and to baseline the surveyed student population. We have identified biases in the images generated by all four AI image generators used in this study.

Computer Science

A Data-Driven Approach to Optimizing Keyboard Layouts for English Text

David Sommerfield

Faculty Mentors: Mingrui Zhang and Sudharsan Iyengar

QWERTY has been the de facto layout for English text input since its invention in 1874. Its continued usage has led to concerns about its ergonomic shortcomings. Previous attempts at layout creation have usually relied on manual observations of typing data rather than a predictive model. To address this issue, we propose a methodology that incorporates both corpus data from 22 million English websites and 8,228 hours of real-world typing data from participants. The corpus data is processed into bigrams and their number of occurrences. The typing data is preprocessed to exclude user-made typos, and then each bigram is tabulated along with its associated typing times. A regression model (MAE: 26ms, R²: 0.76) for predicting typing time is constructed using each bigram's average typing time, frequency, and

positional features on the keyboard. A layout's cost is calculated by taking the sum of each bigram's occurrence count multiplied by its predicted typing time, effectively estimating the layout's typing time across the corpus. Simulated annealing is then employed to settle on a near-global minimum for the cost function by iteratively swapping keys and heuristically accepting these swaps. The result is a keyboard layout with an estimated 9% improvement on QWERTY's typing time.

Enhancing Remote to Local Attacks with Machine Learning

Stephen Sommer

Faculty Mentors: Collin Engstrom, Mingrui Zhang and Sudharsan Iyengar

In the age of advancing technology, artificial intelligence, and big data, Remote to Local (R2L) attacks are increasingly threatening cloud computing environments, heightening concerns about security and privacy. Intrusion detection systems (IDS) using Artificial Intelligence play a role in safeguarding data integrity within databases by swiftly identifying and isolating suspicious records. Furthermore, machine learning techniques enhance the effectiveness of these IDS by continuously adapting to new attack patterns and improving accuracy.

This research investigates the use of Decision Tree, a Machine Learning Algorithm for enhancing Remote to Local (R2L) intrusion detection capabilities, utilizing the KDD Cup 1999 dataset and the NSL-KDD dataset. We applied the algorithm to the KDD Cup 1999 dataset, and to the NSL-KDD dataset individually. Later, we combined the two datasets and applied the algorithm to it. The results indicate that the use of combined dataset enhances intrusion detection accuracy. The IDS achieves an accuracy, detection rate, and false alarm rate of 99.93%, 91% and 0.08%, surpassing the individual accuracies of 99.90%, 83%, 1.08%, for KDD Cup 1999 and 99.83%, 83%, 0.08% for NSL-KDD.

Genetic Association in *Entylia carinata* using Random Forest Classification

Caden Harper

Faculty Mentors: Collin Engstrom and Amy Runck

The goal of this research was to identify locations in the genome of the *Entylia carinata*, known as the treehopper, that are associated with anomalous behavior exhibited by the species. Treehoppers are phytophagous insects and are shown to feed, reproduce, and rear their young on specific aster species. Observation has shown that the insects will disregard potential mates in close proximity in favor of those that originate from the same plant species as themselves. This behavior suggests genetic separation in the species based on plant nativity and warrants genetic analysis. Machine learning offers an effective genetic association technique due to its ability to identify obscure patterns and inferences in data and was chosen as an alternative approach to the treehopper problem. A random forest classification model was trained on sampled treehopper genetic data to predict the type of plant that the samples originated from. Once tuned, the model scored a 0.757 during leave-one-out cross validation and averaged a 0.83 AUROC between the three plant species. The feature importances were extracted and evaluated, yielding a set of locations in the genome that the model relied on during prediction. Because these locations informed the model on the native plant species of unseen samples, they are deemed indicative of the observed behavior and can be used for future analysis in tandem with the results of more traditional parametric genetic analysis tools.

Investigating How Illumination Affects Infrared Gesture Recognition

Lindsey Arndt

Faculty Mentors: Mingrui Zhang and Sudharsan Iyengar

The proposed research aims to investigate the impact of illumination on the accuracy and efficiency of infrared gesture recognition systems. Specifically, the study seeks to explore whether infrared gesture sensors exhibit greater accuracy in low illumination environments compared to environments with high direct illumination.

The experimental setup includes a controlled environment with a moveable light source and a table holding the infrared gesture sensor. Fifty-six tests were conducted, with participants performing gesture recognition tasks under varying illumination levels ranging from 600 lux to 1200 lux. After experimentation, a t-test determined if there is a statistically significant difference in the accuracy of gesture recognition between the two groups. The findings of this study show the threshold illumination is at 1070 lux. An increased illumination after the threshold causes gesture detection failure.

Education

Higher Education for the Digital Age: A Correlational Study of Undergraduate Study and Digital Citizenship

Jenna Ladd

Faculty Mentor: Joel Traver, Steven Baule, and Norb Thomes

The purpose of this non-experimental correlational study was to examine the extent to which there exists a relationship between undergraduate study and digital citizenship knowledge and skills as measured by the digital citizenship scale, a previously validated quantitative instrument. A web-based survey including the DCS, demographic questions, and a Higher Education Engagement questionnaire was distributed to all full-time undergraduate students at a public university in the Upper Midwestern United States. Data was collected from a sample of 349 undergraduate students who completed the entire DCS and the question about number of post-secondary credits earned. A bi-variate correlational analysis revealed that there is no relationship between digital citizenship knowledge and skills as measured by the DCS and number of post-secondary credits earned. Results of multiple regression analysis showed that the absence of correlation remained constant regardless of student demographic characteristics and campus involvement. Study results also provide insight into the mean level of digital citizenship as expressed by DCS scores. Respondents scored in the low-to-moderate range for three of the DCS subscales: Critical Perspectives, Internet Political Activism, and Networking Agency. Respondents who identified as non-cisgender and respondents with majors in the College of Liberal Arts and Sciences had higher mean DCS scores than their peers.

Engineering

A Novel Fixture Development to Characterize Impact Damage of Unidirectional Thermoplastic Composite Laminates

Matthew Ficker, Noah Misukanis, Dominic Perez, Hendrik Welti, Luke Poglayen, and Jacob Kosmoski
Faculty Mentor: Eric Kerr-Anderson

Impact testing of unidirectional thermoplastic composite materials is a challenge due to the Mode I shear of the primary tows on the impact side. Thermoplastic composite products manufactured using laminate stacking are bonded together with films of polymer on both sides of oriented fiber in typically a cross-ply or quasi-isotropic stack. The resulting failure from the distortion field imposed by a hemispherical tup is debonding along the interface between layer 1 and layer 2 oriented in the layer 1 direction from impact site to edge of panel. This failure mode results when the sample is too small relative to the weave pattern and fixturing resulting in more damage than will be witnessed on a large panel. The conservative estimate of impact strength would be appropriate for designing near edges of panels. In order to characterize an effective mid-panel impact toughness with standard Compression After Impact (CAI) fixturing, samples were created with additional length of the primary tows while still being able to fit in the CAI fixturing. Impact Energy was obtained using a Drop Tower Testing Machine. Damage zones were measured using backlit photography after the impact event. Specimens were machined post impact to allow for ASTM D7137 CAI testing to be conducted.

Auto Anchor

Logan Andrist, Markus Iwerbo, Alia Melloch, Noah Schultz, and Youyi Zhou
Faculty Mentor: Keith Dennehy

We've developed a new type of jack stands using glass fiber epoxy composites to tackle the rust and weight issues faced by traditional steel stands. Composites offer the best of both worlds: they're lightweight, strong, and resist corrosion. Our design features a lift range from 12 to 20 inches with a load capacity of up to 1 ton, making it versatile for most situations. After thorough testing following industry standards, our prototype demonstrated outstanding performance, holding up to 4000 lbs. of compression loading and 2000 lbs. of off-center compression loading. In addition, it passed tests for water and UV resistance, ensuring long-term durability. This new jack stand promises to make car maintenance safer and more manageable for everyone.

Block fatigue testing techniques considering hold time, frequency, and residual stress-strain curves

Ethan Ficker, Mitchel Bergmann, and Jackson Morgan
Faculty Mentor: Eric Kerr-Anderson

Block fatigue testing is a technique that can be used to accelerate the damage accumulation of a specimen by using high load tensile-tensile fatigue first to consume a certain percentage of the fatigue life of a specimen prior to dropping to a lower load to failure. Damage accumulation theory allows for partial life consumption analysis which would provide a simple percentage-based extrapolation to generate an S-N curve in a fraction of the time of a traditional fatigue testing campaign. Results from previous testing demonstrated that such a methodology correlates with a correction multiplier. To better understand the effect of block testing, three additional aspects were examined. The use of a hold time between blocks to allow for polymer chain relaxation prior to resuming fatigue testing at a lower tensile load. Traditional S-N curve generation can rely on a constant frequency, which would result in a

slightly different strain rate at different max-min loading combinations due to more displacement in the same cycle time. This aspect was examined by using block testing at the same loads with different frequencies. The final damage mechanism that was examined was how the stress-strain curve changed as a function of fatigue life. These experiments provided additional insight into the possible use of block fatigue testing to accelerate meaningful fatigue curve generation.

Comparison between commodity and high-performance polymer composites in impact resistance

Delia Derner and Kristine Osorio

Faculty Mentor: Beckry Abdel-Magid

Commodity thermoplastic polymers provide good load transfer to and protection of the reinforcing fibers. However, their mechanical properties are inferior to high-performance thermoplastic polymer composites. Findings of preliminary research conducted at WSU showed that continuous fiber reinforced (CFR) commodity polymers such as PETG and PP have better Izod impact resistance than their high-performance CFR counterparts. Further investigation of these findings is conducted in this research project. Quasi-isotropic laminates of GF/PETG and GF/PET-am are fabricated and tested in drop weight impact. The results will be compared with previously determined results of high-performance CF/PPS, CF/PA12 and GF/PPS. The samples are fabricated using the newly acquired Monarch Hot Press from Carver. The fabrication process is presented and discussed in this poster.

Compression of offset curved laminates

Max Kauphusman, Grace Eischens, and Parker Dallek

Faculty Mentor: Eric Kerr-Anderson

For decades, much work has been done to isolate specific loading modes (compression, tension, shear) when performing mechanical testing. Inevitably, this leads to geometrically simple specimens tested under elementary loading conditions. Real-world applications, however, are rarely so straightforward, integrating both combined loading as well as complex geometry. Moreover, exact, continuous predictive models for these scenarios are nearly impossible to develop without making considerable assumptions. Instead of these solutions, finite element analysis (FEA) has become the standard tool for simulation in industry. FEA involves the discretization of complex geometry into rudimentary elements, each with a far simpler mathematical solution. This process has grown with the processing capabilities of computers and is now incorporated into most professional CAD programs. FEA itself, however, struggles to handle the internal complexity of composite materials with mixed modes of compression tension and shear. This makes accurate FEA predictions of the behavior of real-world composite parts challenging. Non-flat composite laminates were tested under compression to investigate these behaviors and compare to FEA predictions. These laminates were created by a wet layup method and laid onto 3d printed tools with various curvatures. Additionally, all results were recorded in a database focused on the effects of compressive stresses on non-flat composite parts. This database is intended to grow and provide easy-access information for those learning about or designing composite parts with different types of curvature.

Effect of constituent materials on the impact properties of CFRTP composites

Kyungbin Min

Student Co-authors: Youyi Zhou, Delia Derner, and Kristine Osorio
Faculty Mentor: Beckry Abdel-Magid

Composite materials are commonly used in industry because they have great properties with a combination of reinforcement and matrix material. For example, an aircraft is made of glass fiber composite since it has high toughness, impact resistance, and high modulus. On the other hand, carbon fiber composite which has high strength and low density is mostly used in automotive and bicycle frames. Those excellent properties can be exhibited when the fibers are combined with the specific matrixes. In this research we focused on two different composites fabricated with polyphenylene sulfide (PPS), and polyamide 6 (PA6). Both PPS and PA6 are semi-crystalline, however, PPS has higher service temperature and chemical resistance than PA6. PA6 is easier to fabricate than PPS because of its lower melting point. Four composite materials, which were CF/PA6, CF/PPS, GF/PA6, and GF/PPS were manufactured in quasi-isotropic layup by compression molding. The specimens were subjected to impact loading of 10J/mm, 15J/mm, and 20J/mm, following ASTM D7136, to determine their impact resistance, absorbed energy, and compression strength after impact. Results of the testing and analysis are discussed in this poster.

Ergo Carbon Workspace

Ethan Atkinson, Joshua Hanner, Rachel Henderson, Anders Nielsen, and Mohamed Salat
Faculty Mentor: Keith Dennehy

The goal of the Ergo Carbon Workspace is to create a monitor stand that is both lightweight and easily transportable, catering to the needs of modern workspaces. Constructed from carbon fiber, epoxy resin, and a honeycomb core, this design emphasizes portability without sacrificing durability. Incorporating aerospace-grade honeycomb core as well as braided carbon fiber epoxy struts bolsters structural integrity while maintaining a lightweight part. The Ergo Carbon Workspace design facilitates effortless assembly and disassembly, simplifying transportation and packaging. Through the utilization of composite materials, the stand achieves an optimal balance of strength and portability. Ergo Carbon Workspace will also incorporate motorized adjustability, adding to its functionality and versatility. This feature enhances user experience and provides additional utility beyond traditional monitor stands. Beyond its ergonomic advantages, the Ergo Carbon Workspace also contributes to sustainability efforts by minimizing its carbon footprint. Engineered to withstand environmental factors like water exposure and UV radiation, this monitor stand ensures longevity and reliability in a variety of work environments.

Hunter's Lite Lift

Kaleb Dobson, Ethan Ficker, Jackson Morgan, Morgan Mumm, and Trevor Paulsen
Faculty Mentor: Keith Dennehy

The Hunter's Lite Lift is a composite climbing stand that offers accessibility for people to climb up into trees to hunt. It is manufactured of carbon fiber/foam core filament wound rods with a carbon fiber/foam core hand lay-up sandwich panel base with aluminum teeth. The climbing stand needs to be stable, able to support the weight of the user, and be small and light while not sacrificing comfort for the individual. This product is unique due to the carbon fiber/ foam core sandwich panel, which will make it lighter than its aluminum counterparts. Having a lightweight and long-lasting climbing stand would be in high demand by avid hunters and photographers. The lightweight stand would put less

strain on the user during hiking to and from their hunting/photography spots. The stand is designed, fabricated, and tested according to the Treestand Manufacturers and other standards such as retaining its mechanical properties when exposed to water and freezing temperatures.

Low-velocity drop weight impact and compression after impact properties of symmetric quasi-isotropic CFRTP composites

Youyi Zhou

Student Co-author: Kyungbin Min

Faculty Mentor: Beckry Abdel-Magid

Low-velocity impact properties and residual compression strength after impact performance are used to evaluate composite materials for many applications. In this research, low-velocity drop-weight impact and compression after impact performance of four continuous fiber reinforcement thermoplastic (CFRTP) composites are investigated. Quasi-isotropic samples of GF/PP, CF-PA12, CF-PA6, GF-PA6 were fabricated and tested according to ASTM standards. Three energy levels of 10, 15, and 20 J/mm, were employed in this research. Results indicate that GF/PP exhibits the highest damage resistance and rebound-ability, evidenced by its minimal indentation and damage area, the highest significant damage threshold force, and the highest ratio of impact elasticity to impact energy. It was followed by CF/PA12, CF/PA6, and GF/PA6. However, the GF/PP compression after impact properties were the lowest among the four materials, especially at higher impact energy. In general, CFRTP composites show a high tolerance to impact energy. At low impact energy levels, 10 to 20 m/s, GF/PP shows higher damage resistance followed by CF/PA12, CF/PA6, and GF/PA6, respectively. CF/PA6 and CF/PA12 exhibited higher compression strength after impact than GF/PP and GF/PA6.

Stride Warrior Lite, an ultra-lightweight mobility device with storage options, a padded seat, and handles that adjust to the custom comfort and needs for people with mobility concerns

Mitchel Bergmann, Cole Groven, Kyungbin Min, Sidney Paulson, and Keaton Reutzel

Faculty Mentor: Keith Dennehy

The Stride Warrior Lite is a walker that takes into account the needs of people with limited mobility. Few carbon fiber walkers and mobility devices exist in the market today; those that are on the market tend to be extremely more expensive than traditional aluminum alternatives. This product aims to serve as a carbon fiber walker that can be manufactured more economically than competitors, while still weighing less than 10 pounds. The majority of the design is manufactured from carbon fiber/epoxy filament-wound tubes, with 3D-printed connectors and steel pins. While the product also includes a cane holder, storage box, and padded seat, the most revolutionary part of the design is the adjustable handles, where the user may adjust the angle to find the most comfortable and ergonomic position. With a focus on being lightweight and ergonomic, the Stride Warrior Lite will prioritize the needs of those with limited mobility, while meeting the strict guidelines for medical devices and being less expensive than competing products.

English

Looking Through a Mirror: Disability in the Works of Flannery O'Connor

Xander Auman

Faculty Mentor: Gretchen Michlitsch

The works of Flannery O'Connor often include depictions of disability. O'Connor herself was disabled, as she was diagnosed with lupus in 1949. At face value, the depictions of disabled characters can seem problematic or suggest negative opinions of the disabled, but my presentation theorizes that O'Connor uses characters with physical disabilities to serve as foils. The disabled characters often bring out the worst in the non-disabled characters around them, allowing for further characterization of all characters involved. These disabled characters are often flawed themselves, but the disability is not what informs those flaws. O'Connor uses depictions of disability to explore human nature.

Memory and the Written Word

Kelly Stelzer

Faculty Mentor: Gretchen Michlitsch

I want to orally present my paper that compares ideas from Plato's dialogue in Phaedrus and Gabriel García Márquez's novel One Hundred Years of Solitude. In my paper I discuss the idea put forth by Plato's Socrates that writing things down often doesn't fully convey ideas for others and merely serves as a reminder to the people who already understand the ideas. Socrates's idea aligns with the experiences of the characters in One Hundred Years of Solitude, which specifically happens when the town of Macondo is thrown into a frenzy of writing things down during the memory loss epidemic. I analyze the section in One Hundred Years of Solitude in which José Arcadio Buendía and his son desperately try to write things down to save the town of Macondo. They describe what a cow is and how to milk it and they make a sign to remind the town of God's existence. I then compare this to Plato's ideas that are expressed in Phaedrus. This four-page paper was written for my Literary Theory Criticism class that I am taking with Dr. Michlitsch.

Satori Literary Journal

Elizabeth Benfield, Xander Auman, and Kelly Stelzer

Other student co-authors: Cody Beekman, Jessica Grafe, Jed Nelson, Kate Nissen, Drake Onyx, Alex Peachey, Benjamin Rayburn, Mandie Schmidt, Kylie White, and Jayde Yeates

Faculty Mentor: Liberty Kohn

This presentation will explain our production of Winona State's Literary Journal, *Satori*. *Satori* had been Winona State University's Art and Literary publication since 1970 and continues to celebrate art created by Winona State students. The production of *Satori* has been turned into a three-credit class and is handled by student editors taking the course.

This presentation will cover our marketing process. This includes the process of designing posters to entice submissions from students and give them valuable information pertaining to the submission process. This presentation will cover the process of designing promotion material for the book release. Submissions were compiled through email which was advertised next sorting the genres their respective committees.

This presentation will cover how we divided up our labor into editorial committees. Specifically, our presentation will demonstrate the selection of the professional guidelines for critical evaluation of all

submissions. Within each committee individuals advocated for their own opinions toward the group decision.

This presentation will cover the study and replication of the publishing industry in our classroom setting. This presentation will cover the work of coordinating with the publisher and printer to edit and order works into a book format using InDesign. This includes the ergonomics of book design to make it easy to read while keeping in mind our budget for printing. This presentation will also cover the electronic creation of the manuscript.

The Up-And-Coming Global Lingua Franca's Existence within China: A Case Study of Teaching English in China

Samanna Johnson

Faculty Mentor: Iris Wang

Overtime, the English language has spread to various parts of the world. The utilization of this language has since increased exponentially and as a result of this, it is becoming the world's official Lingua Franca. Now, many Chinese individuals, especially Chinese youth, have acquired the English language and are able to use it locally and/or internationally, especially within the business world. The research in this paper studied how these individuals learned English and informs us on what resources were available for their substantial language acquisition. This paper aimed to explore the teaching methods that English as a Foreign Language (EFL) teachers have implemented in China, the EFL materials that were/are available, the use of the up-and-coming world's Lingua Franca, English, within the professional world in China, Chinese L2 language learners' opinion on the matter, and the reason reading and writing (ex. the Grammar Translation Method [GTM]) was/is more popular and desired in China opposed to the Communicative Approach. My research finds that due to the long-term use of traditional language teaching approaches, advocated by Confucius, today's teaching methods do not stray far from that ideology. EFL teaching materials provided to most tertiary institutions were scarce and out of date, and EFL teaching training was not inclusive of teaching techniques. English acquisition remained a requirement for securing a job. Although it is not used in some professions, most employees still use English within their workplace, and consider it a part of their professional identities. The significance of this research lies in our everyday communication and how its teaching around the world plays a major part in our communication with numerous countries. Whether this communication is utilized for business, trade, politics, or an aid for cosmopolitan lifestyles, it affects us all one way or another. Therefore, we should all equip ourselves with the knowledge of a widespread linguistic commonality between speakers who possess various native languages.

Geoscience

Cultivating Sustainability: A Proposal to Reduce Campus Food Waste Through Composting

Evelyn Ankrum

Faculty Mentor: Pingping Zhang

Promoting sustainable practices within academic institutions such as Winona State University is crucial in addressing the environmental crisis and fostering a culture of sustainable living. Chartwells, the dining

service at Winona State University, produces about 400 lbs of food waste weekly that goes to landfills; this justifies our need for a large-scale industrial composting system. Composting offers waste reduction, soil enrichment, and carbon sequestration benefits. Winona State University currently has a small-scale industrial composter called Earth Cube in the SEED garden on campus. This project measures the composting process in the Earth Cube by assessing soil nutrient levels and temperature change. We use this data to predict the efficiency and impact of the larger-scale composter that we are proposing. In addition, our project outlines a comprehensive plan for Chartwells to divert all dining hall food waste into a new composting system to reduce food waste from campus and increase Winona's dedication to sustainable living. We make recommendations on location, design, budget, and feasibility in the proposed plan based on the following resources: (1) professional support from Green Mountain Technologies, (2) other established campus composting systems, and (3) the local situation on campus.

This project aims to help create a campus that produces less food waste; by embracing composting, our institution will reduce its ecological footprint and inspire a further transition towards sustainability objectives.

Environmental Catastrophes in Whitewater River Valley, MN

Sho Sato

Other Co-authors (Non-WSU): Jimmy Wood, and Katia Ostermann

Faculty Mentor: Dylan Blumentritt

The Whitewater River Valley is in southern Minnesota along the Mississippi River. This area was inhabited by Native Dakota and subsequently attracted many emigrants from European countries in the 1850s due to its scenic view and fertile soil. After the emigration of Europeans, forests in the valley were quickly turned into agricultural land. Removing vegetation from the valley took away the ability to absorb and hold water from soils which led to erosion and sedimentation. Eventually, streams clogged with sediment assaulted neighboring towns as floodwaters invaded towns and homesteads in the Whitewater valley. These flooding events became so intense and so frequent that residents in the valley had to abandon the valley. The purpose of this research is to summarize the history of Whitewater River Valley by using ArcGIS StoryMaps to tell this story in an approachable way so that all community members could understand the danger of environmental catastrophes that result from using lands without conservation practices.

Experimental Impact Craters into Sloped Targets

Ashley Miller

Other Co-authors (Non-WSU): Drs. Mark Cintala and Christopher Cline (NASA Johnson Space Center)

Faculty Mentor: Jennifer Anderson

Impact cratering is a process that shapes every planetary body in our solar system, including the Earth. On smaller planetary objects without atmospheres like the Moon and asteroids (e.g. Vesta and Ceres), impact cratering creates a rough surface with varying topography as opposed to a flat, horizontal surface. In general, impact cratering experiments are performed into flat targets to simplify the physics and model craters at larger planetary scales. However, the smallest craters that form on planetary surfaces are greatly affected by the local topography and cannot be understood by looking at experiments into flat targets. Dr. Anderson and her undergraduate research group are working to better

understand experimental targets that are more realistic to what we see at small scales on the Moon and asteroids: layered targets and sloped targets. My research focuses on the experiments into sloped targets.

At the NASA Johnson Space Center Experimental Impact Laboratory, the Vertical Impact Facility was used for our sloped-target experiments. You can think of the Vertical Impact Facility as a standard powder gun that is pointed directly downward and fires a 4.76-mm-aluminum sphere into targets consisting of 0.4-0.8 mm rounded, sieved sand at speeds of 1.5 km/s (3400 mph) for these experiments. The targets had slopes of 0°, 5°, 10°, 15°, and 20° above horizontal. A NextEngine 3D Laser Scanner was used to scan the targets before and after impact. I then used CloudCompare, a software program that processes point cloud data, to generate topographic maps of the experiments based on the three-dimensional scans. With CloudCompare, I drew eight transects through the center of each crater and then processed these data using Excel. I created cross-sections and measured the craters' dimensions. The measurements, topographic profiles, and topographic maps of the final experimental craters can then be compared to our control crater into the horizontal target (0°) as well as observations of craters into sloped surfaces on the Moon and asteroids.

Health, Exercise & Rehabilitative Sciences

Orthotic Devices for the Conservative Treatment of Trigger Finger: A Critical Appraisal

Kennedy Bican

Faculty Mentor: Brandon Donahue

Clinical Question: In middle aged individuals with trigger finger, what is the treatment effect related to using an orthotic device versus no device on pain and triggering events?

Clinical Scenario: Currently, there is a limited number of published articles that examine how to best manage trigger finger. Furthermore, the existing evidence doesn't provide conclusive support for one treatment strategy over another. The purpose of this critical appraisal is to explore whether trigger finger is best treated with orthotic devices, or if alternative options such as surgery or steroidal injection provide better outcomes.

Search Strategy: Seven articles were included in the appraisal from a comprehensive literature search of the PubMed, CINAHL, Cochrane, and ProQuest databases. Key search terms included: trigger finger, orthotic, device, conservative, treatment, and non-surgical. Studies were included if they were either a randomized control trial or cohort study, utilized participants aged 18 years and older diagnosed with trigger finger, and evaluated either pain levels or the number of triggering events experienced.

Evidence Quality Assessment: The quality of the seven articles was assessed using the PEDRO scale, with scores ranging from 2/10 to 7/10. The Oxford Level of Evidence of this appraisal was Level 2b, meaning the appraisal was compromised of cohort studies and lower quality randomized control trials.

Results and Summary of Search: The main outcomes analyzed in this appraisal included the Visual Analogue Pain Scores (VAS), Stage of Stenosing Tenosynovitis (SST), and number of triggering events.

Limitations identified in the appraised literature included patient non-adherence to orthotic splinting, orthotic type variation, and attrition. Four studies evaluating triggering events all found that compared to not wearing an orthotic, orthotic usage decreased the number of triggering events for participants ($p < 0.05$). Pain as measured by VAS scores was reduced by orthotic usage in all three studies ($p < 0.05$). One study found that splinting alone, corticosteroid injection, and splinting (with injection) were equally effective in reducing pain and improving hand function. Two studies evaluating SST both found that compared to not wearing an orthotic device, orthotic usage improved SST scores ($p < 0.05$).

Clinical Bottom Line: After reviewing the evidence, there is some limited support to suggest that trigger finger can be treated effectively with an orthotic device although no strong conclusions can be drawn. The Strength of Taxonomy (SORT) score of this systematic review is a B-level recommendation due to it being based on inconsistent or limited quality patient-orientated evidence.

Implications: Orthotic devices may be an effective intervention for the treatment of trigger finger and should be considered when treating this condition before progressing to more invasive measures. This appraisal's findings have shown positive effects of orthotic use, although more exploration into the effectiveness of orthotic variations is needed along with comparison to other invasive procedures.

A More Comfortable Method for Hydrostatic Weighing: Head Above Water at Total Lung Capacity

Annabelle Berggren, Lillian Brinkman, Brianna Carman, Lucas Crouse, Emma Hoffmann, and Sara Twedt
Faculty Mentor: Erin White

Body composition is an important indicator of overall health, and hydrostatic weighing (HW) is one of the many methods of determining body composition. The gold standard of HW requires full submersion with the lungs at residual volume (RV) which is uncomfortable and unnatural.

Purpose: Therefore, the purpose of this study was to find a more comfortable way to complete hydrostatic weighing. To accomplish this, three tests were done: 1) the concordance of HVPRED equations, 2) the validity of TLC using RV, and 3) the validity of HAW@TLC using HBW@RV.

Methods: A convenience sample of participants self-reported age, sex, gender, and physical activity level. Height, weight, head girth, and face girth were taken prior to HW. A HW system was used to complete three different techniques: head above water (HAW) at total lung capacity (TLC), head below water (HBW) at TLC, and HBW at RV. Three consistent trials of each technique within 100 g were used for analysis.

Results: Data of all 122 participants was separated by males ($n = 64$) and females ($n = 58$). Three comparisons were formed from the three techniques: Comparison 1 (HBW@TLC vs HAW@TLC), Comparison 2 (HBW@RV vs HBW@TLC), and Comparison 3 (HBW@RV vs HAW@TLC). Comparison 1: HAW@TLC resulted in higher mean percent body fat (PBF) than HBW@TLC (4.5% total, 3.8% in males, 5.4% in females, $p < 0.05$). Comparison 2: HBW@TLC resulted in lower mean PBF than HBW@RV (5.1% total, 5.3% in males, 4.8% in females, $p < 0.05$). Comparison 3: HAW@TLC resulted in lower (1.5% lower, $p = 0.003$) mean PBF for males but not females and the total (0.6% higher, $p = 0.39$, 0.6% lower, $p = 0.18$, respectively) compared to HBW@RV. Bland-Altman plots showed proportional bias in comparisons 2

and 3, both overall and for females, but not males. Lin's Concordance Correlation Coefficient showed high concordance in Comparisons 1 and 3, but moderate concordance in comparison 2.

Conclusion: In conclusion, HW is the gold standard method, but it can cause physical and psychological discomfort which deters participation. The results show that both head position and lung volume affect PBF results. Comparison 3 results suggest that HW can still be accurate and more comfortable, especially for people who dislike full submersion or cannot perform it, such as children and people with obesity and pulmonary disease.

An Examination of Achilles Tendinopathy Treatment in Physically Active

Patients

Haily Doherty

Faculty Mentor: Brian Zeller

Clinical Question: What is the effect of eccentric loading exercises versus platelet-rich plasma (PRP) on pain in physically active adults with a history of Achilles tendinopathy?

Context: Limited research is available for Achilles tendinopathy treatment. Achilles tendinopathy can be treated by rest, NSAIDs, and avoiding activities that aggravate the condition, however, this study relates to physically active individuals such as athletes. Because of this, rest and avoiding activity may not be an option for them, so implementing other treatments such as eccentric exercise training and PRP may be the best choices. The purpose of this study is to determine the best treatment to reduce pain in physically active individuals with Achilles tendinopathy by comparing eccentric exercise training to PRP.

Data Sources: The author searched the following databases: PubMed and Physiotherapy Evidence Database (PEDro). The following keywords were used individually and in combination: eccentric exercises, platelet-rich plasma (PRP), physically active, and pain.

Study Selection: Studies were included according to the following criteria: (1) randomized control trial, (2) chronic Achilles pain for 3-6months, (3) physically active adult aged 18 years or older, (4) the intervention group received PRP injection or eccentric training compared to the control group that received saline or no training, and (5) the effect of pain from each intervention was reported as the main outcome.

Data Extraction: Data included the number and sex of participants, type of condition being treated, length of pain for the condition, treatment used, control group, outcome measures, and results. Studies were analyzed using the PEDro scale and the Center for Evidence-Based Medicine's Levels of Evidence Scale. PEDro scores for all studies were recorded at a 10, except for the randomized control trial discussing the exercise therapy program for Achilles tendinopathy which recorded a score of 7.4 The OCEBM Levels of Evidence for all studies were recorded as level 2 evidence.

Main Results: Seven articles fit the criteria and were reviewed for a total of 302 participants. There was no statistically significant difference between the scores when comparing PRP injection with an eccentric loading program ($p = 0.171$), indicating that PRP may not be superior to eccentric exercises.¹ When PRP was compared to a placebo group, there was no significant difference between the groups (VISA-A score at 6, 12, and 24 weeks had a difference of 2.5, -1.6, and -0.9, respectively).² Significant

improvements were noted when PRP was combined with exercise ($p < 0.001$).³ When eccentric exercise training was compared to no training, improved function of daily living and sport-related activities, along with a reduction in pain were found in the eccentric exercise training group ($p < 0.001$).⁴ There was no statistically significant difference between the PRP and saline group shown between the two groups at 6 months (mean difference, -1.3 [95% CI, -17.8 to 15.2, $P = 0.868$]).⁵

Conclusions: Eccentric loading exercises are the best treatment for physically active adults who have chronic Achilles tendinopathy regarding pain reduction compared to PRP.

Key Words: Eccentric loading exercises, platelet-rich plasma, randomized control trials.

Beyond the Drill: Assessing the Effectiveness of Active Shooter Simulations for School Safety

Diego Ramirez, Reid Hartness, and Sydney Prince

Community Partner: Ben Klinger (Winona County Sheriff)

Faculty Mentor: Andrea Rossin

School shootings are a growing problem in the United States, making the students and staff who work in US schools more fearful that today might be the day to change all of their lives forever. With this thought in mind, emergency preparedness has come to the forefront of many school district's policies and local legislation. Begging the question, what methods are effective in preparing schools and local law enforcement for a school shooting? How do we prepare schools and local law enforcement without causing trauma to the students and staff of participating schools. This review of the literature looks at shooter simulations and whether they help school districts and law enforcement prepare effectively in the case of a school shooting.

According to the literature reviewed, traditional lockdown methods in active school shootings poorly prepare students and staff compared to a multi-option approach like Run, Hide, Fight. From our own primary data we found that 83% of first responding personnel reported excellent learning outcomes from the training session, indicating knowledge is gained during the training session. Prior to the training, 45% expressed confidence in handling similar situations. However, following the training, 83% of first responding personnel reported a significant improvement in confidence levels when faced with similar scenarios. This 38% increase shows the training program's ability to increase knowledge and confidence in the participants. Implementing lockdown and evacuation drills like fire drills, without simulating actual threats, to familiarize individuals with procedures and establish muscle memory in a controlled, low-stress environment is preferable to traditional lockdown drills. The findings of this literature review suggest that multi-optional approaches are superior to traditional lockdown drills because they will limit the amount of trauma impacting students.

Keywords: School shootings, preparedness, mental health, active shooter drills

Digital Mental Health Outreach Programs for Older Adults

Gavin Jacob, Vincent Pham, and Paige Piazza

Faculty Mentor: Andrea Rossin

Within this literature review, the effectiveness of digital mental health outreach programs for older adults will be examined. With the aging global population continuing to grow larger each year, mental health concerns among older adults have gained more attention than ever. To address these concerns, digital mental health outreach programs have been put in place with the goal of providing older adults with a real person they can regularly talk to and receive advice or recommendations from. This review uses existing research along with tangible real-world experiences to determine the impact these services have on the older adults who utilize them. This review explores the effectiveness of these programs by identifying key findings: improved mental health case identification, reduced feelings of social isolation, and overall improvement in quality of life. Additionally, this review will examine how these programs approach assessing their effectiveness and what they do with that information to make improvements for the future. Throughout this comprehensive analysis of data, this review will provide insight into the world of digital mental health outreach programs for older adults, the effectiveness of them, and highlight the changes for improvement in the future.

Does Virtual Reality Help Parkinson's Patients Improve Balance?

Brooke Penaz

Faculty Mentor: Nora Kraemer

Clinical Scenario: Parkinson's Disease poses a significant challenge, often leading to balance impairments that can severely impact quality of life. Traditional physical rehabilitation has been a cornerstone in managing these balance issues, but the advent of virtual reality (VR) training introduces an intriguing alternative. The purpose of this study is to investigate the comparative effectiveness of VR training versus conventional physical rehabilitation in enhancing balance among older adults diagnosed with Parkinson's Disease. This research aims to address the growing demand for innovative interventions that could potentially offer more engaging and impactful solutions for improving balance outcomes in Parkinson's patients.

Clinical Question: In older adults with Parkinson's Disease, what is the effect of virtual reality training compared to conventional physical rehabilitation on balance?

Search Strategy: Inclusion criteria were randomized controlled trials that included individuals with Parkinson's disease ranging between 50 to 85 years old. Exclusion criteria were other causes of tremor, bone or joint disease, and visual or hearing disorders. A PubMed database search with the following terms: "virtual reality rehabilitation," "Parkinson's disease," "balance," and "traditional rehabilitation," yielded eight research studies.

Evidence-Quality Assessment: PEDro scale scores ranged between 6/10 to 9/10. The Oxford Levels of Evidence score is 1b.

Results and Summary: Four studies demonstrated significant differences of balance ($P < .001$ - $P < 0.05$) between the interventions. The other four studies found no statistically significant differences ($P > 0.009$ - $P > 0.05$) between the interventions. Outcome measures included the Berg Balance Scale (BBS) and Activity-Specific Balance Confidence Scale (ABC).

The strengths of the research include demonstrating that virtual reality rehabilitation for patients with Parkinson's disease can lead to similar or greater improvements in balance compared to conventional rehabilitation, while also providing patients with more enjoyable and interactive training experiences. Limitations of the studies included a non-crossover design, a small sample size, lack of blinding of

therapists in the conventional exercise group, short follow-up testing of 2 weeks, and the complexity of VR programs.

Clinical Bottom Line: While VR rehabilitation offers a promising avenue for improving balance, it is not significantly different from conventional physical rehabilitation. SORT Score B.

Implications: The study's findings have several implications for clinical practice, education, and research. Healthcare practitioners may consider integrating VR training into their conventional rehabilitation approaches for older adults with Parkinson's disease who have issues with balance, given its positive impact. This not only adds variety to interventions but also addresses the reported increase in enjoyment and interactivity during VR training. Future studies could delve into refining VR programs for better long-term outcomes and overcoming the identified limitations, thus contributing to the evolving landscape of Parkinson's Disease care.

Effectiveness of Soft Tissue Mobilization versus Therapeutic Ultrasound on Pain in Adults with Plantar Fasciitis

Wyatt Taylor

Faculty Mentor: Nora Kraemer

Clinical Scenario: Plantar Fasciitis (PF) is an overuse condition resulting in inflammation of the plantar fascia on the sole of the foot which can refer pain to the heel. PF is present in 10% of the United States general population and mostly affects adults from ages 25 to 65 years old. If PF is treated poorly, symptoms can last up to a few months before subsiding and longer if the patient continues activity. Many studies test the effectiveness of treatments for function, such as custom orthotics, heel cups, corticosteroid injections, anti-inflammatory drugs. However, the effectiveness of pain reduction for common soft tissue treatment styles like soft tissue mobilization (STM) and ultrasound (US) can range differently for patients.

Focused Clinical Question: Therefore, the purpose of this critical appraisal is to identify in adults over age 18, who have PF, what is the effect of soft tissue mobilization (STM) vs. therapeutic ultrasound (US) on pain?

Search Strategy: Databases such as PubMed and Cochrane Library were used to collect data. Search terms were "plantar fasciitis", "plantar heel pain", "soft tissue mobilization", "myofascial release technique", and "therapeutic ultrasound". Inclusion criteria were adult general population patients (18+ years of age), complaints of plantar heel pain, or painful first step in the morning, patients referred to a physiotherapist for PF or recently diagnosed with PF. Exclusion criteria included patients who previously received corticosteroid injections for plantar heel pain (PHP), patients who received US treatment previously for PF, currently taking steroidal or nonsteroidal anti-inflammatory medications, and currently using custom orthotics.

Evidence Quality Assessment: Average PEDro was 5/10 to 7/10, 1a-1b research.

Results and Summary of Search: Six of the seven studies that used STM saw a statistically significant decrease in pain ($p < 0.05$ to $p < 0.001$), up to an 82% decrease ($p < 0.05$ to $p < 0.001$), reported on multiple pain scales ($p = 0.05$ to 0.001), over US between 10 days to 6 weeks when combined with foot

intrinsic strengthening and stretching (FISS). One study resulted in no significant reduction in pain after 4 weeks after only US ($P > 0.05$). Study strengths include consistently frequent treatment throughout the study, thorough description of STM methods listed, similar pain scale measurements between studies. Weakness includes limited data about the effectiveness of STM, lacked long-term follow up data, and small sample sizes $n=30$ to $n=32$.

Clinical Bottom Line: STM reduces pain for adults experiencing PF when combined with FISS over the use of US (Level-A study quality). STM should be used consistently with FISS to treat PF for at least 10 days to reduce pain.

Implications: *Athletic trainers should favor the use of STM over US for treating US.* However, more research needs to be done to identify the effects of only STM on reducing pain and the long-term effects. In every study that included STM, FISS was also used in combination with both treatments.

Effects of collagenase injection and surgical fasciectomy for people with Dupuytren Disease: A critically appraised topic

Silvia Parisi

Faculty Mentor: Nora Kraemer

Clinical Scenario: Dupuytren's disease is caused by thickening of the fascia in the palm of the hands that can lead to disability to use them. Minimal research has been published on effective treatments for Dupuytren's disease. Common treatments include collagenase injection and surgical fasciectomy. The purpose of this critical appraisal is to compare these two interventions to determine which is more effective for long term management of Dupuytren's disease.

Focused Clinical Question: In Dupuytren's Disease, is collagenase injection or surgical fasciectomy more effective preventing contracture long term?

Search Strategy: PubMed database was used to find articles with the following search terms: Dupuytren Disease, Dupuytren Disease's treatments, Collagenase injection, surgical fasciectomy in Dupuytren Disease. The inclusion criteria were studies with at least 2 year follow up that evaluated adults aged 18 or older with one or more contractures in different joints of the hands. The exclusion criteria were (2) studies with a follow up less than two years. Seven studies were included.

Evidence Quality Assessment: PEDro score were 4/10 to 8/10. Oxford Level of Evidence was level 2.

Results and Summary of Search: Surgical fasciectomy was more effective in providing short-term relief than collagenase injections ($p=0.014$) in 1 article. 4 articles stated that the disease might reoccur despite surgical fasciectomy and collagenase injections were used (p -values= 0.3, 0.4, 0.014, 0.02) so there was no longer difference between the two treatments. Strengths of the studies were that both the patients and the assessors were blinded. Weaknesses of the studies were the high dropout rate and small sample size.

Clinical Bottom Line: Both treatments help patients in short-term with contractures but after years the disease may manifest again. With this review, it is possible to notice that collagenase injection and surgical fasciectomy for the Dupuytren's disease are disappointing in the long-term. The strength of recommendation score (SORT) is a level B.

Implications: Both treatments, surgical fasciectomy and collagenase injection are not effective in the long term. For the patients, to be able to use their hands, this can force them to go through both treatments multiple times. This study can show to the patients that even with one of those two treatments, their quality of life will improve temporarily and not forever. This topic should be studied in the future trying to understand if one treatment eliminates the other or if they can be used together to hope for a longer result.

Literature Review of Mental and Emotional Wellbeing of Individuals 65 and Above After COVID-19

Shantelle Ruf, Petra Kittleson, and Macy Lien
Faculty Mentor: Andrea Rossin

The Coronavirus (COVID-19) pandemic drastically changed social interactions between people; this had a significant impact on individuals aged 65 and older. This demographic faced challenges such as total isolation, interrupted social connectedness, limited access to their basic needs, and financial stressors due to the shutdown. This review of the literature looks at how the decrease in face-to-face interactions during COVID-19 affected the mental and emotional well-being of older adults during the pandemic. Methods of research conducted through scholarly journals showed the effects of isolation on mental and emotional health. Despite the wide range of availability of digital communication, the 65 years of age and older population found it difficult to maintain connections that way. The research suggests that although technology could be used to provide some emotional support through the COVID-19 pandemic, it could not fully be used in place of face-to-face communication. In conclusion, it was found that reduced face-to-face interactions during the COVID-19 pandemic increased stress, anxiety, and depression in adults 65 years of age and older.

Overhead Athletes and SLAP Repairs and Biceps Tenodesis on SLAP Injury Recovery

Sydney J. Ede
Faculty Mentor: Brian Zeller

Focused Clinical Question: In throwing athletes, what is the effect of a full arthroscopic SLAP repair versus a biceps tenodesis on athletic performance?

Search Strategy: To properly analyze potential differences within these two surgical procedures, narrowed results requiring participants to be overhead or throwing athletes was required to participate within this review. Full arthroscopic repair of a SLAP lesion versus a subpectoral biceps tenodesis procedure was required to participate in these studies. The primary search engines used were PubMed and Google Scholar.

Evidence Quality Assessment: All studies used in this review were retrospective level III cohort studies.
Clinical Scenario: SLAP lesions are a very common injury in all athletes, with the increased prominence in overhead athletes. How to manage and treat this common injury is greatly discussed in the healthcare world, yet a decision on one intervention vs. another has not been established.

Methods: All included studies analyzed were cohort studies with varying levels of evidence. The patient population included patients ranging from 18 to 40 years of age who were overhead athletes. All patients had to have a SLAP lesion (Type II) and had to be treated with either a biceps tenodesis (subpectoral) or a full arthroscopic SLAP repair.

Important outcome measures include the rate of reinjury, the ability to return to pre-surgical level of competition, and the evaluation of patient reported outcomes, including ASES and VAS and DASH scores.

Results: The most profound result found in these studies was a mean increased ASES and VAS score postoperatively. All studies struggled to find any further consistent results. This is to be expected when relying on PROs for conclusive results.

Conclusions: Both procedures yielded positive outcomes in the terms of SLAP repairs. Discussion with patient on pros and cons of each procedure should occur prior to selection of intervention.

Clinical Bottom Line: Both surgical interventions have been shown to be successful, with numerous good outcomes. Patients should discuss surgical intervention preferences with physician.

Implications: The decision of these two procedures for the same or similar athletes should be made based on their future goals.

Patellofemoral Pain Syndrome Rehabilitation Techniques

Taylor Zimmerman

Faculty Mentor: Nora Kraemer

Clinical Scenario: Patellofemoral pain syndrome is the most common cause of anterior knee pain and affects 25-40% of the active population. The etiology or cause of patellofemoral pain syndrome is unknown but has been tied to malalignment and muscular imbalances of the lower extremity, overactivity, or direct trauma. Most patients with patellofemoral pain syndrome can be treated with proper rehabilitation. This research study's purpose was to determine whether a quadricep or hip-focused rehabilitation program would be more effective in decreasing pain and improving function.

Clinical Question: In adults with patellofemoral pain, what is the effect of hip strengthening compared to knee strengthening on pain, function, and strength?

Search Strategy: PubMed was used to find articles. Seven articles were selected through key words such as "patellofemoral", "hip", and "knee". Inclusion criteria were individuals ages of 16-45, insidious onset of symptoms not related to trauma, pain with compression of the patella and anterior or retro patellar knee pain during two or more activities. Exclusion criteria were a current significant lower limb injury, knee surgery, or other MRI confirmed pathological conditions.

Evidence Quality: Pedro scores were of 8/10 to 9/10 and Level 2 on the Oxford Levels of Evidence scale.

Results and Summary of Search: Five of six studies showed significant improvements in pain reduction, function, and strength with both the hip and knee and knee only rehabilitation groups ($p < 0.001$). However, the hip protocol group had significantly less pain than the knee group earlier in the rehabilitation process ($p = 0.035$). Strengths articles included good compliance with low dropout rates,

dosages in the exercise groups were matched, and the inclusion of exercises that isolated specific muscle groups. Limitations were small sample sizes and varying baseline data on pain scales.

Clinical Bottom Line: Both hip and knee or knee only rehabilitation programs for PFPS have been shown to significantly reduce pain and improve function and strength. Despite neither rehabilitation protocol being more effective than the other, there seems to be an upward trend in favor of the hip and quadricep protocol. The SORT score is B.

Implications: Based on the findings of this study, Athletic Trainers should prescribe additional hip exercises to PFPS rehabilitation programs as it may provide pain relief sooner and reduce lower extremity malalignment. Weak hip abductors and external rotators are common in PFPS patients. By targeting these weak muscles, a patient's lower extremity alignment improves and reduces stress on their patella joint due to a decrease in compressive forces. Additionally, future research should focus on the long-term effectiveness of these programs.

Prevention Training effect on rates of ACL injuries in Female Adolescent Athletes

Victoria Ellingson

Faculty Mentor: Brian Zeller

In adolescent female athletes, what is the effect of neuromuscular, core stability, and biomechanical risk prevention training compared to no prevention training on the risk of anterior cruciate ligament (ACL) injuries? The search strategy PubMed and google scholar. Search terminology included but not limited to anterior cruciate ligament, female adolescent, biomechanical factors, risk of ACL injuries, soccer female athletes, prevention training for ACL injuries, core stability effect on ACL prevention programs, and neuromuscular effect on ACL prevention programs. All articles were randomized controlled trials except one article which was a controlled laboratory study. All articles were analyzed utilizing the Pedro scale and the Oxford Level of Evidence. The Pedro scales averaged 9 out of 11 with one article not included due to a different type of study. Five of seven articles had an Oxford Level of Evidence of 1b or 1. The limitations of the evidence included not double blinded, short duration of intervention ranging from 6 to 12 weeks, and potential puberty effecting the results. The evidence strengths are that they are all ACL prevention programs, female adolescents, have an intervention group and controlled group free from lower extremity injuries, and are athletes with an identified risk of lower extremity injuries in their sport. The variation in prevention training programs includes neuromuscular training, biomechanical factors, perturbation, strength, flexibility, core stability, and hip exercises. The risk lessened in the evidence that evaluated hip and knee flexion angles, modification of side cutting and single leg landing through neuromuscular training. According to Evens J, et al., the ACL is the most commonly injured ligament in the knee. The annual reported incidence in the United States alone is approximately 1 in 3500 people. Studies state that the incidence rate of ACL injuries is more common in females than in males and more common for female athletes to rupture their ACLs at a younger age. The goal of many researchers is to determine an appropriate prevention training for adolescent female athletes to decrease the risk of ACL injuries. My goal is to determine the effectiveness of these prevention programs and compare the techniques to determine if a prevention program will help reduce the risk of ACL injuries in young female athletes. The strength of this research rated on the Strength of Recommendation Taxonomy is 1B. I found three articles to be successful in preventing risk of ACL injuries in female adolescent athletes while four articles were inconclusive. Therefore, prevention training for female adolescents may be helpful in lowering the risk of ACL injuries but further research is

needed for the best techniques to use. This review creates awareness of ACL injury risks in female adolescent athletes. Prevention programs for this age group may be needed to help decrease the incidence of these injuries. However, the question remains on what type of prevention training would be best to decrease the risk of ACL injuries and what the program should focus on.

The Effects of Blood Flow Restriction Training on Patients After ACL Reconstruction

Gail Nelson

Faculty Mentor: Nora Kraemer

Clinical Scenario: ACL tears are most common in basketball, soccer, and volleyball. The recovery process may take up to about 12 months. One key factor of an ACL reconstruction (ACL-R) patient's recovery is regaining strength while also decreasing pain as much as possible, however regaining strength in early stages of rehabilitation can be difficult due to weight restrictions on the injured leg. This is where blood flow restriction (BFR) training can help the patient along the road of recovery. The purpose of this critical appraisal is to analyze the effectiveness of BFR training compared to heavy load resistance training with knee flexion and extension strength in ACL-R patients aged 18-65.

Focused Clinical Question: In patients between the ages 18 – 65 post ACL-R, what is the effect of low load BFR exercise training compared to traditional heavy load resistance training (control) on knee flexion and extension strength?

Search Strategy: Articles were found by the keywords BFR training and ACL-R. Final article selection was made by the inclusion criteria of ACL-R participants and participant age of at least 18. Exclusion criteria included injuries to the ACL along with other knee structures and ACL injuries that took a conservative approach to rehabilitation. To search for articles, the databases PubMed, CINAHL, and Cochrane library were used. Once these databases were searched with the aforementioned keywords and inclusion criteria was applied, 7 articles were reviewed.

Evidence Quality Assessment: PEDro scores ranged between 7/10 to 10/10. The seventh article was a prospective study. All 7 articles had an Oxford Levels of Evidence score of 2.

Results of Summary and Search: Only two studies found a statistically significant difference, ($p=.013$ and $p=.034$), when comparing strength gains between the two interventions. However, knee flexion and extension strength gains were statistically significant within the intervention groups, ($p<.05$) in six articles. Strengths of the studies included blinding of assessors and consistency in the intervention protocols. Weaknesses were small sample sizes and lack of blinding of the participants.

Clinical Bottom Line: Both BFR training and heavy load resistance training are effective in increasing muscular strength during rehabilitation with post ACL-R patients. However, minimal evidence exists that demonstrates effectiveness of one intervention versus the other. SORT score: B.

Implications: Both interventions increase muscle strength in ACL-R patients. Knowing this, we can apply either intervention with ACL-R patients knowing both interventions are both safe and beneficial for improving knee flexion and extension strength. However, it is difficult to apply the findings to the non-athletic population and when determining what phase of rehabilitation BFR training is most beneficial. It

would be beneficial to conduct studies with larger sample sizes, studies specific to collegiate male or female athletes or sport specific, along with evaluating BFR in multiple phases of rehabilitation.

The Effects of IASTM and Foam Rolling on Hamstring Range of Motion

Lisa Nadeau

Faculty Mentor: Nora Kraemer

Clinical Scenario: To determine which form of self-myofascial release is more effective at improving hamstring range of motion. Hamstring range of motion (ROM) is important for posture and reducing joint pain or causing injury which is vital in athletics. There are different ways to increase ROM, this review compares how IASTM versus foam rolling can improve hamstring range of motion.

Focused Clinical Question: In college athletes, how does instrument-assisted soft tissue mobilization (IASTM) compared to foam rolling affect hamstring range of motion (ROM)?

Search Strategy: Studies included in the critical appraisal were taken from PubMed, Cochrane Library, EBSCOHost, and Academic Search Premier using the terms: foam rolling, IASTM, Graston, ROM, flexibility, hamstring, athlete, and self-myofascial release. Inclusion criteria included sport related, hamstring ROM, and high school to college aged. While exclusion criteria were hamstring ROM not measured and not in the age category. From this search, seven studies were found with criteria to fit this critical appraisal.

Evidence Quality Assessment: Articles used had a PEDro score ranging from 5/10 to 9/10 and Oxford Levels of Evidence scores between 2-3.

Results and Summary of Search: IASTM and foam rolling have both demonstrated the ability to enhance hamstring ROM. Of the seven studies analyzed, two studies found an improvement in range of motion through IASTM ($p = 0.014$). One study reported an increase using a foam rolling intervention ($p = 0.06$) Four of the studies found that both IASTM and foam rolling were found to increase hamstring ROM ($p = 0.001 - 0.05$). Strengths of the study's included consistency of ROM measurement throughout the study. Weakness found were that not many studies compared IASTM and foam rolling in athletes.

Clinical Bottom Line: Consequently, it can be concluded that both treatments offer viable alternatives for enhancing ROM, thus there was no difference between the two treatments. The strength of recommendation (SORT) is B.

Implications: Healthcare providers can apply both IASTM and foam rolling to improve hamstring ROM. Implications found through this study include that not many studies looked at IASTM and foam rolling with comparing range of motion, specifically in athletes. Future research needs to be done to better determine if one increases ROM more than the other. Future methodology should include looking at specific athletes including level of activity, sport type, and determining how these forms of intervention improve ROM between men and women.

History

Activism and Historical Narratives in the Construction of a Shared Memory of Comfort Women's Trauma

Raelin Craig

Faculty Mentor: Erik Heinrichs and Ai Wang

This thesis explores the impact of comfort women activism on collective memory and Japan-South Korea relations. It provides a historical context to understand the moral, legal, and political challenges inherent in the comfort women issue. The thesis emphasizes the role of shared memory in shaping perceptions and interpretations of this topic. The literature review critically engages with diverse perspectives, including the historical origins of the comfort women system and conceptual frameworks such as shared memory theory and trauma studies. Methodologically, the thesis adopts a qualitative analysis approach, drawing from survivor testimonies and navigating ethical considerations in researching sensitive topics. The research traces historical catalysts and the formation of international networks by exploring the emergence of comfort women activism in the 1990s. It sheds light on the pivotal role of survivor testimonies in shaping memory construction and public discourse. Finally, the thesis examines political and diplomatic responses to comfort women's activism, highlighting challenges in memory construction.

Leadership Education

Enhancing Educational Access and Success: The Impact of Implementing SF 1275 on FAFSA Completion Rates and Student Outcomes in Minnesota

Tyler Peil

Faculty Mentor: Ron Strege

This research project, centered on Senate File 1275 (SF 1275), investigates the potential benefits of making Free Application for Federal Student Aid (FAFSA) completion a graduation requirement for all high school seniors in Minnesota. With an annual surplus of over \$100 million in federal funds remaining untapped, this initiative behind SF 1275 aims to bridge the financial aid gap for students from diverse backgrounds, as well as show students there is much more education left for them after high school. By mandating FAFSA completion, the study anticipates an improvement in FAFSA completion rates, addressing Minnesota's current ranking of 39th in the nation.

The research also explores the astronomical impact of SF 1275 on high school graduation rates and college admission rates, particularly for students of color. Through a comprehensive analysis of educational data and student outcomes, the study aims to demonstrate how FAFSA completion as a graduation requirement contributes not only to increased financial aid accessibility but also to heightened educational achievement.

This project aligns with the broader goal of fostering equity in education by ensuring that students from all racial, cultural, and socioeconomic backgrounds have the necessary resources to pursue higher education. The findings of this research may drive policy decisions as well as educational strategies aimed at promoting inclusivity, boosting graduation rates, and ensuring a smooth transition into post-secondary education for Minnesota's graduating high school seniors.

Mathematics & Statistics

Data Analytics Internship at Fastenal

Jacob Haines

Faculty Mentor: Todd Iverson

The poster will present the results from an analysis of Fastenal's customer base to find characteristics among them that serve as useful predictors of their spending habits. This will allow Fastenal to create more accurate control groups when assessing the effectiveness of various marketing initiatives. This poster acts as the communication of capstone experience outcomes which is required for Data Science majors in addition to the capstone experience.

My Experience as an IT Data Intern

AnnaJo VonSeth

Faculty Mentor: April Kerby-Helm

This poster presentation is focused on my internship as an IT Data Intern with B'nai B'rith Youth Organization (BBYO). I was able to use the skills already learned through courses here at WSU to help project and produce high-end reports. Additionally, I was in-charge of the creation of the survey all the way to creating the PowerPoint presentation with the results. I will also discuss how Microsoft Suites played a huge role in my day-to-day work, from large, complex data sets to cleaning and refining old data, I will be discussing the skills I learned during my time as an It Data Intern.

Using Data Visualizations to Analyze Employee Performance at Xcel Energy

Abby Venz

Faculty Mentor: Todd Iverson

Companies often are curious about their employee performance. But how, exactly, do they analyze this? As a Data Analytics Intern for Xcel Energy, I was in charge of doing just this. This poster will walk you through the methods used to analyze and model employee performance, as well as the results found and the different ways managers at Xcel Energy used them.

Nursing

Assessing Emotional Well-Being: Applying Health Promotion Methods Through Community Service

McKenzie Jirousek and Chelsey Hagedorn

Student Co-authors: Makayla Becker, Halle Wohlers, Samantha Keller, Caylee Ludwig, Yasmin Penny, Lindsey Voigt, Gabrielle Toberman, Jessica Gallier, and Christina Dang

Community Partner: Bridges Health

Faculty Mentors: Jen Timm and Samantha Brown

This is a poster presentation describing a creative activity engaging advanced health promotion strategies through community service. Bridges Health is a free student-led, faculty-guided clinic that offers a variety of health services. One location is in rural Blair, Wisconsin where 12 to 16 patients are

seen each day and receive a variety of services, including health screening and assessment, foot and nail care, massage, vision checks, ear wash, and vital monitoring. The Bridges Health-Blair site is located within a church that the rural community utilizes for a wide variety of community events. The town has an estimated population of 1,305 citizens, according to the U.S. Census (2020).

An intake form is completed with each client and a trend found within this population is that many of the clients score 3 or higher within the mental health section. This subsequently initiates the completion of a PHQ-9 screening, which also trends high. The goal at the Bridges Health-Blair site is to provide excellent and compassionate care within the team's scope of practice and promote psycho-social health and wellness to those in the community. This includes engaging the client in discussions in the 8 dimensions of wellness.

The older adult population has complex perceptions toward depression and treatments, with self-management being a main theme (Nair, et al., 2019). This creative health promotion strategy consists of the transition from the PHQ-9 screening tool to the GDS-15 screening tool at the Bridges Health-Blair site. While the PHQ-9 is a standard screening tool and widely utilized, it may not be the best for older adults as they may score higher due to co-existing health issues that impact their appetite and sleeping patterns. Health issues or normal aging changes may interfere with accurate screening of depression. The GDS-15 questions only require a "yes" or "no" answer, unlike the PHQ-9. This may be more understandable for older adults, especially those with decreased cognition. The questions focus on emotional changes, rather than physical changes like fatigue, that would be anticipated in an aging older adult, but abnormal for a younger adult. The Geriatric Depression Scale (GDS) focuses fully on the individual's emotions and does not include the physical aspects (Smith, 2019).

To date, most clients who completed a GDS-15 screening expressed the tool was appropriate, understandable, and easy to answer the questions. There has been minimal negative impact from switching screening tools to the interprofessional team and operations of the clinic. Future training of the Bridges Health-Blair students will include the GDS-15 and evaluation is underway for the adoption at other clinic sites.

This community service experience shed light to how protective the older adult population can be when it comes to expressing their mental health needs. Symptoms are often minimized and self-management of symptoms in the older adult population is common. Screening older adults for depression yields an opportunity to individualize health promotion and education.

Dedicated Education Unit in a Critical Access Hospital: An Evidence-Based Practice Project

Mark Becknell and Lauren Tarbell
Faculty Mentor: Ashley Busch

Background: Nursing education is a unique and diverse learning environment that requires many venues to train students. As the healthcare landscape continues to change, nursing programs must adapt by investigating and utilizing new and innovative clinical education models.

Objective: The project purpose was to create and implement education for a dedicated education unit (DEU) within an 18-bed medical-surgical unit in a community hospital. The PICO question is: does

creating and implementing a Dedicated Education Unit (DEU) for registered nurses in a community hospital setting increase confidence in preceptor abilities? The comparison is current state, which includes only student shadowing and capstone experiences. Secondary outcomes of this project aim to enhance nursing recruitment, which was noted as a benefit of this clinical model in the literature.

Methods: Methods included development of DEU education based on an exhaustive literature review. Two planned four-hour education sessions were offered for unit staff. Evaluation was completed using the Preceptor Program Educational Outcomes Scale (Smedley et al., 2010) with permission from the authors and the SET-M evaluation tool.

Results: Results were limited with only one staff member from the organization able to participate due to limited staffing availability. The feedback provided by the participant was positive as they reported higher confidence in their precepting abilities after completing the training.

Conclusions: Implementation of a DEU model within an inpatient medical surgical unit in a community hospital is a feasible project to increase preceptor confidence. It also has the potential to assist with RN recruitment staff retention for the facility.

Empowering PICU Nurses: Enhancing Awareness and Understanding of Post-Intensive Care Syndrome-Pediatric (PICS-p)

Carissa Newman and Janelle Strain
Faculty Mentor: Amy Smith

Statement of the Problem: Post-intensive care syndrome (PICS-p) threatens the health of children following a Pediatric Intensive Care Unit (PICU) stay. Morbidities associated with PICS-p can affect children's cognitive, functional, social, and emotional domains.

Purpose: The project aimed to increase awareness of the term PICS-p, increasing knowledge and understanding among nursing staff, and developing their ability to identify patients at risk for developing PICS-p.

Method: The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Healthcare was used to facilitate this project. 20 PICU nurses completed an educational module with a pre/post quiz to analyze learning outcomes about PICS-p.

Interventions: An interactive educational module was created and distributed to all PICU nurses. An identical pre/posttest was included in the educational module to perform statistical analysis and determine the impact of the education.

Results: After the educational intervention, PICU nurses' knowledge of PICS-p increased, with a p-value of 0.008. A secondary outcome was identifying PICU patients that nurses felt were at risk for developing PICS-p.

Conclusions: With the gap of awareness among healthcare providers about PICS-p, education proves beneficial to improve the trajectory of care for PICU patients suffering from morbidities associated with PICS-p.

Keywords: PICS-p, PICU, nursing, education, knowledge, awareness

Improving the Rates of Fentanyl-Induced Overdoses in Winona County with a Student-Led Naloxone and Fentanyl Education Event

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Community Partners: Malia Fox and Helen Bagshaw

Faculty Mentor: Amy Reitmaier

According to The Minnesota Department of Health, "Fentanyl is now involved in 92% of all opioid-involved deaths and 62% of all overdose deaths in Minnesota" (Ahneman, 2023, para 2). Specifically, for Winona, it was seen that from 2020 until now, there have been 15 deaths due to opioids. Additionally, there have been 30 nonfatal overdoses that people have visited the emergency room for (Injury and Violence Prevention Section, 2023). Winona County community assessments were utilized to develop relevant information to be provided in this project which was coordinated by several entities including Winona State University (WSU) nursing students, Bridges Health, and the Friendship Center. A community member with a background as a Steve Rummeler Hope network trainer, critical care nursing experience, and an American Heart Association CPR instructor at Winona Health, as well as a community member who is a part of the Drug Epidemic Memorial Administration team presented information on fentanyl and the use and administration of naloxone. This event provided the opportunity to educate WSU students about the opioid crisis. Preparation for this event included researching information about fentanyl use, naloxone administration, and collaboration with key stakeholders to host the event. In addition to the educational portion of the event, testimonies were given from community members with a personal background relating to the opioid crisis. A post-test was provided to attendees to measure the knowledge and understanding of the information provided during the event to evaluate the efficacy of the teaching. Students who participated in the event were provided with a naloxone kit and fentanyl testing strips to take home with them. Attendance was noted at roughly 60 students, and many expressed how sentimental this event was to them. It was also noted that a majority of attendees found great value in naloxone training, and many intend to carry naloxone kits with them in case of emergency.

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Interventions for Older Adults to Overcome Obstacles Affecting Oral Care: Applying Health Promotion Methods Through Community Service

Kirsten Haefner

Community Partner: Bridges Health

Faculty Mentors: Jen Timm, Ashley Busch, and Amy Harter

This is a poster presentation describing a creative activity engaging advanced health promotion strategies through community service. Winchester Wellness is a grant-funded program of Bridges Health that utilizes a preventative health approach to support a healthy lifestyle and wellness. Services are available to support physical, emotional, and social health, including health screening, promotion, education, and dental, foot, and nail care. The program supports underserved and at-risk populations facing health inequities.

Older adults have several health considerations affecting their oral health, including xerostomia, apraxia, decreased physical capabilities, medication use, cognitive issues, and other health comorbidities. These factors can lead to periodontal disease, edentulism, dental caries, oral infections, and lesions in older adult populations. Evidence demonstrates the importance of educating patients and their caregivers about good oral health routines and the adaptive equipment available to improve oral health among older adults.

The goals of this activity were to: Enhance the quality of life and overall health outcomes for older adults through evidence-based health promotion and education delivered to older adults and their caregivers on proper daily oral care techniques and practices, Increase awareness and utilization of adaptive equipment available for daily oral care among older adults with physical mobility limitations. Mobility was a common challenge that impacted older adult patients and their ability to perform good oral care. Patients were educated and provided information on differing types of adaptive equipment that would minimize mobility issues on their oral health. Adaptive equipment, including built-up handles, toothbrush holders, electric toothbrushes, and flossing aids, to include floss picks and Gripit floss holders, were discussed.

Most dental conditions can be avoided with proper and timely education focused on quality oral care and regular preventative dental care. The literature underscores the significance of evidence-based teaching and performing proper oral care among older adults. Research further demonstrates a high prevalence of oral health problems within the older adult population, including tooth decay, gum disease, and tooth loss. These issues can significantly impact overall health and quality of life. Early interventions can prevent serious complications later on.

Pouring from an Empty Cup – Promoting Student and Faculty Well-Being: Applying Health Promotion Methods Through Community Service

April Loeffler

Community Partner: Bridges Health

Faculty Mentor: Jen Timm

This is a poster presentation describing a creative activity engaging advanced health promotion strategies through community service. Bridges Health provides free health and wellness services to underserved populations virtually and in person at sites across southeast Minnesota and western Wisconsin. These sites are operated by an interprofessional team of students and their faculty. Goals: The goal of this health promotion project was to promote the health and wellness of the students and faculty involved in Bridges Health activities.

Assessment: Risks were assessed and categorized. Students were surveyed to share about how Bridges Health supports or could support their wellness. The student survey was developed to capture the student's perceptions within their clinical site.

Evidence-based Health Promotion Activity: The National Institute for Occupational Safety and Health (NIOSH) hierarchy of controls were used to guide interventions to mitigate health and safety risks. The Bridges Health Director and faculty were presented with the findings and recommendations. Supporting Literature: Poor well-being in healthcare workers can result in errors that risk patient safety (Hall et al., 2016). A culture of safety can prevent injury and support patient safety (Aljabri et al., 2020) Evaluation/Results: Evaluation of this project will include assessing if the interventions were implemented across the organization.

Discussion: Although health and safety of health care professionals and students are known to be important for patient and client health outcomes, it is challenging to keep this priority without implementing sustainable practices to for improvement throughout the organization.

Staff Education Toolkit Heightens Nurses Awareness of Professional Development Opportunities

Dani Edwards

Other Co-authors (Non-WSU): Dr. Sarah Brzozowski (UW Health, Madison, Wisconsin)

Faculty Mentors: Sandra Paddock and Jen Prochnow

Purpose. A toolkit for leaders was designed to assist in the education of nurses on professional development opportunities in alignment with a new nursing clinical ladder program being implemented at a large, academic medical center. The toolkit aimed to ease nurse leaders' span of control, while providing consistent and standardized information and resources to clinical nurses.

Method. A pilot was completed on a general internal medicine inpatient unit. One nurse manager used the toolkit to educate clinical nurses on eight professional development opportunities over the course of four weeks. A pre- and post-survey assessing clinical nurses' perception of four professional development opportunity indicators was implemented.

Results. Paired t-tests, with Bonferonni adjustments, were used to test for significant differences in each of the four indicators of nurse perception of professional development opportunities before and after the intervention. Survey results showed a statistically significant improvement in clinical nurse perception of 'a clinical ladder opportunity' following nurse leader toolkit education ($p=0.02$).

Conclusions. The method of supporting leaders and educating clinical nurses via a toolkit is an effective strategy to assist in the implementation of a nursing clinical ladder program. Leadership toolkit development and implementation may be helpful in the execution of future change initiatives.

Next Steps. To further test the impact of this intervention, leaders from several practice settings will trial the toolkit via established communication mechanisms. Positive outcomes with pilot expansion would promote further application of the toolkit to additional venues requiring leadership support and education of clinical nurses.

The Bridges Health-Hiawatha Valley Mental Health Center Collaborative: Applying Health Promotion Methods Through Community Service

Stephanie Davenport and Angela Mohawk

Community Partners: Bridges Health, Hiawatha Valley Mental Health Center

Faculty Mentors: Jennifer Timm, Amy Reitmaier, Ashley Busch, and Amy Harter

This is a poster presentation describing a creative activity engaging advanced health promotion strategies through community service. Hiawatha Valley Mental Health Center (HVMHC) is a mental health center that serves individuals and families in Winona County and the surrounding area. Bridges Health is a free, Winona State University student-led program and is funded through grants. Bridges partners with HVMHC to provide a location within HVMHC that offers preventative health, wellness, and social care to clients of HVMHC. Services are designed to meet the needs of the HVMHC client, which are those individuals with mental health diagnoses.

As graduate nursing students, we provide nursing leadership to interprofessional students, work with the individuals served, assess, and provide healthcare interventions and screening tools, and connect individuals to additional resources within the community as appropriate. Clients attending this clinic face many inequities, including hardships with mental, emotional, and economic disadvantages. Common financial barriers include being uninsured or underinsured for health, poor access to health education, food insecurity, lack of transportation, and housing complications.

The health, wellness, and preventative services commonly requested at this site include health screening and follow-up, seeking answers to health-related questions, foot and nail care, ear wash, massage, and engagement with socialization. Recommended screenings for adults include those focused on healthy lifestyle, preventing and/or managing chronic illness and mental health, and monitoring for symptoms affecting functioning and quality of life, such as cognitive impairment, vision loss, and safety (UpToDate, 2024). Interventions guided by lifestyle and disease screenings are shown to improve the quality of life for individuals with chronic disease and mental illness (UpToDate, 2024).

Students, under the supervision of licensed faculty, provide numerous evidence-based health promotion methods: Preventative foot and nail care: routine nail care decreases bacteria from under the nails, prevents scratching of the skin, and decreases the risk of infection (Chan et. al., 2018). Ear assessment and cleaning: Impacted ear wax can lead to hearing difficulties which can result in social isolation and increased risk of depression (Munro et. al., (2023). Oral Health Screening & Education: Individuals with poor oral health are at a greater risk of head and neck cancer. Routine oral health screening can significantly reduce the risk of head and neck cancers (Wee et. al., 2022). Fluoride Application: Fluoride application is shown to be a cost-effective method of preventing decayed, missing, and filled teeth. (Nguyen, et al., 2020) Chronic Illness Self-Care Guidance: The nursing act guiding patients to practice self-care is based on Dorothy Orem's long-standing Self-care deficit nursing theory. Self-care - "the practice of activities that individuals initiate and perform on their behalf in maintaining life, health, and well-being" (Orem, 1971) is highly correlated to enhancing the quality of life for people with chronic illness (White, 2013.) Social Interaction: Social interaction is important for many reasons, especially for overall mental health and well-being. It also helps individuals with disabilities avoid becoming isolated from the world and the people around them (Riches, 1996). Neck and Shoulder Massage: Massage is one of the most frequently requested services at Bridges and is an effective relief treatment for chronic neck pain in adults (Bronfort et al., 2010).

This semester, students completed three clinics at this site, delivering over 22.5 hours of health promotion directly to 22 unique individuals from a majority White Non-Hispanic background. Clients served reside and attend from several different home counties, $n=5$ Fillmore, $n=16$ Winona, $n=1$ Trempealeau. Clients report attending the clinic because of the ease of access, feeling welcomed, and the friendliness and great care delivered by the students. One client stated *this is the highlight of my week*. Individuals often return to the clinic monthly to maintain their care, while getting opportunities to socialize with students and faculty. Students experience interprofessional learning and learn how to care for at-risk communities outside the walls of the hospital.

Preventing Illness Through Nutrition

Olivia McCarter

Faculty Mentors: Susan Zeller and Brit Voshage

This is a series of Tik Tok videos that were made to educate people on how to prevent certain illnesses such as diabetes and cardiovascular disease, through nutrition. The series had different types of videos such as recipes and different grocery store items that aid in preventing illnesses while also teaching the benefits of heart healthy nutrients. Each video was sent to a registered dietitian to get further helpful information and approval of content.

The Importance of Program Collaboration to Educate Nursing Students in Bilingualism

Lindsey Voigt and Halle Wohlers

Faculty Mentors: Autumn Cole and Sara Laker

Purpose: With a growing Spanish-speaking population, communication is becoming more important in the healthcare field. It is important to address the needs of this population and one of the ways this can be achieved is by increasing the number of bilingual nurses. The overall purpose of this project was to discover the impact of bilingual nurses in health care and use that information to inspire and educate current and future nursing students. The findings from our review of literature were synthesized along with a survey to create resources for nursing and Spanish double majors and minors at Winona State University (WSU). The focus is on monolingual English speakers and aiding them in becoming bilingual in Spanish. This will be accomplished through a major/minor course map, including a concise list of additional resources for nursing and pre-nursing students.

Method: Through convenience sampling, a survey was conducted on the opinions of future and current nursing students at Winona State University. The survey consisted of six multiple choice, free response, and short response questions related to interest in bilingual nursing education. All the pre-nursing and current nursing students at Winona State University received the survey ($n=620$) and were given seven weeks to respond.

Results: The results from this project indicated that the surveyed students ($n=164$) at WSU showed interest in materials regarding a course timeline and better available information on bilingual education. The participants were aware of the prevalence of Spanish-speaking populations in the healthcare field. The review of literature showed the significant effect of bilingual nursing education on positive patient outcomes. Additionally, nursing students have shown interest in immersion in world language and

nursing programs. Lastly, bilingual student nurses develop cultural competencies to decrease cultural bias and discrimination in healthcare.

Conclusion: The surveyed nursing students at WSU showed a significant interest in bilingual education, while also recognizing a lack of sufficient materials. Through the review of literature, research pointed to the importance, need, and cultural effects of bilingual nursing education for English speakers.

Objective: The purpose of this study is to aid monolingual English-speaking nursing students in becoming bilingual in Spanish at WSU.

The Use of Neuromuscular Blocking Agents (Paralytics)

Marnie Barth and Gabrielle Toberman

Faculty Mentors: Melodie Jolly and Susan Zeller

This is a quick facts sheets on the use of paralytic agents in the Intensive Care setting. It is a tool for nurses to quickly access information needed for using paralytic agents. It includes why using one over another, adverse effects, and dosages while comparing different neuromuscular blocking agents. It also includes monitoring such as train of four as well as nursing interventions while using these medications.

Physics

Anomalies within Winona campus on protected wavelengths

Landyn Schroeder

Student Co-authors: Carly Fitzgerald, and Sammy Schneider

Faculty Mentor: Adam Beardsley

The present study is being conducted with the intention of identifying where, why, and what is transmitting a radio signal of 1419 mmHg. This anomaly is intriguing because 1400-1427 mmHg waves are protected. Because this is a protected wave, it was interesting that it was being transmitted on Winona State Campus which is where the team began research. To gain information, the research team cast the horn to the sky at an elevation of 37 degrees and in the directions of 344 , 213, 143, and 60 degrees bearing, respectively. Now that this baseline information has been collected, the team can narrow in on what portion of the campus is transmitting said anomaly. The horn is then pointed at an elevation of 37 degrees under the highest reading and cast to read both to right and left to determine which building is in question (due to the highest reading being in a general direction rather than towards a specific building). Finally, we will discuss with caretaking teams on campus to inquire about what could be transmitting this signal on a protected wavelength, from the WSU building. Overall, it's well understood that this transmission is likely accidental, though it is imperative to keep certain wavelengths (i.e. 1400-1427 mmHg) open for specific and pertinent communication.

CHART Protocol for Observing the Milky Way Galaxy

Sammy Schneider

Student Co-authors: Landyn Schroeder and Carly Fitzgerald

Faculty Mentor: Adam Beardsley

CHART stands for Completely Hackable Amateur Radio Telescope, and it is used to collect signals from the Milky Way Galaxy. This project began so that other students can make their own radio telescopes with less expensive materials, making it more accessible for all. The goal for my project was to create protocol for other students to be able to follow and recreate the experiments. The protocol will include setting up the horn (telescope), pointing it in the correct direction, having it at the correct angle, having the software set up and everything correctly plugged in, and a goal for the data collection. This will allow for consistent results with the telescope, eliminating possible outliers. The protocol has been used and tested by at least two other students and is now posted on the CHART website online for others to use and follow.

UnCHARTed: Measuring Beyond the Inner Galaxy

Carly Fitzgerald

Student Co-authors: Sammy Schneider and Landyn Schroeder

Faculty Mentor: Adam Beardsley

My goal in conducting my research was to measure the speed of matter in the Milky Way galaxy using CHART -- the Completely Hackable Amateur Radio Telescope is an inexpensive, constructable telescope used to detect radio frequency waves in the galaxy. Using these waves and the doppler shift equation, I was able to measure the velocity of hydrogen gas in the inner galaxy. In doing this successfully, I was able to graph the relationship between the velocity and radius which is the rotational curve of the inner galaxy. I then collected and used additional data to calculate the rotational curve of the outer galaxy.

Political Science

Attitudes Around Space Exploration Among the WSU Student Body

Nicholas Fryer

Faculty Mentor: Edward Guernica

This is a research project that studies the attitudes among the Winona State University student population on the subject matter of space exploration. The survey was the result of a combined effort of students enrolled currently in POLS 410 and was distributed through the platform, Qualtrics. This poster is a Capstone project as required by the Political Science program.

Do Young People Consider Democratic Institutions to be sacrosanct?

Zachary Queensland

Faculty Mentor: Edward Guernica

This research project strives to examine whether young people at Winona State University perceive fundamental democratic institutions to be sacrosanct. This survey was the result of a collaborative effort between students that are presently enrolled in POLS 410. The survey was submitted through Qualtrics and organized by students in the POLS 410 class. This poster is a Capstone Project as mandated by the Political Science Program.

Economic Inequality and its Effects on Voting and Attitudes Toward Government

Logan Spano

Faculty Mentor: Edward Guernica

This is a research project that studies how economic inequality affects voting and attitudes towards the government, using data from students enrolled in Winona State University. The survey used is a combined effort of students in POLS 410 and is distributed to WSU students through Qualtrics. This poster is a Capstone project as required by the Political Science Program.

How do young people feel about voting and how to increase voter turnout among young people

Jacob Brynjulfson

Faculty Mentor: Edward Guernica

This is a capstone research project required by the political science department for POLS 410. I am going to be researching how young people feel about voting at Winona State University. The survey I have used was submitted on Qualtrics and worked on by all the students in POLS 410.

Students' thoughts on Use of Political Violence and other forms of Unconventional Political Participation

Joshua Hansen

Faculty Mentor: Edward Guernica

This research project is about Winona State student's thoughts on different forms of unconventional political participation such as riots and political movements where violence is used as a tool. Research was conducted through Qualtrics in a collaboration with peers in the same course. This survey was given to Winona state students and asked their thoughts on movements that have turned towards unconventional political participation methods. This project was done as a part of the Political Science and Public Administration program.

The Age of Change? Young Adults and Third Party Politics in America

Ava Schroeder

Faculty Mentor: Edward Guernica

This is a capstone research poster looking at college students' opinions on political parties in America. The research focuses on third parties and more particularly why they have failed in the past and what to expect as younger generations become increasingly involved in American politics. The research was conducted, via Qualtrics, by surveying Winona State University college students as a requirement of the Political Science and Public Administration program at Winona State University.

The Perceived Value of a University Education Among the Winona State University Student Body

Mason Moran

Faculty Mentor: Edward Guernica

This is a research project studying how highly valued higher education is among students attending Winona State University. The survey was the result of a combined effort of the students currently enrolled in POLS 410 and distributed via Qualtrics. This poster is a Capstone Project as required by the Political Science Program.

Winona State University student opinion on US support and aid to Ukraine

Nolan Koski

Faculty Mentor: Edward Guernica

This is a research project poster that is dedicated to studying the representation of Winona State University student support of the US's aid to Ukraine during its recent period of conflict. It is designed to fulfill the requirements of POLS 410, Political Research Seminar, and the Capstone Project requirement of the Political Science program. The project is designed to accumulate answers via survey through Qualtrics dedicated towards the respective research question.

Psychology

Discovering My Path: A Reflection on My Internship Experience

Erin Farina

Faculty Mentor: Robert Casselman

Before my internship as a day treatment intern at Family and Children's Center in Winona, MN, I didn't really have any solid career plans. My position as an intern has taught me a lot of valuable lessons—about myself, and about kids—and I have gained extremely valuable experience that will stick with me throughout the rest of my education and my career journeys. I have learned that I enjoy being a safe person in the lives of these kids and teenagers, I would like to work with teenagers in the future, and most of all, I have become a much more patient person. My poster presentation will include my job responsibilities, who I work with, and what I have learned, and I will connect a psychological principle to my internship experience.

Elementary Enrichment at Winona Area Public Schools

Savannah Schaefer

Faculty Mentor: Robert Casselman

In this presentation, I will be detailing my experience providing enrichment activities and engaging new opportunities for elementary students in the Winona area. Connecting with students, nurturing

meaningful interactions, and helping to build a foundation of confidence in participation in new activities have all been at the forefront of the work that I have done. This experience has been a unique opportunity to engage with students and offer support and guidance through many of the challenges that have presented themselves as they learn how to think creatively, problem-solve, and foster resilience as they encounter any new challenge that comes their way.

Family and Children Center Internship

Mikayla Strand

Faculty Mentor: Robert Casselman

The Winona Family and Children Center has allowed me to expand my experience and knowledge in many ways. Through interning at the day-treatment program, I have learned how to help preschool aged children as well as adolescents in building many different skills and coping strategies. I have also been given the opportunity to observe therapists work with the clients in the program, helping them with a wide variety of situations.

Family and Children's Center Day Treatment Internship Experience

Maya Ratzloff

Faculty Mentor: Robert Casselman

This poster presentation will highlight my experience as a day treatment intern at Family and Children's Center in Winona, MN. This includes: my everyday duties, the type of clients I work with, and things I learned which will aid me in my future career. I will also discuss the type of skills my clients work on, and the psychological theories and principle demonstrated throughout my internship experience.

Friendship Center

Abigail Wolfe

Faculty Mentor: Robert Casselman

This is a poster about my internship experience at the Friendship Center. The main focus of my internship was a club that I created called Joyful Aging. Joyful Aging is a club that focuses on finding joy in new experiences and topics. I was also involved in something the facility called tech appointments. Tech appointments are there to help the members with any technological issues they come across.

Health Literacy and Behaviors Among Students in Health vs. Non-Health-Related Majors: Implications for Substance Use, Socialization, and Wellbeing

Amelie Pflamminger and Erin Farina

Student Co-author: Ashley Lenarz

Faculty Mentor: Trisha Karr

Purpose: College is a pivotal time for young adults in relation to new experiences and behaviors. Thus, the purpose of this study was to examine whether students' major relates to health literacy, substance use, peer behavior, and mental health. Prior research found a significant difference in substance use

behaviors by college major (Chen & Chen, 2020), and students in health-related fields of study showed higher levels of health literacy, while students in non-health related majors showed weaknesses across all dimensions (Rababah et al., 2019). This study aims to expand on prior research by examining the relationship between health behaviors and literacy in relation to participants' major being health or non-health related, while additionally assessing peer behavior and mental health.

Procedure: Using an online survey including standardized measures and researcher-written questions, health literacy; alcohol, marijuana, and nicotine use; peer behaviors related to substance use; stress, anxiety, and depression were assessed. Participants were undergraduate students recruited from a Midwestern University (N=82).

Results: Independent samples t-tests were conducted to examine group differences on health literacy. As expected, those in health-related majors showed higher levels of health literacy than non-health-related majors. There were no differences in substance use across groups, but non-health-related majors reported more symptoms of depression than the health-related group. Chi-Square analysis revealed that both groups reported sometimes considering their health prior to using substances, however, health-related majors were significantly more likely to skip a social event because they knew substances would be present. Thus, we found that health literacy through education does not always translate into changes in health behaviors.

Hiawatha Valley Mental Health Center Internship Experience

Alyssa Kang

Faculty Mentor: Robert Casselman

My internship experience included learning new things everyday whether that was while working in residential or community-based services offered through Hiawatha Valley Community Mental Health Center. I have been able to successfully integrate psychological science learned from my undergraduate studies into many of my internship experiences. I am confident that my internship experience will assist me in my future endeavors as well as my career in the mental health field.

Hiawatha Valley Mental Health Center Crisis Response

Taylor Dauer

Faculty Mentor: Robert Casselman

During the time I have spent at Hiawatha Valley Mental Health Center (HVMHC) for my internship, I have learned about various, unique programs within the organization that have been added to assist adult clients in the southeast Minnesota area. One specific program that is unique to the organization is the Crisis Response Team. With my presentation, I will further explain the resource and what it offers compared to other crisis programs.

I am a "Fruit Eater": Predicting Fruit and Vegetable Consumption with Approach Self-as-Doer Identities

Melisandra McLaughlin, Abree Dieterman, Katelyn Kelley, Hannah Dunlavy, and Ashley Lenarz

Faculty Mentor: Amanda Brouwer

The daily recommended intake of fruits and vegetables is 1.5-2 cups and 2-3 cups, respectively, but only one in 10 adults in the United States are meeting those recommendations (CDC, 2019). Research on the

Theory of Planned Behavior (TPB) indicates healthy eating behaviors can be predicted by intentions and other components of the theory (McDermott et al., 2015). Likewise, the self-as-doer, an identity that aims to describe individuals in terms of *doing* a behavior, also predicts healthy eating. However, less research has explored how the orientation of a doer identity predicts fruit and vegetable consumption. Those with an approach doer orientation try to add healthy foods to their diet, whereas those with an avoidant doer orientation aim to remove unhealthy foods. Research exploring the relationships among doer identity orientation, the TPB and fruit and vegetable consumption is needed. Therefore, the aim of the study was to explore whether doer identities predict fruit and vegetable consumption beyond the TPB components.

Participants (N=312, Mage=32.15, SD=12.55) completed a survey assessing fruit and vegetable consumption, TPB components, and self-as-doer identity. Two hierarchical linear regressions were conducted to test if doer identity predicted fruit and vegetable consumption beyond TPB variables. The TPB components and the self-as-doer identities contributed a significant amount of the variance (6.3%) in vegetable consumption, $R^2=.063$, $\Delta F(2, 371)=10.57$, $p < .001$. Adding the self-as-doer identities contributed 5.3% of the variance above and beyond the TPB, $R^2=.053$, $\Delta F(2, 371)=10.57$, $p < .001$. Only the approach self-as-doer identity was a significant predictor of vegetable consumption, $b=.45$, $t(371)=4.00$, $p < .001$. For fruit consumption, the TPB and self-as-doer identities significantly contributed 12.4% of the variance in the model, $R^2=.124$, $\Delta F(2, 371)=18.77$, $p < .001$ and self-as-doer identities contributed an additional 8.9% of the variance in fruit consumption, $R^2=.089$, $\Delta F(2, 371)=18.77$, $p < .001$. Approach self-as-doer identity was a significant predictor of fruit consumption, $b=1.09$, $t(371)=5.67$, $p < .001$, as was perceived behavioral control, $b=-.30$, $t(371)=-1.99$, $p=.05$.

Approach, and not avoidant, doer identity predicted both fruit and vegetable consumption beyond the TPB variables. It was the only significant predictor of vegetable consumption. Additionally, approach doer identity and perceived behavioral control were significant predictors of fruit consumption. Findings suggest that it may be easier for individuals to add new behaviors (i.e., approach orientation) to their diet instead of removing certain foods or behaviors (avoidant orientations). Furthermore, the behaviors of eating fruits/vegetables better align with approach doer identities than avoidant doer identities. These findings also support previous research on the predictability of the self-as-doer identity on general healthy eating behaviors and build on past research supporting the role of adding identity to the TPB. Future research could explore causal relationships between approach doer identities and fruit and vegetable consumption. Overall, research suggests that seeing oneself as the doer of a behavior with an approach orientation is associated with eating more fruits and vegetables.

My Internship Experience at the Winona DAC

Cameron Shores

Faculty Mentor: Robert Casselman

The DAC is a nonprofit organization that is funded by the government. I will talk about what the DAC is and what they do for the community. I will also talk about my experience as an intern at the DAC and what I learned while I was there. I will finish by talking about why the DAC and similar organizations are important and how they do much good for the disabled community.

Project Compass

Grace Christopherson

Community Partners: Linda Jacobs and Casey Moger
Faculty Mentor: Robert Casselman

This poster presentation focuses on the local organization, Project Compass. Project Compass is a community driven program that seeks to better the lives of individuals with disabilities within Winona. This is done through planning, promoting, and executing various events such as bowling, dances, cooking classes, and much more. Through the images and summaries provided on the poster, you will see how Project Compass gives an outlet of human connection for those with disabilities and how beneficial it is for their well-being.

School Counseling Psychology Internship

Sarah Gathje
Faculty Mentor: Robert Casselman

This is a summary of my school counseling internship through the psychology program at WSU. I completed it on site at Caledonia Middle/High School under the supervision of school counselor Brent Schroeder. I was able to learn counseling techniques for individuals and groups of students, help teach character development lessons, attend meetings, and learn what goes on behind the scenes in the life of a school counselor.

Von Wald Youth Shelter Internship

Hayli Flores
Faculty Mentor: Robert Casselman

Von Wald is a youth shelter in Rochester, Minnesota that mainly houses homeless or truancy teenagers. I completed my internship here and learned how the shelter operated, both from a case manager and youth advocate perspective. I did tasks such as learning the behind-the-scenes paperwork, how to complete an intake, organize group work, and how to interact with youth in a professional setting.

Recreation, Tourism, & Therapeutic Recreation

Evaluating the Local Event Experience in Winona

Emma Ihrke, Mason Carnell, Nicholas McNally, and Trent Steuernagel
Community Partner: Frozen River Film Festival
Faculty Mentor: Hyunseo (Violet) Yoon

There are numerous local events and festivals in Winona. Event organizers in Winona need to understand the event/festival experience to enhance the event/festival experience and grow further. For destination marketers in Winona, this information is crucial to attracting more visitors from outside, as local events and festivals are effective destination attractions. Collaborating with Frozen River Film Festival, RTTR370 – Festival and special event planning class will conduct research investigating the local event/festival experience in Winona as a class project. A survey including a series of questions regarding event experience was developed to collect data and will be distributed in early April 2024. Adults who have attended events/festivals in Winona can participate in the survey. Both

quantitative and qualitative data will be gathered and analyzed. The research will show the event/festival participants' post-visit evaluation of their recent event/festival experience and their behavioral intentions regarding the event/festival. The result of this research is expected to contribute to Winona's tourism, hospitality, and community development.

Hooked on Adventure: Bauer Angling's Proposed Fishing Guide Service

Gavin Bauer

Faculty Mentor: Phileshia Dombroski

As outdoor recreation continues to surge in popularity, fishing remains a beloved pastime for individuals seeking adventure, relaxation, and connection with nature. In response to this growing demand, Bauer Angling proposes the establishment of a comprehensive fishing guide service. I aim at providing unparalleled angling experiences for enthusiasts of all skill levels. This research day presentation outlines the conceptualization, planning, and potential impact of this innovative venture. It also gives me a chance to network and advertise.

The foundation of "Bauer Angling" rests on a commitment to excellence in customer service, environmental stewardship, and promoting sustainable fishing practices. I will offer guided fishing trips tailored to clients' preferences, whether they seek exhilarating river excursions, backwater adventures, or challenging trout fishing opportunities. Through knowledge of recreation, tourism, and environmental biology, and personalized instruction, participants will learn essential techniques, gain insight into local ecosystems, and deepen their appreciation for the natural world.

In addition to fostering memorable angling experiences, "Bauer Angling" recognizes the importance of conservation and habitat preservation in sustaining fish populations and ecosystems. We are committed to promoting catch and release practices, minimizing environmental impact, and advocating for responsible angling ethics among clients and the local angling community.

The startup of "Bauer Angling" holds significant potential benefits for both anglers and the local economy. By attracting visitors to the region and promoting outdoor tourism, this guide service will stimulate economic growth, support small businesses, and showcase the natural beauty and recreational opportunities of the area. Moreover, by fostering connections between people and nature, "Bauer Angling" aims to inspire environmental stewardship, promote conservation awareness, and cultivate a deeper appreciation for our natural resources.

In conclusion, Bauer Angling's proposed fishing guide service, represents a unique opportunity to elevate the angling experience, promote environmental sustainability, and stimulate economic development. Through personalized instruction, technological innovation, and a commitment to conservation, I aspire to create unforgettable adventures for anglers while safeguarding the health and integrity of our natural ecosystems. Join me on this journey, and together, let's get hooked on adventure!

Incorporating AI into the Evaluation of a Fishing Guide Business Plan

Payton Beyer, Joe Lothrop, Nicholas McNally, Sam Schultz, Sam Shutter, and Trent Steuernagel

Faculty Mentor: Phileshia Dombroski

This project explores the use of AI in determining the feasibility of a small business plan for a fishing guide service in Winona, Minnesota. Findings describe prompt curation strategies relevant for specific chapters of a business plan, as well as the potential advantages and challenges associated with utilizing AI for this purpose. Additionally, an analysis of the Bauer Angling Business Plan and its feasibility is included.

The Impacts of Local Events on Winona

Joe Lothrop, Patrick Wright, and Payton Beyer
Community Partner: Frozen River Film Festival
Faculty Mentor: Hyunseo (Violet) Yoon

Winona has had many local events and festivals. They can secure better sponsorship and support from the local community when they generate positive impacts on the community. However, how they have contributed to the Winona community has not been investigated. Collaborating with Frozen River Film Festival, RTTR370 – Festival and special event planning class will conduct research investigating the impacts of local events/festivals on Winona as a class project. A survey including a series of questions regarding residents' perceived impacts of events/festivals on Winona and event/festival visitors' consumption behaviors was developed to collect data. The survey will be distributed in early April 2024. Adults who have attended events/festivals in Winona can participate in the survey. The data will be analyzed statistically. The research will reveal the economic, social, and environmental impacts of local events/festivals on Winona. The result of this research is expected to contribute to Winona's tourism, hospitality, and community development.

Who Visits the Local Events in Winona?

Adrianna Fannemel, Grace Baden, and Jenna Fox
Community Partner: Frozen River Film Festival
Faculty Mentor: Hyunseo (Violet) Yoon

Winona's local events and festivals have attracted many residents and visitors from outside. Understanding the event participants' profiles is important for event organizers to develop more effective marketing strategies and to manage the events better. To support the local events/festivals in Winona, collaborating with Frozen River Film Festival, RTTR370 – Festival and special event planning class will conduct research investigating the profiles of the local event/festival participants in Winona as a class project. A survey including questions about event participants' demographic information and past event experience was developed to collect data. The survey will be distributed in early April 2024. Any adult who has attended events/festivals in Winona is eligible to participate in the survey. The data will be analyzed statistically. The research is expected to reveal the comprehensive profile of the local event/festival participants such as demographics, residency, and motivation to attend events/festivals. The research outcome is expected to contribute to Winona's tourism, hospitality, and community development.

Teaching, Learning, & Technology

Examination of 3D scanning and printing

Molly Westemeier and Samuel Michaud

Faculty Mentor: Thomas Hill

We are collaboratively exploring 3D scanning and printing technologies, investigating their potential across various objects and assessing the feasibility and quality aspects of 3D printing. With the advancement of 3D imaging techniques, the ability to capture details of objects has significantly improved, offering a wide array of applications across industries. This research critically examines the feasibility of employing 3D scanning for diverse objects, evaluating its efficacy in capturing accurate representations. Furthermore, it scrutinizes the quality of 3D printing outputs, considering factors such as resolution, material properties, and structural integrity. By comprehensively analyzing both the scanning and printing processes, this study aims to provide insights into optimizing workflows and enhancing the overall efficiency and quality of 3D replication technologies.

Faculty Presentations

Perceptions of Misinformation on Social Media Related to COVID-19

Tammy Swenson-Lepper, Ph.D., Communication Studies
Student Co-presenter: Heidi Hanson

Misinformation on social media was widespread during the COVID-19 pandemic. To understand how a convenience sample of people in the United States perceived and defined misinformation and how those definitions and perceptions relate to ethical issues, we conducted a survey, approved by the WSU IRB, in the spring of 2022. We asked participants to define misinformation in their own words and lay out whether there should be consequences for social media organizations or individuals sharing misinformation. We also asked them which social media platform they believed had the most misinformation and several other news-related issues. This mixed methods study, combining the results of both open- and closed-ended items provides a breadth of information about these issues.

Based on a content analysis of participants' (N=300) definitions of misinformation, we could put their definitions into six categories: 1) intentionally lying or exaggerating information; information that has a bias in it, or that pushes one side's agenda; 2) either intentionally or unintentionally sharing information that isn't true; 3) providing information that is based on opinion and not on credible evidence, facts, or science; not having credible sources; 4) information provided by a celebrity/famous person that is outside their area of expertise; 5) no definition is provided, only examples; for instance, saying that misinformation is anything from the political parties or a politician; and 6) information that is perceived as fake/false by the audience even though it might be true. The first three definitions were the most common and share commonalities with the scholars' definitions of misinformation.

Using thematic analysis, we categorized responses to the question about whether social media companies should face consequences into four themes: 1) no, social media companies are private organizations, and they should not interfere with the postings of their users, 2) yes, social media companies should face consequences for posting blatant falsehoods, 3) maybe, but there's a tension between free speech of users and social media companies and the consequences of misinformation to users, and 4) companies (not the social media companies), that post misinformation on social media should be punished.

Participants (N = 260) believe that Facebook (N = 174, 67%) was the most common source of misinformation, followed by Twitter (N = 29, 11%), TikTok (N = 26, 10%), Instagram (N = 19, 7%), and other social media platforms (N = 12, 7%).

In sum, our study found that ethical tensions about free speech versus protecting the welfare of others were prominent in early 2022 when people were thinking about misinformation. Missing from most participants' discussions were the role of algorithms and troll farms, which may have a larger effect on the information people see than participants were aware of.

Additive Practice-Based Research as Pedagogical Methodology

Patrick Lichty, Ph.D., Mass Communications

Student Co-author: Keaton Riebel

In the Creative Digital Media major in Mass Communication at Winona State, our primary pedagogical methodology consists of Practice-Based Research. This refers to addressing a research question or reflecting on a process through making. MCOM316 Experimental Digital Media explores student-defined projects, often through the taxonomical approach of creating drone cinematography through the progressive accumulation of techniques, generating media for creating a short video. For the Fall 2023 class, this consisted of familiarization with equipment, cinematic shot familiarization, flight practice, conceptual exploration, and compilation. The class also extended drone experimentation by creating 360-degree video (VR) and the traditional (planar) video.

The notion of additive practice-based research in the Experimental Digital Media class relates to the systematic addition of the steps described previously to describe the technology, techniques, and narrative construction to engage the aspects of Bloom's Taxonomy while engaging the narratological character of a landscape. While this approach does not describe a landscape in any anthropomorphic sense, it does allow for defining a "sense" of character within the lands of the Driftless. This characterization enables the students to inhabit a locale (Garvin Heights), investigate its topography, and examine successive flight sessions in that locale to understand the idea of a sense of character and narrative.

In this presentation, the systematic methodology of practice-based exercises that build familiarity, technical capacity, and creative articulation will be described through Fall 2023's Experimental Digital Media class coursework, with a final outcome by student Keaton Riebel. The culmination of the class' methods will consist of a summary of outcomes and projections for upcoming expansions of this class (developing 360-degree video, AI processing) in Summer 2024.

A Field-specific Analysis of Gender and Racial Biases in Generative AI

Joseph K. West, Ph.D., Chemistry

Student Co-author: Meagan Kaufenberg-Lashua

Other Co-authors (Non-WSU): Jaime Kelly and Dr. Valeria Stepanova (Viterbo University)

Four artificial intelligence (AI) image generators were utilized to produce "faces" of chemists with varying occupational titles. Images were analyzed for representational biases and compared to data available from National Science Foundation (NSF). Presentational biases were analyzed within American Chemical Society (ACS) Diversity, Equity, Inclusion, and Respect guidelines with a particular focus on presentation of diversity and disability. Amplification of both representational and presentational biases

was observed for all four AI generators despite alignment of demographic trends with NSF and ACS reporting. Influences of occupationally-tied prompts (specific to chemistry) on demographic distributions of AI-generated images were investigated. At least one AI image generator assigned women and racial minorities to "assistant" positions while males and whites occupied the "top" positions in the field. Our data also demonstrates erasure of people with visible disabilities in the AI-generated outputs.

Perspectives of current students in chemistry classes at Winona State University on 'what a chemist looks like' have been collected and analyzed. The disturbing prevalence of a 'white male' image of a chemist, even for students identifying as female or a person of color, was evidenced.

Effect of SARS-Cov2 on Collegiate Athlete's Aerobic Capacity, Pulmonary Function, and Cardiac Rhythm

Kim Radtke, Ph.D., Health, Exercise & Rehabilitative Sciences

Student Co-author: Laura Ziegelmeyer

Faculty Co-author: Teresa Eber Lee

Other Co-authors (Non-WSU): Cathleen Ly, Bryson Girten, Richard Mikat, and Chapin Wehde (UW-La Crosse) and Andrew Jagim, Joel Luedtke, Sarah Weiss, Christine Hannish, Edward Malone (Mayo Clinic Health System – La Crosse, WI)

Background: The physiological effects of SARS-Cov-2 have yet to be fully elucidated, particularly among young, otherwise healthy, and active, individuals. The residual effects of SARS-Cov-2 on college-age athletes presented in current literature are both limited and conflicting. Therefore, the purpose of this study was to assess the effects of SARS-COV-2 on aerobic capacity, pulmonary function, and cardiac rhythms among collegiate athletes based on prior exposure to SARS-Cov-2.

Methods: Thirty National Collegiate Athletic Association (NCAA) Division III athletes (men, n=9; women n=21) completed a resting 12-lead EKG, Pulmonary Function Test (PFT), and a graded exercise test (GXT) to determine peak rates of oxygen consumption (VO_{2peak}). After their testing session, participants completed a survey to assess symptoms they experienced during their SARS-Cov-2 infection and any disruptions to their physical or mental health.

Results: There was a significant interaction effect between sex and SARS-Cov-2 status for VO_{2peak} ($P=0.004$). No significant interaction effects for RER ($P=0.157$), HRmax ($P=0.266$), and V_e ($P=0.579$) were observed. There were no significant differences in PFT results between male and female participants or SARS-Cov-2 status as it related to FEV₁, FVC, or FEV₁/FVC.

Conclusion: A significant effect was found between sex and HRmax as well as sex and V_e in college-age athletes. Pulmonary function testing revealed a past SARS-Cov-2 diagnosis had no significant effect on current lung volumes and capacities in this population. When referring to rhythm abnormalities, only minor EKG changes were found that did not indicate myocarditis.

Examining the Role of a Negative Social Representation on Resident Recreation in a Past Peak Community

Phileshia Dombroski, Ph.D., Recreation, Tourism, & Therapeutic Recreation

In and around the post-industrial city of Scranton, Pennsylvania, a negative mantra regarding local leisure opportunities has been present for decades, despite a number of successful public and private revitalization efforts. Uttered by a number of residents, echoed in the media, and even considered a mockery is the oft-heard complaint that "there's nothing to do around here". While this shared criticism of the greater Scranton area was pervasive, it was certainly not ubiquitous. Moreover, identifying why this pessimism was so widespread was only assumed, not known. Many believed that those who shared their pessimism regarding local recreation opportunities simply did not participate. Thus, to ascertain if residents' negative perception of local recreation amenities and activities may have stemmed from a lack of awareness or participation, the Theory of Social Representation was utilized as the theoretical framework in this study. A self-administered online survey with a quantitative survey design was created to collect data in a cross-sectional analysis of residents using non-probability convenience sampling. To identify respondents which exhibited tenets of a negative Social Representation (SR), three yes/no questions about respondents' perceptions of that region's recreation opportunities as well as the communication of these ideas were posed on the survey. From this, most respondents were able to be separated into two categories, those who ascribed to the negative SR of local recreation opportunities and amenities, and those who did not. Next, to measure residents' awareness and participation, seven domains of activities were created for this analysis: heritage and cultural attractions; places to watch sports; participation in sports and physical activities or places to participate; outdoor recreation activities or places to participate; performance, media and visual art venues and events; participation in creative or performing arts; and lastly, fellowship and community activities. In analyzing residents' self-reported awareness, results suggested that residents who held a negative SR of local recreation amenities had a significantly lower awareness across five of the seven activity domains. However, in comparing residents' SR with participation, six of the indices for activity domains were found to be non-significant showing no difference in participation levels between those who held a negative SR and those who did not. This study indicated that while residents with a negative SR reported a lower awareness across most domains, their participation rates in such did not differ from the residents who did not ascribe to a negative SR of local recreation opportunities and activities.

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