Research & CREATIVE ACHIEVEMENT DAY Winona State University

2026 Ramaley Celebration
Program and Book of Abstracts

April 23, 2026

Welcome Remarks: University President Kenneth Janz & Student Senate President Sophia Crowe
8:55 AM - Kryzsko Great River Ballroom
Welcome Remarks: University Provost Brenda Kowalewski & Student Senate President Sophia Crowe
12:55 PM - Kryzsko Great River Ballroom

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

Panel 1 Discussion – Research Experiences at WSU – 12:30-1:30 PM – Solarium
Panel 2 Discussion - Disappearing Data and Disappearing Information – 2:00-3:00 PM - Solarium

Student Oral Talks and Performances– 1:00 - 3:00 PM – Kryzsko, Minnesota room 223-224

Videotaped Oral Presentations: https://openriver.winona.edu/rca/2026/ondemand/
These will also be displayed continuously in Kryzsko, Minnesota room 225

Faculty Research Presentations – 11:00-12:20 Kryzsko, Minnesota room 223-224

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

Welcome to the 20th Annual Ramaley Celebration!

This year marks the 20th 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 23, 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 RCA Day All-University Committee owes 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: Kimberly Bates, Amanda Brouwer, Dana Engel, John Holden, Ken Graetz, John Holden, Robin Honkin, Brenda Kowalewski, Kendall Larson, Kara Lindaman, Thomas Nalli, Kayla Olson, Amanda Pruka, Hailey Seipel, Renee Stowell, Nicole Williams, and Violet Yoon

Instructions for Student Presenters

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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Panel 1 – Research Experiences – Solarium – 12:30-1:30

Panel Members	Dept	Description
Prof Dylan Blumentritt	Geoscience	The Research Experience Panel is moderated by Dr. Kimberly Bates, Professor of Biology, Winona State University. Both professors and students will relate some of their research experiences at WSU. Grants and Sponsored Projects Director, Tyler Treptow-Bowman will share details related to grant administration and internal grant opportunities for undergraduate research and creative projects.
Hannah Casselman	Psychology	
Prof Doug Dallier	Sociology & Criminal Justice	
Megan Ekern	Psychology	
Maggie Kramer	Biology	
Ava Krolnik	Psychology	
Tyler Treptow-Bowman	G&SP	

Panel 2 – Disappearing Data and Disappearing Information– Solarium – 2:00-3:00

Panel Members	Dept	Description
Kayla Olson Amanda Pruka Vernon Leighton	Library	Join WSU librarians to discuss how the defunding and intentional removal of data and information has, is, or will impact your research and the research of your students! This session is open to all researchers, students and interested individuals.

Faculty Research Presentations – Minnesota Rooms 223-224

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11:00	Kerr-Anderson, Eric O	CME	America's Cutting Edge and Winona State University's Composites Technology Bootcamp: The Development and Execution of a New Way to Grow the Composites Workforce	99
11:20	Green-Kronebusch, Elizabeth S	NURS	Leveraging Brightspace/D2L to Track AACN Essential Competency Achievement in Undergraduate Nursing Education	99
11:40	Feine, Chrissy	NURS	From Clinician to Educator: Supporting Faculty Onboarding with NLN Competencies	100
12:00	Sulpy, Alessandra	ART	The Sistine Gazebo Mural: Celebrating Winona State's 2035 Strategic Plan	101

Faculty Warrior AI Symposium – Solarium – 9:00-12:00

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tbd	Kadlec, Anton	CoB Student	AI-Powered Pedestrian Safety & Trail Analysis for Winona	NA
tbd	Medvedeva, Nina	WGSS	Teaching Artificial Intelligence from a Feminist Lens	101
tbd	Pringle, Jeremy	CoB Student	Leveraging AI to support local business marketing	NA
tbd	Greeley, Garrett D	PSY	Desirable Difficulties: Configuring Large Language Models for Effective Tutoring	102
tbd	Traore, Alama; Kaldera, Sandumini	CoB Student	Building a WSU Advising Bot	NA
tbd	Ruff, Emily	CHEM	Introducing Students to AI Tools Used in Biochemistry	102
tbd	Pitzen, Raymond	CoB Student	WSU Program Exploration Dashboard	NA
tbd	Lichty, Patrick M	CMST	Speculative Realities: Art, Pattern, and Future Imagination in Research and Pedagogy	102
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ABSTRACTS

Accounting

The Evolution of Accounting: Historical Bookkeeping and Double Entry
Linda Moua
Faculty Mentor: Jodi Olson

In present-day accounting, technology has transformed the efficiency and effectiveness of transaction recording. Microsoft Excel has become a standard tool since its launch in the 1980s and has quickly replaced handwritten work. This research aims to analyze the origins of accounting, specifically in bookkeeping and double-entry, and how it has proven to be the language of business from the beginning. This research will initially look at stone tablets from the Mesopotamian Era and into the development of double entry, with how its evolved origins are still similar and different today. Other than the history of bookkeeping and double entry, there will be a discussion of how accounting in ancient times was able to discuss the socioeconomic backgrounds of the country owners of stone tablets. This research will frame its analysis through discovered evidence and research of similar studies by accounting historians. Not only has bookkeeping in ancient history evolved into a worldwide profession, but it would be difficult not to acknowledge how the start of accounting was the first form of literacy. Overall, this research will dive into the origins of accounting and apply that knowledge to truly capture the essence of the language of business and how that has evolved to modern-day accounting.

Art & Design

Bookworm
Addie DeMars
Faculty Mentor: Danilo Bojić

Within the capstone design course, Advanced Design Project, students are challenged to concept, develop, and execute a project that leverages their design learning and encourages them delve deeper into a field of design they feel most passionate about. With this challenge, Addie DeMars developed the brand Bookworm, a book-lovers accessories box that featured a unique set of sustainable products including a wood engraved bookmark, earrings made from recycled book pages, and a page holder.

Gupi, Sustainable Craft Kits
Thea McAdams
Faculty Mentor: Danilo Bojić

Gupi is my senior capstone project where I created a sustainable, interactive product that challenges overconsumption. The project centers around Gupi Craft Kits which are DIY keychain kits made from repurposed fabric. They are designed to offer a more thoughtful and engaging alternative to fast, disposable products. At its core, Gupi is about sustainability and intentional making. Each kit uses recycled materials, transforming old fabric into something new and meaningful. Rather than contributing to waste, the project encourages reuse and creativity, allowing users to take part in the process of making their own object. This shift away from consuming and towards creating is a key part of Gupi's purpose.

The development of Gupi took a semester and followed the design process. Through research, prototyping, and refinement, I worked week by week to improve both the product and its experience. A major focus was ensuring that every component, from the materials to the packaging, could be reused or responsibly recycled. I also spent time developing a cohesive brand identity, experimenting with logos, colors, and patterns to create a playful and recognizable visual system. Clarity and usability were also central to the project. I refined the instructions to be simple and accessible, making the kits approachable for a wide audience. This balance between design, function, and sustainability helped shape Gupi into a complete and thoughtful product.

Looking forward, Gupi is designed with real-world application in mind. I developed a plan to produce and sell the kits, with the goal of making them both affordable and profitable. In the end, Gupi represents a shift toward more mindful design. It's not just about the final object, but about the experience of creating, the value of reusing materials, and the impact small choices can have on reducing waste.

Hiro Postcards

Kira Kainz
Faculty Mentor: Danilo Bojić

For the course entitled Advanced Design Project (ART 375), we were given the assignment to create a design project of our choice. This project was to be created over the course of Fall semester with five different phases that were to be markers for progress. In terms of my own project, I was deeply inspired by the idea that design could connect us. And additionally, I wanted to explore novelty item design. Which is the reason my brand Hiro Postcards it was it is today. In terms of the branding of Hiro Postcards, I decided to name it after my brother, whose middle name is Hiro and is someone who consistently inspires me. And so, by exploring new skills, finding personal meaning, and combining that with my design knowledge I was able to make a fully hand embroidered postcard. And as the final phases approached, I wanted to expand my project to be a kind of creative greeting card kit. Which was done by making my own envelopes to protect the embroidery done and unique stickers to add to the experience. And to add to the depth of this project I included quotes within the kit that came from family and friends.

Maxwell Branding

Lily Schartau
Faculty Mentor: Danilo Bojić

Maxwell Branding was my capstone project within the Design Program. For this project, I applied all my accumulated skills from both class work and internships to create a brand identity for Stout Fashion Design student Will Maxwell Schartau. This project involved interviewing the client to determine their needs and included creating the most important asset: a website that serves as a portfolio for Maxwell, along with other marketing materials such as a Linktree, social media page, business cards, labels, and stickers. The goal was to have all these assets ready for Maxwell's senior year to help him secure an internship or full-time position immediately after graduation.

Redesigning The UX-UI of Tandem Diabetes t:slim Insulin Pump with User Accessibility in Mind.

Sadie Marks
Faculty Mentor: Danilo Bojić

Redesigning The UX-UI of Tandem Diabetes t:slim Insulin Pump with User Accessibility in Mind. People diagnosed with type 1 Diabetes often rely on insulin pumps to assist in their medical care; therefore, it is of the utmost importance that these devices are accessible, trustworthy, and easy to use. Sadie Marks was diagnosed with type 1 diabetes over 11 years ago, in that time she has used insulin pumps from multiple companies and encountered their UX-UI shortcomings. This lived experience gave her additional insight into creating a user-centered design. Focusing on one of these devices, the Tandem Diabetes t:slim insulin pump currently has a UX-UI with an outdated appearance that does not imply a modern and trustworthy medical device. This project aims to redesign the UX-UI of Tandems t:slim insulin pump to improve usability, accessibility, and visual modernity.
The research for this project focused on ADA accessibility legislation, Tandems own accessibility guidelines, testimony from type 1 diabetics, and lived experience. The design process included evaluating the device's existing interface and user experience, reordering the UX flow, creating a new visual language, and creating a new UI layout. This is showcased in a functional prototype of the device interface.

The redesigned user experience and interface include additional accessibility features, easier to navigate menus, a modern trustworthy visual language, and clearer visual hierarchy. These changes reimagine the device in a more modern, trustworthy, and easy to use way. The additional features allow for greater safety and flexibility for type 1 diabetics with additional needs. This project highlights the importance of an accessible, informed, and user centric design approach for medical devices. It also serves as a suggestion for ways to improve on existing insulin pump devices.

The Sistine Gazebo Mural: Celebrating Winona State's 2035 Strategic Plan

Alivia Tima, Ella Page, Kira Kainz, Star Brown, Danica Kilibarda, Axel Hillis, and Jacinda Lundeen.
Student Co-Authors: Becca Bergen, William Mahowald, Reianna Larson, Ezri Bratrud, Caitlin Nelson, Benjamin Hagen, Gracia Sonderup, Anna Becker, Calista Escobar, Elizabeth Conner, Neveah Rettig, Maya Sawyer, and Aviana Pecinovsky
Faculty Mentor: Alessandra Sulpy

Associate Professor Alessandra Sulpy's ART 317 Contemporary Studio Practices was asked by President Kenneth Janz to complete a public mural celebrating Winona State's 10 year Strategic Plan. This mural will be installed this month in the interior roof of the Alumni Gazebo in the middle of campus and is comprised of 24 painted wooden panels. The top 8 panels depict the 5 Colleges within the University, and the bottom 16 panels showcase the Pillars and Initiatives of the 2035 Strategic Plan. The panels feature students, campus life, our many majors, the arts, sports, clubs and activities, the town and campus, technology, and future buildings. The 20 students in the class, under the direction of Professor Sulpy, designed and painted the panels. We started by brainstorming and diagramming, and interviewing the student body to get their thoughts on what they would like depicted. This helped us solidify our ideas and take the next step in designing the panels. Next steps were taking photographic references, creating mock-ups, and the class had help from Professor Danilo Bojic's ART 365 Campaign and Systems Design class with the typography and word placement. Finally, we created our final mock-ups, prepped the panels, and painted painted painted! We did this all in an incredibly short window of 6 weeks, and what wasn't finished in the Fall 2025 semester was completed by volunteer students and Associate Professor Sulpy in the Spring.

Woven Waste

Alison Buck

Faculty Mentor: Danilo Bojić

Woven Waste is the final product of my senior capstone, where we were challenged to fully develop a design project that aligns with our I–Design concentration. My concentration is sustainable applications, so I wanted to have a project that supports sustainable practices. Woven Waste is a craft book that instructs readers how to make crafting projects using plastic bags. This allows people to creatively and sustainably extend the life of their single-use plastic bags.

The core idea behind woven waste was to find ways to get people to upcycle, specifically with plastic bags. The process behind this project was first finding the problem that I wanted to focus on. I decided my problem that I would focus on was plastic bags because I work at a grocery store, and I would see all of the bags that would get wasted on a daily basis. People already use reusable bags, but for those who still use plastic bags, I wanted to create something that would help people to reuse them. This is where the idea of an upcycling craft book emerged.

Utilizing what I have learned from the last three years in the design program, I implemented hierarchy, iconography, and other design elements to design my book. This was also used to create my books brandings and other elements such as its YouTube channel. My creative strategy when starting this project was first to figure out the projects that would be taught within this book. I tried out different projects and found the most useful and fun projects to do, and perfected the steps to create them. When figuring out what projects to implement into the book, I wanted to make sure that they were also easy for people to execute and follow along with.

After creating the projects for this book, I then started working on the style and layout of the book. I chose colors and types that would inspire creativity as well as be slightly childish, since the target audience is younger people. With the style and layout of the book fully realized, I started by writing the book and each of the steps for the projects highlighted. I also worked on creating video tutorials as well during this process, so that the videos and tutorials were cohesive.

After finishing the videos, I posted them on the book's YouTube channel. Then, after having a fully-fledged book with a cohesive layout and five interesting tutorials, production started with me printing all of the pages and creating the hardcover, which I did by hand. Once all of these elements were produced, I wire-bound them together to create the final Woven Waste book. Woven Waste was made to help people to implement sustainable practices into their daily lives while being able to stay creative. Taking something that would otherwise end up in a landfill, you can give it a second life. This project was extremely fun to work on and taught me a lot about design and sustainable practices.

Biology

Glucose Metabolism generates ROS that activate NGD to Sustain the Entire Translating Pool
Elizabeth Martinez Castro and Kaitlyn Martin
Student Co-author: Caroline Westmoreland
Faculty Mentor: Scott Segal

Deletions in SDH1 and CYC1 effect the mitochondrial electron transport chain (ETC) by disrupting electron flow. This causes electrons to leave the ETC prematurely before reaching Complex IV,

preventing the reduction of oxygen to water. Instead, these electrons react with oxygen to form reactive oxygen species (ROS). While ROS are naturally created during aerobic metabolism, defects in ETC significantly increase oxidative stress. Excess ROS can damage guanine bases found in mRNA, leading to the formation of 8-oxo(G). These 8-oxo(G) bases can stall ribosomes leading to the activation of No-Go Decay (NGD).

NGD is an evolutionary conserved mechanism that aids in the degradation of damaged mRNA that contains stalled ribosomes. While a lot is known about the molecular mechanisms of NGD, the reason why this pathway is evolutionarily conserved is unknown. NGD is mediated by the Dom34p/Hbs1p complex which removes stalled ribosomes and promotes cleavage of mRNA at the stall site by the endonuclease Cue2p. The 5' fragment produced from the cleavage is degraded by the cytoplasmic exosome in the 3' to 5' direction. Whereas the 3' fragment is localized to p-bodies where it gets degraded 5' to 3' by Xrn1p. To minimize the possibility of oxidative molecular damage, cells also express superoxide dismutase proteins (Sod1p) in the cytoplasm to breakdown ROS into O2 and H2O2.

Previous work has shown there is a relationship between ROS levels and NGD activity. Therefore, it can be hypothesized that defects in ETC, which increase ROS could damage mRNA leading to an activation of NGD and an increase in p-body assembly. The Saccharomyces cerevisiae (baker's yeast) strain containing double mutations, cyc1D sod1D, showed increased p-body formation, indicating enhanced NGD activity. In contrast, the sdh1D hbs1D mutant demonstrated decreased p-body formation due to its inability to perform NGD because of the deletion in the hbs1 protein. Lastly, analyses of the sdh1D dom34D strain were unable to be performed due to its significant decrease in cell size. The work presented in this research proposes that NGD is an evolutionary conserved mechanism because it functions to preserve the entire translating pool from reactive oxygen species (ROS) potentially generated from ETC leakiness.

Analysis of Ovarian Structure and Cell Health in *Drosophila melanogaster* After Toxic Metal Treatment

Brooke Helling
Faculty Mentor: Christopher Groen

This project examines how the application of multiple histological and fluorescent stains can be used to visualize the structure of fruit fly (*Drosophila melanogaster*) ovaries, including how toxic metal exposure may affect ovarian tissue. Ovaries were dissected from adult female flies, and some flies were first treated with toxic metals to observe possible changes in cell structure. The samples were stained with DAPI to label nuclei, antibody stains to detect specific proteins within the ovary, and apoptosis stains to identify cells undergoing programmed cell death. After staining, the ovaries were imaged using a fluorescence microscope to compare how healthy and metal exposed tissues looked; and to visualize spatial relationships among different stages of oogenesis. By testing multiple staining techniques this project develops a simple and reliable method for visualizing ovarian structure, protein expression, and cell health. These results help us better understand ovary organization and provide a foundation for studying how environmental toxins influence reproductive biology.

Analysis of Various Neurotoxic Heavy Metal Compounds in Drosophila

Jorvik Jensen
Faculty Mentor: Christopher Groen

Neurotoxic effects of ruthenium and titanium metal compounds with potential to be used as cancer drug carriers were assessed in Drosophila. Both mortality and neurotoxic effects, seen via climbing

speed, were analyzed. Various concentrations of metal compound were used. The goal of this experiment was to see if any of the metal compounds have potential for use as cancer drug transporters without being too neurotoxic and lethal. Five different compounds using either ruthenium or titanium were tested, and brain dissections were taken to observe the degeneration of brain tissue within the Drosophila.

Characterization of Bacteria in Cattle Specimens

Jacob Hanson and Josie Tieskoetter
Faculty Mentor: Kimberly Evenson

Cattle nasal cavities provide a favorable environment for microbial colonization and can habit a wide population of bacteria, including opportunistic and pathogenic species. The objective of this research was to isolate, characterize, and identify bacteria present is nasal swap specimen collected from multiple calves. Samples were cultured and analyzed using selective and differential media, Gram staining, spore staining, and a range of biochemical assays. Several bacterial species were identified including the genus *Corynebacterium* and *Streptococcus* while some isolates could not be identified using classical biochemical methods alone. These results demonstrate that calf nasal specimens commonly contain diverse bacterial populations, some of which contribute to disease. Understanding the types of bacteria present may improve disease prevention, treatment strategies, and overall calf health management.

Comparing dissection vs literature data of cestodes in ducks

Sophia Cross
Faculty Mentor: Kimberly Bates

Cestodes are a class of parasites that are often found in vertebrate animals, specifically ducks. Research conducted by Winona State University students showed that cestodes were the most prevalent type of parasites found within ducks. However, outside research provides controversy as to whether this is actually true. Ducks were dissected by Winona State students over the past seven years, and their internal organs were carefully inspected under a light microscope. Ducks were donated by hunters, mostly harvested along the Mississippi River, from Buffalo City, WI to Winona, MN. Parasites were obtained, stored, and labelled from each duck. A dichotomous key was used to confirm the species, when possible. The average number of cestodes collected from all ducks (n= 177, 17 species) was 28.53 per duck, the largest amount out of all classes of parasites. Nematodes were the least common parasite, with the average being 0.497 per duck. Outside research has shown that cestodes are not the most common parasite found in ducks, with other types of parasites having more frequency. Shockingly, most research studies have concluded nematodes to be the most frequently found parasite species found in ducks in other regions.

Development of virus-like particles (VLPs) expressing human epidermal growth factor receptor-2 (HER2) for targeted cancer immunotherapy

Emma Creen and Sarah Maggiore
Faculty Mentor: Osvaldo Martinez

Breast cancer is the most common type of cancer diagnosed in women in the United States. In patients with breast cancer, upregulated expression of the human epidermal growth factor receptor 2 (HER2) protein occurs in approximately 30% of breast cancer tissues. HER2 is a transmembrane glycoprotein receptor of the epidermal growth factor receptor (EGFR) family. EGFRs regulate cell proliferation,

survival, and differentiation. HER2 overexpression is associated with increased signaling and correlates with poor prognosis. Expression of Ebola virus VP40 and glycoprotein (GP) in 293T cells will produce virus-like particles (VLPs) coated with GP. The Ebola virus GP functions as the viral attachment protein and mediates entry into antigen-presenting cells (APCs). Ebola VLPs expressing GP activate treated APCs inducing antigen-specific immune responses. Adjuvants have been used to improve a VLPs ability to activate an immune response. Retinoic acid inducible gene I (RIG I) functions as a cytoplasmic pattern recognition receptor that recognizes viral infection and induces the production of interferon. Interferon enhances antigen presentation and immune responses. We therefore hypothesize that VLPs expressing HER2, GP, and caRIG I (a constitutively active form of RIG I), induce a stronger anti-HER2 immune response from treated APCs than VLPs containing a mutant inactive form of RIG I (muRIG I). The goal of our present study is to generate HER2 containing VLPs and test whether they can target and activate APCs. VLPs were produced by co-transfecting 293T cells with vectors expressing chimeric caRIG I-VP40 or muRIG I-VP40, HER2, and GP genes. HER2 was shown to be expressed in HER2-expression-plasmid-transfected 293T cells and VLPs produced via expression of caRIG I VP40 or muRIG I, HER2, beta-lactamase and GP or GPF88A, an entry mutant of GP. However, VLP incorporated HER2 had a molecular weight of approximately 110 kDa compared to 160 kDa expressed from 293T cells. In future experiments we will test whether HER2 was cleaved post-transfection. Furthermore, we will test whether HER2 containing VLPs can stimulate APCs.

Effects of exercise and chemotherapy treatments on survival and climbing activity in *Drosophila melanogaster* with different mitochondrial genotypes.

Amber Haines
Faculty Mentor: Christopher Groen

Mitochondrial variation plays a role in energy production, physical performance and responses to physiological stress. This study investigated how *Drosophila melanogaster*, fruit flies, mitochondrial differences and exercise affected survival under the cisplatin and climbing abilities. Fruit flies with different mitochondrial genotypes were assigned to exercise and non-exercise groups. These groups were then split and assigned to either sugar or cisplatin, a chemotherapy drug. Survival rates and climbing ability, a measure of neurodegeneration, were monitored after the treatment. This study will provide information about how mitochondrial variation and exercise can influence responses to environmental and chemical stress.

Effects of Glial Cell Cycle Regulators in *Drosophila melanogaster* on Chemotherapy Induced Peripheral Neuropathy

Katelynn Warzonek
Faculty Mentor: Christopher Groen

Chemotherapy induced peripheral neuropathy (CIPN) is a prevalent side effect of chemotherapy. Cisplatin is a platinum-based chemotherapy drug that is known for neurotoxic effects. *Drosophila melanogaster* are a common model system due to having similar diseases related implicated genes as humans. RNA interference (RNAi) is used to down regulate specific genes leading to gene knockout. The goal of this study is to find which RNAi Drosophila strains are more resistant or sensitive to cisplatin effects on glial cells. Gene knockout of perineurial glial, subperineurial, and ensheathing glia on cyclin B and E were investigated.

Environmental DNA Recovery and Nanopore Sequencing from Spider Webs

Jace Onstad
Faculty Mentor: Amy Runck

Environmental DNA (eDNA) provides a noninvasive tool for assessing biodiversity, yet spider webs—despite their ability to trap genetic material from both spiders and the surrounding environment—remain an underutilized eDNA source. We evaluated the feasibility of using eDNA collected from local spider webs to passively evaluate biodiversity. DNA was extracted from webs collected in a home basement and at the west dock of Lake Winona. A 130 bp fragment of the cytochrome oxidase I (COI) gene was amplified using minibar primers and prepared for sequencing with Oxford Nanopore's Ligation Sequencing Kit V14. Libraries were run on a Flongle flow cell, yielding more than 163,000 DNA reads from the basement sample and more than 67,000 DNA reads from the Lake Winona sample. Sequence processing followed a modified PIMENTA workflow optimized for Nanopore data. After quality filtering, 21 reads from the basement web and 50 from the Lake Winona web were BLASTed and taxonomically identified using GenBank. Our results highlight the potential of spider-web eDNA as a novel and practical tool for biodiversity monitoring.

Expression of Virally Encoded Fibroblast Growth Factors in the Baculovirus Expression Vector System

Hailey Palmer
Faculty Mentor: Casey Finnerty

The goal of this project is to determine whether baculovirus vFGFs are mitogenic, meaning whether they can stimulate mitosis and cell division. Baculoviruses constitute a family of long, double stranded DNA viruses that primarily infect insects. Within the viral genome is a gene that produces viral fibroblast growth factors (vFGFs), which studies have shown induce chemotaxis in host cells. In addition to chemotaxis, FGF genes normally induce cell proliferation during development and wound healing, however, there are no published studies that examine the mitogenic activity of vFGFs. Previous studies at Winona State suggested that bacterially produced FGF may have reduced protein function, potentially due to a large 42 kDa purification tag affecting its activity. As a result, the activity of vFGF observed in earlier studies may not have accurately represented its true potential in a viral expression system. This provided reasoning for the current experiment, in which the vFGF gene without the purification tag will be produced to allow accurate evaluation of its effects on cell proliferation and mitogenic activity. The vFGF will be produced in the baculovirus expression vector system (BEVS) using the transfer vector pVL1393, which contains the extremely powerful polyhedrin promoter used to drive high levels of gene expression. Once produced, the recombinant vFGF will be tested for mitogenic activity. pAcFGF-3 and pCfFGF-3 are plasmid DNA constructs that carry the full length viral FGF genes from *Autographa californica* multiply embedded nucleopolyhedrovirus and *Choristoneura fumiferana* multiply embedded nucleopolyhedrovirus. These plasmids were used as the donor source of the FGF insert for cloning into pVL1393. All plasmids (vector and inserts) were amplified in E. coli, which served as a host for plasmid replication, allowing for production of large quantities of DNA needed for cloning. Ampicillin selection was used to ensure that only the bacterial cells carrying plasmids with the gene AmpR, an ampicillin-resistance marker, survived and grew. The DNA was then purified by maxiprep. Following plasmid amplification and purification, restriction digests were performed to isolate and cut the plasmids at the appropriate sites and generate DNA fragments for cloning. Ligation reactions were then performed to insert the vFGF gene into the pVL1393 vector. The ligation products were transformed into E. coli, and then transformed cells were plated on media to identify the potential recombinant colonies. These transformants will be screened to confirm the successful cloning of the vFGF insert into the transfer

vector. Once the transfer vector is confirmed to have the vFGF gene, it will be introduced into insect cells, causing a crossing over recombination event to make two new recombinant viruses expressing the vFGF genes under the control of the polh promoter. Studies are ongoing to discover whether baculovirus vFGFs are mitogenic, whether the recombinant construct has been successfully generated, and whether expression of vFGF in the baculovirus system produces stronger biological activity in cell proliferation assays.

Impact of exercise on *Drosophila* sensitivity to chemotherapy drugs

Wallace Whelan
Faculty Mentor: Christopher Groen

Drosophila melanogaster is a helpful model organism to understand human disease. In this experiment, cisplatin a chemotherapy drug that causes damage to neurons was fed to D. melanogaster. D. melanogaster was placed on an exercise regimen over the course of a few weeks to increase their resistance to the negative effects of the toxic stress of cisplatin or titanium compounds. Their ability to perform Negative Geotaxis Climbing Assays after being exposed to toxic stress provided data for the effectiveness of this protocol. The control flies were analyzed to attain a baseline for the Oregon Red phenotype then the subsequent trials were fed poisoned 10% sucrose solution with a Titanium compound Vs. Cisplatin to assess if flies that were on the exercise regimen climbed better than flies that did not exercise and exposed to Cisplatin and titanium compound.

Morphological Identification of *Echinostomas* Found Within Dabbler and Diving Ducks

Madison Becker, Emma Harms, Maggie Kramer, Miana Risser, and Sammy Schneider
Faculty Mentor: Kimberly Bates

Most ducks can be separated into two categories, dabblers or divers, depending on their feeding guild. Dabbler ducks are surface feeders and consume vegetation while diver ducks feed below the surface and consume aquatic animals. The *Echinostoma* species present in ducks may vary depending on their feeding guild. Three species of ducks from various regions of Wisconsin were donated by hunters for examination of endoparasites, particularly those from the genus *Echinostoma*. The sites of collection included Trempealeau, Marionette, and Onalaska. One species of dabbler duck, Gadwall (*Mareca strepera*), and two species of diver ducks, Lesser Scaup (*Aythya affinis*) and Canvasback (*Aythya valisineria*), were examined. Through dissection of the ducks, parasites were obtained and examined for morphological differences. Species of *Echinostomas* were identified microscopically through staining and slide mounting of the parasites. Once identified, it will be determined if the feeding methods impact the type of parasites the ducks will harbor.

Parasite prevalence in local grasshopper populations

Ali Gronquist and Lucia Freund
Faculty Mentor: Kimberly Bates

Spur-throated grasshoppers (genus *Melanoplus*) are a common agricultural pest in North America. Spur-throated grasshoppers are also a common host to several parasitic organisms. Horsehair worms (phylum *Nematomorpha*) are parasitic organisms known for their ability to manipulate the behavior of its insect host, particularly grasshoppers and crickets, by urging the host to enter water so it can complete its life cycle. Along with being a host to parasitic worms, they are a frequent target of grasshopper mites. Grasshopper mites (*Eutrombidium locustarum*) is a short-lived parasite that can negatively influence the reproductive ability of their host. Because grasshoppers are a major agricultural pest, gaining a better

understanding of possible natural regulators, species present, and the life history trends could influence management and sustainable agriculture in the future. This study examines the frequency of parasitic prevalence in local grasshopper populations and across different ecosystems. Sixty-five grasshoppers were collected across three Wildlife Management Areas (WMAs), one near a pond, one near a stream, and one within a prairie. The collected grasshoppers were identified, sexed, and dissected in lab to evaluate the frequency of parasites. Species were found to be *Melanoplus femurrubrum*, *Melanoplus differentialis*, and *Melanoplus sanguinipes*. Of the 65, 29 were found to be female and 36 to be male. We hypothesized that females would be more negatively impacted by parasite presence than males and that infection frequency would be greater in proximity to water. Currently, 2 females have been observed to have worms near water, and 2 males and 1 female have had mites near water. The prairie location is in its final stage of being studied but shows no parasites.

Primary Cultures of Skin, Liver, and Kidney Cells from White Sucker (*Catostomus commersonii*) and Creek Chub (*Semotilus atromaculatus*)

Morgan Dahlager
Faculty Mentor: Casey Finnerty

The *Catostomus commersonii*, also known as the White Sucker, and the *Semotilus atromaculatus*, Creek Chub, are freshwater fish primarily located in the upper Midwest in the Great Lakes basin and Northeast United States. They are very commonly found in small ponds, streams, and lakes all over Minnesota often used as bait and have very similar physical characteristics. These fish are very useful by acting as bioindicators by determining the health of these ecosystems and are useful for screening for sensitivity to pollutants and pathogens. This procedure was done by removing three different organs from each species of which are liver, kidney, and skin and transferred to flasks containing Leibovitz's L-15 media with 20% FBS and a PenStrep, Gentamycin, and Nystatin combo to observe how they grow over 3 months. Harvesting these organs was done with assistance including usage of their lab and materials at the USFWS in Lacrosse, WI. Two attempts at these cell lines have been made. The first was not successful in producing a viable cell line of any of the three organs from six White Sucker fish. The second attempt, with many modifications to procedure, did end up successful with more viable cells. Twelve fish were used in total between the two species for the second attempt. Six fish were White Sucker and six Creek Chub. Identification of each species was by their body shape and color pattern. The second attempt had more success due to multiple changes in the protocol. Some of which include surface decontamination of the fish before organ removal, homogenizing organs instead of mincing using a razor blade, and refeeding with fresh media compared to older media. Over time, the skin cells proved to be the most efficient in both species, although Creek Chub cultures grew better than White Sucker, by growing homogenous monolayers that appeared healthy enough for subculturing using a 1:3 split ratio after two weeks once the confluency was up to 80% from a Creek Chub. White Sucker skin cells also grew homogenous monolayers but only got up to approximately 55% at week four. The liver cells also proved to be the next best cell line due to another monolayer being formed and a successful subculture attempt using a 1:2 split ratio after three weeks once the confluency was up to approximately 75% from a Creek Chub. The kidney cells were also successful in both species by growing multiple sections of cells in their flasks for observation but not enough for subculturing. The highest confluency of White Sucker kidney got to 20% by week four and Creek Chub at 10% by week four. One liver and one kidney flask became contaminated around week 2-3 after set up, both from the same White sucker, but changes to the surface decontamination protocol significantly reduced the rate of contamination from the first attempt which had two kidney flasks from White Suckers get contaminated by week two and five.

Using Molecular Techniques to Determine the Different *Echinostoma* Species Found in the Diving Ducks and Dabbling Ducks of Wisconsin

Emma Davis, Sam Emery, Mackenzie Kastner, Ellie Sampson, and Jaelyn Then
Faculty Mentor: Kimberly Bates

Echinostoma species are zoonotic intestinal trematodes that infect vertebrates through the consumption of infected aquatic intermediate hosts. Echinostomiasis in waterfowl can cause intestinal damage, weight loss, poor condition, reduce survival, and reproduction. The differences in the feeding habits of dabbling and diving ducks may impact their diet, so it can be assumed that these differences would impact the *Echinostoma* species that they harbor. The purpose of this study was to determine whether the dabbling ducks and diving ducks in Wisconsin host the same *Echinostoma* species, using molecular techniques. We compared one Gadwall (*Maraca strepera*) a dabbling duck from Trempealeau, WI, one Lesser Scaup *(Aythya affinis*) a diving duck from Marinette, WI, and one Canvasback (*Aythya valisineria*) a diving duck from Onalaska, WI, in different regions of Wisconsin to determine whether feeding guild is associated with differences in parasite species. This was done by amplifying and sequencing two gene regions, 28S and ND1 to compare genetic identities of the *Echinostoma* in the ducks.

Visitor Recreational and Purchasing Behavior at Perrot State Park

Madeline Palmer
Faculty Mentor: Austin Yantes

There is a need to widen the diversity of visitors and to enhance recreational experiences at state parks. This study evaluated visitor-reported metrics of recreational activities, purchasing behavior, and location preferences across a demographically diverse population at Perrot State Park in Trempealeau, Wisconsin. We compared park use across age classes and influence of visitor origin (zip code) and distance traveled on type of pass purchased (day versus annual). Data was collected via online surveys administered at Perrot State Park (n=77) through social media platforms (n=125). Findings indicated that the majority of visitors were traveling from within a 35-mile radius of the park. The hiking trails were identified as the most frequently utilized feature, with no significant differences observed across age groups. For those staying in the campground, an annual pass was bought instead of a day pass. This was not the same case for hiking trails, the pass type varied. The results suggest that park managers should focus management strategies on trail maintenance at Perrot State Park. Park managers could also benefit by encouraging visitors who live within a 35-mile radius of any state park to purchase an annual pass, increasing purchases for the park and experiences for the visitor. By including visitor preferences and demographics into management planning, park managers can improve the overall value of state parks.

Renal Colic CT: Sex-Related Radiation Dose Differences

Alexander Charles
Mentors: Murray Donovan; Ashley Tao, Daniel Gomez Cardona, Jacob Feinas, Andrea Arenz, and Matthew Huspeni (Gundersen Clinic – La Crosse)

PURPOSE: To identify sex-related radiation dose differences in CT imaging for suspected renal colic.

BACKGROUND: Computed Tomography (CT), because of its speed, availability and accuracy, remains the primary imaging modality for renal colic, an increasingly prevalent and often-recurring disease affecting 1 in 11 adults. Historically considered a male-predominant disease, renal colic, recent national survey

data indicate, has a rising incidence among young women. Efforts to reduce radiation dose particularly for this population gain importance as the use of CT for this clinical task is increasing.

METHODS: 463 consecutive emergency department encounters which included CT renal colic-protocol examinations were analyzed. Demographic, estimated radiation dose, and imaging results were collected.

FINDINGS: Significant differences in renal colic CT radiation exposure metrics were observed between sexes. Females exhibited higher size-specific dose estimate (SSDE) for any given body mass ($p = 0.021$). Females also demonstrated higher cumulative numbers of CT renal colic-protocol examinations and other body CT's. Obstructive calculi distribution in females was strongly bimodal, in proximal and distal ureters.

DISCUSSION: Findings suggest females receive higher radiation exposure from renal colic-protocol CT, and that disease incidence, cumulative dose from multiple examinations and from other CT studies contribute to females' radiation burden. Existing low-dose protocols have reduced radiation, and have optimized automated technical parameters (kVp, mAs, collimation, pitch), without concomitant reduction in body volume exposed, which remains discretionary.

Bioinformatics Prioritization of Ribosome-related Genes in the Oocyte Transcriptome of PCOS Patients

Vincent Griffith
Faculty Mentor: Claudia Preston

Polycystic ovary syndrome (PCOS) is a metabolic disease, and the most common anovulatory disorder of women in reproductive age. However, the molecular mechanism behind this disorder is still not fully understood. The aim of this study is to identify the transcriptomic changes in oocytes and granulosa cells that may contribute to altered folliculogenesis and poor oocyte maturation in patients with PCOS. This preliminary study utilized a bioinformatics approach using a previously published dataset (GSE155489). Gene expression analysis was performed on oocytes and granulosa cells of six age-matched patients (PCOS n=3; non-PCOS n=3). Significance threshold was set at the adjusted p-value (adj p) < 0.01 (Benjamini Hochberg FDR). Gene ontology AmiGO2 was used to define mitochondrial and nuclear-related genes, and this initial analysis focused only on nuclear-associated genes. Functional enrichment was performed with Reactome pathway database and DAVID functional annotation webtools. Protein-protein interaction (PPI) analysis and gene prioritization were performed using STRING database and Cytoscape network analysis. Gene expression profiling of PCOS-related oocytes and granulosa cells revealed enrichment of "nucleic acid metabolic process" (spliceosome and ribosome functions) in down-regulated genes of oocytes. Among the prioritized oocyte-associated genes, RPL7 and RPS6 have previously been shown to be important in mouse oocyte development. This analysis could help expand the understanding of human oocyte maturation and their potential functional impact in patients with PCOS. Future studies will include protein localization of RPL6 and RPL7 ovarian tissue, as well as analysis of mitochondrial-related genes.

CONCLUSIONS/WAY FORWARD: Reduced acquisition volumes targeted to identifying urolithiasis and obstructions, may permit reduced radiation exposure without accuracy compromise.

Business Administration

AI Major Simulator
Adam Heimdahl
Faculty Mentor: Huh-Jung Hahn

The AI Major Simulator is designed to help students explore academic options by answering questions about majors, minors, and potential course loads. It allows students to visualize different academic paths and better understand how changes may impact their schedule.

An AI-Enabled Condition Assessment of the Lake Winona Bike Path
Anton Kadlec
Faculty Mentor: Patrick Paulson

This project was developed as part of the Winona State University Artificial Intelligence Innovation and Engagement Pilot Fund, which supports extracurricular AI projects that address campus and community challenges and strengthen career readiness through hands on experience. This project is presented as part of the Warrior.AI Symposium.

This project develops an AI-powered trail condition assessment for the Lake Winona Bike Path, a 5.3-mile paved loop encircling the East and West Lakes in Winona. The system correlates three data sources to produce cost efficient maintenance recommendations for city staff and improve Return on Investment: International Roughness Index (IRI) scores from Total Pave, Pavement Condition Index (PCI) scores collected through a field survey, and community experience feedback gathered via QR Code surveys posted at five trailhead locations. IRI measures pavement roughness in inches per mile using a mobile phone sensor and GPS. Higher IRI values indicate rougher surfaces with scores generally ranging from 0 to 500. PCI rates overall pavement distress on a scale from 0-100 where 0-10 is a failed surface, 10-25 is a very poor surface, 25-40 is a poor surface, 40-55 is a fair surface, 55-70 is a good surface, 70-85 is a very good surface, and 85-100 is an excellent surface. Together these two quantitative indicators provide a comprehensive picture of trail health at the segment level.

The project draws on my three years of professional infrastructure experience as an intern at GoodPointe Technology, a St. Paul based infrastructure asset management firm. This work included pavement condition data collection and management for municipalities including Apple Valley, Eden Prairie, and the St. Cloud Area Planning Organization, where I collected 150 miles of IRI data during Summer 2024.

The AI advisory system is built using Microsoft Copilot Studio. Survey responses are correlated with IRI and PCI measurements to produce a serviceability score for each trail segment. This allows the city staff to identify where their limited maintenance budgets will have the greatest impact.

ASK WARRIOR
Alama Traore and Sandumini Kaldera
Faculty Mentor: Patrick Paulson

ASK WARRIOR is a conversational tool created to make it easier for students, faculty, staff, and visitors to access information at Winona State University. The purpose of this project is to simplify how people find answers to common university-related questions by providing a quick, easy, and user-friendly way to get information in one place. Instead of searching through multiple webpages or reaching out to different departments, users can simply ask questions in plain language and receive clear, helpful responses. The chatbot is designed to assist with topics such as Admissions, Financial Aid, International Services, Study Abroad, and other campus resources. This helps reduce confusion, saves time, and improves the overall experience for anyone trying to navigate university information.

The tool focuses on being approachable and easy to use, allowing users to have natural, back-and-forth conversations without needing any technical knowledge. By providing instant responses, it helps users feel more supported and informed when making decisions or looking for guidance. The broader goal of this project is to improve accessibility to information and create a more efficient way for the university community to connect with important resources. It also aims to reduce the workload on staff by handling frequently asked questions, allowing departments to focus on more complex needs.

In the future, the chatbot can be expanded to include more information and continuously improve the quality of responses, ensuring that users always have access to reliable and up-to-date guidance. Overall, the WSU AI Chat Widget is designed to make university information more accessible, convenient, and user-centered, contributing to a more connected and supportive campus environment.

Chemistry

Assessment of Metal "Sunscreen" Complexes as Dye-sensitizers for Solar Cells
Edric Robbins, Megan Kreul, Jackson Moua, Jackson Dopkins, and Brady Gregory
Faculty Mentors: Jennifer Zemke and Joseph K. West

Metal complexes of chromium, iron, and cobalt have been prepared with common sunscreen ingredients (avobenzone and oxybenzone) utilized as supporting ligand systems. These complexes have been targeted for their potential to enhance solar cell efficiency by more readily absorbing light in the UV and visible wavelength ranges. These absorbance enhancements are suggested due to these ligands already established abilities as strong UV absorbers and the LMCT interaction between them and the coordinated metal ions.

Bioactivity Assays of Synthesized Sulfamethoxazole-based imines
Hailey Notebaart, Madison Bleess, Caleb Meyer, and Rylan Yocum
Faculty Mentor: Jonathon F. Mauser and Joseph K. West

We have examined the bioactivities of imines synthesized from sulfamethoxazole and aromatic aldehydes. Assays including disk diffusion and cell growth inhibition were performed on E. coli, P. aeruginosa, and S. aureus. In conjunction with this, optimized structures of these imines were docked with dihydropteroate synthase using SwissDock to determine relative binding energies. Comparisons

between docking results and bioactivity assays were made to evaluate the correlation between binding affinities and antibacterial efficacy.

Computational Investigation of Ruthenium Complex Interactions with DNA for Anticancer Applications

Mikayla Ertz
Faculty Mentor: Hannah Leverentz-Culp

Ruthenium complexes are being studied as potential alternatives to platinum-based cancer drugs because they are often less toxic and more selective for cancer cells. This project uses computational modeling to investigate how a ruthenium complex interacts with DNA, which is an important target for anticancer activity. All simulations were performed using the MSI Agate supercomputing system through Termius. The complex was first tested in the major groove of DNA with and without a leaving group, followed by the same set of simulations in the minor groove. Binding energies were analyzed to compare interaction strength and determine how groove position and ligand structure affect binding.

The results showed that the ruthenium complex primarily interacts with the DNA backbone, specifically the oxygen atoms on the phosphate groups, rather than directly with nucleotide bases. In the major groove, binding energies ranged from -4.99 kcal/mol (with leaving group) to -7.46 kcal/mol (without leaving group). In the minor groove, energies ranged from -5.72 kcal/mol (with leaving group) to -7.80 kcal/mol (without leaving group), with the most favorable binding observed in the minor groove without the leaving group. Overall, removing the leaving group consistently led to stronger binding, suggesting it may interfere with optimal interaction. These results show that both groove position and ligand structure impact how ruthenium complexes bind to DNA. Future work will focus on comparing these results to cisplatin and using more flexible DNA models to see If interactions can shift from the phosphate backbone to direct binding with nucleotide bases.

Co-precipitation Synthesis of Magnetic Nanoparticles Fe3O4 and Their Photocatalytic Performance

Leo Doan, Kahun Vue, and Natalie Chouinard
Faculty Mentor: Jennifer Zemke

Iron oxide nanoparticles (NPs) were prepared and evaluated for their photocatalytic activity in degrading methylene blue (MB). MB is widely used in different industries and is difficult to remove from waste due to the benzene groups, so the removal of MB becomes an emergency problem. Magnetic nanoparticles (MNPs), Fe_3O_4, were successfully synthesized using a co-precipitation method between $FeCl_3.6H_2O$ and $FeCl_2.4H_2O$. The point of zero charge (PZC) was determined to be approximately at pH 6.37. The NPs were examined under UV light irradiation, and their catalytic activity was monitored using UV-Vis spectroscopy. The λ_{max} of MB was determined to be approximately 664.6 nm. The dye degraded more rapidly in the presence of MNPs, confirming the catalytic effect of MNPs. The control reached only 26.2% degradation with the rate of 0.00550 min^{-1}, while Fe_3O_4 NPs improved this to 55.2% degradation at pH 7 with the rate of 0.00733 min^{-1} and 66.1% degradation at pH 13 with the rate of 0.0140 min^{-1}. Overall, Fe_3O_4 MNPs can significantly increase the rate of dye degradation.

Crystal Growth and X-ray Analysis of Anthranilic Acid-based Azo Compounds

Silas Buchner, Laken Ivie, Ben Johannes, and McKayla Knaack
Faculty Mentor: Joseph K. West

X-ray diffraction is a powerful technique that can is unmatched in terms of solid-state structural determination. The focus of this project was on growing single crystals of the various azo compounds followed by subsequent X-ray analyses obtaining essentially a picture of the synthesized molecules. Analysis of this type allows for unequivocal structural determination including azo attachment point and geometric isomer preference.

Deep Tissue Massage-Induced Muscle Damage Associated with Delayed Onset Muscle Soreness (DOMS), Stress, and Rhabdomyolysis

Lily Ekert and Ella Halopka
Faculty Mentor: Jonathon Mauser

Deep tissue massage is a common treatment method used to aid in muscle recovery, reduce pain, and promote overall physical well-being. However, there is limited research explaining its biochemical effects at a cellular level, particularly in relation to muscle damage and systemic inflammation. Severe cases of muscle tissue breakdown are Rhabdomyolysis, which is discussed with an emphasis on clinical evidence rather than biochemical aspects. The goal of this study is to determine whether deep tissue massages cause cellular damage and tissue inflammation. This testing will be done through quantitative measurements of biomarkers within the bloodstream. In previous studies, four specific markers were tested before and 24 hours after the massage. These markers were Interleukin-6, C-reactive proteins, Myoglobin, and Creatine Kinase. Interleukin-6 and C-reactive protein levels provide insight into the inflammation. Myoglobin and Creatine Kinase are proteins that aid in energy supply within muscles. It was shown through Enzyme-Linked Immunosorbent Assay (ELISA) that signs of inflammation had returned to the baseline within 24 hours of the massage. Current research for this study includes adding sensitivity testing for cortisol. Cortisol is a hormone that indicates if the body is under stress. It would also include more time increments within the 24 hours to gain a better understanding of the trend of inflammation caused by deep tissue massages.

Detection of 17α Ethynylestradiol and 17β Estradiol in Wastewater

Kezia Lemke
Faculty Mentor: Jeanne Franz

Environmental estrogens act as endocrine disrupting chemicals, thereby affecting the metabolism, synthesis, and receptors of hormones. For this reason, estrogens can have serious health consequences for aquatic wildlife by negatively affecting their reproductive abilities. Synthetic estrogens, such as 17α ethynylestradiol, the synthetic analog of 17β estradiol, are particularly potent, and are shown to have more harmful effects at lower concentrations. This illustrates the importance of developing sensitive and efficient methods for 17α ethynylestradiol and 17β estradiol detection, so that areas of high concentration can be recognized and methods to decrease the estrogen concentrations can be put in place. To this end, an estrogen detection method that employs Solid Phase Extraction (SPE) will be developed to concentrate environmental wastewater samples and to remove contaminants. This will be followed by High Performance Liquid Chromatography (HPLC) to separate the estrogens. After separation, the fluorescence detection of the estrogens will allow low concentrations to be detected due to the sensitivity of fluorescence analysis. Fluorescence detection will also enable method efficiency because few compounds fluoresce, allowing for limited chromatographic contamination from other compounds. Environmental water samples will be taken from wastewater treatment plants that use different methods to treat their water, as the effect of wastewater treatment method on estrogen concentration has not been thoroughly explored. Overall, the goal of this research is to determine an efficient and sensitive detection method for 17α ethynylestradiol and 17β estradiol to evaluate

wastewater samples where relatively low but detectable concentrations of estrogen are expected to be found.

Effects of Water and Oxygen on the Structural Stability of RAPTA Complexes in Solvents Relevant to Biological Assays

Meagan Kaufenberg-Lashua
Faculty Mentor: Joseph K. West, Jonathon Mauser

Ruthenium-arene PTA (RAPTA) complexes represent a versatile class of organometallic compounds with promising pharmacological properties. In this study, we investigated how water and oxygen influence the structural stability of various RAPTA complexes in two solvents relevant to common biological assays: ethanol and dimethyl sulfoxide (DMSO). Assessment in chloroform, a common solvent for structural characterization, has also been conducted as a benchmark. NMR, UV-vis, and mass spectrometry were used to track solvolysis or hydrolysis. We have also explored how oxidized PTA, or protonated structures influence structural stability.

Electronic Structure Analysis of Sulfanilamide-based Imines

Autumn Schuch, Clara Thompson, Samantha Andersen, Andrew Denneson, and Lauren Bailey
Faculty Mentor: Joseph K. West

In this project, we focused on the properties modeling of sulfamethoxazole-based imines by modeling synthesized compounds in both *cis* and *trans* forms. Our aim was to mine properties for alignments with bioactivity results. The results, specifically the energies, were analyzed to determine the effects of substituents on isomer selection as well as other properties. Electronic properties, specifically population analyses of key atoms, have been conducted as well.

Elucidation of solution state structures of $CoCl_2$ in assorted Lewis basic solvents

Regan Stefanoni, Abigail Savatski, and Connor Lehner
Faculty Mentor: Joseph K. West

$CoCl_2$ is readily solubilized in a variety of Lewis basic (a.k.a. "donor") solvents. While the aqueous structure is commonly known, $[Co(H_2O)_6]Cl_2$, identification of exact coordination sphere geometry has not been elucidated for any other solvents. Spectroscopic (IR, UV-vis) data has been combined with an extensive computational analysis, conducted at the r2SCAN-3c level of theory, to deduce most probable solution state structures in acetone, acetonitrile, dimethylsulfoxide, dimethoxyethane, methanol, and tetrahydrofuran for both cationic and anionic species. Due to photophysical properties of a commonly occurring $[CoCl_4]^{2-}$ anion, we have utilized anion exchange to attempt to isolate cationic complexes of the presumed form $[Co(S)_n]^{2+}$ (S = donor solvent) as tetraphenylborate salts. Crystallographic approaches have also been utilized to attempt determination of solid-state structures, when feasible.

Enhancing Winona State's NMR Capabilities by Making Available More Nuclei

Nora Cowell, Hà Nguyễn
Faculty Mentor: Joseph K. West

Nuclear magnetic resonance spectroscopy (NMR) is a powerful analytical tool for structural elucidation and isotope specific analysis in chemistry and related fields. Winona State University recently acquired a new NMR instrument equipped for common nuclei such as ^{1}H,^{13}C,^{19}F, and ^{31}P. In order to expand

usefulness of this instrument beyond the most conventional applications, we are enabling direct detection of a broader range of nuclei, including ^{6}Li, ^{11}B, ^{27}Al, ^{51}V, ^{55}Mn, and ^{59}Co. This work involves identifying appropriate reference standards, determining resonance frequencies, establishing chemical shift ranges, and optimizing pulse parameters for each nucleus. These enhanced capabilities will support greater research possibilities on campus, strengthen collaborations, and potentially foster industrial partnerships.

Getting Students Invested in the Plastic Problem: Lab Activities about PET hydrolase

Karina Kpahn
Faculty Mentor: Emily Ruff

If the world continues our current trend of plastic production and waste, the UN predicts that we will have over 1.1 billion metric tons of plastic waste accumulated by 2050. In 2016, researchers reported a bacterium (*Ideonella sakaiensis*) that can use polyethylene terepthalate (PET) as a carbon source. Since then, many researchers have studied the *I. sakaiensis* enzyme PET hydrolase (PETase) and tried to optimize it for recycling and other applications. We believe that educating students about the current plastic problem and showing them different ways that chemistry can be used to solve this environmental issue is an important part of working towards a sustainable solution. We gathered information from previously published research to create various lab activities for upper- and lower-division chemistry courses. Upper-division Biochemistry students purified a His-tagged PETase construct using affinity and size-exclusion chromatography and validated their purification. Organic Chemistry students measured degradation of PET from various sources by purified PETase.

Impact of Point Mutations on the Structure and Function of VRK1

Leo Doan, Elijah Murray, and Maddie Thoemke
Faculty Mentor: Emily Ruff

Vaccinia-related kinase 1 (VRK1) is a serine/threonine kinase protein involved in cell cycle regulation, DNA damage response, and chromatin remodeling. VRK1's structure contains an N-terminal domain for nuclear localization, a catalytic domain for ATP binding and substrate phosphorylation, and regulatory regions for protein interactions. Mutations of the VRK1 catalytic domain, including L195V and A66G, were studied and compared to the wild-type (WT) characterizations. These mutations have been previously linked to genetic disease. A plasmid encoding the His-tagged protein catalytic domain was introduced to BL21 DE3 RIL cells, then cultured. The protein was separated using affinity, desalting, and gel filtration chromatography. Procedures were adapted to the department's new NSF-funded fast protein liquid chromatography (FPLC) instrument. Circular dichroism (CD) spectroscopy and differential scanning fluorimetry (DSF) were used to study protein structure and stability of the WT and mutant proteins. The binding of nucleotide and two inhibitors (PIK-75 HCl and BI-D1870) was also investigated using DSF. Binding to ligands stabilizes the protein and increases the melting point. Understanding how these mutations affect VRK1's ligand binding may improve our understanding of this protein and its role in disease. This abstract and poster were also presented at the 2026 ASBMB National Meeting.

Protein Binder Design Using RFDiffuse and AlphaFold

Alex Dahle and Henry Gramann
Faculty Mentor: Emily Ruff

Designing proteins with customized binding domains and structural geometries is a new capability in biochemistry. This study uses methods of protein design with molecular biology protocols to create and characterize novel protein structures.

We used RFDiffusion to predict a high affinity protein binder for kinase Aurora-A (AurA), alongside a manual design of a custom protein scaffold of TPX2 (AurA's native binder). The resulting protein sequences were used to design codon optimized plasmids for expression in Escherichia coli. Gene blocks with flanking NheI and XhoI restriction sites, as well as a Tobacco Etch Virus (TEV) protease cleavage site, were ordered and purchased. We plan to insert these into a bacterial expression plasmid, adding an N-terminal 6xHis-tag for Ni-NTA protein purification. Protein purity and concentration will be assessed using SDS PAGE and Bradford assays, and if purification is successful, we plan to assess binding to AurA as well.

Investigating the Bioactivity of Novel β-Diketonate Complexes

Celeste Remolina
Student Coauthor: Dylan Wolfe
Faculty Mentors: Joseph K. West and Jonathon Mauser

Ruthenium β-diketonate complexes have emerged as promising chemotherapeutics due to their selective bioactivity against tumors. We assessed the bioactivity of novel synthesized ruthenium β-diketonate complexes on human cancer cells as well as wild-type cells. Using cell growth assays, we screened candidate ruthenium complexes and determined the IC50 value for effective candidates. Here we present a model for ruthenium-mediated growth inhibition

Modeling Geometric Isomer and Electron Configuration Preferences Alongside Absorbance and IR Spectra of Metal "Sunscreen" Complexes

Taelyn Stuve, Braunwyn Darrington, Nick Popovich, and Evan Swanstrom
Faculty Mentor: Joseph K. West

Trivalent, homoleptic complexes of avobenzone and oxybenzone with chromium, iron, and cobalt have all been modeled at the r2SCAN-3c level of theory in Orca. Structural energetics have revealed the preferred geometric isomers as well as electron configurations. Additionally, IR and UV-vis spectra have been generated allowing comparisons to experimentally obtained spectra for attempted modeling validation against synthesized and isolated complexes.

Modern Analysis of *d*-Electron Count Impact on Crystal Field Splittings

Hanna Sunsdahl and Leighton Stouffer
Faculty Mentor: Joseph K. West

We have applied modern, high-level computational methods to reexamine crystal field theory with a specific focus on partially filled *d* electron manifolds (*d*1–*d*9). Using coupled cluster approaches with an all electron basis set, we modeled a range of coordination geometries to directly probe how *d* electron count influences crystal field splittings. These calculations reveal systematic, and in some cases unexpected, changes in both the absolute energies and relative rankings of d orbitals as electron occupancy increases. Beyond simple magnitude shifts, electron count is shown to alter orbital preferences and splitting patterns in ways not captured by conventional crystal field models. Together, these results provide a clearer, quantitatively grounded picture of how electron configuration governs orbital energetics across different crystal field environments.

Modern Approaches to Crystal Field Theory: A Comparison of Coupled Cluster and DFT Methods

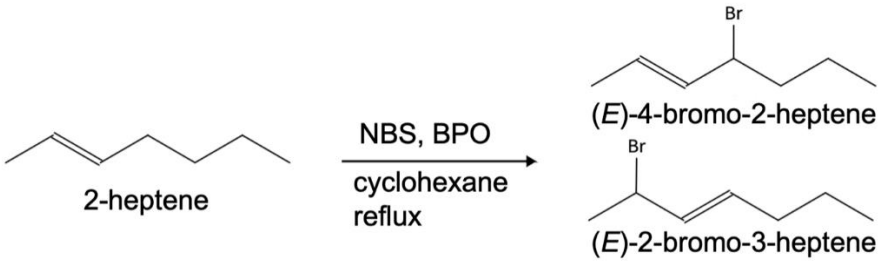
Leighton Stouffer and Meagan Kaufenberg-Lashua
Faculty Mentor: Joseph K. West

We have taken a modern computational approach to a foundational concept in inorganic chemistry: crystal field theory. By modeling several d_0 systems and d_{10} systems using both DFT and couple cluster methods and an all-electron basis set, in different geometric environments ("crystal fields"), we have uncovered some surprising differences with the conventional theory. These highly accurate methods have given a more clean understanding of exact energies of orbitals and prediction of orbital splitting patterns arising from the various crystal fields.

N-Bromosuccinimide Bromination of 2-Heptene: Determination of all Allylic Bromide Products

Natalie Olsen
Faculty Mentor: Thomas Nalli

The main goal of this research was to demonstrate the occurrence of allylic rearrangement in the reaction of N-bromosuccinimide (NBS) with 2-heptene. Thus, we aimed to demonstrate using ^{1}H NMR and HPLC that (*E*)-2-bromo-3-heptene (*E*-2-3) and (*E*)-4-bromo-2-heptene (*E*-4-2) are formed in roughly equal amounts. This is important because several references claim that allylic rearrangement does not occur to a significant extent in this reaction. The reaction was run using 2.1 mL (15 mmol) of 2-heptene, 1.84 g of NBS (10 mmol), and 0.008 g of benzoyl peroxide (0.03 mmol), in cyclohexane (9.4 mL) under reflux. ^{1}H NMR of the product mixture clearly showed the formation of both products (43% *E*-2-3, 37% *E*-4-2), which we attempted to isolate by HPLC.



NMR Analysis of Anthranilic Acid-based Azo Compounds

Sawyer G. FierkeLepp, Isaac Owens, Kateri E. St. John, and Elizabeth Yanke
Faculty Mentor: Thomas Nalli and Joseph K. West

We attempted to synthesize an array of azo compounds via the diazotization of anthranilic acid and subsequent reaction with naturally occurring phenols. In most cases, there is uncertainty in azo group attachment point preference during formation of the targeted compound. NMR is a powerful technique that enables unmatched solution-state structural determination. Analyses of ^{1}H and ^{13}C spectra have provided a clear picture of the exact products obtained in each case.

NMR Analysis of Sulfamethoxazole-based Imines Synthesized from Aromatic Aldehydes

Lily Trier, Ava Ostrowski, Ashley Powers, and Kaylee Ruberg
Student Co-author: Connor Lehner
Faculty Mentor: Joseph K. West

In this project, we focused on the ^{1}H NMR analysis of seven different imines synthesized by combining sulfamethoxazole, a classic antibacterial agent, with various substituted benzaldehydes. Our ^{1}H NMR analysis provided detailed insights into the precise structures of these compounds, confirming their successful formation and purity beyond what was capable for other characterization methods such as mass spectrometry and IR spectroscopy. Purity analysis and structural verification of these compounds was performed in support of several related projects.

Photocatalysis of Methyl Red Using Iron Oxide Nanoparticles

Mikayla Ertz, Henry Gramann, Connor Lehner, and Bonnie Ni
Faculty Mentor: Jennifer Zemke

This study investigated the photodegradation of methyl red, an azo dye commonly used as a pH indicator and a known environmental pollutant, using synthesized Fe_3O_4 nanoparticles. Methyl red is resistant to degradation from simple environmental conditions such as heat and light. The goal of this project was to determine whether Fe_3O_4 nanoparticles could act as an effective catalyst for dye degradation under UV light and to analyze the reaction kinetics using UV-Vis spectroscopy.

The Fe_3O_4 nanoparticles were synthesized, then confirmed to be magnetic and further characterized using IR spectroscopy. Photodegradation experiments were conducted by exposing 50 ppm methyl red solutions, both with and without nanoparticles, to UV light for 75 minutes. Absorbance measurements were taken every 15 minutes to monitor changes in dye concentration. Control samples without nanoparticles showed little to no change in absorbance over time, while samples containing Fe_3O_4 nanoparticles showed a gradual decrease in absorbance, indicating dye degradation.

Although degradation was observed, the change in absorbance was relatively small over the experimental timeframe with a 5.7% total degradation. This suggests that reaction conditions such as nanoparticle concentration, pH, or exposure time may not have been fully optimized. Despite these limitations, the results support the potential role of Fe_3O_4 nanoparticles as a photocatalyst for azo dye degradation.

Overall, the results suggest that Fe_3O_4 nanoparticles can contribute to dye degradation under UV light and may have potential applications in treatment of methyl red. The rate constant (k) was determined to be 0 min^{-1} for the control and 0.0007 min^{-1} with the nanoparticles in the dye. Future experiments could improve this work by testing a wider range of reaction conditions, increasing exposure time, and comparing different nanoparticle amounts to determine which factors give the greatest dye removal.

Preparation of Organoruthenium Complexes as Potential Cytotoxic Agents

Eion Hinkle
Faculty Mentor: Joseph K. West

RAPTA complexes and their precursors are an emerging class of therapeutic agents with potential cytotoxicity, making them candidates for cancer treatment. We have prepared a variety of

organoruthenium compounds composed of a ruthenium core, a *p*-cymene, a β-diketone ligand, and a chloride or a 1,3,5-triaza-7-phosphaadamantane (more commonly known as PTA). Structures have been verified by ^{1}H and ^{13}C NMR (as well as ^{19}F and ^{31}P, when applicable) as well as by mass spectrometry. In a few select cases, single crystals suitable for X-ray diffraction analysis have been obtained enabling unequivocal structural determination. These compounds are currently under investigation by our collaborators for potential as antibacterial and anticancer agents.

Product selection analysis for azo group formation by computational modeling

Jessie Johnson, Megan Johnson, and Kiley Passow
Faculty Mentors: Hannah Leverentz-Culp and Joseph K. West

Theoretical predictions of the relative stabilities (measured by Gibbs free energy values) and infrared (IR) spectra of structural isomers of several azo compounds were computed using molecular modeling software. Correlation between the location of the nitrogen attachment site to a phenol compound and relative isomer stability was investigated. Theoretical IR spectra were compared to experimental spectra for these compounds to assess the validity of the theoretical stability predictions.

Purification and Investigation of Bromelain Enzyme from Pineapple

Elsie Dahnert, Leah Hanson, Eion Hinkle, Reyna Olson, Regan Stefanoni, and Muaj-Infinite Yang
Faculty Mentor: Emily Ruff

Bromelain proteins are a group of digestive protease enzymes that act as a chemical defense to prevent grazing. Bromelain is often taken as a dietary supplement in an attempt to support digestion, and it is used as a meat tenderizer in the restaurant industry. Extracting Bromelain from pineapple, especially the skin, leaves, and stem of the plant, can create a value-added product from what is widely considered to be agricultural waste. In this research, we examined the difference in Bromelain concentrations between the flesh of the pineapple and the skin, leaves, and stem of the pineapple, and the efficacy of different methods for the purification of Bromelain. The concentration of protein, the activity of Bromelain, and the molecular mass and relative purity of Bromelain were determined via Bradford assay, activity assay, and SDS-PAGE, respectively.

Synthesis and Characterization of a Range of Imines Carrying a Sulfonamide Functional Group

Kimberle Ramirez, Marisa Mausolf, Adam Schneringer and Makadyn Gust
Faculty Mentor: Joseph K. West

In this study, seven different imines were synthesized and characterized using mass spectrometry, IR spectroscopy, and melting point determination. All imines were made by combining sulfamethoxazole, a classic antibacterial agent, with various substituted benzaldehydes. The characterization techniques provided detailed insights into the structural properties of the synthesized imines, confirming their successful formation and purity. Synthesis of these compounds was performed in support of several related projects as part of a CURE-based laboratory experience in CHEM 213.

Synthesis and Characterization of Anthranilic Acid-based Azo Compounds

Lillian Kimmes, Carter Schlink, and Alexander Williams
Faculty Mentor: Joseph K. West

A series of highly colored azo compounds have been prepared from the diazotization of anthranilic acid followed by its combination with an array of naturally occurring phenols. These compounds have all been characterized by mass spectrometry, IR spectroscopy and melting point determination. This research was performed in support of several related projects as part of a CURE-based laboratory experience in CHEM 213.

Synthesis and Characterization of Trivalent Complexes of Cr, Fe, and Co Bearing Avobenzone and Oxybenzone Ligands

Paige Blavat, Ariana Madera, Sam Whempner, and Paige Pearson
Faculty Mentor: Joseph K. West

In this study, homoleptic complexes of trivalent chromium, iron, and cobalt were prepared with two different β-diketonate ligands, avobenzone and oxybenzone. These systems are being studied for the potential to absorb light in a useful wavelength range to enhance solar cell efficiency and for their geometric isomer preference. Methods unique to each metal were necessary to obtain these targeted complexes. A variety of techniques have been employed to verify their successful isolation including IR spectroscopy, mass spectrometry, magnetic susceptibility and melting point determination.

Synthesis of Iron Oxide Nanoparticles for the Degradation of Rhodamine B Dye

Catherine Braaten, Kezia Lemke, Elijah Murray, and Leighton Stouffer
Faculty Mentor: Jennifer Zemke

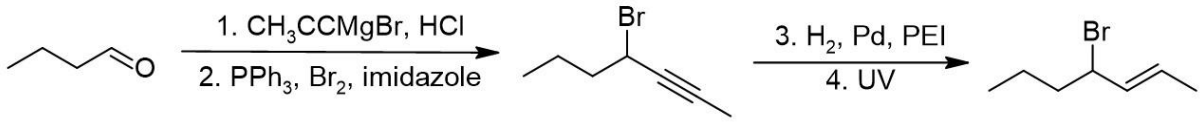
Rhodamine B dye is a harmful contaminant in wastewater, so methods were developed to synthesize iron oxide nanoparticles that could catalyze the photodegradation of rhodamine B in water. Iron oxide nanoparticles were synthesized through the co-precipitation method and using $FeCl_2$ as a source of Fe^{2+} ions. The nanoparticles were then characterized through IR spectroscopy and adsorption testing. Finally, a control solution of rhodamine B and an experimental rhodamine B solution with nanoparticles were exposed to UV light in a photo cabinet to analyze the degradation of rhodamine B over time using UV-Vis spectroscopy. IR spectroscopy showed that an iron oxide material had been synthesized, and adsorption testing revealed that rhodamine B adsorption equilibrium occurred around 95 min. The equilibrium dye adsorption Q value was 0.44 mg/g on the nanoparticles. The photocatalysis experiment showed little difference between the control and experimental solutions, with slopes of -1.5×10^{-3} mg/(L×min) and -1.7×10^{-3} mg/(L×min), respectively, and poor linearity with R^2 values of 0.32 and 0.28, respectively. Overall, the results illustrate that an iron oxide nanoparticle material was synthesized and it was able to adsorb a moderate amount of rhodamine B. However, there was little degradation of rhodamine B in both the experimental and control solutions with almost no enhanced catalysis due to the presence of iron oxide nanoparticles.

Progress toward Synthesis of *trans*-4-Bromo-2-Heptene

Ava Dillon
Faculty Mentor: Thomas Nalli

trans-4-Bromo-2-heptene (**1**) is a simple compound that, despite two reports to the contrary, has never been synthesized in pure form. Nevertheless, it could be a useful starting material for organic synthesis. The compound presents a significant synthetic challenge due to a propensity to undergo allylic rearrangement to form a mixture of allylic bromides. Therefore, the goal of this research was to synthesize **1** with a multistep synthesis. Step 1 was to produce hept-2-yn-4-ol (**2**) via a Grignard

synthesis by combining butanal and propynyl magnesium bromide with the triple bond acting as a masking group for the alkene. The alcohol was then converted to 4-bromo-2-heptyne (**3**) using triphenylphosphine, bromine, and imidazole. The most critical step of selectively reducing the triple bond to the desired double bond was attempted using both H_2 and palladium on polyethylene imine catalyst and a monohydroboration method via disiamylborane and protonolysis with acetic acid. Finally, because the reduction should produce the cis alkene, the last step will be isomerization, to produce 1.



Using Fluorimetry and Spectroscopy for Quantitative Analysis of Biomaterial-Derived Carbon Dots

Kahun Vue
Faculty Mentor: Jeanne Franz

Carbon Dots (CDs) are renowned for having great quantum yield, absorption, electron transfer, and stability. Biomaterial-derived carbon dots are eco-friendly nanomaterials synthesized through the carbonization and condensation of organic surface groups. This study investigates the synthesis, characterization, and application of CDs derived from various biomaterial precursors, including chitosan, cellulose, β-keratin, α-keratin, and amylose derived from chitosan, corn husk, chicken feathers, human hair, and potato skin respectively. Hydrothermal and purification methods were used to develop a green, cost-effective synthesis while evaluating the eco-friendliness and sustainability of the resulting nanomaterials. The physicochemical properties of each CD were evaluated based on fluorescence intensity, photostability, metal ion selectivity, and relative size distribution. Fluorimetry was used to analyze fluorescence behavior, including sensitivity and selectivity for metal ion detection, while UV–Vis spectroscopy and Fourier-transform infrared (FTIR) spectroscopy were used to characterize optical properties, particle size trends, and how surface functional groups were affected by hydrothermal treatment. UV–Vis spectroscopy had an λ_{max} of 230 nm, which was used to assess relative size distribution and synthesis uniformity. Results indicated that the molecular makeup of a biomolecule significantly influenced the fluorescence behavior and metal ion selectivity of a CD. These findings highlight the tunability of CD properties based on their surface functional groups. Overall, this research supports the application of green chemistry principles by converting renewable and waste-derived materials into functional nanomaterials. The results demonstrate the potential for sustainable, low-cost carbon dots in sensing and environmental applications, providing a foundation for future optimization and large-scale implementation.

UV-vis Absorbance Spectra of New Phenol-substituted Azo Dye Compounds

William Arntzen, Caramia Chang, Lillian LeMire, and Eli Youngs
Student Co-author: Meagan Kaufenberg-Lashua
Faculty Mentor: Joseph K. West

UV-visible absorbance spectra were collected from some new highly colored azo compounds (substances containing a N–N double bond). Visible absorption spectra of azo compounds formed from anthranilic acid and naturally occurring phenols were analyzed to determine substituent effects.

UV-Vis Analysis of 1st Row Transition Metal "Sunscreen" Complexes

Kelsey Sterud, Elle Lind, Bailey Sommerville, McKenna Stocker, and Tristan Waldron
Faculty Mentor: Joseph K. West

Tris(β-diketonate) complexes of chromium(III), iron(III), cobalt(III) were analyzed by UV-vis spectroscopy. These complexes have been targeted for their potential application as sensitizers for solar cells and thus exact absorbance profiles have been sought to correlate their relative performance in this application. Strongly absorbing π-system ligands, avobenzone and oxybenzone, promote absorbance in the UV coupled with LMCT transitions due to the ligand-metal interaction. Comparisons of experimental and computationally generated absorbance spectra have also been made.

Communication Studies

IShowSpeed and Hegemony: An Ideological Critique of Native American Representation in the Speed Does America Tour

Julien Ponsolle
Faculty Mentor: Adam Gaffey

The media's creation and reinforcement of malignant Native American identities is an expression of hegemonic American ideology. While the hegemony of traditional media is well understood in its shaping of indigenous identity, fewer criticisms have been directed towards increasingly influential social media personalities that constitute the "new media." Further, contemporary indigenous tourism research often considers power dynamics in tourism without consideration for its mediated manifestations. This essay focuses on IShowSpeed, or Darren Watkins Jr., and his highly successful 24-hour, 35-day Speed Does America tourism livestream broadcasted on Twitch and YouTube. Using ideological critique and drawing from ethical standards described in indigenous tourism research, this essay will analyze and evaluate interactions with and around Native American hosts. Readers will understand how online personalities like Watkins can challenge and reinforce ideologically created identities, potentially influencing the way in which their audiences perceive the world.

A Feminist Analysis of Greta Gerwig's Little Women and Lady Bird

Tamara J. Hughes
Faculty Mentor: Adam Gaffey

Following recent attention being given to gender values seen within popular culture, more scholars are taking the time to consider the role that films play in communicating these values. Given this attention, this analysis hopes to look at feminist themes within two films written and produced by Greta Gerwig (Little Women and Lady Bird). I propose to use a communication analysis using perspectives of both feminist criticism and fantasy theme analysis to uncover and understand the use of themes throughout the two films. This analysis hopes to gain understanding of the communication methods that Greta Gerwig imposes in her films to communicate feminist values with the audience.

A Metaphor Criticism on Disney-Pixar's Elemental

Erin Donovan
Faculty Mentor: Adam Gaffey

Immigration is a contested topic, having a variety of opinions, both negative and positive throughout history. Films are important to study, as they can frame important topics, like immigration, and shape our understanding. Animated children's films have the ability to deliver messages and create meaning through a fun, innocent vehicle that disguises these messages. The use of metaphors in this case, are a delivery method of underlying messages, as metaphors can be strategically used to go unnoticed in a story. This study sets out to use metaphor criticism on the Disney-Pixar film, Elemental (2023), by Peter Sohn, to examine its use of metaphors and representation, as a gap in research has been identified for this study not being done before. Further, this study hopes to uncover meaning around the present immigrant story in the film to understand the communication methods made by Disney-Pixar in relation to what it invites to audience to think about through its underlying messages.

Do You Have a Dog?: Investigating How Teacher Self-Disclosures Affect Student Perceptions

Kylie Nelson
Faculty Mentor: Adam Gaffey

One of the most common questions a student might ask a professor is, do you have a dog? Self-disclosures from college professors have become commonplace in a classroom, but as perceptions and norms shift, teacher self-disclosure has yet to be understood in a modern context. The purpose of this study is to understand how teacher self-disclosure affects students' perceptions. Using a survey research design, this study aims to test associations between appropriate self-disclosure and student satisfaction. Effects of frequency, negativity, and relevance of self-disclosure aim to be correlated with student affect for the class and professor. Results are expected to find that the more appropriate a teacher's self-disclosure is perceived to be, the higher student satisfaction will be.

Does Positive or Negative Informal Social Media Impact Internalized Stigma Around Mental Health in College Aged Adults

Katrina Wicker
Faculty Mentor: Adam Gaffey

The purpose of this research study was to look at how positive and negative informal social media impacts internalized stigma towards mental health in college aged adults. I hope to find some relation showing that the more positive a social media video is the less it negatively impacts someone's internalized stigma around mental health. Internalized stigma is how someone thinks and feels about mental health that ends up influencing how they behave when it comes to mental health. I want this research to show that social media is having an impact on those internalized stigmas, and that if we want to be able to fight stigma surrounding mental health we need to be thinking about how social media influences us.

Finding Belonging: How International Students Build Connection in the Midwest

Iris Nickolaus
Faculty Mentor: Adam Gaffey

International students often enter U.S. universities navigating unfamiliar cultural, social, and academic environments, which can make developing a sense of belonging more complex. Belonging plays a critical role in student well-being, academic success, and overall adjustment, particularly for students studying far from their home countries.

Although prior research acknowledges that international students may experience challenges such as cultural adjustment, language barriers, and social isolation, less attention has been given to how everyday communication practices shape their sense of belonging. Specifically, there is a gap in understanding how students actively construct belonging through interpersonal interactions, relationships, and participation in campus life.

The goal of this study is to examine how international students at Winona State University experience and build belonging through communication. Using an interpretive approach, this study is based on semi-structured interviews that explore how students form relationships, navigate cultural differences, and engage with both academic and social communities. Guided by Social Identity Theory, this research focuses on how students negotiate identity and group membership within a new cultural context. This study expects to identify key themes related to belonging, including the role of peer relationships, informal interactions, and campus involvement. It also aims to better understand how communication contributes to feelings of inclusion, connection, and identity development. These findings will offer insight into how universities can foster more supportive and inclusive environments for international students.

Gender Studies Scholarship: An Examination of Midwest Professors Who Teach Gender Studies

Mena Faber
Faculty Mentor: Adam Gaffey

Gender studies is an interdisciplinary field spanning higher education institutions globally, yet the experiences of scholars withing specific regional contexts remain understudied. This study aims to examine the loved personal and pedagogical experiences of gender studies and gender communication scholars in the Midwest. Using a qualitative approach, semi structured interviews were conducted to explore participants' experiences, perceived pressures, and responses to the current political and academic climate. Interview questions focused on the challenges scholars face as well as the communicative practices they adopt in response to shifting attitudes toward gender studies. This research seeks to contribute to a deeper understanding of how scholars navigate evolving expectations and policies within higher education and the broader sociopolitical landscape.

Internship with 100 Rural Women

Isa Uribe
Faculty Mentor: Tammy Swenson Lepper

Submission: This internship with 100 Rural Women was conducted in a fully online environment, focusing on communication, outreach, and organizational support within a rural women's advocacy context. Core responsibilities encompassed podcast production assistance, social media content development and management, and the creation of written materials for organizational platforms including the website, newsletter, and reports. Through these experiences, original messages were constructed for a variety of audiences, while effective use of digital communication technologies was analyzed and applied within an organizational setting. The role further involved conducting research to

inform and advance organizational initiatives, alongside coordination and facilitation of virtual programs and events. Communication competencies including leadership, followership, and interpersonal communication were demonstrated throughout, particularly through sustained collaboration in weekly team meetings, ensuring strategic project alignment and cohesive communication across the organization. Ultimately, the work done through this internship supported the 100 Rural Women mission to connect women across rural communities.

Masculinity in HBO's Euphoria

Lisa Kalle
Faculty Mentor: Adam Gaffey

In a time where modern masculinity is being contested and up for debate, the study of popular representations of masculinity have become of increasing importance. HBO's Euphoria (2019) is a widely popular show among young viewers and has broken streaming records. The show features many male characters who are often polarizing and tackle many aspects of masculinity, such as relationships, sexuality, strength and more. These representations are in need of analysis, and this study seeks to examine their values and messages. In this case, through a feminist analysis with a combined racial lens to determine whether Euphoria reinforces or challenges common hegemonic representations of masculinity.

Scrolling TikTok, like it's my job… because it is

Lauren Larson
Faculty Mentor: Tammy Swenson-Lepper

I work as a social media and admissions intern at Winona State University's admissions office. Located in Winona, MN, in Maxwell Hall on the WSU campus. For this internship, I was tasked with creating content for the WSU admission platform, typically on TikTok and Instagram. To go along with creation, I was also involved in the behind-the-scenes, looking at analytics. Another responsibility was giving the welcome speech before tours to prospective students and their families. I also gave tours during the larger events held by the admission office, such as Warrior Way Day and OGVs. I can apply what I have learned as an admissions intern to communication study theories/ terms such as mass communications, social exchange theory, norms, symbols, chronemics, and SWOT analysis to my presentation. I will also discuss the outcomes expected for my Communication track of Applied Communication and how they can be applied to my internship. Finally, I will go over the lessons and skills that I have gained throughout this internship that will be useful to my future career.

The Rhetoric of Empowerment in Female Centered Brand Advertisements

Isa Uribe
Faculty Mentor: Adam Gaffey

The study aims to explore female-centered brand advertising that frequently promotes messages of empowerment, beauty, and self-worth. Additionally, the messaging appears shape how women and understand confidence. However, it remains unclear whether these empowerment messages genuinely support consumers or primarily function as strategic branding tools to enhance brand image. The purpose of this study is to investigate and understand the rhetoric of empowerment in three video advertisements from the personal care brand Dove using qualitative content analysis. It is expected that findings will reveal themes such as self-acceptance, natural beauty, and confidence, suggesting that

while empowerment is emphasized, these messages may also reinforce selective ideals that ultimately align with brand identity and marketing goals.

Transfer Student Internship Through Admissions

Iris Nickolaus
Faculty Mentors: Tammy Swenson Lepper and Sarah Curtin

This poster presents my experience as a Transfer Admissions Intern at Winona State University in Winona, Minnesota. In this role, I support prospective and incoming transfer students by helping them navigate the admissions process, understand academic pathways, and feel more confident in their transition to a new institution. My responsibilities include assisting with recruitment travel and Instant Decision Days, creating transfer plans and student-facing materials, supporting campus tours and presentations, and helping students with admissions and registration questions.

The poster will include my job title, organization, and location, along with a detailed list of my responsibilities. These responsibilities reflect hands-on work in student outreach, communication, and enrollment support, including developing visual materials, engaging with prospective students, and assisting with communication content such as newsletters and recruitment messaging. This aligns with the internship's focus on student engagement, admissions support, and strategic enrollment practices.

In addition, this poster will relate my internship experiences to key concepts and theories from Communication Studies. I will connect 5–7 learning moments to relevant concepts such as uncertainty reduction, audience-centered communication, interpersonal communication, and organizational communication. For example, working directly with students has highlighted how clear and supportive communication can reduce uncertainty and build trust during major decision-making processes.
The poster will also demonstrate how my experiences align with the learning outcomes for the Applied Communication track, particularly in areas such as professional communication, adaptability, message design, and audience awareness. Finally, I will identify 3–5 key lessons I will take into the professional world, including the importance of clarity, empathy, and flexibility in communication, as well as the value of tailoring messages to diverse audiences.

Why Stay? Looking at Relational Satisfaction in Situationships

Addison McBroom
Faculty Mentor: Adam Gaffey

The first time I learned about situationships is when I came to colleges. Situationship is a term that was created by pop culture and is defined as a romantic or sexual relationship that has not been formalized. For my research I am using a self-report anonymous survey in hopes to understand why college aged students are in these types of informal relationships. Further so I am looking at the differences in how males and females perceive relational communication within the situationships and if that effects the results. Situationships are an understudied subject with very minimum research, that I feel needs to be studied. I hope that this study will help to provide further insight on this subject and discover more about how situationships are perceived.

Winona Family YMCA Marketing Intern Student

Robert Spain
Faculty Mentor: Tammy Swenson-Lepper

This poster will present my experience as a Marketing Coordinator Intern at the Winona Family YMCA in Winona, Minnesota. In this role, my responsibilities have included building positive relationships with staff, compiling an annual book report highlighting major events and accomplishments at the YMCA, capturing photographs at community events, and helping develop new outreach strategies. I have also worked on planning member and staff spotlight features to highlight stories within the YMCA community, as well as working on the creation and management of a TikTok account to expand the organization's digital presence.

Throughout this internship, I will relate what I have learned to key concepts and theories from my Communication Studies major, including interpersonal communication with staff and members, audience analysis, branding compliance, and media strategy. I will also connect these experiences to the learning outcomes for my Communication Studies track, demonstrating growth in professional communication, relationship building, and strategic messaging. Specifically, this internship has allowed me to practice leadership and advocacy skills by first initiating contact with the senior director of operations, Lisa Engfer, to put myself in the position of getting this role as a marketing intern. Additionally, creating compelling and adaptable messages through the work that I have created for the YMCA, and using digital communication platforms to network and engage the community.

Finally, I will reflect on lessons from this internship that I will carry into the professional world. These include the importance of building strong professional relationships, the value of clear and adaptable communication, understanding how to engage audiences effectively, and how to use digital platforms strategically to expand reach and impact. I will relate what I've learned in these areas to demonstrate how my internship experience has prepared me to apply communication principles and leadership skills in future professional settings.

Winona State University Admissions Internship

Emma Miller
Faculty Mentor: Tammy Swenson-Lepper

This project examines my internship experience with the Admissions Office at Winona State University, where I developed professional skills while supporting prospective students throughout the college admissions process. The internship provided hands-on exposure to student recruitment strategies, communication methods, and daily administrative operations within higher education.
Throughout the experience, I assisted with campus visits, engaged with prospective students and their families, and responded to inquiries regarding coordinating large group visits with high schools across the state. I also contributed to outreach efforts, including event support and communication initiatives designed to increase student engagement and enrollment interest. These responsibilities allowed me to strengthen my communication, organization, and interpersonal skills in a professional setting. Additionally, this internship provided insight into how admissions offices play a critical role in shaping incoming classes and fostering institutional growth. Observing admissions counselors and staff highlighted the importance of relationship-building and personalized communication in influencing students' college decisions.

Overall, this experience demonstrates the value of experiential learning in bridging academic knowledge with real-world application. The internship not only enhanced my professional confidence but also solidified my interest in careers related to communication in an organization.

Computer Science

Analyzing Accessibility Issue Detection Differences Between WAVE and Google Lighthouse Using a Controlled WCAG Violation Webpage

Saabiriin Abdi
Faculty Mentors: Trung Nguyen and Mingrui Zhang

Automated accessibility evaluation tools, such as WAVE and Google Lighthouse are widely used to assess compliance with the Web Content Accessibility Guidelines (WCAG). However, prior studies indicate that these tools often disagree, vary in the success criteria they support, and differ in the type of issues they detect. Because most evaluations were conducted on real websites, where the precise number of accessibility violations is unknown. Without a ground-truth baseline, it is impossible to measure false negatives, false positives, or the accuracy of detection.

This project addresses that gap by creating a controlled HTML webpage containing 40 intentional WCAG 2.1 Level A and AA violations distributed across the four POUR principles. Each violation is documented with its success criterion, HTML location, and expected detection behavior. WAVE and Lighthouse were executed 40 times under identical system conditions using automated macros to ensure consistency, and all results were directly compared to the WCAG 2.1 success criteria to identify true positives, false negatives, and false positives.

Both tools exhibited deterministic behavior, producing identical results across all runs. WAVE detected a broader range of violations, especially in perceivability and structure, yet generated substantial informational noise. Conversely, Lighthouse identified fewer violations overall but showed stronger performance in programmatically testable areas such as ARIA validation and contrast errors. Overlap analysis showed a high level of agreement regarding missing alt text, absent labels, and contrast failures, but low level of agreement in keyboard operability, focus order, and landmark structure. These findings indicated that the two tools captured fundamentally different subsets of WCAG violations.

Overall, the findings showed that no single automated tool provided complete WCAG 2.1 coverage. WAVE offered a wide range of features but lacked precision, while Lighthouse offered precision but lacked breadth. The results demonstrated that multi-tool evaluation was necessary for meaningful accessibility assessment, and that manual testing is crucial for success criteria that cannot be consistently automated. This study offers empirical evidence supporting the integrated application of both automated and manual approaches in assessing web accessibility.

Exploring Boolean Dependency Mapping for Rust Crates Aimed at Embedded Systems

Hamilton Ferris
Faculty Mentors: Trung Nguyen and Mingrui Zhang

Rust Crates are concise, safe ways to abstract compilation units in the Rust programming language. Each crate can be compiled individually, or some may depend on others (i.e. function `bar` may depend on crate `foo`). However, there is no standard way to compile Rust crates in a `no_std` configuration, which targets the compilation at embedded systems.

Existing research into this topic mostly focuses on developer opinion. Sharma et al. (2025) discovered that only 68% of developers thought that Rust crate support was sufficient. In addition, 92% of

developers surveyed also used C for embedded systems, and 64% of them claimed an improvement in code safety after switching to Rust, implying a market for Rust features, but not some of the baggage that comes with the language.

This paper tests the open problem P0.1 from the 2025 paper authored by Sharma et al., which hypothesizes the idea of compiling a given Rust crate and its dependencies using a binary constraint satisfaction algorithm to derive the correct compilation flags. This paper expands the hypothesized algorithm to be able to derive the minimum required compilation flags for a given Rust crate.

The Rust crates are downloaded from lib.rs, filtered by `no_std` compatability, then piped into the Binary Constraint Object Model (BCOM), which is modeled using the python library PuLP. The model then determines what, if any flags need to be enabled in order to achieve a successful compilation (i.e. no errors during compilation), then displays them to the console. In addition to this, a manually compiled set of crates using `cargo build –no-default-features` are collected, the "human" set to compare the accuracy and minimal feature flag derivation of the BCOM.

During testing, the BCOM successfully detected and printed feature flags for some of lib.rs' most popular crates, but only if they declared such features in the `Cargo.toml` file, specifying configuration options for each Rust crate build. The model is expected to be extended to support in-line code derivations as well as lib.rs declarations, in order to be fully applicable to all Rust crates.

Impact of News Sentiment Analysis on the Performance of Stock Trading Models

Trevor Nindl
Faculty Mentors: Collin Engstrom, Nguyen Trung, and Mingrui Zhang

This study investigated how news sentiment analysis improves stock price prediction accuracy. Two Long Short-Term Memory (LSTM) neural networks were created using PyTorch, a baseline model without sentiment analysis trained using 22 technical features, and another model with sentiment analysis scores from Alpha Vantage's sentiment analysis API. The historical data gathered spans from 2018-2025 and it covers a total of seven securities at 20-minute intervals. There are three volatile stocks (Tesla, NVIDIA, AMC), three stable stocks (Johnson & Johnson, Coca-Cola, Procter & Gamble), and a single S&P 500 index (SPY). The models were run in the same testing environment that mimicked a real-world trading platform using historical stock data. They were both also implemented on two identical Alpaca live paper trading accounts where they traded autonomously. Performance was evaluated using total returns, win rate, and statistical significance. A real-world environment like this gave us evidence that sentiment analysis inclusion can be worth it when it comes to stock price predictions in certain situations.

Prediction of Soccer Match Result with Machine Learning

Pronob Kumar
Faculty Mentors: Mingrui Zhang and Trung Nguyen

Predicting soccer match outcomes is difficult due to the low-scoring nature, frequent draw outcomes, and other factors. This project used a historical dataset from European leagues spanning 1960 to 2024 to develop supervised machine learning models for predicting match results. The dataset included various features related to match conditions, team information, and historical performance. The study compared multiple machine learning models, including logistic regression, decision trees, XGBoost, and random forest, with a regression-based baseline model. Model performance was evaluated using

accuracy, confusion matrices, ROC curves, and AUC metrics. Preliminary results indicate that machine learning models outperform the baseline model in predicting match outcomes, particularly for home and away wins, while draw outcomes remain more difficult to predict.

Spatio-Temporal Detection of Mitotic Events Using a CNN-Based Approach

Andy Yan
Faculty Mentors: Mingrui Zhang and Trung Nguyen

Carcinogenic changes are known to influence both the timing and progression of mitosis in colorectal cancer cells, which makes quantitative analysis of mitotic events an important but challenging problem. In DNA-only time-lapse microscopy, these events tend to be short-lived, visually inconsistent, and relatively sparse, so methods based on dense segmentation are often not a good fit, especially when pixel-level annotations are limited.

In this project, we developed a spatio-temporal CNN-based method to detect mitotic events in DNA-only time-lapse microscopy. Mitosis detection was treated as an event localization problem rather than a segmentation task. Each event was represented by its center, and Gaussian heatmaps were used as supervision instead of full masks. A lightweight U-Net-based architecture was trained on 256×256 cropped patches. To include temporal information, consecutive frames were stacked together as input, which provided some context without making the model overly complex.

During inference, local maxima detection and non-maximum suppression were applied to the predicted heatmaps to obtain event coordinates, and detections were linked across frames to form trajectories. This also made it possible to estimate mitotic duration. Model performance was sensitive to the choice of Gaussian scale, with $\sigma = 3$ and $r = 8$ giving the best overall results, where σ represents the spread of the Gaussian target and r represents the radius of the supervised region. Using temporal input also helped, and $T = 3$ gave the most stable results overall, where T denotes the number of consecutive frames used as input.

Overall, this approach reduced annotation effort and demonstrates a scalable approach for quantitative analysis of mitotic dynamics.

The Correlation Between Data Monetization Term Usage and Readability of Privacy Policies

Garrett Buryska
Faculty Mentors: Mingrui Zhang and Trung Nguyen

Websites and online services have become essential to daily life, and with that, guardrails in the form of privacy policies are as important to maintain user consent. However, privacy policies are one-sided. While these policies are meticulously crafted by corporations, the resulting documents are often dense and legally complex for the average user. This study utilized natural language processing (NLP) to investigate the relationship between readability and the presence of terms related to sensitive data and monetization. The dataset used for the analysis consisted of over 100 privacy policies across many sectors. A data disclosure score was developed using the SpaCy library to detect disclosures of data sharing, tracking, and sensitive information using common keywords while also considering negation. Readability was scored using the Textstat library, with the Flesch Reading Ease (FRE) metric being used primarily. Statistical analysis revealed a significant negative correlation between readability and the data disclosure score, showing that policies with possibly more invasive data practices are more difficult to read. A paired t-test also showed that sentences containing data disclosure keywords are significantly

harder to read than the rest of the text. Our results showed that less readable text occurs around sensitive data and monetization disclosures, which possibly conceals important privacy disclosures from the average user.

Economics and Finance

WSU Explorer: Navigating Academic Success With AI
Raymond Pitzen
Faculty Mentors: Patrick Paulson and Larry Schrenk

The process of committing to a program of study is a significant challenge for many incoming students, often characterized by information overload and the frustration of navigating disconnected academic and career resources. WSU Explorer addresses this challenge through a unified, data-driven platform designed to guide program discovery at Winona State University. Developed for the Warrior.AI Symposium and supported by the AI Innovation & Engagement Pilot Fund, this project utilizes AI-powered tools to aggregate authoritative sources including MN DEED, WSU IPAR, and IPEDS, into a single accessible interface. At the center of the platform is a custom Warrior Advisor agent that helps students explore academic programs through a conversational interface tailored to Winona State. The site provides program-specific data such as enrollment trends, faculty, career outcomes, and course requirements, allowing students to compare their options more efficiently and make better-informed decisions. In addition, the platform tracks real-time program interest, geographic trends, and conversion data, providing the university actionable insights into student engagement and experience. By combining web development, institutional research, and AI capabilities, WSU Explorer demonstrates how universities can use data and intelligent tools to empower students to make more informed and confident decisions about their academic goals.

Educational Leadership

The Impact of Social Emotional Learning Interventions on Students
Kaiya Nelson
Faculty Mentor: Joel Traver

Social and Emotional Learning (SEL) has become increasingly prevalent in schools, with 83% of schools nationwide implementing SEL curricula or programs as of 2024, compared to 46% in 2018. In Minnesota, the Collaborative for Academic, Social, and Emotional Learning (CASEL) framework identifies five core competencies: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making—as foundational to student development. SEL supports students in managing emotions, building relationships, and making responsible choices, while fostering a positive and inclusive school climate. Despite growing adoption, challenges such as limited instructional time, the need for culturally responsive practices, adequate mental health staffing, and strong family engagement systems remain. This study examines the impact of SEL interventions on K–2 students and explores how early elementary schools implement SEL within the educational system. By analyzing the implementation and outcomes of CASEL's five competencies, this research aims to contribute to the understanding of SEL's role in promoting academic success, behavioral growth, and overall student well-being.

Engineering

Composite Infusion Table

Todd Carroll, Sawyer FierkeLepp, Will Gunderson, and Noah Holicky
Faculty Mentor: Eric Kerr-Anderson

The purpose of our research is to build a standardized composite infusion table. The infusion process requires a mold to be created and significant space to be used around the mold for the vacuum bag to spread out. Creating this mold is time and space consuming.
Our goal is to build a standardized infusion table where you can easily swap in smaller molds. This would allow new molds to be created faster and use less resources. This is because the new molds only cover where the resin would go and the space used for the vacuum bag to spread out would be reused by the table. Another purpose of this table is to help present infusion technology to high schoolers to get them interested in composites as a possible career.

In order for these purposes to be met the table must have several characteristics: Epoxy cannot fuse the part to the table. Resin must not stick to the surface of the table. Tables must be able to be used with many tools and have storage for those tools. Steps for accomplishing this goal include Brainstorming and comparing ideas, creating an initial prototype, testing the prototype, modifying the prototype, creating a final design, and testing the final design

Compression After Impact

Wyatt Laborde and Michael Dietz
Faculty Mentor: Eric Kerr-Anderson

This Is the second part of our project. Last year, we manufactured fiberglass panels that were 12 layers thick and would eventually be 6" by 4". This year, we completed the second half of our testing by first cutting the panels square to be as close to 4" by 6" as possible. Then, before testing could be started, the damage types and diameter were measured. This is measured because it helps when examining the type of failure the panel endures. Then, testing could be started. The panels were placed in the housing and fitted so they could move up and down but not side to side. This allows the part to flex throughout testing. Then the top is placed on, and it is fitted in the center of the testing platform. The thickness, height, and width of the pieces were input to the machine, and then the test began. Each part was tested until there was a fracture in the piece or the top and bottom housing touched. At this point, it was stopped because the metal was then being tested. After each run, the specimen was photographed and put to the side. After all testing was completed, the data was compiled and examined to see how the panel's compressive strength was affected by the amount of force impact in the first step of testing.

Crystal Science is not Fast Science

Seiya Katada, Campbell Casper, and Lane Waller
Faculty Mentor: Eric Kerr-Anderson

The science of crystal growth is a slow process by which material is dissolved in a medium and particles slowly deposit on the surface of a seed crystal in an ordered arrangement to form a larger crystal. Three different solutions were attempted to create the best Alum seed crystal. After seed crystals were tied or glued to a string, it was hung in a solution with dissolved Alum. Three different concentrations of growth

media were used to determine the effect and how to grow the best crystal. Observations were periodically made, crystals were weighed, and additional powder was added to the growth media.

Design and Fabrication of a Composite Combination Backpack & Lawn Chair

Brennan Coit, Kyle Gerold, Jacob Kosmoski, Caleb Lightfoot, and Noah Strasser
Faculty Mentor: Keith Dennehy

While many metal and plastic lawn chair products are available in markets worldwide, it was observed that there is a clear need for a lighter, more versatile, and convenient product. The proposed product serves as a dual-purpose system that functions as both a lawn chair and a wearable backpack, allowing users to easily carry and set-up seating when needed. The product is unique due to its carbon fiber reinforced polymer frame, which provides a superior strength-to-weight ratio compared to traditional steel or aluminum designs. Having a compact, multifunctional product would be highly beneficial for activities such as camping, hiking, and sporting events, while also reducing strain on the user during transport. The frame is designed, fabricated, and tested according to a structured engineering design process to ensure performance, safety, and reliability.

Design and Fabrication of a Composite Torpedo Baseball Bat

Peyton Lee, Carter Mathison, Noah Misukanis, Jaden Schwantz, and Cole Stalberger
Faculty Mentor: Keith Dennehy

Observing current trends in Major League Baseball, there has been increasing interest in torpedo-style wood bats due to their unique weight distribution. Unlike traditional bat geometries, the torpedo design shifts more weight toward the hands, improving balance and allowing for greater control throughout the swing. This project applies the same concept using composite materials so that high school and college players can also have access to this design innovation. The proposed bat is constructed from carbon fiber reinforced polymer with an epoxy resin to create a lightweight and durable structure. The design aims to maintain the performance benefits of the torpedo profile while improving strength and consistency compared to wood bats. The bat is designed, fabricated, and evaluated to meet both the current bat regulations (BBCOR) and the design objectives regarding weight distribution, stiffness, and overall performance.

Design and Fabrication of NockLite Composite Bow-Stand

Peyton Coahran, Matt Ficker, Kian McNerney, Luke Poglayen, and Sidney Scott
Faculty Mentor: Keith Dennehy

This lightweight composite bow-stand seek to replace products traditionally made from steel. Bow stands are ubiquitous in archery competitions throughout the state of Wisconsin and more broadly throughout the nation. There are currently no bow-stands made from composite materials, presenting a unique market opportunity to offer a lightweight, easy to transport alternative. The proposed design utilizes a glass fiber reinforced composite material to significantly decrease the overall weight while maintaining the strength and stability required to safely hold multiple bows. The purpose of this design project is to fabricate a composite bow-stand that will provide much needed innovation. The bow-stand, which will operate under the trade name NockLite, will be designed and tested to work in a variety of archery environments, including both outdoor and indoor conditions.

Growing Alum Crystals

Jackson Struhar, Lexi Freiboth, and Ana Schneider
Faculty Mentor: Eric Kerr-Anderson

Alum, also known as Potash, is used to can pickles. Alum powder was used to create seed crystals. The seed crystal was hung in a jar submerged in distilled water with alum powder dissolved to attempt to grow an Alum crystal over the Spring semester. Three different concentrations were used to determine changes associated with crystal growth and quality. Numerous strategies were employed throughout the semester as growth methods worked and did not work.

Growing Alum Crystals

Todd Carroll, Kevin Dang, Daniela Gutierrez Rubio, and Samuel Whempner
Faculty Mentor: Eric Kerr-Anderson

One of the easiest crystal growth experiments uses Alum powder to dissolve in water. The dissolved material slowly forms with seed crystals to create larger crystals. As the dissolved material is depleted, more is added to continue the crystal growth. Four different concentrations were used for seed crystal growth. Those crystals were attached to a string and hung in a bath of Alum solution. Different strategies were used to grow crystals and in some cases dissolve crystals.

Growing Large Alum Crystals

Wyatt Laborde, Will Gunderson, and Kyle Behrens
Faculty Mentor: Eric Kerr-Anderson

Alum forms a colorless cubic crystal that can grow to the size of a small apple over the span of 2-3 months of growth in a concentrated solution. Many different seed crystal solutions were used to obtain large clear seed crystals. The best seed crystal was attached to a string and suspended in various concentrations of Alum solution to allow for the seed crystal to grow into a large crystal. By monitoring the weight of the crystal, the solution concentration was adjusted for optimum growth.

Growing Large Single and Multi-Crystals from Alum Powder

Owen Paulson, Mayra Aguilar, Owen Maloney, and Kole Koehler
Faculty Mentor: Eric Kerr-Anderson

Crystal growth science is used to replicate the growth of crystals that form in nature. Channels of hot fluid with concentrations of minerals created the crystals found as gemstones. At low concentrations, no crystal grows. At high concentrations, a multitude of crystals grow. At the ideal concentration, a single, clear crystal grows. Four solution concentrations were used to create seed crystals. Those Alum seed crystals were attached to a string and suspended in various concentrations of Alum solution to find concentrations that create no crystal, a single crystal, and a multi-crystal.

Learning to Grow Alum Crystals

Caleb Beskow, Michael Dietz, and Juan Carlos Feregrino Ponce
Faculty Mentor: Eric Kerr-Anderson

Large crystals can be made using common household ingredients. Alum is commonly used in canning pickles, but can also grow large crystals when properly prepared and fed material consistently over time. Three different strategies to grow seed crystals were attempted with some large and small crystals

developed. After tying the seed crystal to a string, it was hung in a solution and periodically weighed. The material that was gained by the crystal from the previous weight gathered was added to the solution as feedstock to continue the crystal growth. Periodically the jar was heated to dissolve crystals formed at the bottom of the jar.

Low-velocity impact behavior of reinforced commodity and high-performance thermoplastic composites

YuBo Ma
Faculty Mentor: Beckry Abdel-Magid

The low velocity impact behavior and compression after impact performance of glass fiber reinforced polyethylene terephthalate glycol (GF/PETG), glass fiber reinforced amorphous polyethylene terephthalate (GF/PETa), and carbon fiber reinforced polyether ether ketone (CF/PEEK) thermoplastic composites were investigated to compare impact resistance across different material properties and cost levels. Quasi-isotropic laminates were fabricated by compression molding and subjected to drop weight impact at energy levels of 10, 15, and 20 J/mm, followed by compression after impact testing in accordance with ASTM D7136M and D7137 standards. Impact force response, energy absorption characteristics, and damage development were evaluated to assess material behavior under increasing impact energy. The results show clear differences in impact response and residual compression strength among the three materials. CF/PEEK generally exhibits the highest and most stable compression after impact strength among the investigated materials, although comparable values are observed with GF/PETa at 15 J/mm. GF/PETa shows higher residual strength than GF/PETG under the investigated conditions. The observed differences in residual strength indicate distinct impact damage resistance mechanisms among the investigated thermoplastic composite systems. When impact performance is considered in terms of material cost, GF/PETa provides a favorable balance between impact resistance and post-impact strength among lower-cost composites investigated in this research. CF/PEEK offers superior overall performance for applications where higher material cost is acceptable.

WeatherWise Bench

Ella Carr, Matthew Wooden, Dominic Perez; and Beckett Malaise
Faculty Mentor: Keith Dennehy

Current outdoor seating concepts seem to be either heavy and bulky yet durable or light and easy to move, but lacking durability. How about combining the best of both worlds to create a seat that is light and easy to move, but also durable. WeatherWise is a sleek, carbon fiber bench that incorporates a honeycomb core to ensure a lightweight product that is also durable. The carbon fiber provides a sleek look and added strength. The design allows the bench to be outdoors in all types of weather from hot, sunny summer days to cold, snowy winter nights. The design allows for maximum comfort with contoured slats resulting in a comfortable and natural sitting position.

English

Higher Than Cloud Nine by Grace Ahrens

Grace Ahrens
Faculty Mentor: Liberty Kohn

This is a poster presentation on a novel written by me. The poster will feature the book's cover, synopsis, and a few printed lines and paragraphs from the book. This novel is my spring semester project for the Winona Wordsmiths club.

Publishing Satori Literary Journal
Shaela Eriksen, Reagan Roesler, Jade McElmury, and Camden McDonald
Student Co-Authors: Elena Armstrong, Lydia Domaille, Shaela Eriksen, Jenifer Frick, Linda Hang, Eva Hodnick, Sarah Huderle, Dylan Jackson, Charlie Lund, Kendra McClure, Camden McDonald, Jade McElmury, Linda Moua, Reagan Roesler, Callie Sahlstrom, and Allen Wedekind
Faculty Mentor: Liberty Kohn

This poster presentation will cover how ENG 324 created Winona State University's Literary Art Journal, Satori, and its companion, Irotas. Both journals feature works of poetry, fiction, non-fiction, and photo submissions. Satori was created by students in the class who worked to solicit submissions and market the journal across campus. This presentation will also cover the production process and the many logistical aspects of publishing a literary journal.

The process of soliciting submissions included a variety of social media and traditional formats to advertise the Satori submissions. While receiving submissions, the class studied the legal and production processes of book creation. This was seen through monitoring trends of a wide variety of published literary journals.

After the submission deadline had passed, the class began the process of selecting and editing works for publication based on the values of Winona State University while working to emphasize creativity from the student submissions.

While a select number of students used InDesign, other groups worked together using Canva to create another unique literary art journal, Irotas, that includes submissions that were not featured in Satori. The final edition of the Satori was completed with the help of the Winona State print shop, which aided us in printing around 400 copies to distribute within both Winona State and the larger Winona area.

Geoscience

Evaluating the Stabilization of Mine Tailings Using Fly Ash
Lukas Wolfe
Faculty Mentor: Candace Kairies-Beatty

Acid mine drainage (AMD) forms when sulfide minerals such as pyrite are exposed to oxygen and water during mining, generating acidity and releasing metals into the environment. Severe AMD can render ecosystems "biologically dead." This experiment investigates whether combining mine tailings with fly ash can neutralize mining tailings to prevent negative impact to the environment. One possible mitigation approach involves combining mine tailings with fly ash, a byproduct of burning coal. Fly ash contains calcium and magnesium oxides, which act to neutralize the acidity generated from the tailings. Additionally, the cementitious properties of the fly ash allow it to bind with the tailings, limiting reaction of the tailings with air and water. The goal of this research is to determine whether solidified fly

ash/tailings mixtures minimize or prevent the release of metals when subjected to a rigorous leaching protocol designed to mimic potential natural disposal conditions.

Seven columns, four containing unique fly ash–tailings mixtures (CGO#2 – CGO#5), one duplicate column (CGO#5), one containing tailings only (CGO EW) and one blank are leached weekly with 340 mL of ultrapure water. After a two-hour reaction period the columns are drained and the leachate is collected, filtered and analyzed for pH, alkalinity, metals (Cu, Ni, Fe), specific conductance, and sulfate. Results of over ten weeks of leaching along with an assessment of the success of the mixtures in neutralizing the tailings/preventing metal release will be presented.

Geomorphic Monitoring of Cedar Valley Creek

Ray Dean, Savannah Nicolai, and Evelyn Ankrum
Faculty Mentor: Dylan Blumentritt

A section of Cedar Valley Creek in Winona County underwent a stream restoration and habitat improvement project in 2022 to improve erosion from stream banks, water quality, and trout habitat. The project sought to stabilize the stream channel and improve flow by reshaping the floodplain, bank reinforcement using boulders and root wads, and planting native vegetation on the floodplain and stream banks. The objective of our project is to contribute to an existing dataset that analyzes the post-restoration morphological change in this section of Cedar Valley Creek.

Our project uses four different methods of data collection to assess channel geomorphology. A longitudinal profile was measured to determine the downstream changes in elevation of the deepest part of the channel, bank full, and water level. This provides information on the gradient and bed-form differences, such as pools, riffles, and runs in the study area. A method was developed to monitor stream conditions using HOBO loggers to measure changes in stream stage (water level), water temperature, and air temperature throughout a season. Seven cross sections were evaluated in the stream reach using an auto level, stadia rod and measuring tape to collect elevation and distance measurements perpendicular to streamflow. These cross sections help us better understand the interaction of floodwaters and near-channel topography. We also measured the sediment size distribution by performing pebble counts using a gravelometer. Two sampling approaches were taken, a representative count of 100 samples across the study area, and riffle counts of 100 samples from four riffle locations. The representative count provides information on the grain size distribution within the entire stream reach. The riffle counts inform understanding of the maximum size of actively moving channel material.

This project builds upon a foundation for the long-term geomorphic monitoring of Cedar Valley Creek after its restoration in 2022. The data collected this semester provides insights into the changes of channel shape, slope, and sediment distribution. Ideally, data collection will be repeated each semester using the same procedures with the goal of creating a multi-year dataset that can be used to evaluate the effectiveness of the restoration project and to improve understanding of the influences on this specific stream system.

Imaging the Underground: Investigating Mystery Cave using Geophysics

Catheryn Hudak, Ben Earley, Ian McKinzie, and Dawn Ryan
Faculty Mentor: Jennifer Anderson

Subsurface conditions are essential for understanding groundwater flow, geological structure, and cave formation processes. Mystery Cave, located in southeastern Minnesota, is the longest cave in the state, containing over 13 miles of underground passages within a karst landscape, a landscape that has numerous caves in the subsurface. These systems contain soluble bedrock such as limestone and dolostone, which create a network of complex underground fractures and tunnels.

In GEOS 442 Geophysics last semester (Fall 2025), our class used an Electrical Resistivity Imaging (ERI) system that pushes electric current into the ground and measures the ease at which the current passes through the subsurface. GEOS 442 students used the ERI system in November 2025 at Mystery Cave State Park and collected data to interpret characteristics of the subsurface. Resistivity depends on the amount of water in the subsurface and can illuminate the difference between soil and bedrock. These data are used to infer the structure and composition of the underlying subsurface and better understand the geological features under the surface.

Examining resistivity patterns in this study gives insight into the subsurface conditions that influence the formation and development of Mystery Cave. Our results will be used by State Park naturalists to better understand the cave system.

Preliminary Investigation of Soft-Tissue Mineralization in an Edmontosaurus Mummy from the Late Cretaceous Hell Creek Formation of North Dakota: Insights from XRD, XRF, and Petrographic Analysis

Meagan Kaufenberg-Lashua
Non-WSU Co-Authors: Chad Wittkop, Jeffrey Brewer, Beth Fisher (Mankato State University)
Faculty Mentor: W. Lee Beatty

Dinosaur "mummies" are extremely rare fossils that preserve not only skeletal material but also skin and other soft tissues. These fossils form only under geochemical conditions that inhibit decay while promoting mineralization of soft tissues. In 2024, a team from Winona State University excavated the remains of an Edmontosaurus from the Late Cretaceous Hell Creek Formation of western North Dakota. The remains were preserved in fluvial channel sandstone and included skin and soft tissues preserved in iron-rich clastic sediment. This preliminary study integrates powder X ray diffraction (XRD), X ray fluorescence (XRF), and petrographic thin section analysis to examine the diagenetic history of the specimen and its host sediment. Together, these analytical approaches help to illustrate the burial conditions that enabled the mineralogical preservation of soft tissues in this Edmontosaurus mummy and provide a framework for comparing this specimen to the handful of other dinosaur mummies known worldwide.

Global Studies

Mazahua Children's Books

Natalie Leet and Yaretzy Sandoval-Reyes
Faculty Mentor: Mary Hudgens Henderson

Mazahua is an indigenous language of Mexico that is currently spoken by approximately 100,000 people. Many speakers of Mazahua learn to read and write in only Spanish because there is a dearth of educational materials in their native language. Many indigenous languages lack literacy materials, such

as short books for new readers. Research has demonstrated that supporting students in learning to read and write in their first language will assist them in transferring these skills to the dominant language of society, in this case Spanish. This project was a coordinated effort to create elementary level children's books for students who are learning to read in Mazahua and Spanish. The group used Canva.com to create templates for short books that could easily be printed out by classroom teachers in Mexico. The group used WhatsApp to communicate with a team of Mazahua instructors and college students who provided authentic bilingual texts and translations into Mazahua; we then illustrated the stories using Canva.com tools. The result was a large collection of bilingual Mazahua and Spanish illustrated children's books that can be posted online and printed by classroom teachers in Mexico.

Challenges of this project include not knowing Mazahua, which meant we had to rely entirely on the Spanish text in order to select illustrations for the stories. Additionally, we were able to illustrate and create the texts much quicker than our partners in Mexico were able to translate them, leading to some delays. Another challenge was ensuring that the images and graphics used were applicable to experiences the indigenous students would have in their daily lives. Canva.com has a lot of Americanized images and we had to select culturally appropriate graphics. There remains a huge need for literacy materials in all indigenous languages around the world; we hope this project fills one need for one indigenous community in Mexico.

Health, Exercise & Rehabilitative Sciences

Accuracy of wearables for measuring Heart Rate

Xavier R. Mogensen, Kirstyn Sand, and Imogene Fields
Faculty Mentor: Erin White

Within the HERS department at WSU, the Polar H9 heart rate (HR) monitor has often been the standardized method for tracking HR during exercise for lab use. Today there are various portable methods that are widely used to track changes in HR while exercising that are more user friendly and intuitive. This study intends to test the accuracy of alternative HR trackers compared to the Polar H9 in order to determine if these alternative methods can be used in the HERS lab setting. College aged male and female participants will be instructed to sit, walk, and run for 6 minutes each on a treadmill with one apple watch on each wrist (SE 3 and Series 6), and the HR will be collected and compared to the Polar H9 every minute. We are currently finalizing the data collection and analysis process.

ACL (anterior cruciate ligament) Reconstruction Hamstring Tendon VS Patellar Tendon

Maggie Davis, Grace Douglas, and Allyson Kahler
Faculty Mentors: Brandon Donahue and Nora Kraemer

Clinical Scenario: This review compares re-rupture rates between hamstring tendon (HT) and bone-patellar tendon bone (BPTB) grafts after anterior cruciate ligament (ACL) reconstruction. As athletic trainers, we often counsel patients on graft selection, yet much of the current evidence includes broad age ranges and mixed activity levels, leaving a gap in research focused specifically on competitive athletes. The purpose of this review was to determine which graft type shows higher re-rupture rates and to strengthen our ability to provide evidence-based guidance to patients.

Focused Clinical Question: Among active adults undergoing primary ACL reconstruction, how does the use of HT autograft affect graft re-rupture rates compared with BPTP autograft?

Search Strategy: We included nine articles in our review derived from databases that included PubMed, National Library of Medicine, and Sage Journals. Our inclusion criteria consisted of patients undergoing ACL reconstruction with either a BPTB or HT autograft. Patients with medial collateral ligament (MCL) involvement, poster cruciate ligament (PCL) involvement, or a meniscus tear involving more than two thirds of either meniscus were excluded from the study. Search terms included "ACL," "re-rupture rate," "comparison," "patellar tendon graft," "hamstring graft," and "reinjury."

Evidence Quality Assessment: PEDro scores ranged from 5-7 out of 10 indicating that most studies were of moderate quality. Three studies were classified as Level 2 on the Oxford Level of Evidence scale, representing trustworthy evidence. Six studies were rated as Level 3, reflecting moderate-quality evidence with some limitations.

Results and Summary of Search: Of the nine studies, two reported a greater risk of re-rupture with BPTB grafts ($p= 0.04$ and 0.73), one was inconclusive, and seven showed higher re-rupture rates with HT grafts ($p= <0.001 - 0.044$). Overall, these findings suggest that HT grafts may carry a greater likelihood of re-rupture in active populations. Limitations include the small number of available studies, generally small sample sizes, and low reinjury counts. Strengths include long follow-up periods and the presence of statistically significant outcomes in most studies.

Clinical Bottom Line: Hamstring tendon grafts showed higher re-rupture rates in 6 of the 9 included studies, indicating a consistent trend favoring BPTB graft durability. However, given that evidence base consists primarily of limited-quality studies and yields a Strength of Recommendation Taxonomy (SORT) rating of B, the findings provide moderate but not definitive support.

Implications: These findings support evidence suggesting higher re-rupture rates with HT grafts. This information can help athletic trainers provide evidence-based guidance during graft-selection discussions. The results also highlight the need to educate clinicians on how graft choice may influence surgical outcomes. Future research should focus on athlete-specific and sport-specific populations to better clarify re-rupture risk and inform best practice.

Between Team Frequency and Variability of Bimodal Force Time Curves in a Countermovement Jump

Brady Ferguson
Faculty Mentor: Becky Heinert

PURPOSE: The countermovement jump (CMJ) is commonly used to assess performance and fatigue for athlete monitoring and training adaptation. Force–time curves differ across populations, presenting as either unimodal (single peak) or bimodal (two peaks). Distinguishing between these profiles may allow coaches and researchers to group athletes for individualized training and more accurate analysis. Examining team-level CMJ type variability and frequency may support the development of an objective classification method, improving consistency in categorization.

METHODS: A retrospective database analysis was conducted on four Division II women's teams over 16 weeks: track and field (n=17; 21 sessions), gymnastics (n=22; 10 sessions), soccer (n=26; 8 sessions), and

basketball (n=13; 7 sessions). Athletes performed three hands-on-hips CMJs per session. Exclusion criteria included lower-body injury within six months, missing more than three consecutive sessions, or fewer than twelve total jumps. Peak and trough force values were extracted from force–time curves and extrapolated into a custom spreadsheet. Percentage differences between these values were analyzed across minimum prominence thresholds (MPT) to classify curves as unimodal or bimodal. Between threshold agreement was assessed on each team using Cohen's kappa, and bimodal frequency was calculated as the percentage of athletes on each team that was classified as bimodal at each MPT.

RESULTS: Bimodal classification frequency decreased with increasing MPT across all teams. Soccer and basketball consistently showed higher frequencies than track & field and gymnastics, and remained nonzero at 10% MPT, while track & field and gymnastics approached zero by 8–10%. Cohen's kappa indicated strong agreement between adjacent MPTs (generally ≥0.80), with the lowest at 1–2% in gymnastics (κ=0.798) and consistently higher agreement from ~3–4% onward.

CONCLUSION: CMJ classification is highly dependent on the MPT. Soccer and basketball athletes had more frequent bimodal jumps than track & field and gymnastics at all thresholds, suggesting sport specific differences CMJ classification. Thresholds of 3% MPT or higher provide more consistent classification across MPT, indicating these levels are most reliable for CMJ classification.

Comparison of Total Distance and Sprint Distance Between Positions of Division II Female Soccer Players

Tamas Sebestyen and Jonathan Bayer
Faculty Mentor: Becky Heinert

Introduction: To manage player health, minimize injury, and optimize performance in NCAA Division II soccer, this study analyzed positional demands using GPS technology. The findings provide insights into enhancing training plans and recovery based on specific positions.

Methods: NCAA Division II female soccer players were tracked during sixteen in-season competitions using 10 Hz GPS wearable technology. Players were grouped into tactical roles including Wing Backs (WB), Center Backs (CB), Defensive Midfielders (6), Attacking Midfielders (10), and Forwards (9). Key metrics analyzed included Total Distance (TD), Total Sprint Distance (TSD), and Distance per Minute (D/M).

Results: Forwards (9) and attacking midfielders (10) covered the highest average total distance. Forwards (9) registered the highest sprint distance (342 m), followed by wingbacks (WB) and attacking midfielders (10). Center backs (CB) covered the lowest total distance and sprint distance on average. Attacking midfielders (10) and forwards (9) maintained the highest intensity, measured in distance covered per minute.

Positional Groupings	TD	TSD	D/M
CB	9077(±2416)	126(±65)	49(±13)
WB	9563(±1082)	210(±83)	50(±5)
6	9168(±1061)	142(±49)	50(±6)
10	9930(±1472)	215(±110)	55(±7)
9	10047(±1382)	342(±84)	54(±9)

Table 1. Players are grouped into their positional categories, and the displayed metrics (TD, TSD, D/M) are a calculated average and a standard deviation in each group. Abbreviations: TD = Total Distance, TSD = Total Sprint Distance, D/M = Distance per Minute.

Conclusion: Coaches and athletic staff can use this data to tailor training and recovery protocols based on these numbers. The data can also be used to better observe/manage the workload of everyone in their "true" position instead of assuming their traditional roles.

Limitations: Looking at player data, there were three players that have played in different positions consistently, which may slightly alter the trends of those positions.

Comparison of Postoperative Pain Following Two Shoulder Procedures in Active Individuals with Shoulder Labral Injury

John Dao, Marino Maeda, and Yu Ling Zeng
Faculty Mentors: Blaine Birtzer and Nora Kraemer

Clinical Scenario: Superior Labrum from Anterior to Posterior (SLAP) repair is the standard treatment for isolated type II SLAP lesions in physically active individuals. However, biceps tenodesis (BT) has emerged as a promising alternative for pain reduction. The purpose of this review is to compare follow-up outcomes by evaluating Visual Analog Scale (VAS) scores between patients who underwent SLAP repair and those who underwent BT.

Focused Clinical Question: Is BT associated with lower VAS scores at follow-up when compared with SLAP repair in physically active individuals with type II SLAP lesions?

Search Strategy: A search of Academic Search Premier, PubMed, the Cochrane Library, and ScienceDirect identified peer-reviewed human studies published in English between 2005 and 2026. Key terms included SLAP lesion, operation, repair, tenodesis, labrum, pain, and VAS. Studies were included if participants were physically active individuals (i.e. athletes, workers, and military soldiers) diagnosed with isolated type II SLAP lesions who underwent SLAP repair or BT and had pain assessed using VAS. Studies were excluded for concomitant shoulder pathology, history of shoulder surgery, or a non-active population.

Evidence Quality Assessment: Evidence quality was assessed using the Oxford Levels of Evidence and the PEDro scale. All studies were classified as Oxford Level 3 due to non-randomized cohort or

retrospective designs. PEDro scores ranged from 3/10 to 6/10, reflecting low to moderate quality, largely due to lack of randomization, allocation of concealment, and blinding.

Results and Summary of Search: Seven articles met the criteria. Two studies reported statistically significant lower VAS scores following BT (1.3 ± 1.9 and 1.5 ± 0.5) compared to the SLAP repair group (1.8 ± 0.4 and 2.6 ± 2.5, $P < .05$). Four studies found no statistically significant differences in pain levels between the two groups ($p > .05$). One study reported lower VAS scores in the BT group (0.8 ± 0.8) compared to the SLAP repair group (1.7 ± 1.2) when compared to a control group (0.3 ± 0.3). Six studies reported significant reductions in pain levels in both groups following surgery ($p < .05$). Current evidence suggests that BT is equivalent to or slightly more favorable than SLAP repair for physically active individuals with isolated type II SLAP lesions.

Clinical Bottom Line: BT shows comparable pain reduction to SLAP repair in four of the seven studies with significantly lower VAS scores in two. However, given the overall methodological limitations and a Strength of Recommendation Taxonomy (SORT) rating of B, current evidence supports BT as a favorable yet not definitively superior intervention for follow-up pain reduction.

Implications: BT demonstrates comparable, and in some cases more favorable, intervention outcomes in pain levels during follow-up. Future reviews should evaluate health outcomes beyond pain at follow-up to empirically determine which intervention successfully returns a patient back to full function and activity. Consistency in inclusion criteria should be considered to maintain homogeneity, improve comparability, and preserve internal validity.

Does Improved Reaction Time Correlate with Improvements in Sport Performance? A 10-Week Smart Reaction Training Intervention in Division II Collegiate Football Athletes

Caleb Forst and Christopher Mayer
Faculty Mentor: Becky Heinert

Introduction: Neurocognitive reaction time plays a critical role in football performance by influencing perceptual processing speed, decision-making, and motor execution. Slower reaction time has been associated with increased injury risk and reduced neuromuscular control, yet limited longitudinal research exists within Division II collegiate football populations. This study examined whether a 10-week smart reaction training program improves reaction time and whether these improvements are associated with performance outcomes, measured by the number of accurate hits.

Methods: Thirty-one athletes from the Winona State Football team began the intervention and were divided into position groups (QB, WR, DL, OL); 19 completed the study. Upper-extremity reaction time and total hits were measured weekly using a six-light stimulus system across three 30-second trials. Paired t-tests (differences between two related measurements), repeated-measures ANOVA (differences across multiple time points), effect sizes (magnitude of differences), correlations (strength and direction of relationships between variables), and regression analyses (predicting outcomes from variables) were conducted ($\alpha = .05$).

Results: Reaction time significantly improved from 805.75 ± 103.75 ms to 640.95 ± 41.44 ms (−19.34%), $p < .001$. Hits increased from 30.21 ± 4.05 to 37.16 ± 2.19 (+25.39%), $p < .001$. Improvements in reaction time were strongly correlated with improvements in hits ($r = −0.878$, $p < .001$), and baseline performance predicted the magnitude of change ($R^2 = 0.857$ for reaction time; $R^2 = 0.786$ for hits).

Conclusion: These findings suggest that reaction time is trainable and strongly associated with task performance in collegiate football athletes.

Effect of Anterior Cruciate Ligament Reconstruction Recovery on Patient Reported Outcomes

Alexa Hoffman, Nicole Kirscher, and Alexis Partida
Faculty Mentors: Blaine Birtzer and Nora Kraemer

Clinical Question: In patients that have undergone anterior cruciate ligament repair (ACL-R), what are the effects of accelerated rehabilitation versus conservative rehabilitation on patient-reported outcomes (PROs)?

Search Strategy: We searched the following electronic databases: PubMed, ScienceDirect, ProQuest, and Cochrane Library from 2000 to 2026 for all articles related to ACL-R rehabilitation timelines with the search terms: accelerated, aggressive, early, conservative, ACL rupture, rehabilitation, and ACL reconstruction. The reference list in selected articles was also reviewed for additional sources. Inclusion criteria were isolated ACL rupture, multiple rehabilitation protocols, Knee injury and Osteoarthritis Outcome Score (KOOS), and International Knee Documentation Committee (IKDC) scores. Exclusion criteria were ACL sprains, other ligamentous involvement, non-operative maintenance, and previous history of ACL tear. Eight articles met our criteria and were included in this review.

Evidence Quality Assessment: Articles were evaluated using the PEDro Scale and Oxford Level of Evidence. PEDro scores ranged from 5 to 8, indicating "fair" to "good" methodological quality. Oxford scores ranged from Level 2 to Level 3, indicating moderate to strong evidence.

Results and Summary of Search: In active individuals who underwent ACL-R, accelerated rehabilitation showed no significant differences compared with conservative protocols in IKDC and KOOS scores. One of three studies assessing KOOS and five of seven studies assessing IKDC scores reported no statistically significant differences ($p = 0.06–0.88$; $p = 0.27–0.91$). Strengths of the articles include consistent findings across graft types, clinically relevant populations, and high retention rates. Limitations include small sample sizes, short follow-up, protocol variability, compliance differences, and broad inclusion criteria.

Clinical Scenario: While traditional rehabilitation protocols have required 9-12 months before return to play, newer evidence suggests that accelerated rehabilitation may allow athletes to return as early as six months, which may raise safety and effectiveness concerns. The purpose of this study was to compare accelerated versus conservative ACL-R rehabilitation protocols in physically active individuals by evaluating differences in recovery and return to activity based on PROs.

Clinical Bottom Line: In active individuals who underwent ACL-R, accelerated rehabilitation showed no significant differences compared to conservative rehabilitation on PROs. The evidence supports a Strength of Recommendation Taxonomy grade B, indicating weak support for the intervention. Wide variability in PROs suggests recovery is highly individualized, with optimal rehabilitation timelines differing between patients. Clinically, these findings support a criteria-based, individualized rehabilitation approach rather than a strictly time-based progression.

Implications: This research continues to build support for more recent practices of limiting immobilization periods and having patients move as soon as safely possible. ACL-R rehabilitation protocols are continuously evolving based on new studies and surgical advancements. In the backdrop of athletics, the question will always be: how soon can we return the athlete to play?

However, sometimes what is physically possible and what leads to the best long-term results for the patient are two different things. Future research should continue to focus on minimum acceptable ACL-R recovery timelines and longer follow-ups to examine knee instability, retear rates, and quality of life.

Effectiveness of a Four Week Velocity Block and Subsequent Force Block on Peak Relative Propulsive Force and Takeoff Velocity in Division II Collegiate Athletes

Logan Stauffer, Gannon Siwicki, and Garett Prestholdt
Faculty Mentors: Becky Heinert and Justin Geijer

Purpose: This study aims to investigate the effects of a sequential velocity-focused training and force-focused resistance training program on peak relative propulsive force (PRPF) and takeoff velocity (TOV) in NCAA Division II baseball athletes. Lower-body force production and movement velocity are critical for explosive performance in baseball, where acceleration, jumping ability, and rotational power are essential for meeting positional demands. Understanding how structured training blocks influence these mechanical outputs may help optimize pre-season programming strategies.

Methods: Fifty-six male Division II baseball athletes, free of lower-extremity injury for at least three months, completed an eight-week intervention. Performance was assessed at three time points: pre-intervention (week 0), after the velocity-focused block (week 4), and after the force-focused block (week 8). At each session, participants performed three maximal countermovement jumps (CMJ) with hands on hips using Hawkin Dynamics wireless dual force plates. Three trials were performed per testing session on nonconsecutive days, and the weekly average was used for statistical analysis. Primary outcomes included peak relative propulsive force (N/kg) and takeoff velocity (m/s). The training program consisted of two sequential four-week blocks, performed three times per week. Weeks 1-4 emphasized movement velocity using light-to-moderate external loads (~30-60% 1RM), plyometrics, ballistic exercises, and maximal intent. Weeks 5-8 prioritized maximal force development with heavy loads (~80-97% 1RM), low repetitions, and multi-joint compound movements.

Statistical Analysis: One-way repeated measure ANOVA will determine changes in peak relative propulsive force and takeoff velocity across the three testing points. If significant differences are detected, ($p \leq 0.05$), post hoc pairwise comparisons will identify where change occurred.

Results: PRPF did not change significantly across timepoints ($p = 0.940$) with mean values of 269.96 +- 23.25, 270.67 +- 23.30, and 269.63 +- 22.70 %BW at initial, post-velocity, and post-force testing, respectively. TOV showed a non-significant trend towards improvement ($p=0.080$), increasing from 2.926 +- 0.164 m/s at baseline to 2.974 +- 0.175 m/s post-force block. TOV gains were gained in the force block, rather than the velocity block.

Discussion: Neither hypothesis was fully supported. PRPF showed no meaningful response to either block, suggesting that peak force production may require longer training durations or greater individualization to induce change. The TOV trend, created from the force block, was contrary to initial expectations and may reflect the physical profile of this group responded favorably to maximal strength work. Large individual variability across athletes suggests a uniform sequential protocol may be insufficient for this group. Individualized force-velocity profile-based programming may produce greater outcomes.

Conclusion: An eight-week sequential velocity-to-force training intervention did not significantly improve PRPF or TOV in Division II baseball athletes. A positive trend was observed for TOV. Results support the need for individualized training created by force-velocity profiling.

How Do Jump Counts Differ Among Volleyball Positions During Practices and Games?

Daniel Arntzen, Aubrey Gibson, and Sophia Taarud
Faculty Mentor: Becky Heinert

PURPOSE: Volleyball is a high impact, jump dominant sport where athletes experience repeated mechanical loading, constantly placing them under high stress. In volleyball, positional roles impose distinct movement and technical demands, hence why jump exposure can vary between athletes. Understanding that jump exposure varies by position helps inform practice design, athlete monitoring, and load management. Therefore, the purpose of this study was to examine positional differences through external loads by comparing jump counts between volleyball positions (middles, outside, and setter) during both practices and games.

METHODS: Five NCAA DII female volleyball athletes were tracked throughout the 2025 season, specifically 17 practices and 15 games using an IMU (inertial measurement unit) placed around their waist. An inertial measurement unit quantifies jump count in real time. The positions in this study included 2 Outside Hitters, 2 Middle Blockers, and 1 Setter. Jump count was recorded and uploaded for analysis after each practice and game session.

RESULTS: Setters demonstrated the highest overall average jump counts compared to outsides and middles in practices [Setters - 120 jumps] followed by Outside Hitters [103 jumps] and Middle blockers last with [101 jumps], However for games the mean jump count was as followed [Setters - 157 jumps] then Middle blockers [100 jumps] and finally Outside hitters [85 jumps] . Between practices and games, setters showed a 31% increase in jump count, while outsides and middles showed a 17% and 1% decrease in jump count, respectively.

CONCLUSIONS: The results of this study demonstrate different jumping demands between positions when looking at jump count. Setters had the highest jump count by a large margin, and while Middle blockers and Outside hitters had similar means, they demonstrated large variability in their jump counts. Using this study, coaches will be able to design their practices considering the jump count from games between positions to manage load and prevent injury.

How the Social Determinants of Health Shaped the COVID-19 Pandemic

Grace Tjossem
Faculty Mentor: Andrea Rossin

The social determinants of health (SDOH) are non-medical factors that significantly impact health outcomes, well-being, and quality of life. They play a critical role in population health and contribute to widespread health disparities and inequities. The primary objective of this review was to evaluate the extent to which the SDOH were associated with COVID-19 health outcomes and assess the strength of the relationship if one existed. A comprehensive literature review was conducted to examine the role social determinants played during and after the pandemic. Findings from the review indicate that a significant portion of health outcomes are determined by the conditions that individuals live in, and adverse effects of these conditions disproportionately impact certain populations more than others. The presence and pattern of inequity in health extends far beyond the pandemic.

Implementing Motor Preference Profiling to Optimize Hitting Performance In Division II Collegiate Softball Players

Miyako Deloney
Faculty Mentor: Becky Heinert

PURPOSE: Softball hitting is a complex motor skill that requires players to quickly identify pitch type and location while simultaneously executing a coordinated swing. Individual differences in motor abilities and movement tendencies can influence performance. Implementing motor preferences (MP) may allow for more individualized and effective training strategies. Therefore, the aim of this study was to assess the implementation of testing to identify MP profiles and evaluate targeted training on individualized profiles by assessing hitting performance metrics.

METHODS: Twenty-two NCAA Division II (DII) softball players performed MP assessments to determine their MP profiles. Seventeen players met inclusion criteria and were included in the final statistical analysis. Players underwent MP testing that involved comparing various balance positions and determining their sturdiest position via tester observation and player feedback. The MP profiles included in this study: Aerial vs. Terrestrial, Flexion vs. Extension leg, Move Dial, Associated vs. Disassociated, Axial vs. Large, Horizontal vs. Vertical, and Motor Shoulder. Each player was categorized for each MP profile based on the 11 MP assessments conducted. The Hittrax Pro and Blast Motion were used to measure performance metrics including ball exit velocity (BEV), bat speed (BS), and attack angle (AA). Descriptive statistics identifying individual performance metrics were calculated, and a Paired t-Test was conducted in SPSS. Significance was determined with a p-value of $p < 0.05$.

RESULTS: The data from this study revealed a statistically significant increase in BS after MP testing and targeted hitting practice ($p = 0.002$, $d = 0.923$). No statistically significant differences were found for BEV and AA ($p > 0.05$).

CONCLUSION: These findings suggest implementing MP testing and individualized training may be an effective approach for improving hitting performance, with the greatest improvement observed in BS among collegiate softball athletes.

Isokinetic Hamstring-to-Quadriceps Ratios in Division II Collegiate Female Athletes

Lillian Brinkman
Faculty Mentor: Becky Heinert

PURPOSE: Females are 4-6 times more likely to sustain an anterior cruciate ligament (ACL) tear than males; however, only 12-19% of sports science publications contain female participants. Discrepancies in lower extremity muscular strength are a potential risk factor. A hamstring-to-quadriceps strength ratio (HQR) of less than 0.60 (60%) has been identified as a risk factor for greater ACL tension when landing. The purpose of this study was to first collect normative data on HQR in Division II collegiate female athletes via isokinetic strength testing. Secondly, this study compared HQR values between sports. It was hypothesized the mean HQR of each sport would be below the 0.60 (60%) threshold, indicating most female athletes may be at a greater risk for ACL injury.

METHODS: Sixty-four NCAA DII female athletes completed lower extremity knee isokinetic flexion-extension testing at a velocity of sixty degrees per second. Metrics analyzed include quadricep peak torque, hamstring peak torque, and HQR. Descriptive statistics for each group were calculated. HQR

values were compared via a nonparametric Wilcoxon/Kruskal-Wallis h-test. Significance was denoted with a p-value of $p<0.05$.

RESULTS: Statistically significant right leg HQR team comparisons include Soccer (51.24±1.32) greater than Volleyball (45.97±1.69) ($p = 0.0097$), Soccer (51.24±1.32) greater than Tennis (41.47±3.23) ($p=0.0181$), Basketball (52.13± 1.04) greater than Volleyball (45.97±1.69) ($p=0.0105$), and Basketball (52.13± 1.04) greater than Tennis (41.47±3.23) ($p=0.0097$). Statistically significant left leg HQR comparisons include Basketball (54.26±1.24) greater than Cross Country (45.70±3.84) ($p=0.0385$), Basketball (54.26±1.24) greater than Soccer (49.64±1.57) ($p=0.0441$), and Basketball (54.26±1.24) greater than Volleyball (46.70 ± 2.01) ($p=0.0017$).

CONCLUSION: All teams had a mean HQR below the 0.60 threshold, indicating the female athletes in this study may be at risk for greater ACL tension when landing. Statistically significant differences in HQR were found between four teams on the right leg and three teams on the left leg. These differences in HQR may be due to differences in sport demands. Strengthening the hamstring muscles to improve HQR values is recommended for all teams.

Relationship between countermovement jump metrics and fastball velocity in Division II collegiate pitchers

Joe Navratil and Joe Pearson
Faculty Mentor: Becky Heinert

Introduction: Pitching a baseball is one of the most demanding and complex movements in sports, characterized by the generation of high forces and angular velocities throughout the kinetic chain, from the lower extremities to the throwing arm. Within this context, fastball velocity has emerged as a paramount performance variable, serving as a primary indicator of pitching effectiveness and a significant factor in a pitcher's professional longevity and value. Multiple studies have investigated the lateral ground reaction forces of pitching using force plate technology; however, there is limited research comparing pitching velocity to lower extremity force generated through a countermovement jump (CMJ). Therefore, the purpose of this study was to determine if there is a relationship between fastball velocity and CMJ force plate performance metrics.

Methods: Data was collected retrospectively from 23 division II collegiate pitchers recruited from the Winona State Baseball team that reported no injuries to upper or lower extremities. The pitchers were between the ages of 18 to 22 years and weighed 140 to 230 pounds. Each athlete performed 3 countermovement jumps, with a 10 second rest between repetitions. Hands were kept on hips to isolate lower body and remove the skill of timing the arms with the jump. Weekly testing was completed over a 3-month period during the fall season. High speed cameras and radar technology were used to track the pitcher's average fastball velocities. Speeds were assessed weekly over a 3-month duration during the fall season.

Results: There is no strong correlation between average fastball velocities and CMJ force plate metrics. Intraclass correlation values were weak for both Peak Relative Braking Force (icc-value=0.36) and Net Positive Impulse (icc-value=0.36).

Conclusion: There is a weak correlation when comparing CMJ force plate metrics and average fastball velocity in division II college pitchers. This may be due to complex biomechanical demands of pitching.

Practical Applications: The results of this study indicate that CMJ performance metrics including peak relative braking force and net positive impulse are not strongly correlated to fastball velocities. However, these metrics may provide valuable information on where to target training to potentially enhance pitching velocity. For future research, upper extremity force plate testing should be looked at along with lower extremity data to provide a better indicator for fastball velocities.

The Effects of External, Internal, and Neutral Attentional Focus on 10-Yard Sprint Performance and Running Mechanics in Collegiate Athletes

Lucas Crouse, Annika Groendal, Jessica Lenz, and Niharika Pandit
Becky Heinert, Tisha Hooks

PURPOSE: This study investigates the effects of attentional focus, external (EXT), internal (INT), and neutral (CON), on 10-yard sprint performance and running mechanics in collegiate students. Based on the constrained action hypothesis, we expect external focus cues to enhance performance by encouraging more automatic and efficient coordination. Previous studies indicate that external focus cues improve sprint times even among elite and novice athletes, while internal cues may hinder performance. Many elite-level coaches still predominantly use internal focus instructions, suggesting a disconnect between motor learning theory and practical coaching strategies. This study aims to bridge the gap between theoretical frameworks and practical coaching applications by quantifying the performance and biomechanical impact of attentional focus, ultimately offering evidence-based guidance for improving sprint performance in college-aged individuals.

METHODS: 5 college-aged, recreationally active students at Winona State University participated in this research study (male = 4, female = 1). This study employed a within-subject experimental design, with each participant completing three sprint trials under each attentional focus condition. The first session is always the CON condition to account for learning effects, followed by randomized EXT and INT sessions. Sprint times will be measured using the Freelap electronic timing system, which ensures high accuracy. A standardized dynamic warm-up will precede all trials, and sprint mechanics will be captured using slow-motion video recording on an iPad (6th generation). Biomechanical data will be analyzed using kinograms for each participant to visualize performance across key sprint phases as outlined by the ALTIS kinogram method. Mean ± SD and the range for each trial's time, as well as change-score plots to show the time difference between CON and INT vs EXT conditions. Descriptive statistics were calculated. Mean 10-yard sprint time (averaged across three trials) was calculated for each participant.

RESULTS: Results are as follows: 1.81 ± 0.19 s in the control (CON) condition, 1.85 ± 0.16 s in the INT conditional group, and 1.84 ± 0.15 s in the external focus (EXT) condition. Trial means were consistent across the three attempts within each condition (CON: 1.83, 1.83, 1.78 s; INT: 1.87, 1.84, 1.85 s; EXT: 1.83, 1.84, 1.85 s). Individual responses varied: EXT produced faster mean times than CON for 2 of 5 athletes (improvements of ~0.02–0.05 s), while INT was slower than CON for 3 of 5 athletes (slower by ~0.03–0.11 s).

CONCLUSION: In this pilot sample of college-aged individuals, neither external nor internal attentional focus cues produced a consistent performance advantage over the neutral/control instruction. Although EXT was slightly faster than INT at the group level, performance changes were highly individual, suggesting that cue effectiveness may depend on athlete-specific factors (e.g., skill level, preferred cueing style, or response to instruction). These preliminary findings support using attentional focus cues flexibly in coaching and justify replication with a larger sample to better evaluate performance and running-mechanics trends.

The Examination of Conservative Treatments on Plantar Fasciitis

Jaden Kramer and Noah Ziperski
Nora Kraemer and Brandon Donahue

Clinical Scenario: Plantar heel pain, most commonly attributed to plantar fasciitis, is treated using several conservative and minimally invasive treatments. Among these, platelet-rich plasma (PRP) injections and corticosteroid injections (CSI) are two frequently used therapeutic interventions. This appraisal compares clinical outcomes associated with PRP and CSI to determine which treatment provides greater therapeutic benefit for adults experiencing plantar heel pain.

Focused Clinical Question: In adult patients with plantar fasciitis, what is the effect of PRP injection compared to CSI in reducing pain as measured on a visual analog scale (VAS)?

Search Strategy: A literature search was conducted using PubMed and JSTOR. Search terms included: *"plantar fasciitis modalities," "cupping plantar fasciitis," "plantar fasciitis Graston," "plantar fasciitis shockwave,"* and *"plantar fasciitis PRP"* or *"plantar fasciitis corticosteroid injection."* Studies were eligible if they involved adults aged 18–70 diagnosed with plantar fasciitis and evaluated PRP injection or CSI as treatment interventions. Studies were excluded if participants had a history of foot or ankle surgery, pregnancy, significant comorbid medical conditions, or functional impairments unrelated to plantar fasciitis. The search yielded 7 studies that met the inclusion criteria and informed the clinical appraisal.

Evidence Quality Assessment: Four of the seven included studies scored ≥7/10 on the PEDro Scale, including one study that achieved a perfect score of 10/10. Based on the Oxford Levels of Evidence, 6 studies were classified as Level II, while one study was classified as Level III. Overall, the evidence demonstrates moderate to high methodological quality.

Results/Summary: In 5 out of the 7 articles, CSI produced greater short-term pain reduction, with mean VAS improvements of 3.0–4.5 points at 4–8 weeks (SD ±1.0–1.8). In contrast, PRP showed smaller improvements of 1.5-3.0 points over the same period (SD ± 0.5-1.4). Platelet-rich plasma, however, demonstrated superior mid- to long-term outcomes, with VAS reductions of 4.0–6.5 points at 6–12 months (SD ±1.2–2.0), compared with 2.0–3.5 points in CSI groups. Five out of the 7 studies reported statistically significant between-group differences favoring PRP at long-term follow-up (95% CIs excluding zero; $p < 0.05$). Key limitations included studies that lacked follow-up beyond six months, small sample sizes, and the absence of a control group for some trials.

Clinical Bottom line: Our findings weren't conclusive in favoring one treatment over the other. Both CSI and PRP injections are effective treatment options for plantar heel pain. CSI provides greater short-term pain relief, whereas PRP demonstrates more sustained long-term improvement. Although the evidence consistently reflects this timing pattern, the overall strength of the literature supports a SORT Level B recommendation, indicating patient-oriented evidence that is limited or mixed.

Implications: CSI and PRP injections are both viable options for managing plantar fasciitis, with CSI offering short-term relief and PRP providing longer-term improvement. Clinicians should support shared decision-making by discussing these differences and aligning treatment with patient preferences. Future studies involving larger, more diverse samples and additional treatment comparisons are needed to strengthen and broaden the evidence base.

History

An Analysis of Letters from Second World War Veteran Dr Marvin Palecek

Alexis Miller, Riley Nelson, Kyle Pike, Alec Shopek, and Olivia Kaether
Faculty Mentor: Matthew Lindaman

Our presentation showcases the letters and experiences of Doctor Marvin Palecek, a Second World War Veteran and former Chair of the Winona State University History Department. As a soldier of the 45th Infantry Division, Dr Palecek participated in several major campaigns of the Second World War. Through his letters, Dr Palecek reveals a harrowing, gritty, emotional and empowering story of military service at the height of the largest conflict in human history. Our access to Dr Palecek's letters was made possible by coordinating with his son, Glen. This presentation was assembled by a team of student historians who have been working with Glen extensively for several weeks to document the surviving letters, photographs and other primary resources from Dr Palecek's war experience. Working with Glen afforded the students of this project the opportunity to record, analyze and further preserve the memories, experiences and legacy of Dr Palecek through digital scans of the primary resources like letters, newspapers and photographs. Following the complete scan of all available documents, the participants of this student project were able to help contribute to Glen's mission of publishing his father's experiences by providing a centralized, organized digitization of Dr Palecek's primary documents. Primary documents are crucial resources for historiographical analysis and surviving letters from soldiers like Dr Palecek are an integral component of research for historians. These resources allow historians to cultivate a deeper understanding of major historical events like the Second World War from the lens of ordinary people not often recorded in history.

Dr. Palecek recorded his experiences in an extensive series of letters and photographs between himself and his wife, Betty, that survived into preservation through his son. Glen is a Winona area resident who served for several decades as a fire fighter, and made the decision to record his father's story. Glen also wrote an exhaustive series of editorials for the Winona Post for several years about his father's wartime exploits. Along with these editorials, a host of personal effects remain in the Palecek family that help tell the meaningful story of a soldier from the Second World War. These effects include photographs and mementoes he brought home, Nazi flags and arm bands, war medals, badges, rank patches and pieces of his military uniform. But the most important of these artifacts are the letters Dr Palecek wrote home to his wife. A vital window into the personal and everyday life of a married soldier, these letters capture the thoughts, experiences and emotions of a frontline soldier, using witty and often poetic language, as well as the occasional, very emotional reflection on the horrors of battle and the hellish landscape of the Second World War.

Forgotten Heroes: The Legacy of World War II Nurses

Emma Boots, Anna Kunau, Rachel Smith, and Ella Stewart
Faculty Mentor: Matthew Lindaman

Our research project honors Gudrun Stenoien. Stenoien was a nurse in the 26th General Hospital Unit of the United States during World War II. During the war, Stenoien, affectionately known as "Goodie," documented her experiences through photographs and letters home. From North Africa to Italy, Goodie served as a Second Lieutenant nurse for the Army from 1942 to 1944. By reading her letters and analyzing documents, we have learned about the legacy Gudrun Stenoien left in her nursing career. Goodie's detailed collection of photographs and letters was generously donated to Winona State

University, inspiring research into her journey. Her story also motivated us to further explore nursing during World War II. Through our research, we uncovered many untold stories and noted the lack of overall representation of nurses in the war. While World War nurses were not directly involved in battle, their service was vital to America's success. We believe these stories need to be shared, and the sacrifices made by nurses should be recognized. Gudrun Stenoien's legacy exemplifies the importance and experiences of the dedicated nurses who served in World War II.

Mass Communication

Bring the Heat, Bring the Savings: Supporting Strategic Growth for Minnesota-based Energy Efficiency Nonprofit
Abigail Oldenberg
Faculty Mentor: Stacey Kanihan

Through analysis rooted in strategic communication theories, this research project focuses on the Minnesota-based nonprofit organization Center for Energy and Environment (CEE). This organization's purpose is to deliver effective energy solutions to cold-climate states. It makes energy more affordable for residents and businesses, promotes environmental equity, and lowers carbon footprints. This project considers the social and political landscape in the United States and its impact on environmental nonprofits. Given the status of grants allocated for energy efficiency programs, while prioritizing the organization's business development and growth goals, Center for Energy and Environment must diversify its revenue streams. Primary and secondary research conducted for this project includes annual impact reports, social media and website analytics, and investigating the external environment surrounding the clean energy industry. In 2026, several in-depth interviews with staff revealed CEE's need for reliable revenue. This research confirmed the hypothesis that as a nonprofit organization with ambitious growth goals, it is necessary for CEE to exceed previous years' revenue each year going forward, or the organization's growth goals will be at risk. CEE conducts a majority of its business in the state of Minnesota. Establishing reliable partnerships outside of Minnesota is an essential growth strategy attainable for the organization. Supported by Diffusion of Innovations theory and the Behavioral Public Relations model, this project's strategic campaign "Hot Like Minnesota" calls for contractors and municipal energy departments across the Midwest to partner with Center for Energy and Environment, emphasizing the ability to save money on energy for commercial and community developments. This campaign and its findings support CEE as the region's premier energy efficiency organization with unrivaled expertise and experience, which will result in beneficial partnerships and contracts.

The Living History Project: Documenting Winona State's Legacy
Ken Goroztieta, Holly Foss, and Aubree Hansen
Faculty Mentor: Kay Hannahan

This table will showcase the work of the Living History Project at Winona State University which preserves the history of WSU by documenting the careers of people who have impacted the university for the better.

The table will display three short documentary films produced by students during the Fall 2025 semester, running on a monitor with headphones on a continuous loop. The films feature Tom Sawyer

(former football coach), Jo Stejskal (former Dean of Nursing), and Jim Bromeland (former Professor of Political Science).

Alongside the films, the table will include a display of photography from premieres over the past 20 years and a booklet of all past Living History Honorees. Student filmmakers from the fall 2025 class will be present at the table to engage with attendees, discuss their production processes and how these documentaries record the history of WSU.

Mathematics & Statistics

Agiliti Health Rental Model Development

Nicole Braun and Alissa Pettit
Faculty Mentor: April Kerby-Helm

In the modern healthcare landscape, managing medical technology efficiently is vital to patient outcomes. However, healthcare facilities often struggle with equipment management during volatile, influenza-driven patient surges. This project presents a data-driven reporting framework designed to transition Agiliti Health from reactive equipment management to a proactive consultative approach, ensuring hospital preparedness during peak seasonal demand.

The primary objective was to design a reporting suite that transforms disconnected data streams into actionable strategic insights. The methodology involved centralizing internal logistics data from Azure Databricks and integrating external trends from the Center of Disease Control. Technical implementation required rigorous data cleaning using Python and Polars to unify disparate date formats and aggregate rental history. This prepared data was then used to develop a relational semantic model within Power BI, utilizing a live SQL Server connection to ensure continuous data updates.

A core feature of the framework is a custom DAX-based algorithm that calculates a 180-day projected rental count based on three-year rolling averages. This predictive tool allows sales teams to provide evidence-based suggestions for critical assets, such as infusion pumps and ventilators, specifically for the peak influenza season from October to March. To provide clinical context, the dashboard also visualizes state-level influenza spikes, helping hospital administrators align equipment needs with viral activity. Initial deployment results indicate that the framework effectively bridges the gap in strategic planning by providing visual, quantitative foundations for inventory scaling. While currently limited to statewide influenza data, future iterations aim to automate CDC data ingestion and refine predictive logic to include emerging trends like COVID-19. Ultimately, this framework establishes a standardized methodology that ensures logistical constraints do not impede clinical care during high-volume periods

Evaluating Movement-Based Detection of Moose Calving Using GPS Collar Data

Lauren Beck
Faculty Mentor: Christopher Malone

Moose (Alces alces) give birth during a short seasonal window and exhibit distinct changes in movement behavior, including long-distance travel followed by a period of localized movement while caring for newborn calves. Previous research has shown that these patterns can be identified using GPS collar data; however, it remains unclear whether movement data alone can reliably predict calving events.

This study evaluated whether movement-based metrics derived from processed GPS collar data from the 2013 calving season could be used to develop a predictive model for calving. Movement data were compiled into a dataset of daily movement features and event-level summaries, and candidate events were identified based on sustained reductions in movement (localization), event duration, and a composite event score. Model predictions were evaluated against confirmed 2013 calving records using precision and recall. Results showed that movement data contains meaningful signal, with models achieving moderate recall (up to 0.679), but relatively low precision (0.45–0.58), indicating frequent false positive detections. Incorporating a biologically informed temporal constraint improved precision but reduced recall, highlighting a tradeoff between sensitivity and accuracy. These findings suggest that while movement patterns are useful for identifying general calving behavior, they are insufficient as a standalone predictor due to behavioral overlap and potential GPS collar error. Additional ecological context may be necessary to improve predictive performance.

Fastenal Internship and KPI Tracker Project

Tyler Schaack
Faculty Mentor: April Kerby-Helm

From my internship at Fastenal, I have been able to learn and apply many skills from my classes into my day-to-day work. In the supply chain department of Fastenal there are many things' planners must keep an eye on to ensure proper and sufficient supply for our customers. Working for a big company means that there are lots of unique parts and plans that need to be constantly reviewed to keep everything accurate. Before starting my project there was no good way of organizing and tracking what improvements need to be made to our parts. Using Excel, Power Query, and Power Bi, I was able to make a visual representation of all the improvements that need to be made to our books of business. These visuals have increased accountability and accuracy in my team's day-to-day work and have helped decrease the number of errors we run into on our parts.

Naming a Generation: Regional and Gender Patterns in 21st Century American Baby Naming

Courtney Casey
Faculty Mentor: Tisha Hooks

Baby names provide a unique lens through which cultural change, regional identity, and social trends can be examined over time. Using U.S. Social Security Administration baby name data from 2000 and 2024, differences in naming diversity across gender and geographic regions were examined. Naming concentration was measured using the Herfindahl–Hirschman Index (HHI), a diversity metric based on the distribution of name frequencies, while regional variation was assessed through rank deviation between regional and national top ten names. Results indicate that female names consistently exhibited greater diversity than male names and that naming diversity increased significantly for both genders between 2000 and 2024. Regional comparisons reveal persistent differences in naming preferences, with the West and Midwest exhibiting the greatest deviation from national trends. Together, these findings suggest that while naming practices in the United States have become increasingly diverse over time, regional identity and gender continue to shape naming behavior.

Predicting the Probability of Having Diabetes Using Machine Learning

Logan Stewart
Faculty Mentor: Silas Bergen

Each year the Centers for Disease Control and Prevention (CDC) distribute the Behavioral Risk Factor Surveillance System (BRFSS) telephone surveys to acquire nationwide data about US residents' health. This survey collects data on hundreds of health-related variables from hundreds of thousands of participants. It is a powerful tool for building health promotion and has even influenced and supported health-related state legislation. This study uses that data to predict an individual's probability of having diabetes based on dietary, demographic, health, and economic factors. Diabetes is a group of diseases that causes the body to use insulin ineffectively, and one in four people with diabetes don't know they have it. This study aims to discover what factors are most prevalent in people with diabetes to spread awareness and encourage those at higher risk to seek treatment that would prevent further complications. To achieve this, a machine learning decision tree model called XGBoost is used. The results of this study provide predictions with high accuracy as well as the factors that are most influential in the model's decision making.

Music

On The Gloop
Ryan Rademacher and Gunner Hove
Faculty Mentor: Aaron Lohmeyer

An original piece for drums and bass composed and performed for RCA Day 2026.

Nursing

Accessibility of Online Health Portals
Kailey Cooper, Nate Dolan, Carly Kreisa, Ayva Peterson, Lindsey Pinter, Helen Prow, Abagail Ripley, and Amelia Torgerson
Faculty Mentor: Samantha Brown

Winona State University Nursing students partnered with Winona County Public Health to create education for clients related to accessibility, navigating online health portals, and addressing barriers to accessing portals. The project included a community assessment and literature review that outlines health portals and how they are accessed amongst different patient populations.
As the healthcare world shifts from paper to online services, online health or patient portals have become increasingly common (Andreadis et al., 2025). Online health portals are used as a communication pathway between healthcare interdisciplinary teams and the patient. Information on these portals includes lab results, communication with providers, visit summaries, current medications, and medical history (Turner et al., 2015). When used properly, portals help patients stay updated on accurate health information. Access to and use of these portals were not equal among all patients. Individuals living in rural areas and those with lower levels of education experienced greater difficulty using patient portals compared to those in urban areas or with higher education levels. Providing education and support on how to use patient portals can improve patients' confidence and engagement in managing their health information. While some patients prefer instant access to reduce anxiety associated with waiting, others may experience increased stress, especially when results are abnormal (Steitz et al., 2023). Therefore, healthcare providers must be aware of the potential emotional impact of immediate access and guide patients on how to interpret and respond to their results. Overall,

educating patients on both the benefits and limitations of patient portals can promote more effective use and increase trust in the healthcare system.

However, many patient populations, including older adults, face significant barriers related to digital literacy and accessibility. The group assessed our individual clients' subjective knowledge of online health records and the barriers to use of online health portals. Literature was reviewed and incorporated into an educational brochure for clients. Clients were able to successfully navigate their electronic health portals, explain the benefits, and have an increased knowledge of the information they can access. In conclusion, the project focused on the importance of online health portals and increased accessibility for clients. This project improves community health outcomes by empowering clients to manage their care through online portals.

A Collaborative Approach to Strengthening Behavioral Strategies in the Arcadia School District

Sada Stanley, Ariana Huntington, Erin Janiszewski, Sydney Graf, Josie Becker, Bailey Ripley, Dana Jones, Mallory Arndt, Gabby Rinowski, Luke Garner, and Hailey Schliep
Faculty Mentors: Ann Boberg

The School District of Arcadia is lacking mental health resources due to budget cuts from state and federal levels. Mental health needs have become a rising concern in recent years. With that, the guidance counselors, who traditionally supported students' emotional regulation and behavioral needs, became increasingly occupied with Academic and Career Planning requirements, leaving them with limited time to address students' mental health needs. To help address this need, Winona State University nursing students partnered with the district's guidance counselors to develop supplemental emotional management and decision-making skills-building videos that counselors could use during busy periods to support students' coping skills and emotional awareness. The WSU nursing students made recorded video presentations breaking down Dialectical Behavior Therapy Skills in Schools Training for Emotional Problem Solving for Adolescents (DBT-STEPS-A). The videos are intended to increase the students' knowledge of these emotional problem-solving strategies through guided exposure and skill demonstration. The data is currently being processed from the pre- and post-test surveys to assess students' knowledge of the skills before and after watching the videos. In the future, recommended opportunities for Arcadia High School students include the application of skills in a safe setting, such as a classroom, filling out topic-related worksheets, talking through real-life examples, or creating a written outline to implement in challenging situations. These efforts would continue to support the ever-needed services of emotional management and decision-making in adolescents.

Beyond Caseloads and Calendars: Measuring Staff Satisfaction in Treatment Court

Ariana Huntington
Faculty Mentor: Maryann Abendroth

Background and Purpose: Treatment courts are specialized programs designed to divert individuals from incarceration while supporting recovery and rehabilitation. With more than 4,000 treatment courts operating nationwide and serving over 150,000 individuals annually, they represent a critical component of the criminal justice system. Treatment court staff may be particularly vulnerable to stress due to sustained exposure to complex substance use cases and systemic, administrative, and team-related demands. Assessing staff well-being is therefore essential, as it has implications for court effectiveness, workforce stability, and overall system functioning. Despite this importance, limited research has examined the experiences of treatment court professionals. The purpose of this exploratory pilot study

was to examine the experiences and well-being of a treatment court team and affiliated professionals whose work is central to program success.

Methods: A cross-sectional survey employing purposive sampling was used to collect data from treatment court team members and associated staff. Demographic variables and responses from a 5-point Likert-type instrument, measuring team satisfaction, were analyzed using descriptive statistics. Item-level means and individual scores were reported, with overall team satisfaction calculated using the group mean. Open-ended responses were analyzed line by line through thematic analysis to identify key words, phrases, and patterns across participants' responses, which were used to contextualize and support the quantitative findings. Institutional Review Board approval was obtained prior to initiation of the project.

Results: Participants (N = 9) completed demographic items, with the largest proportion (33%) reporting ages between 40 and 49 years and 6–9 years of treatment court experience. Team satisfaction measurements and qualitative analyses were based on the seven respondents who completed the full survey. Item-level satisfaction means ranged from 3.43 to 4.71, indicating moderate to high agreement across domains of team functioning. Individual mean satisfaction scores ranged from 3.57 to 4.78 on the 5 point scale, reflecting moderate to high satisfaction among team members. Overall group satisfaction was high, with a mean score of 4.23. Thematic analysis of open ended responses identified three primary themes: improved participant quality of life, professional passion and resilience, and the complexity of needs within the treatment court setting. Several subthemes further elaborated and strengthened these findings.

Conclusion: Findings from this project suggest that treatment court team members report high overall satisfaction with team functioning, while also recognizing the complex and demanding nature of serving individuals with multifaceted needs. Results demonstrated consistently positive satisfaction ratings and qualitative findings highlighted the passion and commitment along with managing the complexities of situations. These results support the value of treatment courts as collaborative programs that positively impact participants' quality of life, and contribute to professional fulfillment among team members. Future implications include the continued use of satisfaction assessments as a tool for monitoring team functioning and identifying areas for targeted support and system improvement.

Care, Capitalism, and Croissants: Interprofessional Students Take on Business of Healthcare in Paris

Phoebe Enebechi, Selma Dzamalija, Nicole Sharp, Beth Komay
Faculty Mentor: Amy Reitmaier

The Business of Healthcare in Paris is a faculty-led study-away program that unites business, nursing, and other healthcare students in an immersive experience of global healthcare systems. The primary design of this course is around interprofessional learning that integrates coursework and cultural experiences from within the Midwest United States (US) and France.

Students begin the course by visiting healthcare facilities and small alternative-therapy businesses in the US, gaining initial exposure to diverse care environments. They then travel to Paris and surrounding areas to explore comparable sites, including hospitals, an art therapy center, a residential rehabilitation facility, and small businesses providing alternative healthcare services. Through these parallel site visits, along with collaborative learning and structured reflection, students examine how healthcare delivery, policy, economics, and entrepreneurship intersect across global contexts.

Given the substantial differences between the US and France in social structures, economic priorities, healthcare systems, cultural views of health, and payer models, a structured comparison of the two systems encourages critical analysis and enhances student learning. Organized coursework experiences help students think outside of their discipline of study; illustrating how operating in silos can be a barrier. Arming students with this knowledge prepares them to enter their respective fields with a global perspective on how business and healthcare function together and influence one another. Coursework highlights the shared global drivers of health: infrastructure, historical, cultural, environmental, nutrition, exercise, wellness, innovation, small business, and government.

Survey results from participating students show strong gains in cultural awareness, confidence navigating unfamiliar healthcare environments, and appreciation for interprofessional teamwork. Some described the experience as “eye-opening” and “transformative,” particularly in understanding how business, policy, and clinical care intersect across systems. Students shared that traveling together, engaging in dialogue about diverse perspectives from various healthcare workers from the US and France, and completing collaborative assignments, such as social media posts and portfolio reflections, helped them understand how business, clinical practice, and policy intersect in real-world healthcare settings. Experiencing the French healthcare system firsthand allowed students to recognize both strengths and challenges within each model of care. By comparing France's universal coverage structure with the US insurance-based system, students gained deeper understanding of cost control, access, preventive care, and government oversight.

Beyond academic outcomes, many students described the experience as personally enriching. They characterized it as transformative, citing increased independence, adaptability, enhanced communication skills, and a deeper respect for diverse perspectives in healthcare leadership. Business students developed a stronger understanding of patient-centered practices and ethical considerations in healthcare management, while nursing and healthcare students gained insight into the operational and financial dimensions of healthcare delivery.

By centering student voice and reflective comparison, this program fosters global awareness, interprofessional collaboration, and leadership readiness, preparing students to navigate complex healthcare systems across clinical and administrative settings. Through international learning and cross disciplinary dialogue, this faculty led study away experience serves as a catalyst for developing globally minded healthcare and business professionals equipped to work in an increasingly interconnected world, offering meaningful preparation for future careers across diverse areas.

Disaster Preparedness in Healthcare Workers

Helen Prow
Faculty Mentors: Samantha Brown and Susan Zeller

Disasters can negatively impact healthcare systems worldwide, with increased impacts on resource-limited communities. Nurses and other healthcare workers are often on the frontlines of disaster response; evidence shows that many healthcare workers worldwide are not adequately prepared to respond effectively. The purpose of this honors project is to analyze factors and interventions that influence healthcare workers, specifically nurses, in disaster preparedness in resource-limited settings globally.

A review of peer-reviewed literature published within the past ten years was conducted using systems such as CINAHL, PubMed, Google Scholar, and Open Evidence. Articles were selected based on relevance to disaster preparedness among healthcare workers in resource-limited settings. This project also included a community assessment of healthcare workers in Honolulu County using targeted questions informed by issues found in the literature review. This county was chosen due to its risks for disaster and its unique geographical barriers that restrict patients from receiving care. The assessment evaluated participants' knowledge of disaster roles, institutional policies, available resources, and disaster-related education and training.

The literature identified two major themes influencing disaster preparedness: education and resource availability. Educational interventions included structured training programs, simulations, and disaster management courses, which were consistently associated with improved knowledge, confidence, and disaster preparedness. Resource-related factors, such as access to infrastructure, equipment, disaster plans, and organizational support, were strongly linked to preparedness. Systemic barriers were also identified, including limited funding, lack of role clarity, and insufficient governmental support.
Based on the literature review and community assessment, an evidence-based educational poster will present key factors that promote disaster preparedness and offer recommendations for healthcare workers and institutions in resource-limited settings. This project aims to strengthen disaster preparedness and support healthcare workers in the event of a disaster.

Gamification as a strategy for Interprofessional Learning

Phoebe Enebechi
Faculty Mentor: Sandra Paddock

Background: A Community-based, student-led clinic provides free health services to underserved areas, bringing together students from allied health disciplines to promote interprofessional collaboration and health promotion. Previous orientation sessions were lecture-based with a team-building activity providing limited opportunities for active learning. To address this, a gamified orientation activity was developed using realistic, scenario-based cases designed to exemplify common community health situations.

Purpose: This quality improvement project aims to evaluate whether gamification improves students' perceived ability to communicate, collaborate, and understand roles and responsibilities when delivering team-based care.

Methods: The project was guided by Bandura's Social Learning Theory and implemented using the IOWA model. Interprofessional scenarios were developed specifically to five allied health disciplines. Participants included students (n=33) enrolled in a community-based clinical. A review of current literature supported the use of gamification as an educational tool that enhances engagement and motivation among healthcare students. The Interprofessional Collaborative Competency Attainment Survey (ICCAS) was used for pre and post measurement. Paired t-tests examined changes in mean pre/post responses for each of the 20 items. $p < 0.0025$.

Results: Quantitative results indicated a decrease in self-reported interprofessional competencies post-intervention. However, students reported gaining a deeper awareness of interprofessional collaboration, likely reflecting a shift from perceived competence to self-awareness, a finding consistent with the Dunning-Kruger effect.

Conclusion: Although self-assessment scores declined, students verbalized increased understanding of interprofessional communication and collaboration. Gamification may serve as a valuable learning method to promote team-based learning and promote self-awareness. More studies with larger samples are suggested.

Objectives: After the learning activity, students will

- Verbalize Improved interprofessional communication and collaboration
- Demonstrate enhanced identification of interprofessional roles and responsibilities
- Discuss development of critical thinking and decision-making in health promotion.

Health Education for Caregivers of Individuals with Intellectual and Developmental Disability (IDD)

Madison Conlin, Jack Lux, Megan Hesse, Sadie Olson, Violet Nelson, Christina Chao, Anna Peterson, and Johanna Shubert
Faculty Mentor: Kathryn Frie

Background: Winona State University nursing students partner with Home and Community Options (HCO) during their population health clinical experience. HCO's mission is to "empower and support people with developmental disabilities," with a vision of ensuring that all individuals thrive and are valued members of their communities (Home and Community Options, n.d.). The Healthcare Director at HCO identified a need for additional staff education related to common health conditions affecting individuals with intellectual and developmental disabilities (IDD), including arthritis, diabetes, and depression or other mental health concerns. In response to this identified need, nursing students developed evidence-based educational strategies to enhance staff knowledge and support the health and well-being of individuals living with IDD.

Problem: People with intellectual and developmental disabilities (IDD) experience significant health disparities compared with the general population, including higher rates of chronic conditions, unmet healthcare needs, and barriers to accessing preventive services. Individuals with IDD often rely on direct support professionals (DSPs) and other care staff to assist with daily living, health monitoring, and coordination of care. However, many staff members receive limited formal training in health education, disease prevention, and evidence-based care practices tailored to the unique needs of this population. Developing evidence-based health education programs for staff who support individuals with IDD can strengthen their knowledge, skills, and confidence in promoting health and recognizing early signs of illness. By integrating current research, best practices, and accessible training approaches, such programs can improve the quality of care, support better health outcomes, and reduce preventable complications among people with IDD.

Methods: This project utilized a community-based participatory research approach and incorporated both qualitative and quantitative data collection methods. Data were gathered through community assessments, surveys, and a review of peer-reviewed evidence-based literature to inform and support the project.

Outcomes: Four health education posters addressing arthritis, diabetes, heart health, and depression were developed. Each poster highlights the importance of the condition, common symptoms, and strategies staff can use to provide support in the home setting. QR codes on the posters link to

supplemental educational videos. The videos demonstrate recognition of symptoms and illustrate both effective and ineffective support strategies using visual aids and communication techniques.

Conclusion: Overall, this project demonstrates academic- community partnerships in service leadership. The education tool to target the knowledge gap that caregivers may possess regarding health conditions of people with intellectual/developmental disabilities is a system level strategy to support this vulnerable population. This work highlights the importance of structured, evidence-informed education to empower the workforce that plays a critical role in the day-to-day health and well-being of individuals with IDD.

How Transportation Access Affects Health Outcomes in Rural Elderly Populations

Madison Conlin
Faculty Mentors: Sara Laker and Kathryn Frie

Older adults living in rural communities experience significant transportation barriers that directly influence their health, wellness, and overall quality of life. Barriers such as limited funding, inadequate public transportation, long travel distances, and high transportation costs contribute to missed medical appointments, delayed preventative care, reduced social participation, and health disparities. The project targets the question, "For older adults who live in rural communities, what is the effect of reliable, convenient, and affordable transportation versus not, on health, wellness, and quality of life?", specifically focusing on older adults within the community of Winona, Minnesota. To explore this issue, the project was conducted using a multi-method approach including a community needs assessment, performing a windshield survey of the Winona area, and informal interviews with local organizations that serve older adults. Additionally, findings from local, state, and national data will be synthesized in this presentation to identify key gaps in transportation access and the effect on healthy aging. The final poster will disseminate the findings of how transportation is a critical social determinant of health and how adequate transportation resources impact the overall health and well-being among rural older adults.

Implementation of Education Regarding Trafficking among Healthcare Staff and Community Organizations

Kate Arndorfer and Anna Peterson
Faculty Mentors: Autumn Cole and Samantha Brown

Background: Over the past two decades, human trafficking has received increasing media attention and public awareness efforts. Despite this, significant gaps remain in the knowledge and preparedness of healthcare professionals, specifically nursing staff, to identify and respond to trafficking victims. Human trafficking includes the exploitation of individuals through the use of force, fraud, or coercion for labor or sexual acts. Survivors often experience acute injuries, chronic illness, psychological trauma, and long-term health complications. Healthcare settings, particularly emergency departments, may be one of the few opportunities for victims to have contact with professionals outside of trafficking situations. However, there is a lack of standardized protocols in hospitals within the United States and formal education programs to help guide healthcare providers in identifying and supporting victims of trafficking.

Problem: Survivors of trafficking have the same healthcare needs as the rest of the population. They are also prone to injury, illness, and long-term health issues. However, when health care is received, they

often are not identified as current or previous survivors. Nursing staff do not have formalized training on recognizing cues or indicators of these individuals in clinical settings, making healthcare more difficult to navigate safely. Providing appropriate education to nursing staff can individualize care, identify survivors, and provide appropriate resources if they are accepted and ready to seek help.

Methods: This project presented a comprehensive review of literature to current Winona State Nursing Students. This review included definitions, identifiers, limitations to identification, risk factors, and potential interventions. Quantitative data was collected via pre and post-test surveys. This data was further analyzed to determine the efficacy of the educational session.

Outcomes: The project evaluated whether the education presentation improves the knowledge that nursing students have regarding human trafficking, identification of victims, and appropriate response strategies during these situations. Findings will be presented in a research poster that includes the analysis of pre- and post-test results.

Conclusion: This project highlights the importance of structured education for healthcare professionals on recognition and response to human trafficking. There is an educational gap surrounding trafficking awareness in healthcare. Increasing awareness and knowledge among nursing students and future healthcare professionals may strengthen early identification of victims and improve access to appropriate care and resources for this population.

Mental Health and Loneliness Within College Students

MacKenzie Kellen, Josie Kessel, Kylie Anderson, Madeline Beinborn, Julia Bangert, Madeline Vitzthum, Kaylee Bateman, and Sarah Jama
Faculty Mentor: Brit Voshage

Purpose: Mental health is a broad topic, with many different aspects that can affect someone's daily life. Loneliness is the feeling of being alone or experiencing an imbalance between desired and actual social interactions (Potter et al., 2023). This project explores, the mental health aspect of loneliness. Data from Winona State University (WSU) students was collected using the UCLA Loneliness Scale (ULS3). On campuses, many traditional college students experience loneliness from a new environment that is potentially away from family, friends, and familiarity. The transition to college and experiencing independence for the first time can increase stress levels, thus, increasing feelings of isolation and loneliness. Although loneliness is seen as “normal,” these feelings heighten risk for poor academic performance, decreased social connections, and increased potential of other mental health concerns, such as anxiety and depression. This project aims to gain understanding of student experiences with loneliness at WSU and identity gaps in current university students.

Methods: To assess the met and unmet needs of students at Winona State University regarding loneliness, the data that is surveyed will be collected at the 2026 Health and Wellness Fair. Current students at the university will voluntarily approach an informational table where they will be asked to write down the answers to three questions: (1) Did you experience with loneliness at WSU when you first began going to school here? (2) What, if anything, did the university provide (resources, opportunities, clubs, tools, etc.) that helped decrease your loneliness? (3) What advice or positive affirmation would you give an acquaintance who told you they were experiencing loneliness at WSU?

Outcomes: Results will be revealed following the Health and Wellness Fair. It is anticipated that the results will provide further knowledge into methods to decrease loneliness risk and increase social

interaction for WSU students. Additionally, there will be a better understanding of ways to connect with college students on the Winona State University Campus.

Conclusion: Loneliness among college students is a significant mental health concern that can impact emotional well-being, academic success, and overall quality of life. This project aims to better understand student experiences and identify gaps in current university resources. By exploring both helpful and missing support services available, the findings can guide improvements in campus programs to promote connection and reduce feelings of isolation. Addressing loneliness early can help support healthier coping, stronger social networks, and improved mental health outcomes for college students.

Moving and Grooving: Staying Safe, Active, and Connected

Seth Brewers, Norah Clough, Megan Hefti, Sydney Kiefer, Abigail Knoernschild, Jessica Miley, Boyd Skelley, and Gavyn Soderstrom
Faculty Mentor: Maryann Abendroth

Background: The Holmen Area Community Center (HACC) is a community-based organization whose mission is to facilitate opportunities and interactions that connect all generations. Nursing students at Winona State University offered wellness checks for community members, mainly older adults, which included blood pressure screening, foot care, fall risk assessments, hearing checks, memory screens, and gentle shoulder massages. During these experiences, community members and staff requested more information and interactive sessions focused on safety education, disease prevention, wellness promotion, and emergency preparedness.

Problem Statement/Purpose: Recent feedback showed a growing demand for interactive sessions and support that builds confidence in managing health needs and emergency preparation at home and the community center. Without structured education and peer support, older adults may face increased risk of preventable injuries, unmanaged chronic conditions, and reduced readiness during emergencies. Improving access to engaging safety and preparedness programs will support healthier, safer, and more confident aging. The purpose of this project was to provide education and prepare older adult community members for unexpected safety hazards. Four safety needs topics were identified, including Automated External Defibrillator (AED) usage, choking precautions, recognition of stroke symptoms, and health education for those at risk of osteoporosis and/or falls. Advocating for peer support and educational activities at the HACC was sought to benefit community members and staff. These safety topics allow the community to become aware of the most prevalent issues. The objective was to ensure the community felt safer and more prepared after health teaching for urgent situations. For this activity, students borrowed an instructional AED to demonstrate its use in emergent situations. The students engaged in meaningful conversations with community members in various exercise classes, allowing them to build relationships, answer questions, and address further concerns or issues.

Results: The results from health teaching on AED use, stroke, choking response, and osteoporosis safety showed that education was effective. Of the 15 community members who participated, about ten were from the walking group, and the remaining five were from exercise classes. Many community members found the education helpful, with some saying, "I didn't know that time was a vital factor in stroke response," and others stating, "I feel more comfortable understanding what an AED does if I ever have to use it." Several noted the value of knowing various ways to help someone who may be choking.

Implications and Conclusion: The safety education was effective and well-received as members said they had increased confidence in a potential emergency. The conversational format between the nursing students and community members clarified further questions and ultimately helped reduce concerns about using an AED, and increased awareness of time-sensitive emergencies such as stroke response. These findings suggest that targeted, interactive health teaching can improve community members' understanding of emergency response and health safety topics that may often be misunderstood or overlooked. This activity reinforced the role of community-based nursing education in promoting preventive strategies that enhance safety awareness and preparedness.

Public Health Book Club

Amelia Beyer, James Durst, Kelly Freymiller, Julia Kunz, Ashia Meister, Chloe Sand, Josephine Sandquist, and Jaci Winchell
Faculty Mentor: Autumn Cole

Introduction: This project describes the development and implementation of a book club focused on population health topics to promote learning, discussion, and community engagement. A public library is a safe space to host book club meetings due to its non-intimidating environment. All members of the community are welcome to participate. A book club was hosted on campus for members of the nursing cohort to attend. With a focus on public health, these book clubs build awareness, critical thinking, and community engagement around population health issues.

Purpose: The promotion of a book club can improve health literacy in the community by building awareness in the community on risk factors, understanding of health systems, ability to evaluate health information, and knowledge of prevention strategies. A library is considered a third space, which includes places that aren't home, work, or school. Third spaces give people a safe, neutral place to go, as well as foster social connections in the community. Public health book clubs can include discussing certain social or economic topics from the book in community groups and utilizing critical thinking and preventing misinformation on these topics. Students engage book club participants to consider ways that the topics have or could affect their lives. Ideally, student leaders can educate and inform participants on chronic health conditions and assess ways we can help them improve and maintain their symptoms using topics from the chosen book.

Results: Other than the group that hosted the book club, there were additional participants that joined on different days over the weeks that it took place. There was one person who joined almost every week, with a few other people that joined just once. During each book club, thought-provoking questions were asked based on the chapter that was being discussed that week. These questions produced meaningful conversations for the group that surrounded public health issues such as food insecurity, poverty, drug addiction, housing instability, mental illness, the foster system, and inequities in social services.

The Impact of Early Skin-to-Skin Contact on Neurodevelopmental Outcomes in Preterm Infants

Ashia Meister
Faculty Mentors: Megan Anibas and Stephanie Ryan

Preterm infants face significant neurodevelopmental risks due to the interruption of late gestation brain maturation. Early skin to skin contact has emerged as a low cost intervention that supports sensory regulation, physiological stability, and neural development. This honors project synthesizes current

evidence on how early skin to skin contact influences cognitive, motor, language, and socio emotional outcomes in preterm infants and translates these findings into an educational presentation for pre licensure nursing students. Across studies, early and sustained skin to skin contact is associated with improved brain activity, behavioral organization, and developmental scores in infancy, with additional evidence of structural and functional benefits into early childhood. Implementation varies widely due to differences in timing, duration, and clinical protocols, as well as barriers such as delayed initiation until medical stability, parental participation challenges, privacy concerns, and staffing limitations. By strengthening nursing students' knowledge and confidence in supporting early skin to skin care, this project aims to promote evidence based neonatal practices that improve developmental outcomes for preterm infants.

The Experiences of Pediatric Nurses

Madeline Vitzthum and Julia Bangert
Faculty Mentors: Maryann Abendroth and Megan Anibas

Background and Purpose: Nursing is a specialty that requires deep clinical knowledge and skill but also high levels of emotional engagement. This is most apparent in pediatric nursing. Pediatric nurses are the nurses who care for societies' most precious and vulnerable population, and because of this, pediatric nurses' experiences may differ from those who care for adults. However, there is a noticeable gap in the existing literature that specifically describes the unique challenges and benefits of this nursing specialty. The purpose of this study was to explore the experiences of pediatric nurses and to identify the strategies they use to navigate challenging situations in practice.

Method: This qualitative study used a focus group method which was guided by semi-structured interviews to ensure core topics were covered and to facilitate in-depth discussion, while allowing participants to expand on their experiences. Discussion topics included the unique aspects of the pediatric nursing specialty, perceived challenges and benefits of working in pediatric settings, and coping strategies used by nurses in their professional roles. Participants were recruited using a snowball sampling strategy. Seven registered nurses (N = 7) took part in the study. The sample included nurses representing multiple pediatric specialties, including the pediatric emergency department, neonatal intensive care unit (NICU), and bone marrow transplant/oncology units. The 90-minute focus group session was audio and video recorded. Data were transcribed verbatim and de-identified. Line by line analysis was used to label words or phrases representing key ideas or sentiments. This thematic analysis approach was used to identify recurring patterns and themes across participants' responses. Institutional Review Board approval was obtained prior to data collection.

Findings: Thematic analysis revealed three primary themes: (1) emotional and physical demands, including high patient acuity and the intensity of caring for sick children; (2) professional rewards, characterized by a deep sense of fulfillment and work engagement; and (3) the development of resilience, where nurses utilized peer support, humor and reflective practices to navigate high-stress environments. Notable subthemes emerged from the data which informed and strengthened the primary themes.

Conclusion: This qualitative study revealed many unique aspects of pediatric nursing and how it may differ from adult nursing. The findings deepened understanding of pediatric nurses' experiences, particularly the emotional and professional demands associated with caring for children and their families. The study also identified coping strategies pediatric nurses used to manage these demands and explored nurses' perceptions of the effectiveness of these approaches. Collectively, the findings provide

a clearer picture of the realities pediatric nurses face in their daily practice. Future research should further examine specific occupational stressors such as pediatric patient death and exposure to child maltreatment and their effects on pediatric nurses' well being and professional sustainability.

Physics

Testing A New Amplifier for Affordable Radio Astronomy
Liyu Liu
Faculty Mentor: Adam Beardsley

We started this project for building affordable radio astronomy equipment for people to experiment in a professional way. The same equipment and techniques are used in real-world systems, including wireless communication, radar, and satellite technology. We built a system, which was simple and efficient, but the amplifier we selected was no longer produced. Now we are testing out a new amplifier to compare the performance to the old. The gain of the amplifier and bandpass of the filter was comparable to the original device. Next, we are testing for external interference with a handheld RF signal generator. This experiment is important because it provided evidence on how new amplifiers work compared to the old ones.

Political Science

Analyzing the Union Decline in the U.S.
Jack Larsen
Faculty Mentor: Elissa Alzate

There are three popular explanations for the steady decline in union representation in the U.S. The first is explained by a dedicated effort from employers dissuading their employees from organizing or structurally making it harder for them to. A second explanation to this is that legislation has played a role in the downturn. Finally, some scholars explain it as a slippery slope, where less density leads to less awareness and support. This study analyzes the decline in union density in the United States and variables that have shaped union organizing ability. The study also looks at correlations between factors that may have contributed to the difficulty to organize. The hypothesis I included also provided that a majority of union qualifying workers would prefer to be represented, so the union density decline would have to be based on external factors. The analysis is tested with data relating to union membership trends.

Asymmetrical Nuclear Deterrence
Alan Clouse
Faculty Mentor: Elissa Alzate

This article reviews the state of nuclear deterrence between two different types of cold conflict. The first being the United States and the USSR/Russia, then also India-Pakistan. This will explore how the two different types of conflict result in different types of deterrence theory developed due to the nature of their relations.

Fact or Fiction? The Relationship Between Fake News Recognition and Political Polarization

Kate Diedrich
Faculty Mentor: Elissa Alzate

This study examines the relationship between media consumption, the ability to identify fake news, and levels of polarization. Data will be collected through a survey measuring demographic characteristics, primary sources of political news, and participants' ability to distinguish between real and fake news. The study seeks to analyze how media exposure and misinformation may influence political polarization. Intervening variables such as age, level of education, and use of a convenience sample will be considered in interpreting the results. All data collected for this study is anonymous.

Impact of Race on Trust in Government

Nevaeh Johnson
Faculty Mentor: Elissa Alzate

Past research consistently finds racial differences in federal political trust. Studies using data from the ANES, NAES, GSS and SCCBS surveys show that Black Americans often report lower levels of trust in federal government than White Americans. However, these effects are often reduced when controlling for factors such as partisanship, socioeconomic status, age, religion, and even experiences with discrimination. While past literature highlights the importance of race, the use of control variables makes it harder to isolate races direct impact on trust in federal government. Guided by a deductive theory, this study examines the direct, observational relationship and trust in the federal government without control variables. Using data from the 2020 American National Election Studies Survey, and using cross-tabulation and a chi-square analysis, I test the hypothesis that individuals who identify as Black will report lower levels of trust in the federal government than those who identify as White. I hope to find that even without controls, Black respondents have slightly lower levels of trust compared to White respondents in the federal government. This would support the argument that race alone is a meaningful association to political trust.

The Impact of Social Media on Voter Turnout

Madeline Hutchison
Faculty Mentor: Elissa Alzate

I will be observing how the use of social media affects voter turnout in the presidential election. Using data collected by the American National Election studies I compare data on how often respondents are on social media, and if they voted in the most recent election. I hope to find that an increased use of social media leads to citizens being more likely to vote in the presidential election, especially if they get political information from these social media sites. My main hypothesis is that more access to social media leads to a higher voter turnout in American presidential elections, and I will use this Social Media survey data to prove or disprove my hypothesis.

The Role of Partisan Indifference and Contradictory Ideas in Split-Ticket Voting Across Offices

Venushi Haththalla
Faculty Mentor: Elissa Alzate

Split-ticket voting has traditionally been examined through the lenses of institutional incentives, strategic preferences for divided government, and candidate-centered evaluations. This study investigates the role of partisan indifference and contradictory political ideas in shaping split-ticket

voting across offices in contemporary U.S. elections. Building on scholarship that distinguishes strong partisan attachment from weak, ambivalent, or indifferent orientations, the analysis argues that voters who lack meaningful affective ties to either major party are less constrained by partisan loyalty and therefore more likely to divide their electoral support between Democratic and Republican candidates.

Using individual-level survey data from the American National Election Studies (ANES), the study tests whether partisan-indifferent voters exhibit a higher propensity to cast split tickets compared to strong partisans. In addition, it examines whether a specific age group and holding contradictory or cross-pressured policy attitudes further increases the likelihood of cross-party voting. The findings demonstrate that partisan indifference significantly predicts split-ticket behavior, even in an era of heightened polarization, and that attitudinal inconsistency amplifies this effect. By centering partisan indifference as a psychological mechanism, this research contributes to a more nuanced understanding of electoral behavior and clarifies how weak partisan attachments and contradictory political beliefs interact to produce split-ticket voting across offices.

Psychology

Advocating for Adolescents: Family and Children's Center Psychology Internship

Carlene Boeke
Faculty Mentor: Robert Casselman

Student will present on her field observations and hands-on work done at her internship site, the family and children's center of Winona. Presentation will show the knowledge gained from engaging in the centers adolescent day treatment program. The clients participate in 3 hour sessions, 5 day's a week: an hour of group skills, followed by group therapy, and ending with supporting client's wants/needs. I will explain what the hands-on learning has taught me that wasn't able to be learned in the classroom. The presentation will include challenges faced and how I overcame them. I will offer a truthful reflection of my time spent with this program, and how it has altered my plans going forward. I will share the lesson I made and presented, and how receptive the clients were and what I would keep / change for next time.

Effects of Parental Communication on Alcohol Use and Self-Esteem as a Mediating Variable

Alanna Hartman
Faculty Mentor: Robert Casselman

Alcohol abuse has become a problematic phenomenon among young adults. Previous studies have found that parental communication with low warmth leads to greater risk for alcohol abuse later in life. We predict there is going to be a positive correlation between negative parental communication and alcohol abuse. Self-esteem has also been shown to have a relationship with alcohol abuse in previous research. We hypothesize that self-esteem would negatively correlate with alcohol abuse in the current study. Additionally, the literature suggests a relationship between self-esteem and parental communication. Given the relationships among these variables, we predict that self-esteem would partially or fully mediate the parental communication and alcohol abuse relationship.

Methods: Participants (N=179) completed a survey with questions regarding parental communication (father and mother), self-esteem, and alcohol abuse.

Results: There were strong correlations between father communication and alcohol abuse, $r = -.212$, $p < .001$ and mother communication and alcohol abuse, $r = -.227$, $p < .001$. There were also strong correlations between self-esteem and father communication, $r = .415$, $p < .001$ and self-esteem and mother communication, $r = .318$, $p < .001$. There was not a correlation between self- esteem and alcohol abuse. Since there was no relationship between self-esteem and alcohol abuse, we did not run a mediation analysis.

Discussion: Our result confirms that there is a relationship between self-esteem and parental communication. However, our hypotheses regarding parental communication and alcohol abuse as well as self-esteem and alcohol abuse were not supported. We predicted that negative parental communication would be positively correlated to alcohol abuse and our result showed high negative correlations between these variables. Therefore, there might some other problems that are leading to alcohol abuse, or some other factor entirely. Meaning that negative communication could be leading to depression or anxiety, which puts the individual at greater risk for alcohol abuse or potentially a lack of communication altogether is leading to alcohol abuse. Future research could look deeper into this relationship to determine what is causing the negative correlation between parental communication and alcohol abuse. There was no relationship found between self-esteem and alcohol abuse in the current study. There is a lot of debate on whether low or high self-esteem was a bigger predictor of alcohol abuse. One study found that high self-esteem was a greater predictor suggesting that high self-esteem needs to be look at as a predictor for alcohol abuse. This could be the reason why we found no relationship between self-esteem and alcohol abuse. Future research could take a closer look at alcohol abuse and self-esteem and determine if there is a relationship between these variables and if high or low self-esteem is a greater predictor for alcohol abuse.

Evaluating the Accuracy of CJS Knowledge in Justice-Involved Populations

Lillian Stahl
Faculty Mentor: Trisha Karr

Public understanding of the criminal justice system (CJS) is often shaped more by media exposure and social influences than by direct knowledge of legal procedures. Drawing on Albert Bandura's Social Learning Theory, the present study examines how individuals develop knowledge about the CJS through both direct and indirect experiences. While previous research has explored how involvement with the CJS influences attitudes and trust, less is known about whether such exposure relates to the accuracy of factual knowledge about the system. The current study investigates the relationship between personal and familial involvement in the CJS and individuals' objective understanding of its functions. Using an online survey, participants will be assessed on their level of direct, relational, and academic exposure to the CJS, as well as their accuracy on a measure of criminal justice knowledge. It is hypothesized that individuals with higher levels of personal or familial involvement, as well as those with academic exposure, will demonstrate greater factual accuracy compared to those without such experiences. Findings from this study may contribute to a better understanding of how knowledge of the justice system is formed and highlight potential gaps between perception and reality, with implications for public education and policy.

Gender of Perpetrator and Political Affiliation in Relation to Violence Myth Acceptance

Kylie Buck, Paige Christianson, Kaidin Barnes, and Kyra Nelson
Faculty Mentor: Trisha Karr

Increasing political polarization has left political parties at an impasse regarding having bipartisan conversation about pressing social issues including rape and domestic violence. The present study examined how different demographic factors influence perceptions of interpersonal violence. It was hypothesized that identification by political status, abuse type, and perpetrator would yield different results. Using an online survey, participants (N = 223, 81% female, 88% white, 48% republican, 35.4% freshman) were randomly assigned to 1 of 8 scenarios describing differing instances of interpersonal violence. Results from a three way between groups ANOVA indicated that republicans view domestic violence and rape as a myth more than democrats. Additionally, domestic violence is more often viewed as a myth when women are the perpetrator. Perceptions of interpersonal violence were not impacted by relationship type. These findings suggest that political identity powerfully influences perception of interpersonal violence and highlights the importance of acknowledging ideological differences in violence prevention education and policy.

Hiawatha Hall Internship Presentation

Preston Brand
Faculty Mentor: Robert Casselman

This is a poster board presentation discussing my time interning at Hiawatha Hall. It will include pictures of the site, as well as potentially co-workers and showcase what I have accomplished over my time working at the site. It will also include one integrative point, which would be something I learned from my classes that ties in with my internship experience.

Hiawatha Valley Mental Health Center Internship

Delaney Weber
Faculty Mentor: Robert Casselman

This is a poster presentation on my internship experience at Hiawatha Valley Mental Health Center. It provides an overview of services in which I gained experience, including Adult Rehabilitative Mental Health Services, Mobile Crisis Services, and Peer Support Network Services. The poster will also highlight the connections between practical experiences and psychological theories and principles.

Internship at Hiawatha Hall

Mekedelawet Mersha
Faculty Mentor: Robert Casselman

I interned at Hiawatha Hall from September to December 2025. Hiawatha Hall is a residential facility operating under the organization called the Family and Children Center (FCC). It is dedicated to fostering a healthy society by supporting individuals and families to achieve well-being. During my internship, I attended and led group sessions, co-facilitated skills groups, helped prepare materials for group activities, and took notes on group participation for groups I led. I also conducted hourly checks and engaged with residents in evening social and recreational support. I would like to share my experience at Hiawatha Hall during Research and Creative Day, as I believe it will provide valuable insights for any student seeking an internship at this residential hall.

Internship Experience at the Family and Children's Center of Winona Spring 2026

Kendra Olson
Faculty Mentor: Robert Casselman

This poster summarizes my internship experience at the Family and Children's Center of Winona. Being involved in their day treatment programs, Bridges and Adolescents, I had many opportunities to apply psychological theories and principles across different age groups and to deepen my understanding through real-life experience.

Internship with Day Treatment at the Family and Children's Center (FCC): Adolescence and Bridges Program

Kennedy Wehler
Faculty Mentor: Robert Casselman

The Family and Children's Center in Winona, MN, focuses on supporting the well-being of children and their families. They provide numerous services including therapy, day treatment, assessment, foster care, home visits, and family counseling. During my the Spring semester of 2026, I've had the pleasure of working with their day treatment programs. Day treatment at FCC includes their adolescence program, working with teenagers, and their Bridges program, working with children in elementary school. Children referred to day treatment at FCC are dealing with severe emotional and behavioral difficulties. Through day treatment, children are provided individual support, community support/management, crisis planning, psychotherapy, and skills training. Days are broken up into three hours. First hour is a lesson teaching clients about different life skills, second hour is group therapy lead by a therapist, and third hour which is time to hang out and play games.

Living in Anticipation of Violence: Behavioral Modifications in Response to Gendered Fear

Kylie Buck
Faculty Mentor: Trisha Karr

Fear of victimization remains a pressing concern of women throughout the US. The present study examined protective behaviors due to gendered fear. It was hypothesized that more gender differentiated fear would correlate with more frequent protective behaviors. It was also hypothesized that women with prior experiences with violence, threats of violence, or education in criminal justice would report higher rates of protective behaviors. Participants completed a survey assessing overall fear and behavior modification. Six subscale areas including avoidance, travel strategy, communication, safety tool prevalence, situational awareness, and digital safety were used to measure behavior modification. Following data collection, it is expected that analyses will show an association between greater fear and more prevalent behavior modifications. These findings may suggest that fear of crime is a behavioral driver and highlight the importance of acknowledging the real, tangible social consequences that affect women's daily lives.

My Internship at Family & Children’s Center in Winona, Minnesota

Mackenzie Casper
Faculty Mentor: Robert Casselman

This is a reflective project demonstrating my experiences that I gained from my internship at the Family & Children’s Center in Winona, MN. The poster includes important learning opportunities, the activities and responsibilities at the internship site, the personal philosophy of the internship site, and how the internship experiences can be applied to the Thomas-Kilmann conflict mode model.

My Internship at the DAC

Ava Vortherms

Faculty Mentor: Robert Casselman

This poster presentation will be about the experiences that I had while working at my internship at the DAC in Winona. This internship included working with individuals with physical and mental disabilities. This internship was part of the psychology internship class.

My Internship Experience at Caledonia Middle/High School

Kyra Nelson
Faculty Mentor: Robert Casselman

This is a poster display presentation on my internship experience at Caledonia Middle/High School. This is a psychology internship working under the school counselor. The poster will describe what my days at my internship usually look like and the different things I am involved in, like character development lessons, tutoring, scholarships, and PSEO/college meetings. The poster will also describe some of what I have learned about the profession and myself, like how much I love career counseling. It will also describe challenges I have faced along the way, like finding ways to connect with the students. Finally, it will describe how I have applied different psychological theories to my internship, such as Erikson's psychosocial stages.

Project Compass Internship

Mari Mohling and Autumn Randall
Faculty Mentor: Robert Casselman

This project is about two interns who worked with Project Compass Spring 26' semester. Both interns will share information about Project Compass, events this organization hosts, target audience, and unique experiences the interns went through. Interns will also share what they took away from the internship and what could be done differently at Project Compass.

Psychology Internship 2026; RISE family and Children's Center

Star Brown
Faculty Mentor: Robert Casselman

This will be a posterboard presentation on a completed internship though Winona State University. The internship was with the RISE program at The Family and Children's Center in Winona. The posterboard will cover curriculum made and lessons taught. The lessons will be there for guests to view and ask questions about. The posterboard will also cover changes brought to the program and the impact those changes had.

Self-Esteem, Self-Control, and Self-Acceptance as Predictors of Grit and Resilience

Ava Krolnik
Faculty Mentor: Robert Casselman

Introduction: The debate between whether grit and resilience are the same thing or different concepts has long been discussed. While they may have different definitions, many claim that they measure the same thing while others claim that they are indeed separate ideas. During this debate, many studies have found that self-control, self-esteem, and self-acceptance are all positively correlated with both grit and resilience. Despite these positive correlations, it is unclear which of these self-factors is the

strongest predictor of grit and resilience and if they are the same for both. The current study aims to delve deeper into these connections to determine whether self-control, self-esteem, and self-acceptance are predictors of both grit and resilience and which is the strongest, while determining whether grit and resilience seem to be distinct concepts.

Methods: Participants (N=224) completed a survey with questions about grit, resilience, self-control, self-esteem, and self-acceptance.

Results: There were strong correlations between grit and resilience, $r = 0.467$, $p < 0.001$, grit and self-control, $r = 0.719$, $p < 0.001$, grit and self-esteem, $r = 0.476$, $p < 0.001$, and grit and self-acceptance, $r = 0.537$, $p < 0.001$. There were also strong correlations between resilience and self-control, $r = 0.448$, $p < 0.001$, resilience and self-esteem, $r = 0.541$, $p < 0.001$, and resilience and self-acceptance, $r = 0.676$, $p < 0.001$. We conducted two hierarchical regression analyses to explore whether self-control, self-esteem, and self-acceptance were significant predictors of grit and resilience. Self-control and self-esteem were the only significant predictors of grit. The regression coefficient indicates that for every increase in self-esteem, grit increases by 0.273, $b = 0.273$, $t(220) = 2.196$, $p = 0.029$. For every increase in self-control, grit increases by 0.451, $b = 0.451$, $t(220) = 10.992$, $p < 0.001$. Self-acceptance and self-esteem were the only significant predictors of resilience. The regression coefficient indicates that for every increase in self-esteem, resilience increases by 0.203, $b = 0.203$, $t(220) = 2.175$, $p = 0.031$. For every increase in self-acceptance, resilience increases by 0.382, $b = 0.382$, $t(220) = 7.350$, $p < 0.001$.

Discussion: Our results confirm that grit and resilience are significantly correlated. However, they do appear to be distinct concepts which support previous research and suggest that there is some level of difference between them. Self-control, self-esteem, and self-acceptance were all positively correlated with grit and resilience supporting the findings of previous studies. While self-esteem was a significant predictor for both grit and resilience, self-control was only a significant predictor for grit, and the self-acceptance was only a significant predictor of resilience. These results may be due to the difference in what these concepts measure by their definitions. Practitioners should focus on helping clients improve their self-control when wanting to improve their clients' grit, and self-acceptance when wanting to improve their client's resilience. Future research should delve deeper into the relationships between self-control and grit, and self-acceptance and resilience to further explore why these predictive relationships emerged.

Social Dominance in CD1 Female Mice

Hannah Casselman, Eli Illescas-Huerta, and Nancy Padilla-Coreano
Faculty Mentor: Richard Deyo

Social rank and dominance have a profound impact on the survival of many animals. Social dominance fosters social stability and modulates neuroactivity, immune response, and endocrine function. Understanding and measuring social rank in laboratory mice is crucial when assessing social behavior. Previous research has focused primary on dominance in male mice based on measurements of aggressive and competitive behaviors. However, it remains unclear how social dominance is exhibited in female mice and which behavioral assays are most effective for measuring their rank. Males tend to be aggressive and territorial, whereas females engage in less aggressive and visibly competitive behaviors. Given the importance of social dominance hierarchies and the gap regarding female dominance, this study seeks to assess the efficacy of different social dominance behavioral assays in female mice. Assays commonly used in males were utilized to assess CD1 female mice and their behavior was compared to CD1 males. The assays used were urine marking, observation of agonistic behaviors, tube test, and a

food competition test. Findings show that social rank in females was unstable during both the observation of agonistic behaviors and the urine marking test in comparison with males, while the tube test showed unstable social rank in both males and females. However, during the food competition, female winners exhibited significantly shorter latency time than losers during competition but not during training, indicating that the more dominant mouse was more competitive. Similar findings were observed in males. These results reveal that behavioral assays used in males are difficult to replicate in females, highlighting clear sex differences between CD1 males and females. While the food competition test was an effective way to measure social dominance in CD1 female mice, it is necessary to continue evaluating dominance and rank in female mice to foster a greater understanding of female social behavior.

Student Perceptions of Academic Anxiety, Social Media Use, and Academic Performance

Veronica Hemming
Faculty Mentor: Trisha Karr

Academic performance can be determined by many factors, including mental health status and the rapid increase of social media use in college students. The current study aims to evaluate the relationship between academic anxiety, social media use, and academic performance through the perceptions of students at a Midwestern university. Participants were surveyed on their typical levels of anxiety based on three academic categories: tests, public speaking presentations, and written assignments.

Additionally, social media use was reported based on questions identifying use as either beneficial or problematic. Lastly, performance was measured by asking students to report their grade point averages and typical grades on each of the three types of assignments. Data collection and analysis for this study is currently in progress. It is hypothesized that greater combined levels of social media use and academic anxiety would predict the lowest performance. Additionally, the best performance would relate to when anxiety is moderate and social media use is low. Finally, it is predicted that anxiety by assignment type will relate to grade by assignment type. Findings will be beneficial in providing insight on how specific types of academic anxiety relate to performance, as well as how both beneficial and problematic social media use influence academics.

The Experience of Sexism on Career Aspirations in College Women

Gabby Becker, Sayeeda Khan, Emerson Omangi, Caroline Petty, and Maria Tanner
Faculty Mentor: Elizabeth Russell

Benevolent and hostile sexism are considerably prevalent in American culture. Benevolent sexism includes valuing traditional gender roles and attitudes, whereas hostile sexism includes punishing women who step outside of traditional gender roles. People may perceive benevolent sexism as less harmful than hostile sexism, but both can have effects on women's wellbeing. Previous research emphasizes the effects of women's own attitudes as opposed to their experiences with others. This study aims to explore the effects that experiencing sexism has on career aspirations in college women. 308 college women completed self-report questionnaires regarding their career aspirations, experience with benevolent sexism, and experience with hostile sexism. We performed separate regression analyses for five different dependent variables. They were: Overall career aspirations, achievement aspirations, leadership aspirations, education aspirations, and family career orientation. Predictor variables included three types of experiences with benevolent sexism and experiences of hostile sexism. These experiences were significantly predictive of career achievement, educational aspiration, and

family career orientation. These results suggest that these types of sexism reinforce certain career paths for women.

The Relationship Between Emotional Dysregulation, Self-Esteem, and Body Dissatisfaction

Daisy Trader
Faculty Mentor: Robert Casselman

The research literature suggests that body dissatisfaction may have a relationship with eating disorders (Costantini et al., 2026). Thus, an examination of factors related to body dissatisfaction (BD) could be a helpful avenue for better understanding eating disorders. Research suggests that low self-esteem (SE) and emotional dysregulation (ED) may be relevant factors in this relationship (Brytek-Matera et al., 2021). The current study aimed to examine these relationships to better understand disordered eating in adults.

Research suggests that low self-esteem is correlated with body dissatisfaction (Abdoli et al., 2025). For example, Stapleton et al. (2017) found that self-esteem significantly predicted body dissatisfaction in a sample of 222 adult women. Similarly, Cruz-Saez et al. (2018) found a significant negative correlation between SE and BD. Additionally, emotional dysregulation appears to be related to body dissatisfaction. For example, Zainab et al. (2023) found that negative affect, a construct related to emotional dysregulation, was related to body dissatisfaction; while Momeñe et al. (2023) found that BD was significantly correlated to five subscales of an emotional dysregulation measure. In sum, there is evidence that SE and ED may be salient factors in the phenomenon of body dissatisfaction in females. Given the connections between these variables, we also examined emotional dysregulation as a mediating variable in the relationship between SE and BD. Cruz-Sáez et al., (2018) found that negative affect partially mediated the SE-BD relationship. Thus, we predicted that emotional dysregulation would partially mediate this relationship in the current study.

Based on past research, we hypothesized the following: H1) self-esteem would be negatively correlated with body dissatisfaction; H2) emotional dysregulation would be positively correlated with body dissatisfaction; and H3) emotional dysregulation would partially mediate the self-esteem-body dissatisfaction relationship

The Relationship Between Parental Factors and Self-Esteem

Ryan Sleypen
Faculty Mentor: Robert Casselman

We analyzed past data collected, and were looking at what parental factors most predict and influence self-esteem in young adults. We ran a linear multiple regression and a bivariate correlation on six variables. The variables are father rejection, father parental-child-communication (P.C.C.), father parental conflicts, mother rejection, mother P.C.C, and mother parental conflicts. For the bivariate correlation we found a significant positive correlation for both father P.C.C and mother P.C.C on young adults' self-esteem. We also found a significant negative correlation with Father rejection, father parental conflict, and mother parental conflict on self-esteem development. However, when we ran a linear multiple regression analysis, we found that only Father and mother P.C.C. was a significant predictor in self-esteem development. Our findings show that although most of our variables either correlate positively or negatively with self-esteem, only father and mother P.C.C was a significant predictor in self-esteem development. Our findings show that although most of our variables either

correlate positively or negatively with self-esteem, only father and mother parent-child-communication during adolescents significantly predicted self-esteem in young adults.

Understanding Factors Associated with Mental Health Among Collegiate Athletes

Kaidin Barnes, Kylie Buck, Paige Christianson, and Kyra Nelson
Faculty Mentor: Trisha Karr

Understanding factors associated with mental health among collegiate athletes may help inform targeted support and reduce barriers to care. This study examined relationships among athletic identity, perceived stigma, psychological distress, and sport participation in college students. Participants (N = 312) reported varsity or club sport involvement, with 28.2% identifying as varsity or club athletes. Variables measured included athletic identity, perceived stigma, and symptoms of anxiety, depression, and stress. A subset of participants also reported injury history. Data were analyzed using correlations and independent samples t-tests. Athletic identity was moderately and positively associated with stigma, indicating that students who identified more strongly as athletes reported greater perceived stigma. Anxiety, depression, and stress were strongly interrelated, suggesting that psychological distress tended to co-occur. Sport participants reported slightly lower anxiety than non-participants, though differences in depression and stress were minimal. Varsity athletes reported significantly stronger athletic identity than club athletes, but groups did not differ meaningfully in stigma or mental health. Overall, findings suggest that identity-related factors may play a larger role in students' psychological experiences than sport participation alone, highlighting the importance of addressing stigma and athletic identity in campus mental health efforts.

What do Healthy Eaters Do?: A Qualitative Analysis of Self-as-Doer Healthy Eater Identities

Ava Krolnik, Megan Ekern, Isabelle Okeson, Esther Gauerke, Georgia Jeddeloh, Riley Buck and Madeline Bersch
Faculty Mentor: Amanda Brouwer

Healthy eating is critical for promoting longevity, lowering risk of chronic illnesses like heart disease and maintaining a healthy weight. However, only 1 in 10 Americans are meeting dietary guidelines and 60% have one or more diet-related chronic diseases. Research on psychosocial factors like the Theory of Planned Behavior and identity may help promote the engagement of healthy eating behaviors. Longitudinal research suggests that factors such as attitudes, subjective norms, perceived behavioral control and intentions predict long-term eating behaviors and lifestyle changes when intentions are internalized and believed. Research also demonstrates that constructs such as the self-as-doer identity predict healthy eating behaviors. The self-as-doer identity is a construct which aims to describe one in terms of the action of doing a behavior (i.e. gym-goer, fruit-eater). Knowing that doer identities predict a stronger relationship with doing certain habits means that we can create interventions based on identity to promote healthy behaviors. However, less is known about how individuals define a healthy eater. That is, what does a healthy eater look like and in turn, do? Better understandings of how individuals conceptualize healthy eaters may help promote more healthy eating behaviors. Therefore, we qualitatively explored how individuals perceive and describe healthy eaters.

Participants (N=383), both online and in-person, were asked to imagine what a healthy eater looks like and responded in an open-ended question. Consensual qualitative research methodology was used to analyze themes.

Three themes describing common behaviors of healthy eaters emerged. Healthy eaters eat specific foods or follow certain diets (e.g., vegan, vegetarian). Specific foods mentioned were fruits, vegetables and whole grains. Healthy eaters also prepare food in a specific way (e.g., eating fresh vs. processed foods) and eat foods with specific nutritional values. In addition to eating healthy foods, healthy eaters also engage in regulating their eating behaviors by being "watchful" or "cautious" of what they eat. More specifically, healthy eaters also restrict or avoid certain foods or dietary behaviors (e.g., limit salt or sugar) and certain foods are withheld or avoided altogether.

Findings demonstrate that individuals conceptualize healthy eaters eating specific healthy and avoiding specific unhealthy foods. Notably, avoidance or limitation of unhealthy foods and is highly reflective of cultural influences (e.g., fresh vs. processed foods, diet types, etc.). Results also demonstrate a strong presence of what to eat rather than "how" to eat, which enables us to create goals that can build doer identities and to sustain healthy eating. Limitations include a correlational design, limited sample pool, and western culture ideals; themes may not be generalizable to all. Future researchers could examine whether healthy eater identities lead to healthy eating behaviors using experimental designs such as food diaries and real-time food consumption data collection. Researchers could also measure how people are being healthy eaters not just what makes them a healthy eater.

What is the Impact of Stress? A Comparison Study of College Athletes & Non-Athletes

Paige Christianson, Kaidin Barnes, Kylie Buck, and Kyra Nelson
Faculty Mentor: Trisha Karr

The aim of this study was to explore differences in stress mindset, perceived stress, and extreme life stressors among athlete and non-athlete college students. The sample included participants recruited from a Midwestern university (N = 312), in which 28.2% identified as an athlete in either a NCAA Division II team and/or a sports club. Participants completed an online anonymous Qualtrics survey answering questions measuring their stress mindset, perceived stress, and current most extreme life stressor. Comparisons between the two groups, stress mindset scores and perceived stress scores were evaluated through independent samples t-tests, while differences in most extreme life stressor was compared through a Chi-square analysis. Findings showed no significant difference between groups for stress mindset score, indicating that both athletes and non-athletes view stress as debilitating. Results for perceived stress also showed no significant difference between groups, suggesting similar experiences of stress. Lastly, findings for the most extreme stressor showed a significant difference between the groups. Overall, findings suggest that both athletes and non-athletes experience similar mindsets and the experience of stress, while their most extreme stressor varied.

Winona Friendship Center Psychology Internship

Olivia Christofferson
Faculty Mentor: Robert Casselman

Over the course of this Spring semester, I've spent ten hours a week at my internship site at the Winona Friendship Center. My main responsibility there has been to create, promote, and run a mental health related program for the older adult members of the Friendship Center. The program I created was a reminiscing and memoir writing program. I lead a group of 4 – 12 members a week through the writing process to write and share their memoir and helped them process in a group setting the emotions and memories that came up during the process. My other responsibilities at the Friendship Center include hour long one on one appointments, planning and organizing the Volunteer Recognition Banquet for the

2025 volunteers, attending other Friendship Center programs to grow my relationship with members, and working on other assigned projects and presentations for the Friendship Center. My internship experience has helped me gain confidence in my abilities, apply my classroom lecture knowledge to the real world, and has made the gap between undergrad and the workplace feel less monumental.

Recreation, Tourism, & Therapeutic Recreation

Exploring How Virtual Reality Affects The Client-Recreational Therapist Relationship

Sophia Young, ellie barker, Natalia Miller, and Lindsay Bergan
Faculty Mentors: Damien Cavanaugh, Hyunseo (Violet) Yoon, Begum Aybar-Damali

Virtual Reality (VR) is an electronic recreation of reality, depicting environments, and enabling clients to interact with instantaneous simulations that provide an immersive experience (Guttentag, 2010; McGovern, 1994). Adopting VR as an intervention could be a breakthrough innovation to overcome obstacles while connecting with clients. Current research on VR used in Recreational Therapy (RT) holds inconsistencies in its findings, specifically across various populations and VR tools. The purpose of this study was to gain insights from professionals about the therapeutic relationship between clients and therapists when using VR as an intervention. This study examined how the relationship between the therapist and client is impacted by using VR in programming, using two research questions:

1. How has the use of VR in RT affected the relationship between the client and recreational therapist?

2. What factors contribute to VR strengthening or weakening the therapeutic relationship in TR practice?

This study used secondary data from a cross-sectional survey. Participants, Certified Therapeutic Recreation Specialists (CTRSs), were originally recruited through an e-Blast distributed by the National Council for Therapeutic Recreation Certification (NCTRC). After Institutional Review Board approval and approval from NCTRC, the Qualtrics survey was distributed via an email link in June 2025. Data collection ended on August 6, 2025. To be eligible for the survey, participants must have been currently or previously employed in RT, 18 years of age or older.

After data cleaning, 277 valid responses were kept out of the 375 total responses. The majority of respondents worked in therapeutic recreation (93%), had a mean age of 44 years, were female (85%), and had been CTRSs for an average of 16 years. Most respondents had not used VR for clients (73%), however 56% of respondents had considered using it.

VR demonstrates considerable potential as an innovative modality for enhancing mental, emotional, and physical wellbeing within recreation therapy. Data from practitioners suggests improvements in therapeutic rapport, trust, and communication, alongside beneficial impacts on client mood, engagement, and physical activity. However, widespread adoption is constrained by barriers including cost, limited expertise, and adverse effects like nausea, anxiety, and dizziness. Addressing these implementation challenges through targeted strategies could enhance accessibility and clinical utility.

Resident Perceptions of Local Festivals in Winona, Minnesota

Madelynn Punzal and Jullie Thakur

Faculty Mentor: Phileshia Dombroski

This study examines residents' social representations of local festivals in Winona, Minnesota, and factors that shape pathways to engagement with these events. Local festivals play an important role in community life, yet residents do not all view them in the same way. Focusing on five annual local festivals, the study considers how individuals perceive and evaluate these events in terms of familiarity, accessibility, and sense of fit.

An online survey has been developed to assess residents' perceptions and selected factors associated with those views, including personal experience, media exposure, and social networks. The study also considers how broader life circumstances may influence how individuals relate to local leisure opportunities. This work aims to inform more inclusive and engaging festival experiences.
Data collection will occur in spring and summer 2026, with results expected to provide insight into how residents relate to local festivals.

Faculty Presentations

America's Cutting Edge and Winona State University's Composites Technology Bootcamp: The Development and Execution of a New Way to Grow the Composites Workforce

Eric Kerr-Anderson, Composite Materials Engineering
Student Co-Authors: Noah Misukanis, Luke Poglayen, and Dominic Perez

Winona State University has partnered with the Institute for Advanced Composite Materials Innovation to offer Composite Bootcamps in the summer free of charge to anyone 17 and older. There are many stages in setting up programming that pull in aspects of concept, budgeting, paperwork, and campus discussions. As the pilot site for this ambitious nation-wide programming, the brainstorming and production was entirely developed by WSU staff and students. The curriculum and car was designed in a way to allow for alternate sites to recreate with multiple types of processing equipment.

Leveraging Brightspace/D2L to Track AACN Essential Competency Achievement in Undergraduate Nursing Education

Elizabeth Green-Kronebusch, DNP, RN, PHN, EMT & Halle Haedtke, DNP, RN

Background: The Commission on Collegiate Nursing Education (CCNE), the Department of Undergraduate Nursing's accrediting body, expects all accredited programs to ensure students are practice ready through the achievement of the competencies outlined in the American Association of Colleges of Nursing (AACN) 2021 Essentials. The AACN (2021) Essentials include 10 domains, 45 competencies, and over 200 entry-level sub competencies that guide competency-based nursing education. Programs must demonstrate systematic tracking of student achievement in all 45 competencies to ensure graduate readiness and meet accreditation expectations.
Objective/Aim: The purpose of this project was to identify and use an accessible and low-cost platform for tracking student achievement of competence within each course and across the undergraduate nursing program.

Methods: Brightspace/D2L's Learning Outcomes tool was designed to assist with assessment for course learning outcomes (Wang, 2025). For accreditation purposes, we have utilized this tool to map each

AACN competency to course assignments and clinical evaluations. Each course has an assessment method in D2L to align with the mapped AACN competencies. A faculty member grades students' submission and/or observable behavior and determines a competency level. Competency levels include not met, in progress, meets or exceeds. The Mastery View function within the gradebook in D2L provides faculty the ability to track each student's progress on meeting the competencies associated with a given course. More specifically, faculty can identify unmet competencies requiring remediation or curricular reinforcement. This allows faculty to support students in achieving all required competencies within a course. Furthermore, the Nursing Administration can evaluate student achievement of competency across the Undergraduate Nursing Program. This feature provides key program-level data critical for accreditation reporting and program evaluation.

Results/Conclusion: Brightspace/D2L provides an effective, cost-neutral platform for tracking competency achievement at both the course and program levels. Since the learning management system was already in use, implementation of learning outcome tracking required minimal additional training for faculty. This approach supports transparent documentation of student progress, enhances the program's ability to demonstrate competency attainment, and provides program-level data for ongoing quality improvement to support student success.

From Clinician to Educator: Supporting Faculty Onboarding with NLN Competencies

Chrissy Feine, MSN, MBA, PHN, RN

Background: Nursing programs face persistent challenges in meeting the demand for qualified faculty, frequently recruiting experienced clinical nurses into academic roles. This transition requires a substantial shift from bedside care to responsibilities such as curriculum development, research, and student mentorship. Many novice nursing faculty members enter academia with a limited understanding of academic role expectations, which contributes to increased stress, role ambiguity, and job dissatisfaction. While structured orientation is standard practice for nurses entering new clinical environments, comparable onboarding processes for novice nursing faculty are often inconsistent or absent. The lack of formalized orientation and support systems may hinder professional development and faculty retention.

Methods: This quality improvement project implemented a structured onboarding program to enhance novice nursing faculty members' perceptions of support, preparedness, and confidence, guided by the National League for Nursing's (NLN) Novice Academic Nurse Educator Competencies. Onboarding content was derived from a focused literature review and mapped to selected NLN competency task statements aligned with the project scope. To promote early engagement and demonstrate organizational commitment, preboarding communication and resources were initiated in July and continued until the start date. The onboarding program integrated institutional orientation with nine structured onboarding sessions, each approximately 90 minutes in length, delivered over a 12-week fall semester. Program effectiveness was evaluated using pre- and post-session surveys that measured participants' perceived support, preparedness, and confidence during the onboarding experience.

Results/Conclusion: Participants were primarily early-career faculty or those new to the institution. Most had only university-level orientation; few had mentors or department-specific onboarding. Participation started strong but declined as semester demands increased. Pre- and post-session surveys showed improved preparedness, confidence, and perceived support. Final survey results indicated 100% agreement that participants felt supported, confident, and more knowledgeable. The outcomes of this project underscore the critical role of structured onboarding in facilitating the transition from expert

clinician to novice nurse educator. The project recommends aligning institutional onboarding practices with national standards to ensure faculty are adequately prepared.

The Sistine Gazebo Mural: Celebrating Winona State's 2035 Strategic Plan

Alessandra Sulpy, Art & Design

My ART 317 Contemporary Studio Practices was asked by President Kenneth Janz to complete a public mural celebrating Winona State's 10-year Strategic Plan. This mural will be installed this month in the interior roof of the Alumni Gazebo in the middle of campus and is comprised of 24 painted wooden panels. The top 8 panels depict the 5 Colleges within the University, and the bottom 16 panels showcase the Pillars and Initiatives of the 2035 Strategic Plan. The panels feature students, campus life, our many majors, the arts, sports, clubs and activities, the town and campus, technology, and future buildings. The 20 students in the class, under the direction of Professor Sulpy, designed and painted the panels. We started by brainstorming and diagramming, and interviewing the student body to get their thoughts on what they would like depicted. This helped us solidify our ideas and take the next step in designing the panels. Next steps were taking photographic references, creating mock-ups, and the class had help from Professor Danilo Bojic's ART 365 Campaign and Systems Design class with the typography and word placement. Finally, we created our final mock-ups, prepped the panels, and painted painted painted! We did this all in an incredibly short window of 6 weeks, and what wasn't finished in the Fall 2025 semester was completed by volunteer students and Associate Professor Sulpy in the Spring.

Faculty – Warrior AI Symposium

Helping Students Identify Hallucinations and Misinformation in Common Public Issues

Liberty Kohn, English

This presentation will demonstrate how I blend education on identifying misinformation, on writing coherence, and on detecting AI hallucinations into a single assignment. I'll explain how I build purposeful hallucinations into a report by using current cultural or political topics in which misinformation factors heavily.

I'll review a report in which I asked ChatGPT to write a CDC-style report on vaccine safety, then have ChatGPT write a similar report from the vantage point of Robert Kennedy, Jr. and the anti-vaxx movement. I then blended the reports together, planting small segments of anti-vaxx argument amongst the larger pro-vaccine report. Students were told the report was written by AI, and the students' task was to edit, expand, or verify the information.

I'll detail how students generally identified the hallucinations, but did so by identifying incoherent leaps in style or through examples that didn't match claims or main ideas. Students did not engage heavily or debunk health-content misinformation, such as the AI hallucination claiming that terrain theory, a debunked theory used by RFK-style anti-vaxxers, was an adequate replacement for germ theory. Thus, the talk will demonstrate how to create hallucinations that students must identify as part of their AI education, but I'll also demonstrate how students relied more on information cues than fact-checked content to identify hallucinations.

Teaching Artificial Intelligence from a Feminist Lens

Nina Medvedeva, Women's, Gender & Sexuality Studies

This paper is based on my research for the upcoming Fall 2026 course WGSS 150: Our Data, Ourselves - A.I., Algorithms, and Cyborgs. This paper presents a feminist sociotechnical approach to artificial intelligence (A.I), machine learning, and algorithms. A sociotechnical approach holds that humans and machines are entangled and inseparable. This approaches' practitioners believe that to fully understand technological systems requires us to study the complicated ways technical, social, and institutional constraints shape our worlds. I hold that we should use the tools of feminist political economy to analyze A.I. and its impacts. The field of political economy seeks to understand how systemic decisions about resource extraction and renumeration impact our daily economic practices at home, at the workplace, and in the public.

In lieu of conversations over A.I. as a classroom nuisance or as a research tool, I argue that we should approach A.I. as a rich social object that we can analyze as an industry, site of labor, policymaking, and political contestation. In doing so, we can begin to see A.I. and the broader technological sector as a site of struggle shaped by systems of racism, classism, resource extraction, sexism, and homophobia. This approach opens the space for students to understand A.I. as problem that we can intervene in rather than absorbing passively.

Desirable Difficulties: Configuring Large Language Models for Effective Tutoring

Garrett D. Greeley, Psychology

Large language models (LLMs) promise to boost productivity. But what about learning? Can learning be enhanced with these tools, or will that responsibility be offloaded? In this talk, I describe the importance of desirable difficulties and how critical "strategic friction" is throughout the learning process. In doing so, I outline key learning principles from a cognitive science perspective that can be applied as LLMs become integrated into educational contexts. To illustrate these points, I describe a recent (and still ongoing) independent learning project in which I have configured an LLM to act as a personal tutor that provides scaffolding, hints, and feedback without giving away the answer. While more formal research is needed, I will share my experience with this approach along with tips, tricks, and words of caution if you adopt a similar technique.

Introducing Students to AI Tools Used in Biochemistry

Emily Ruff, Chemistry

Artificial intelligence tools have revolutionized molecular biochemistry in recent years. In recognition of these advances, the 2024 Nobel Prize in Chemistry was awarded for developments relating to protein structure prediction and design. This talk will describe activities and projects I have used to introduce students to some of these tools. In one classroom activity, students designed a helical bundle protein sequence and used the tool AlphaFold3 to predict whether their sequence would fold as they expected. Students also assessed the model's confidence in its predicted structure and named some potential ethical consequences of using AI for protein design. In another project, students are using the open source tool RFDiffusion to design binding partners for a target protein.

Speculative Realities: Art, Pattern, and Future Imagination in Research and Pedagogy

Patrick Lichty, Communication Studies

This presentation examines speculative AI media research as a mode of artistic practice, critical pedagogy, and cultural inquiry through selected faculty and student projects at Winona State University.

Bringing together experimental visual communication, speculative design, and exhibition-based pedagogy, it argues that art can function not only as representation, but as a method for modeling possible worlds, interrogating technological systems, and making visible alternative structures of thought, place, and futurity.

The first project, Personal Taxonomies, investigates whether recurrent visual and conceptual structures emerge when large bodies of a neurodiverse artist's work are examined synoptically and analyzed through Generative Adversarial Networks. Rather than treating individual works as discrete artifacts, the project reads an oeuvre as an accumulative field in which persistent patterns, symbolic recurrences, and formal tendencies become legible. In this sense, creating a cognitive taxonomy serves as both an interpretive method and speculative framework, proposing pattern recognition across artistic production as a way to understand artistic cognition, self-organization, and the emergence of meaning.

The second project, ReVisioning Winona, extends speculative inquiry into a civic framework by projecting Winona into the year 2075 for an exhibition at the Winona County Historical Society. Drawing on design fiction and future-oriented visualization, the project asks how artistic research using AI can help communities imagine environmental, architectural, technological, and social transformation at a regional scale.

The presentation concludes with Postcards from the Future, a 50th Anniversary SIGGRAPH conference exhibition developed in partnership with Bowling Green State University and featuring AI-based projects by Winona State University visual communication students. Together, these projects position speculative realities as a vital methodological framework for contemporary art, interdisciplinary teaching, and future-oriented cultural research.

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