

ELEVENTH ANNUAL

MONTANA STATE UNIVERSITY BILLINGS

**RESEARCH AND
CREATIVITY SYMPOSIUM**

APRIL 12, 2024



Blake McCrary
Object Permanence

2024 SYMPOSIUM

Montana State University Billings is proud to host the eleventh annual Research and Creativity Symposium (RCS) on the University campus April 12, 2024. Sponsored by the Office of Grants and Sponsored Programs, the Office of the Provost, and Montana IDeA Networks of Biomedical Research (INBRE), the symposium provides the opportunity for undergraduate and graduate students of all fields to present their research and creative scholarship in a public forum. This program includes abstracts from the research projects as well as artworks from the Juried Student Exhibition.

The calendar below lists names and times for the live presentations. As some students are not participating live, links to online presentations in ScholarWorks will be available here: msubillings.edu/research

APRIL 12 Student Union Building – Glacier Room	
11:30	Creative Writing Presentations
Poetry Readings Students: <i>Sylvia Ambuehl, Garth Howley, Savannah Phillipson, Sebastian Sapnu</i> Faculty Mentor: <i>Dr. Bernard Quetchenbach</i>	
12:10	Symposium Welcome from Chancellor Dr. Stefani Hicswa Keynote Introduction by Provost Dr. Sep Eskandari
12:20	Keynote Speaker Jennifer McCullough, MSUB Alumna
1:00	Poster Session
2:30	Awards and Closing Remarks by Provost Dr. Sep Eskandari
APRIL 18 Liberal Arts Building – Northcutt Steele Gallery	
5:00	Reception for Juried Student Exhibition LA first floor

KEYNOTE SPEAKER

Jenny McCullough

Senior Director of Marketing & Operations
Terramor Outdoor Resort // Kampgrounds of America, Inc

Jenny McCullough holds a Master of Business from the University of Wyoming and earned her undergraduate in Public Relations from Montana State University Billings where she was a member of the MSUB Yellowjacket Soccer Team. She has been an integral member of research driven marketing programs for Kampgrounds of America, Inc. (KOA) and the Wyoming Office of Tourism. Her current role has involved the development of a new hospitality brand, Terramor Outdoor Resort, a venture of KOA, Inc. Jenny leads all brand development to include identifying key markets, hospitality trends, guest experiences and conducts market analysis for new property locations. She credits her experience at MSUB for creating a knowledge base and understanding of the power of research to drive businesses forward. Jenny currently resides in Billings with her family: two kiddos and two pups.

Using Research to Reinvent, Reengage, and Develop Brands

How do businesses stay relevant in an ever-changing world? Between emerging technologies, changing political landscapes, and ever-present safety concerns, organizations have to be innovative and nimble to survive. Learn how a 60-year-old company created a data-driven culture and how it utilized research findings to reach a new market of consumers. Find out how decades-long assumptions prevented organizational growth and how research reports changed the way businesses speak. This session will spotlight the importance and the benefits of understanding data to stay relevant in the marketplace, both for businesses and individuals alike.

THANK YOU **TO ALL FACULTY MENTORS**

Dr. David Butler
Dr. Madison Collins
Dr. Jason Comer
Dr. Hope Dewell-Gentry
Dr. Stephen Eliason
Dr. Jay Gentry
Dr. Lynn George
Dr. Joshua Hill
Dr. Jana Marcette

Dr. Matthew McMullen
Dr. Paul Nash
Dr. Suzette Nynas
Dr. Matt Queen
Dr. Bernard Quetchenbach
Dr. Alex Shafer
Dr. Jacob Thacker
Dr. Richard Warner
Dr. Jeffrey Willardson

Abstracts

A Divide in School District Diversity

Student Researcher: James Anderson, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

This study explores the effects of incorporating diversity, equity, and inclusion (DEI) via mission statements in a school district setting. Through various methods, authors Carolina Aragao and Meltem Odabas were able to create a data set showing the various effects of incorporating DEI in 1,314 school districts. Odabas and Aragao believed that as the incorporation of DEI in school district mission statements increased per state, the higher the likelihood of other variables within the world of education. Using this dataset, this project further explored these variables and found other relationships in an effort to draw more concise conclusions.

Effects of a Modified Plank Position on Core Stabilizing Muscle Activation

Student Researcher: Jaye Marie Anderson, B.S. Health & Human Performance

Faculty Mentor: Dr. Alex Shafer

Core muscles have many functions including protecting internal organs, keeping alignment, and keeping the body stable. The standard plank has been shown to benefit many aspects of exercise including strengthening, stabilizing, rehabilitating, and injury prevention of the body's trunk. This study seeks to determine whether changing the standard shoulder position during a forearm plank will increase muscle activity in the lower rectus abdominis and erector spinae muscles. The participants in this study will each perform a standard plank and modified plank with surface EMG on the lower fibers of the rectus abdominis and the erector spinae muscle group. Maximum voluntary contraction percentage will be recorded and compared to find which position elicits the maximum muscle activity.

Veterans' Confidence within the Legal System

Student Researcher: Alyah Balthazor, B.A. History Education

Faculty Mentor: Dr. Hope Dewell-Gentry

Using the General Social Survey in 2018, this project will investigate whether the number of years served within the military has any effect on the confidence a veteran has with the legal system. I hypothesize that veterans should have more confidence with the legal system, due to the number of resources veterans have at their disposal. Previous research has shown that race, court systems, and mental health all significantly play a role in veterans' confidence in the legal system.

Officers' Perspectives of Frequent Encounters with Individuals in a Mental Health Crisis

Student Researcher: Christian Barber, B.S. Criminal Justice

Faculty Mentor: Dr. Stephen Eliason

One of the most prominent issues that law enforcement deals with is offenders with known mental health problems. This is more difficult in rural areas where mental health resources are not available for law enforcement officers or communities. This is why we see such a spike in law enforcement having negative interactions with mental health suspects as the frequency of interactions correlates with higher risk. What are specific challenges faced by law enforcement in rural communities in Montana when handling incidents that involve suspects who suffer from mental health issues?

Cohabitation in the U.S.

Student Researcher: Katie Beebe, B.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

This research focuses on cohabitation before marriage and is based on a dataset from Pew Research Center of 9,834 participants. Results show that people were most likely to cohabitate for love and companionship, and less often for convenience or financial reasons. By comparing different variables within this dataset, I have been able to display the effects cohabitation has on the perception of relationships. In addition, some descriptive statistics are illustrated showing reasons couples choose to cohabitate, and how long couples have lived together. Results additionally show that the frequency with which a couple discusses the topic of marriage is significantly linked to their perceived likelihood of marrying their partner.

Examining Abortion Access Opinions Based on Demographic Variables

Student Researcher: Margaret Bertsch, B.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

This research analyzed data collected by the General Social Survey in 2021, the year before Roe v. Wade was overturned, to examine opinions about abortion access. The central question in this analysis is if respondents do or do not believe it should be possible for a woman to get a legal abortion for any reason. Abortion access beliefs and respondent demographics were analyzed using chi-square to assess for statistically significant differences. Demographic information included marital status, number of children, age, education, sex, race, political affiliation, and socioeconomic class. Statistically significant differences were found in abortion access beliefs for marital status, socioeconomic status, number of children, age, education, and political affiliation.

Analysis of Education Looking at Domestic and Demographic Factors

Student Researcher: Joseph Blatter, B.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

Using data collected from the General Social Survey in 2002 and 2022, this study sought to find correlations in participants' lives in relation to the amount of education that they achieved. Married individuals were more likely to achieve higher levels of education than those who were not married. A negative correlation appeared between the level of education and the number of children the participant had. Additional findings were presented and shown to have minor effects on the level of education participants were able to achieve.

Impactful Factors on Marital Happiness

Student Researcher: Thomas Bledsoe, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

This research analyzed data collected by the General Social Survey in 2010 and 2022 to see if there are possible correlations between different factors surrounding marriage and marital happiness. Jamovi and Rstudio were utilized in analyzing the data to find correlations. Data showed that several factors had existing correlations with marital happiness. Specific factors include the number of children, religious affiliation, and level of education.

Mineralogical and geochemical characterization of Line Creek Plateau porphyry outcrops (Beartooth Mountains) and Frontier Formation porphyry cobbles (Bighorn Basin)

Student Researcher: Nicholas Brailer, B.S. Chemistry

Faculty Mentor: Dr. Jacob Thacker

Early findings suggest a link between porphyry cobbles from the 95-million-year-old Frontier Formation in eastern Bighorn Basin and the outcrops on Line Creek Plateau in the southeastern Beartooth Mountains. In-progress trace element chemistry provides evidence that the Beartooths area is the source of these cobbles, while the chemistry of coeval Idaho Batholith porphyry is too enriched to suggest an Idaho source. Pending trace element chemistry, uranium/lead dating, and scanning electron microscope analysis is expected to clarify the nature of the relationship between Beartooth Mountains and Frontier Formation porphyry. Determining the source of the Frontier Formation cobbles and the nature of porphyry magmatism exposed on Line Creek Plateau may provide temporal constraints on magmatic and tectonic development in Montana and Wyoming.

The Role of Cultural Identity and the Mental Wellness of Native American University Students

Student Researcher: Britta Brenner, B.S. Criminal Justice

Faculty Mentor: Dr. Stephen Eliason

The Native American people have faced many tribulations in American history leading to a variety of challenges today. These challenges include education, specifically higher education, with some of the lowest attendance, retention, and graduation rates of any population in the nation. The methods employed in this study elicit data through the perspective of Native American students in order to help institutions understand what factors improve success or cause failures in the transition to college life. Essentially, this project hopes to spotlight the importance of cultural identity to these individuals and improve the experience for future generations.

The Relationship Between Body Composition, Visceral Adiposity, and Hypertension

Student Researcher: Tommy Campbell, B.S. Health & Human Performance

Faculty Mentor: Dr. Alex Shafer

In 2020 the U.S. had more than 670,000 deaths attributed to heart disease with hypertension being a common occurrence in those cases. This study will assess the relationship between body composition (percent body fat), visceral adiposity, and cardiovascular disease risk measure of hypertension. Results may provide stronger support for primary or supplemental prescribed diet and exercise treatment for modifiable risk factors for heart disease. Precise direct segmental measurement multi-frequency bio-electrical impedance analysis (DSM-MFBIA) is used to measure body fat percentage and visceral adipose tissue commonly referred to as an Inbody scan. Utilizing this technology to accurately determine body fat percentage and visceral adipose tissue helps in understanding correlations between measurement values of blood pressure.

Soluble Versions of B7-H3 without an Artificial HA tag Provide Unbiased Analysis of Protein Interaction with Midkine

Student Researcher: Rebecca Chambers, B.S. Biology

Faculty Mentor: Dr. Richard Warner

We are investigating the protein B7-H3 to identify protein interactions that may have value towards immunotherapy. We identified midkine (MDK) as a soluble growth factor that may have robust interaction with B7-H3. Previously, we have cloned B7-H3 and MDK into protein complementation assay (PCA) DNA vectors to analyze their interaction in our system. We have been working to remove any potential interference with the natural protein interaction between these proteins. We have been cloning long (4-domain) and short (2-domain) versions of B7-H3 without the HA-tag into our PCA vectors to more effectively study the natural interaction.

A Case for the Decriminalization of Methamphetamines

Student Researcher: Mike Chenoweth, B.S. Accounting

Faculty Mentor: Dr. Josh Hill

Billings and Yellowstone County, along with the greater whole of Montana, consistently rank near the top nationally for methamphetamine usage. We seek to determine if the costs to society of methamphetamine usage warrant the resources being expended on investigation, apprehension, prosecution, and incarceration of individuals for this behavior. Economic principles were applied to data available from governments at the national, state, county and city levels regarding drug effects, usage patterns, and law enforcement responses to compare the impacts of meth abuse against the costs of policing that abuse. The high costs of apprehension, prosecution and incarceration, along with significant recidivism rates among released inmates, indicate an opportunity to use resources more effectively for the betterment of society by applying them elsewhere.

The Effect of Attentional Focus on Lower Limb Muscle Activation

Student Researcher: Jordan Cookman, B.S. Health and Human Performance

Faculty Mentor: Dr. Alex Shafer

Electromyography (EMG) is used to measure electrical activity in the muscles via electrodes. Past research has shown that an internal focus of attention increases EMG activity, whereas adopting an external focus of attention causes it to decrease. The purpose of this study was to examine the EMG activity in the vastus lateralis on the dominant leg with the use of an internal focus and an external focus. Participants were fitted with surface EMG electrodes on the vastus lateralis. The test protocol consisted of performing six repetitions of leg extension with both legs while only focusing on the EMG activity that appears in the dominant leg. It was found that EMG activity was not different in the vastus lateralis muscle under an internal or external focus of attention, and it was also found that the percent MVC was not different between males and females.

Geologic Mapping of Porphyritic Intrusions on the Line Creek Plateau, Southeastern Beartooth Mountains, Montana and Wyoming

Student Researcher: Eddy Cunningham, B.S. Broadfield Science

Faculty Mentor: Dr. Jacob Thacker

Porphyritic intrusions, igneous rocks with two grain sizes, are found throughout the Line Creek Plateau in the southeastern Beartooth Mountains. Previously mapped as “Tertiary or Late Cretaceous,” these porphyritic units have been recently dated to 98-96 Ma (Cenomanian, Upper Cretaceous). Our geologic mapping of this area was conducted at 1:24,000 scale on the Line Creek Plateau. Four samples of porphyry were collected for petrographic microscope analysis, geochemistry analysis, and U-Pb dating. A spatial analysis was conducted using ArcMap comparing the surface area of our mapped porphyry exposures to previous 1:100,000 scale mapping, which showed a 227% increase in porphyry area compared to that previously mapped. U-Pb dating and geochemistry are currently in progress; we hypothesize the ages will be consistent with recent nearby dates showing a mid-Cretaceous age. We will also compare the geochemistry with other nearby porphyry.

Driving Under the Influence in Montana

Student Researcher: Alee Davenport, B.S. Criminal Justice

Faculty Mentor: Dr. Stephen Eliason

The goal of this research is to understand different societal, structural and cultural factors that may influence one's actions and choices involving driving under the influence (DUI) and what can be done to reduce these rates. This study examines the prevalence of DUI, the demographic and social factors contributing to this behavior, and the psychological characteristics of individuals who engage in DUI. We expect to see that people, especially from rural areas, would like more options for transportation to stop this issue.

Intracellular *Toxoplasma gondii* Susceptibility to Killing by Valinomycin or Beauvericin

Student Researcher: Christy Derenburger, B.S. Biology

Co-Authors: Kaidyn Harris, Amanda Loisel, Emma Voigt, and Amanda Johnson

Faculty Mentor: Dr. Paul Nash

Toxoplasma gondii is an obligate intracellular parasite that can cause birth defects if contracted during pregnancy, and severe symptoms, including death, in immunocompromised individuals. *T. gondii* has the ability to inhibit apoptosis (programmed cell death) in host cells, including when the host cells are treated with the fungal-derived toxin beauvericin and the bacterial-derived toxin valinomycin. We previously showed that either toxin killed *T. gondii* when treated outside of host cells. In this study, our main goal was to determine whether the protective effect provided to the host also protects the parasite when it is intracellular. We tested three strains of *T. gondii*: RH, S1T, and Me49, for survival after treating infected cells with beauvericin or valinomycin. Our results showed that all three strains of *T. gondii* were very susceptible to killing by both toxins.

The Effect of Acute Resistance Exercise on Memory and Mood in College Students

Student Researcher: Shaylyn Dilley, B.S. Health & Human Performance

Faculty Mentor: Dr. Jeffrey Willardson

Research has shown that aerobic exercise has been shown to help improve both memory and mood, however resistance exercise has a lack of evidence in this category. The purpose of this study is to test if acute resistance exercise will improve the memory and mood of college students. Participants will begin by filling out the Brief Mood Introspection Scale handout and completing the CogniFit memory test for the pretest. The participants will then be instructed through a moderate acute resistance workout consisting of four supersets: barbell back squats and Romanian deadlifts, bench press and bent over rows, weighted lunges and weighted calf raises, and dumbbell bicep curls and seated overhead press. After the resistance workout is completed, the participants will complete a new handout of the Brief Introspection Scale and retake the CogniFit memory test.

The Role of Cultural Identity and the Mental Wellness of Native American University Students

Student Researcher: Sierra Dove, B.S. Criminal Justice, B.S. Sociology

Faculty Mentor: Dr. Stephen Eliason

The Native American people have faced many tribulations in American history leading to a variety of challenges today. These challenges include education, specifically higher education, with some of the lowest attendance, retention, and graduation rates of any population in the nation. The methods employed in this study elicit data through the perspective of Native American students in order to help institutions understand what factors improve success or cause failures in the transition to college life. Essentially, this project hopes to spotlight the importance of cultural identity to these individuals and improve the experience for future generations.

Investigation of Political Misinformation Based on Data Found in the 2023 Mountain States Poll

Student Researcher: Liam Duczek-Mccoll, B.A. History Education

Faculty Mentor: Dr. Hope Dewell-Gentry

This research focuses on questions from the 2023 Mountain States poll related to political misinformation. Results showed that those whose primary source of news was social media and TV news had the lowest likelihood of inspecting sources, followed by newspapers then radio, podcasts, and finally independent journalists being the most inspected. One major surprise was that political alignment had very little effect on the likelihood of inspecting sources. However, education did have a large bearing on willingness to inspect sources, with two-year degrees polling roughly 10% higher than four-year degrees, interestingly. More surprisingly, levels of education had fairly minimal effects on respondents' primary news sources.

The Effect of Davunetide on Induced Convulsions in *C. elegans*

Student Researcher: Kylie Durand, post-baccalaureate

Faculty Mentor: Dr. Jana Marcette

For a sub-set of epilepsy patients, recent findings point to the underlying mechanism being either microtubule minus-end destabilization or altered cell-signaling, due to loss of function of the CAMSAP1L1 protein. *C. elegans* contains a homologous protein that is similar to the epilepsy related CAMSAP1L1 protein in humans, making *C. elegans* an acceptable model for simple seizure activity. In this experiment, we tested an array of drugs, including Davunetide, an existing FDA-approved drug, on two strains of *C. elegans*: wild-type (control) and ptrn-1 mutants. Seizure activity was induced by growing worms on nematode growth medium plates devoid of calcium and then placing the worms in a seizure-inducing buffer (~2:1 NaCl:MgCl₂). We found that Davunetide does not appear to rescue *C. elegans* from induced seizure-like activity. However, the drug Etoposilone B—an FDA-approved antineoplastic agent—did appear to restore *C. elegans* to normal functioning.

Investigating the Potential Anticonvulsant Effects of Taxol Through Microtubule Stabilization in *C. elegans* Model of Epilepsy

Student Researcher: Madelyne Elbert, B.S. Biology, Medical Lab Sciences

Faculty Mentor: Dr. Jana Marcette

Recent research has found a mutation in the CAMSAP gene as a causative factor in a distinct form of epilepsy. CAMSAP's pivotal role in microtubule stabilization and cellular signaling underscores its significance in neuronal function. This experiment poses to answer the question: Does the stabilization of microtubules stop the progression of convulsions for a specific type of epilepsy? Microtubules orchestrate the spatial organization within cells, essential for cellular integrity and function. Perturbations in microtubule dynamics, marked by instability and subsequent shrinkage due to GTP hydrolysis, can precipitate cellular dysfunction. We proposed the application of Taxol, a renowned microtubule-stabilizing agent, in a *C. elegans* model. Leveraging the simplicity of *C. elegans*' nervous system, we aim to elucidate Taxol's potential in mitigating seizures.

The Effect of Amantadine on *C. elegans* Convulsions

Student Researcher: Trey Engellant, B.S. Business Administration

Faculty Mentor: Dr. Jana Marcette

Nearly one third of epilepsy cases do not respond to traditional treatments. One recent discovery shows a link between mutations in CAMSAP-1 proteins in patients' neurons and a previously unidentified form of epilepsy and neuronal migration disorder. This study uses *C. elegans* (microscopic worms) with a mutation in CAMSAP to test if amantadine reduces seizures in these worms. Amantadine is traditionally used to treat Parkinson's disease by inhibiting dopamine receptors in neurons. It is thought to act on signaling molecules (impacting PAK1, CDK5, and KIF2A kinases). To perform this study, *C. elegans* were placed on plates with PTZ-enzymes which cause them to seize along with amantadine. The worm's activity is then monitored and observed for 10 minutes. We expect these worms to show less seizure like activity (convulsions) when exposed to Amantadine than those which are not treated using the drug.

The Acute Effects of Whole-Body Vibration and Weighted Dynamic Warmup on Vertical Jump Performance in Female Collegiate Athletes

Student Researcher: Jane Ersepke, B.S. Health & Human Performance

Faculty Mentor: Dr. Suzette Nynas

Stretching exercises are often integrated into warmups before physical activities in hopes of improving athletic performance and preventing injury. However, in the last several years, many athletic trainers and exercise physiologists have cautioned against static stretching warmups, as it may reduce muscle power and force production. Additionally, whole body vibration (WBV) has been shown to increase vertical jump in individuals ranging from minimally active students to intercollegiate athletes. The purpose of this study was to assess the effects of a weighted dynamic warmup and whole-body vibration on vertical jump height in female collegiate athletes. Participants completed two sessions in a randomized order. In each session, participants underwent a standard dynamic warmup followed by an initial countermovement jump test. Following those, participants would: session 1) receive either whole body vibration or a weighted dynamic warmup, passive rest period, proceeded by another countermovement jump test; and in session 2) receive the opposing warmup from session one and repeated the same procedures for a post-intervention jump test.

Characterization of SaePQRS Components During Human Blood Encounter

Student Researcher: Dominic Estes, B.S. Biology

Faculty Mentor: Dr. Madison Collins

Staphylococcus aureus (*S. aureus*) is traditionally associated with hospital-acquired infections and immunocompromised individuals; however, *S. aureus* is increasingly infecting otherwise healthy individuals in recent years. A recently identified virulence gene system within *S. aureus*, SaePQRS, has been highlighted as a potential target for combating *S. aureus* due to its crucial involvement in the interaction with human leukocytes. Using isogenic mutants in the clinically relevant strain of *S. aureus* (USA300), we aim to characterize hemolysis patterns of USA300 Δ saeP and USA300 Δ saeQ relative to the parent stain USA300 in human blood and on blood agar plates. Preliminary findings from survival experiments suggest that USA300 Δ saeQ may exhibit enhanced survival compared to other mutants when suspended in heparinized human blood.

The Effects of COVID-19 on Racial Issues in the United States

Student Researcher: Brittane Fisher, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

Pew collected survey data in 2020 on the effects of COVID-19 on racial discrimination in the US through the American Trends Panel Wave 68. The analysis performed on this preexisting data set from Pew found that there were significant connections between race issues and COVID-19. These findings are of importance because they draw a connection between the effects of COVID-19 on racial relations, and potentially highlight the significant differences in health care among different racial groups.

Driving Under the Influence in Montana

Student Researcher: Dena Friesen, B.S. Sociology

Faculty Mentor: Dr. Stephen Eliason

The goal of this research is to understand different societal, structural and cultural factors that may influence one's actions and choices involving driving under the influence (DUI) and what can be done to reduce these rates. Through a review of existing literature and original research, this study examines the prevalence of DUI, the demographic and social factors contributing to this behavior, and the psychological characteristics of individuals who engage in DUI. We expect to see that people, especially from rural areas, would like more options for transportation to stop this issue.

Factors that Affect Income

Student Researcher: Taylor Gertsch, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

Income has played a factor in everyone's life. It is one of the larger determinants of lifestyle. Level of education, parents' level of education, marital status, religion, children, and age can all affect an income level. This project analyzes survey data collected by the General Society Survey in 2000 to 2022. Factors that affect income showed that there are many influences out there that can shape someone's income.

Driving Under the Influence in Montana

Student Researcher: Makiah Gotschall, B.S. Criminal Justice

Faculty Mentor: Dr. Stephen Eliason

The goal of this research is to understand different societal, structural and cultural factors that may influence one's actions and choices involving driving under the influence (DUI) and what can be done to reduce these rates. Through a review of existing literature and original research, this study examines the prevalence of DUI, the demographic and social factors contributing to this behavior, and the psychological characteristics of individuals who engage in DUI. We expect to see that people, especially from rural areas, would like more options for transportation to stop this issue.

Mental Healthcare in the Justice System, Is It Lowering Recidivism?

Student Researcher: Nathan Groves, B.S. Criminal Justice

Faculty Mentor: Dr. Stephen Eliason

This research will seek to answer whether mental healthcare in the criminal justice system is influencing recidivism. Prior findings have suggested community-based programs, mental health courts, cognitive therapy, and other mental health programs have significant influence on recidivism rates. This project surveyed local criminal justice professionals' opinions on the correlations of these interventions as well as the effects of access to medical insurance, public stigmas, and other related issues. The findings of the surveys as compared to prior research shed light on what is effective in terms of utilizing mental health care to reduce recidivism.

The Division of the American People Through Politics

Student Researcher: Taylor Hall, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

This research analyzed data collected by General Social Survey in 2004 and 2014 on Americans' feelings toward the federal government, assessing any significant statistical differences between those feelings and party affiliation. Questions included if they felt that they could trust the government, if they felt the government needed to do more or do less, if they felt politicians were in politics to serve themselves and if they felt that they had any say in what the government does. With this data we hope to outline how divided we are politically and be able to use this data as a platform for assessing ways we can reduce the divide between the American people.

Mental Healthcare in the Justice System, Is It Lowering Recidivism?

Student Researcher: Austin Hansen, B.S. Criminal Justice, B.S. Sociology

Faculty Mentor: Dr. Stephen Eliason

This research will seek to answer whether mental healthcare in the criminal justice system is influencing recidivism. Prior findings have suggested community-based programs, mental health courts, cognitive therapy, and other mental health programs have significant influence on recidivism rates. This project surveyed local criminal justice professionals' opinions on the correlations of these interventions as well as the effects of access to medical insurance, public stigmas, and other related issues. The findings of the surveys as compared to prior research shed light on what is effective in terms of utilizing mental health care to reduce recidivism.

An Examination of Fluorescent Light Spectrometers: Qualitative Analytical Comparison of Commercial and Educational Grade Fluorimeters

Student Researcher: Kaidyn Harris, B.S. Biology

Faculty Mentor: Dr. Matt Queen

An educational grade fluorimeter was constructed using a combination of provided parts and household items to analyze varying excitation and emission spectra of a series of ten Fluorescein dilutions. The same analyses were done with a commercial grade fluorimeter, which allowed for a baseline for qualitative comparison. To ensure that both spectrometers were accurately measuring concentration without predetermined linearity, seven randomized ratios of Fluorescein and water were prepared and analyzed on both instruments. Statistical pooled t-test analysis for two means was then used to quantitatively determine the detection ability of the educational grade fluorimeter as compared to the commercial grade.

Officers' Perspectives of Frequent Encounters with Individuals in a Mental Health Crisis

Student Researcher: Amanda Helmann, B.S. Criminal Justice, B.S. Sociology

Faculty Mentor: Dr. Stephen Eliason

One of the most prominent issues that law enforcement deals with is offenders with known mental health problems. This is more difficult in rural areas where mental health resources are not available for law enforcement officers or communities. This is why we see such a spike in law enforcement having negative interactions with mental health suspects as the frequency of interactions correlates with higher risk. What are specific challenges faced by law enforcement in rural communities in Montana when handling incidents that involve suspects who suffer from mental health issues?

Population Genomics Analysis of *Grindelia squarrosa* (Pursh) Dunal in Billings, Montana

Student Researcher: Selbi Ilmuradova, B.S. Biology

Faculty Mentor: Dr. Jason Comer

This study investigates how different populations of *Grindelia squarrosa* (Pursh) Dunal, commonly known as curly-cup gumweed, adapt to diverse environmental conditions in Montana, a key to understanding plant adaptability and resilience. Using a population genomics approach and next-generation sequencing desert vs mesic plants were explored to identify genetic variations that may be linked to their environmental adaptations. We hypothesize that these populations are unique under different selective pressures, which will be detected at the genomic level, providing a clearer picture of how species respond to varied ecological pressures. These insights will advance understanding of conservation genomics and highlight the crucial role of genetic diversity and adaptation in facing environmental changes.

Is There a Difference in Agility Performance When Preceded by Static Versus Dynamic Stretching?

Student Researcher: Faith Johnson, B.S. Health & Human Performance

Faculty Mentor: Dr. Alex Shafer

Theoretically, static stretching may hinder agility performance by changes in the parallel elastic component impairing the force to the line of action and reducing fiber rotation during contraction. On the other hand, dynamic stretching involves controlled active movements that take a joint or muscle through its full range of motion. The purpose of this study is to analyze the claim that dynamic stretching is more beneficial than static stretching when completed prior to agility performance. The study comprises two distinct groups: Only one group that is counterbalanced. Participants will engage in the foot fire setting, aiming to maximize the number of steps on the quick board machine. Additionally, all groups will undergo a stability reaction setting, resembling a step dance machine, on the quick board to evaluate reaction time and athletic agility. The experiment will utilize the quick board agility test to assess agility scores, and each group will be subjected to this test to determine the most effective stretching techniques for enhancing agility performance.

The Acute Effects of Self- myofascial Release Interventions on Muscle Activity and Force Output in Collegiate Athletes

Student Researcher: Brynn Jolma, B.S. Health & Human Performance

Faculty Mentor: Dr. Alex Shafer

Warmup strategies have been studied in search of the greatest preparatory routine for improved performance and prevention of injury. For this study, nine collegiate athletes were randomly divided into two groups to carry out foam rolling interventions, either with a non-vibrating foam roller, or vibrating foam roller. Participants returned for the second session of testing following the same protocol, but switched the type of foam roller. There was no significant difference in pre- and post-values for foam rolling or vibrating foam rolling in force output or muscle activity. Neither type of foam roller elicited a significant change in test values. There was also no significant difference comparing foam rolling and vibrating foam rollers overall. Foam rolling, with and without vibration, caused no significant improvements in performance, but did not diminish performance abilities.

Exploring the Interplay of Income, Education, and Work Status on General Happiness: A GSS Data Analysis

Student Researcher: Laila Ketchum, B.S. Psychology

Faculty Mentor: Dr. Mathew McMullen

This research project aimed to investigate the combined influence of total family income, education level, and work status on general happiness levels using the General Social Survey (GSS) dataset for the year 2022. The methodology involved statistical analyses such as Pearson's correlation coefficient, one-way ANOVA, and moderation analysis using linear regression with interaction terms. Results from this study provide a nuanced understanding of how income, education, and work status collectively influence general happiness levels and may be used to inform policies aimed at reducing income disparities and improving overall well-being.

Identifying SaeR/S-dependent Mechanisms in *S. aureus* that Alter Human Neutrophil Autophagy

Student Researcher: Bryn Lien, B.S. Biology

Faculty Mentor: Dr. Madison Collins

Staphylococcus aureus (*S. aureus*) is a ubiquitous commensal of the human anterior nares that is estimated to permanently colonize ~30% of the population. *S. aureus* is also a predominant infectious pathogen that causes significant morbidity and mortality, and options for treatment are dwindling at an alarming rate. Others have demonstrated a role for the SaeR/S gene regulatory system in *S. aureus*. Preliminary results suggest SaeR/S-regulated factors may influence neutrophil autophagy function. We utilized a clinically relevant strain of *S. aureus* USA300 and an isogenic deletion mutant deficient in SaeR/S (USA300 Δ saeR/S) to complete two fluorescence-based detection methods. Early microscopy colocalization data using autophagy specific markers of autophagosomal development suggest differences in autophagy progression in neutrophils that phagocytosed WT versus the SaeR/S mutant. These observations were further examined using spectrophotometry to measure the fluorescent autophagic lysosomes between neutrophils that phagocytosed either strain of *S. aureus*.

Personal Biases and Women in Leadership Positions

Student Researcher: Madison Martinez, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

This archival research study analyzed data collected through Pew Research Center in 2018 to help identify how people felt about women in leadership positions based on their personal biases and beliefs about women. For this digital survey, each subject was prompted to select the answer that most closely aligned with their views. Data was then analyzed to identify a correlation between personal biases and how subjects' beliefs affected how they felt about women maintaining leadership positions. The analysis found a strong correlation between subjects' personal beliefs and their feelings about women in powerful leadership positions.

The Relationship Between Pain and Myers-Briggs Personality Factors

Student Researcher: Teague McChesney, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

This study examined an existing dataset on the links between physical pain and a person's personality. The dataset that was created collected information about various participants including their age, weight, height, sex, and activity level; information about biomechanical pain located in the neck and/or spinal areas was also collected. Personality was assessed using the Myers-Briggs Type Indicator (MBTI) test of personality. This research presented a correlational analysis between pain and MBTI categories. The results of correlational analyses showed pain was not strongly correlated with MBTI categories. ANOVA was conducted between pain and personality type to gauge whether pain levels were different between MBTI personalities.

Attitudes Toward the Outdoors: Examining Subjective Class, Happiness, and Regional Effects

Student Researcher: Paul McKean, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

Attitudes toward the environment and general happiness were examined based on outdoor activity, region, and income differences. A previous study found that individuals who spent more time outdoors reported higher overall satisfaction. The 2021 General Social Survey was utilized to compile quantitative data. Regional differences were found in outdoor leisure, enjoyment of the outdoors, and general happiness. A slight correlation between happiness and enjoyment of nature was observed. In addition, a correlation between subjective class identification and outdoor recreation was observed.

Mental Health Care in The Justice System, Is It Lowering Recidivism?

Student Researcher: Megan Mendenhall, B.S. Sociology, B.S. Human Services

Faculty Mentor: Dr. Stephen Eliason

This research will seek to answer whether mental healthcare in the criminal justice system is influencing recidivism. Prior findings have suggested community-based programs, mental health courts, cognitive therapy, and other mental health programs have significant influence on recidivism rates. This project surveyed local criminal justice professionals' opinions on the correlations of these interventions as well as the effects of access to medical insurance, public stigmas, and other related issues. The findings of the surveys as compared to prior research shed light on what is effective in terms of utilizing mental health care to reduce recidivism.

American Trends: Has Science Helped or Hurt Our Health and Food?

Student Researcher: Brittney Mill, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

Using Pew Research Center data from 2018 this project analyzed data based on public perspective of science's influence on food, health and the environment, and, more specifically, whether people feel science has helped or hurt these categories. My research highlights the effects sex, age and political beliefs have on individual perceptions of scientific influence on our food and health.

How the Trauma of a Small Town Put Them in the Spotlight: Its Short and Long-term Impact

Student Researcher: Deja Morgan, B.A. English

Faculty Mentor: Dr. Jay Gentry

My project focuses on Truman Capote's novel, *In Cold Blood*, which covers the true murder case of The Clutter Family in the small town of Holcomb, Kansas, and the murderers Dick Hickock and Perry Smith. However, my focus will primarily revolve around the short and long-term effects that the slayings had on the overall community of Holcomb in terms of collective trauma, the economy, and "dark tourism." The communal trauma of Holcomb was further exacerbated when the coverage of the case became widespread during the time of the investigation. In addition, Capote's novel was a literary influence that simply added another layer of the unwanted spotlight of tragedy and infamy that Holcomb had become known for.

Why Dating Has Become Harder These Days

Student Researcher: Naomi Nation, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

Current research shows that adults are saying dating has become harder in the last 10 years. Using 2019 Pew survey data, this research project looked further into the possible causes based on gender and dating and relationship experiences. These experiences include but are not limited to ghosting and continued contact after expressing disinterest., Charts made from statistical tests comparing the 4,680 participants show that more women than men have experienced harassment from someone they went on a date with, and about one-third of men and women said they have been ghosted. Participant data indicates that the physical and emotional risks of dating are the primary factors leading to the belief that dating has become more difficult.

Does the Government Have a Right to Interfere with a Woman's Right to an Abortion

Student Researcher: Cindy Newton, B.S. Psychiatric Rehabilitation

Faculty Mentor: Dr. Hope Dewell-Gentry

My research explores reasons why political parties get involved in a woman's choice to get an abortion. I will use the GSS 2018 data set to compare my dependent variable with my independent variable to see if women should be able to get an abortion for any reason with the political party and religion. There is a lot of confusion about the woman's right to do what she wants with her body. Before Roe v. Wade, women could decide to do what, they wanted without legal consequences.

Relationship Between Parental Discussion of Gender and Sexuality on Other Aspects of Children's Lives

Student Researcher: Du Ngo, B.A. Psychology

Faculty Mentor: Dr. Matthew McMullen

The topics of gender and sexuality have become increasingly relevant in today's media, and many parents remain conflicted as to whether their children should be educated on this topic. While some parents claim it is important to be open-minded about LGBTQ+ acceptance, others are reluctant to discuss anything related to LGBTQ+ topics to avoid giving unintended ideas to their children. This study examined the relationship between parents' communication with their children about the topics of gender and sexuality and the parents' opinions on other aspects of their children's lives, such as racial inequality and mental health. The data used in this study was obtained from the Parental Survey performed by the Pew Research Center in 2022.

eDNA Extraction from Lake Josephine, Billings, Montana; A Gateway to Understanding Local Biodiversity in Eastern Montana

Student Researcher: John Nguyen-Ho, B.S. Biology

Co-Authors: Dominic Estes, David Russell

Faculty Mentor: Dr. Jason Comer

Environmental DNA (eDNA) is DNA obtained from an environment used to elucidate regional biodiversity, examine species migration patterns, monitor anthropogenic impact on an ecosystem, and other areas of research. Our project aims to use an eDNA approach to explore genetic diversity of Lake Josephine (Billings, MT) and the surrounding area. We extracted DNA from Lake Josephine water samples and sequenced the recovered DNA for a metagenomic analysis to identify local species. BLAST searching through an environmental DNA database predominately resulted in mammalian matches along with a notable presence of bacterial and freshwater-vertebrate genetic data. BLAST results from a genomic survey sequence database showed strong matches for fragments of known human genomes. This data can be used to explore the impacts these organisms have on Lake Josephine and provide a steppingstone for further conservation studies in eastern Montana.

Crime and Punishment: Legal Procedure Representations in Literature and the True Crime Genre as seen in *In Cold Blood* by Truman Capote

Student Researcher: RoseLynn Olson, B.A. History

Faculty Mentor: Dr. Jay Gentry

This paper studies Truman Capote's *In Cold Blood* (published 1966) in the context of legal procedures central to the time of the due process revolution in the United States in the 1950s and 1960s. I argue that Truman Capote as an author is able to expand upon the trial in the literary sphere by including evidence in the "fictional" trial that was not considered during Perry Smith and Richard Hickock's original legal trial. Additionally, I argue how true-crime novels such as *In Cold Blood* can influence public perception and opinions.

The Effect of TV Hours on Strength of Party Affiliation

Student Researcher: Nathaniel Palmer, B.S. Psychiatric Rehabilitation

Faculty Mentor: Dr. Hope Dewell Gentry

Does the amount of TV an individual watches strengthen their political affiliation? Research has shown race, upbringing, the region in which one lives, education, employment, and religion influence political affiliation. However, I argue individuals tend to only watch what they already find agreeable, putting themselves into echo-chambers, strengthening their party affiliations. To test this, I will be using the General Social Survey from 2018. I expect that the amount of television time will exert a strong influence on an individual's party affiliation.

The Role of Cultural Identity and the Mental Wellness of Native American University Students

Student Researcher: Alyssa Pearce, B.S. Sociology, B.S. Political Science

Faculty Mentor: Dr. Stephen Eliason

The Native American people have faced many tribulations in American history leading to a variety of challenges today. These challenges include education, specifically higher education, with some of the lowest attendance, retention, and graduation rates of any population in the nation. The methods employed in this study elicit data through the perspective of Native American students in order to help institutions understand what factors improve success or cause failures in the transition to college life. Essentially, this project hopes to spotlight the importance of cultural identity to these individuals and improve the experience for future generations.

Effects of Frequent Internet Use on Aspects of COVID-19

Student Researcher: Hailey Petermann, B.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

In the early stages of COVID-19, there was skepticism surrounding the pandemic and how much the media should be trusted. In 2020, the American Trends Panel created by Pew Research Center collected survey data on Americans' skepticism of news media. Research conducted on the data showed frequency of internet use influenced attitudes related directly to COVID-19, like wearing a mask in public, employment status post-pandemic, believing undiagnosed symptoms are COVID-19, and what life would look like post-pandemic. The results will shed light on how influential frequent internet usage is on American people's opinions.

Support of Birth Control based on Party Identification

Student Researcher: Aurora Pierson-Cosgriffe, B.S. Liberal Studies

Faculty Mentor: Dr. Hope Dewell-Gentry

Much research has gone into looking at the effects and efficacy of birth control use and availability on a state-by-state level. Research has also shown that comprehensive sex education and access to birth control for teens is effective at preventing teen pregnancy and STI's. In states with abstinence only sex education, teen pregnancy and birth rates are higher. Using the 2018 General Social Survey, I intend to explore if an individual's party identification has an impact on whether they believe teens aged 14-16 should have access to birth control.

The Impact of COVID-19 on Work and Marriage

Student Researcher: Emma Power, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

This research project aimed to assess the impact of the COVID-19 pandemic on employment and on marriage by using archival GSS results from 2018 and 2022. Variables assessed included workforce status, hours worked per week, work-from-home status, marital status, number of children, happiness (personal and marital), and demographic variables like age, race, and sex. Among other trends, the results showed that hours worked, marital happiness, and personal happiness generally decreased, and that the percentage of time that individuals worked from home and/or were self-employed increased.

Archival Data Analysis – Family Study

Student Researcher: Micah Richter, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

This research analyzed data that was collected by Pew Research Center in 2019. This analysis was conducted to show correlations between different variables such as race, gender, and religious beliefs and the participant's answers to the Pew questions about beliefs surrounding marriage, family living arrangements, and child financial independence.

Nanopore Sequencing for Genome Analysis- Exploring the Genomic Structure of Field Bindweed (*Convolvulus arvensis*)

Student Researcher: Justice Roberts, B.S. Biology

Faculty Mentor: Dr. Jason Comer

Field bindweed, scientifically known as *Convolvulus Arvensis*, is an invasive perennial weed widely found across North America that has been reported in all 50 states and declared a noxious weed in 22 states. Field bindweed can displace native plant species, reduce crop production, and cause soil erosion. Management of bindweed is challenging due to its high tolerance to herbicides, aggressive growth, and adaptability. The aim of this experiment is to gather crucial genomic data to better understand how to manage an invasive plant species.

Elongator's Nucleolar Modification of Ribosomal RNA

Student Researcher: David Russell, B.S. Biology

Faculty Mentor: Dr. David Butler

Mutations in genes encoding the Elongator complex contribute to a host of neurological diseases including amyotrophic lateral sclerosis, autism spectrum disorder and familial dysautonomia. Elongator catalyzes the addition of a 5-carboxymethyl group (cm5) to wobble uridines of tRNA. This reaction is required for efficient translation of codon-biased mRNAs. We investigated the hypothesis that Elongator also catalyzes the addition of cm5U to ribosomal RNA. We analyzed global ribosomal RNA modification by mass spectrometry and cellular localization of Elongator by immunofluorescence microscopy.

Characterizing Neutrophil Reactive Oxygen Species Production during Interaction with *S. aureus*

Student Researcher: David Russell, B.S. Biology

Faculty Mentor: Dr. Madison Collins

Staphylococcus aureus (*S. aureus*) is a predominant infectious pathogen that bears a considerable burden on the healthcare industry, carrying significant morbidity and mortality. Once largely restricted to hospital environments, multi-drug resistant strains of *S. aureus* are now commonplace in community settings. The SaeR/S regulatory genes have been implicated in *S. aureus*' survival of the immune system's oxidative killing response utilized by neutrophils. We measured chemiluminescence-based detection of two reactive oxygen species (ROS), O_2^- and H_2O_2 , as a qualitative marker to explore the importance of two of the SaeR/S genes (*saeR* and *saeS*) on the bacteria's resistance to neutrophil-mediated degradation. A wild type of *S. aureus* has been shown to meter the neutrophil's initial burst release of ROS in contrast to the deletion mutant of SaeR/S. This work has supported that the SaeR/S sensory system is responsible in-part for the evasion of the immune system's oxidative killing response and will be expanded to include various immunomodulators (i.e., rapamycin, 3-MA) to understand how two critical neutrophil functions (ROS release and autophagy) are linked.

Salicylic Acid Vs the World

Student Researcher: Vaughn Sheridan, undeclared

Faculty Mentor: Dr. Jana Marcette

This research examines the effectiveness of seizure-suppressing medicine on a specific seizure-causing genetic mutant., focusing on Salicylic Acid's ($C_7H_6O_3$) ability to suppress seizures induced by medication. Methodology includes putting *C. elegans* on NGM plates and observing whether convulsions will occur. I hypothesize that Salicylic Acid will help suppress the effects of the epilepsy-inducing drug PTZ.

The Role of Cultural Identity and the Mental Wellness of Native American University Students

Student Researcher: Bryor Smith, B.S. Sociology

Faculty Mentor: Dr. Stephen Eliason

The Native American people have faced many tribulations in American history leading to a variety of challenges today. These challenges include education, specifically higher education, with some of the lowest attendance, retention, and graduation rates of any population in the nation. The methods employed in this study elicit data through the perspective of Native American students in order to help institutions understand what factors improve success or cause failures in the transition to college life. Essentially, this project hopes to spotlight the importance of cultural identity to these individuals and improve the experience for future generations.

College Student AI Use in School

Student Researcher: Josephina Snyder, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

This study evaluated the knowledge levels, usage patterns, and career aspirations concerning Artificial Intelligence (AI) among college students representing diverse academic disciplines, utilizing data from the Kaggle dataset titled "College Student AI Use in School." The survey found a significant interest in AI career pathways with a noteworthy proportion of students expressing high levels of interest. There was a notable level of awareness regarding Chat-GPT, as most participants indicated familiarity with this specific AI technology. The study's findings offer valuable insights into the AI landscape among college students by highlighting diverse knowledge levels, usage behaviors, career inclinations, and awareness of AI tools.

Effect of Political Party and Strength of Party Affiliation on Generalized Social Trust

Student Researcher: Troy Spang, B.S. Sociology

Faculty Mentor: Dr. Hope Dewell-Gentry

Research tells us that perception of political polarization has a negative correlation to generalized social trust. There is also evidence that strength of affiliation of religion has a negative correlation on generalized social trust. Research methods include analyzing GSS data from 2018 using the trust variable as the dependent variable and political affiliation and strength of affiliation as the independent variable. The expectation of this research is that individuals who are strongly affiliated with a political party will have lower generalized social trust, and those who identify with conservative parties will show lower levels of social trust than their liberal counterparts.

Officers' Perspectives of Frequent Encounters with Individuals in a Mental Health Crisis

Student Researcher: Braylee Stone, B.S. Psychology, B.S. Criminal Justice

Faculty Mentor: Dr. Stephen Eliason

One of the most prominent issues that law enforcement deals with is offenders with known mental health problems. This is more difficult in rural areas where mental health resources are not available for law enforcement officers or communities. This is why we see such a spike in law enforcement having negative interactions with mental health suspects as the frequency of interactions correlates with higher risk. What are specific challenges faced by law enforcement in rural communities in Montana when handling incidents that involve suspects who suffer from mental health issues?

Acute Effects of Pilates on Flexibility, Mobility, and Nonspecific Low Back Pain

Student Researcher: Jacqueline Threefingers, B.S. Health & Human Performance

Faculty Mentor: Dr. Alex Shafer

The primary purpose of this study is to further test the theory of Pilates acute effects on flexibility, mobility, and nonspecific low back pain (LBP). Subjects will be recruited from local Pilates classes. For the initial testing subjects will complete a questionnaire and functional fitness assessments that are specific to mobility and flexibility. The second session will consist of the same assessments and the data will be analyzed using inferential statistics such as dependent t-test and effect size will be calculated using Cohen's d. This study may suggest that individuals can improve their flexibility, mobility, and nonspecific LBP using Pilates exercises.

Titin...a New Piece in the Puzzle of Neurodegenerative Disease

Student Researcher: Lauryn Torres-Hernandez, B.S. Biology

Faculty Mentor: Dr. Lynn George

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease that results in the death of motor neurons, which control muscle and voluntary movements. As motor neurons deteriorate, individuals lose the ability to speak, eat, and eventually breathe. The George Lab aims to characterize the association between ALS and mutations in the Elongator complex and investigate how Elongator may regulate the production of the titin gene, serving as a potential mechanism of disease. Using immunohistochemistry, we quantified titin levels in motor neurons of *Elpl* conditional knockout mice where Elongator is selectively ablated in motor neurons. Mutations in the titin gene are associated with ALS. While this association is presumed to be due to titin's role in muscle, we hypothesize that its connection to ALS is via its function in the neuronal nucleolus and that its levels are regulated by Elongator.

Mapping the Binding Site for the Interaction of B7-H3 with Midkine Using Protein Complementation Assays

Student Researcher: Lauryn Torres-Hernandez, B.S. Biology

Co-Authors: Rebecca Chambers, Dalton Theilen, Spencer Walters, Christy Derenburger

Faculty Mentor: Dr. Richard Warner

B7-H3 (or CD276), a transmembrane protein known for its high expression in cancer cells and immunosuppressive functions, shows promise for immunotherapy targeting in Melanoma. To identify B7-H3 associated proteins, we previously performed immunoprecipitations along with mass spectrometry. The top candidate from these experiments was a growth factor, midkine (MDK). We have developed a protein complementation assay protocol to confirm the direct interaction of these two proteins. Our experimental design included fusing complementary fragments of a reporter protein, the Gaussia luciferase enzyme, to B7-H3 and MDK. We have made the PCA vectors with these two genes cloned into them and we are testing for interactions by PCA experiments. Importantly, we are testing whether heparin, a known midkine binding molecule, has a positive or negative effect on B7-H3 interactions. Ultimately, we hope our analysis of this novel immune protein interaction will show potential for successful immunotherapy for melanoma.

Identification of Fish Species in Lake Josephine Using eDNA

Student Researcher: Sterling Trenary, B.S. Biology

Faculty Mentor: Dr. Jason Comer

This experiment investigates general biodiversity and specific fish species inhabiting Lake Josephine, adjacent to the Yellowstone River, and compares these findings to preliminary expectations. Environmental DNA (eDNA) is the genetic material of organisms found in the environment. In this experiment, we extracted the eDNA from the Lake Josephine sample, used next-generation sequencing, and then used bioinformatic analyses to identify local biodiversity, in particular fish species. The first round of sequencing gave us 5.45k reads, averaging 460 base pairs, a total product of 167.71Mb of data. A second sequencing run was completed using a different method to increase the amount of sequence data. This study will provide a better understanding of the biodiversity of Lake Josephine, furthering our understanding of the local and global ecology.

Mental Healthcare in the Criminal Justice System, Is it Lowering Recidivism?

Student Researcher: William Ullery, B.S. Criminal Justice

Faculty Mentor: Dr. Stephen Eliason

This research will seek to answer whether mental healthcare in the criminal justice system is influencing recidivism. Prior findings have suggested community-based programs, mental health courts, cognitive therapy, and other mental health programs have significant influence on recidivism rates. This project surveyed local criminal justice professionals' opinions on the correlations of these interventions as well as the effects of access to medical insurance, public stigmas, and other related issues. The findings of the surveys as compared to prior research shed light on what is effective in terms of utilizing mental health care to reduce recidivism.

CAMSAP and Valproic Acid '24

Student Researcher: Madison Walker, B.S. Chemistry

Faculty Mentor: Dr. Jana Marcette

CAMSAP-1 is a genetic mutation in humans that has been linked to a specific, life altering form of seizures. We are working with the Undiagnosed Diseases Network at Washington University School of Medicine to conduct a drug screen to help in finding a useful treatment for seizures. The focus of this research is Valproic Acid, an anticonvulsant that can be used to treat some forms of seizures, the management of bipolar disorders, and the prophylaxis of migraine. Valproic Acid interacts with the HDAC1 enzymes that influence and regulate gene expression. By inhibiting these enzymes and influencing the subsequent gene expression, focusing on the CAMSAP mutation, our drug screen will hopefully yield some possible candidates for further testing.

Income and Parenting a Closer Look

Student Researcher: Kendall Weinberger, M.S. Psychology

Faculty Mentor: Dr. Matthew McMullen

The purpose of this analysis is to determine whether the level of income a family makes affects how parents raise their children, including the values such as political beliefs they pass on to their children. Data collected from the Pew Research Center was analyzed in R-Studio to measure factors related to family lifestyles, satisfaction of having children, and whether parents believed school was adequately providing for their children. Analysis of variance was used to determine the relationship between income level and parents' views of caring for their children including what characteristics the parents wanted to instill in their children.

Job Security and Fertility Intentions: Policy Implications for Increasing Birth Rates

Student Researcher: Sujin Woo, B.A. Political Science, B.S. Business Administration

Faculty Mentor: Dr. Hope Dewell Gentry

The study examines the impact of job security on the desired number of children in developed countries, suggesting that employment stability can increase fertility intentions. It uses 2018 General Social Survey data and SPSS analysis to propose policy recommendations for improving birth rates through job stability.

The Effects of Quercetin on Seizure like Activity in *Caenorhabditis elegans* Mutants

Student Researcher: Braiden Worden, B.S. Biology

Faculty Mentor: Dr. Jana Marcette

Our experiment on *Caenorhabditis elegans* aims to provide relief for patients with a clinically recognizable neuronal migration disorder caused by CAMSAP1 mutations. CAMSAP1 is thought to stabilize microtubule minus ends and to be involved in cell signaling. There are currently no treatments for this disorder. *C. elegans* have a homolog for the CAMSAP1 gene called PTRN-1. The worms were grown on NGM (Nematode Growth Medium) plates without calcium and convulsions were induced. We delivered the drug Quercetin, chosen because of its ability to downregulate cell signaling pathways impacted by CAMSAP, into the worms by using a "spot dead" method. Quercetin seems to be effective; however, further testing is required.

Creative Writing

Poetry Readings

Students: Sylvia Ambuehl, Garth Howley, Savannah Phillipson, Sebastian Sapnu

Faculty Mentor: Dr. Bernard Quetchenbach

Poetry readings presented by the spring 2024 creative writing class.



2024

MSU

BILLINGS

JURIED

STUDENT

EXHIBITION



Emmitt Bartsch

weightin'

Watercolor on aqua board. Two 6 in. x 6 in. tiles.



Nathan Bohan

Untitled

Linocut print. 11 in. x 8 in.



Tazia Brester

Off-brand Thinker

Ceramic. 8 in. x 4 in. x 5 in.



Faith Carreno

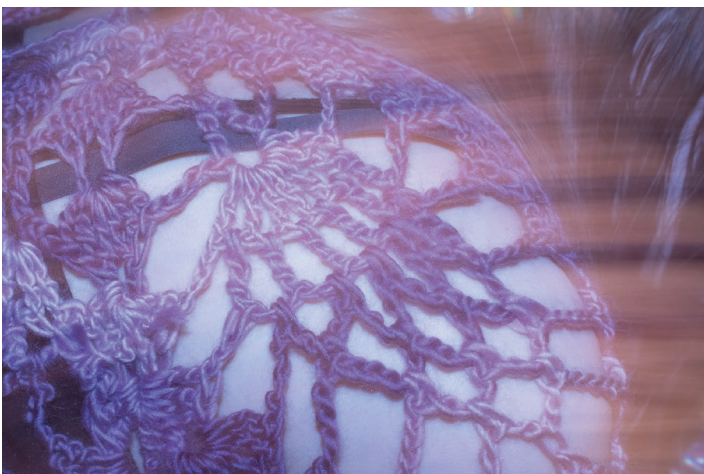
Merry Christmas, My Dear

Sumi ink and watercolor. Both roughly 18 in. x 24 in.

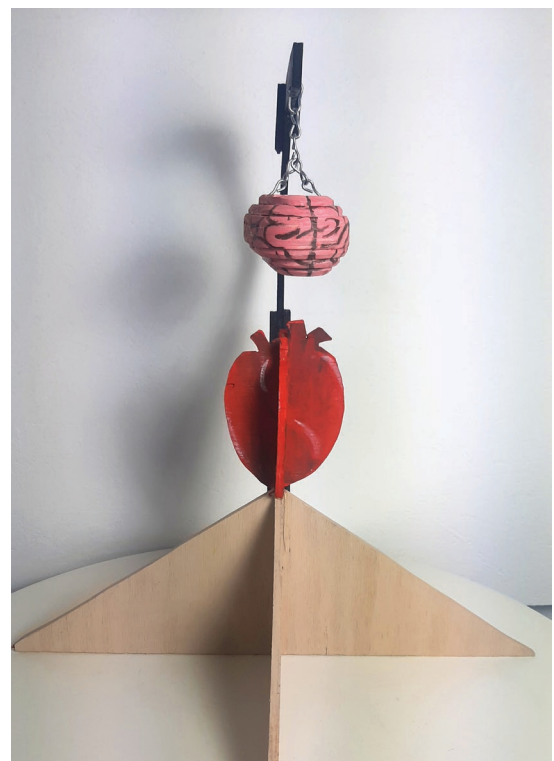


Isabelle Carroll
Self Portrait (Lepidopteran) 1
Archival pigment print. 12 in. x 8 in.

Isabelle Carroll
Self Portrait (Lepidopteran) 2
Archival pigment print. 12 in. x 8 in.



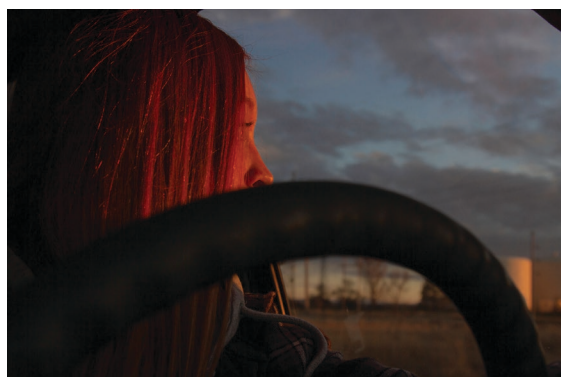
Isabelle Carroll
Cold Shoulder
Archival pigment print. 12 in. x 8 in.



Sierra Covert
Balancing the brain and heart
Plywood.



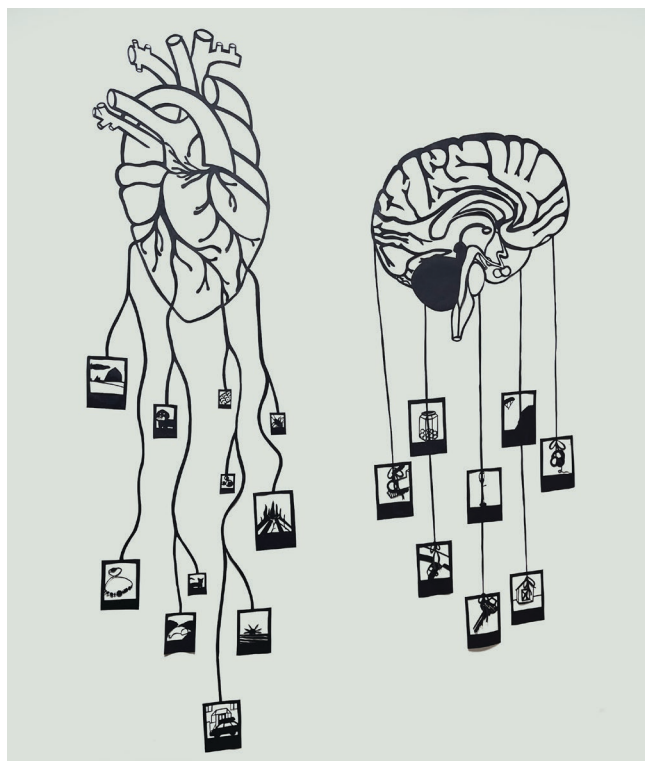
Olivia Hoke
On the Horizon
Photography. 5280x2160 pixels.



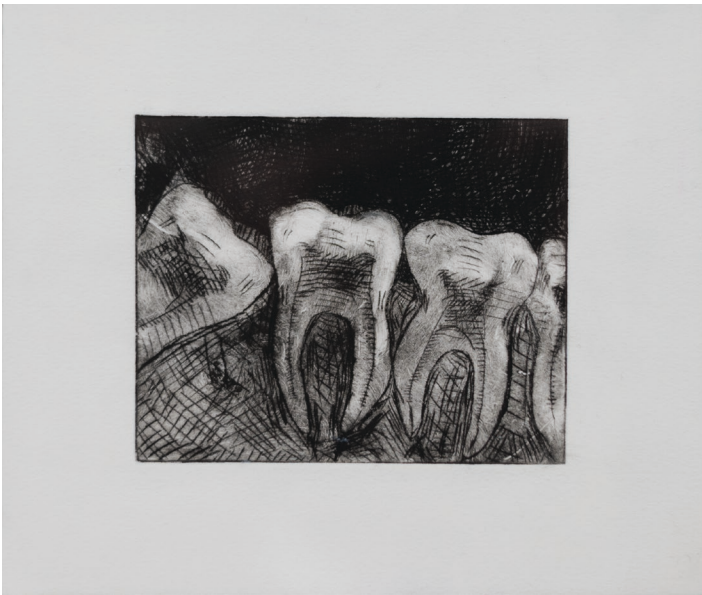
Olivia Hoke
Radiant Spectacle
Photography. 2500 x 1667 pixels.



Jaedon Hopson
CROSSROADS
Digital print. 16 in. x 20 in.



Isabelle Johnson
"memories of a heart and mind."
Black construction paper.
Approximately 65 in. x 41 in.



Karmen Joki
Crowding Pain

Intaglio print (Akua ink on BFK Rives paper).
7 in. by 8 in.



Blake McCrary
Object Permanence

Clay, acrylic, alcohol ink, paint markers, and assorted
embellishments. 13 in. x 13 in.



Kaylin Millsap
Help for Homeless Parasites

Mixed media. 16 in. x 12 in.



Kaylin Millsap
*Microbial Elegy for my Aunt's Swamp
Cooler (Legionella Pneumophila)*

Oil on Arches paper. 15 in. x 11.5 in.



Ashlynn Morser
Black Out
Graphite. 11 in. x 14 in.



Daphne Picard
The Ongoing Queen
Pencil, collaged paper, glue. Approx. 15 in. x 15 in.



Isac Pratt
Toxic Connection
Photography. 16 in. x 20 in.



Maddi Smith
Memento Mori in Plastic
Mixed media. 6.5 in. x 5 in. x 4.5 in.



Emily Tiry
Exploration
Oil paint. 15.5 in. x 22 in.



Magnolia West
Shunka Warak'in, Wendigo, Flathead Lake Monster
Ceramics. 12 in. each.



Magnolia West
flower petals from broken windows
Video.



Ethan Whitefox
Tripped Out Terror
Short Film.



Ciel-Nicole Williams
Undulation
 Ceramics. 10 in. x 15 in. x 26 in.

Ciel-Nicole Williams
Untitled Rings
 Metals. 2 in. x 2 in.

JUROR STATEMENT — JIM ZIMPEL

When asked to serve in a curatorial role for the exhibition at MSUB, I considered the best way to approach a group of submissions composed of very disparate works - both in media, artistic choices, and subject matter. Ultimately, as is the case when conducting a course, I chose to select and evaluate works primarily on the overall dedication, appropriate level of craft, and execution I felt was present in each project. As an educator, artist, and gallery/museum patron, I often encounter work that is different to the work I produce myself, and continually revisit works I once didn't appreciate (and may now, or still may not appreciate), find new favorites, and gain respect for a variety of artistic approaches, styles, and artists. Hopefully, as you continue in your career and on your path, each of you will push yourselves to do the same.

The exhibition represents an eclectic mixture of traditional art practices, craft-oriented works, and less established additions to the field. Throughout the show glimpses of Leonora Carrington, Claes Oldenburg, Jackie Ranken, Sam Raimi/Trent Harris, Maria and Julian Martinez, and Pipilotti Rist (to list just a few) can be found. The show embraces the relevance/validity/and need for the variety of forms of artistic expression one can, and should, find within the field of contemporary art.



Juror Jim Zimpel, Associate Dean of the Montana State University College of Arts & Architecture and an Associate Professor of Sculpture and Extended Media

Thank You to Our Research & Creativity Symposium Judges

Dr. Melinda Aley, Assistant Professor, Communication

Austin Bennett, Instructor, City College

Dr. Joseph Bryan, Professor, History

Victoria Contreras, eResources and Technical Services Librarian, Library

Daniel Funderhide, Access Services Librarian, Library

Bryan Grove, Assistant Director of Advising

Hashini Herath, Assistant Professor, Biological and Physical Sciences

Natalie Preston, Executive Assistant to the Chancellor

Dr. Matt Queen, Professor, Biological & Physical Sciences

Leigh Ann Ruggiero, Assistant Professor, English, Philosophy & Modern Languages

Nathan Sonnenschein, User Services & Experience Librarian, Library

Erika Sturn, Chemical Safety Officer, Biological & Physical Sciences

Joann Stryker, Director, Institutional Research

Kathleen Thatcher, Director, Assessment and Accreditation

Zack Thatcher, Program Coordinator, College of Liberal Arts & Social Sciences

Dr. Amber West Martin, Director, Academic Support Center

Eileen Wright, Director, Library

Special Thanks & Appreciation

Chancellor Dr. Stefani Hicswa

Provost Dr. Sep Eskandari

Jenny McCullough – Keynote Speaker

Patrick Williams – Multimedia Designer

Robin Earles – Art Gallery Director

SUB staff – Event Setup and Coordination

IT staff – Poster Printing and Sound/Tech

Jenay Cross – Research Symposium Committee

Cindy Bell – Research Symposium Committee

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