# TENTH ANNUAL MONTANA STATE UNIVERSITY BILLINGS RESEARCH AND CREATIVITY SYMPOSIUM A P R I L 21, 2023

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Lisa Blomquist Grandmother in Me



# **2023 SYMPOSIUM**

Montana State University Billings will hold its tenth annual Research and Creativity Symposium (RCS) in a mixed online and in-person format. Sponsored by the Office of Grants and Sponsored Programs, the Office of the Provost, the University Honors Program, 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.

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

APRIL 20			
5:00	Reception for Juried Student Exhibition LA first floor		
		APF	RIL 21
12:15	Symposium Welcome from <b>Chancellor Dr. Stefani Hicswa</b> Keynote Introduction by <b>Provost Dr. Sep Eskandari</b> (Glacier Room and WebEx live streaming)		
12:25	Keynote Speaker <b>Dr. Jennifer Lynn</b> , Professor of History		
12:40	Oral Presentations		
Contemporary and Ancestral Interpretation of the Sleeping Buffalo Rock Nicholas Redgrave			Montana's Gubernatorial Ban of Transgender Citizens Changing their Sex Designation Amanda Rouse
<b>Time to Take Action</b> Sydney Gustin		<b>Poetry Reading</b> Samantha Eder, Luke Manthey, Lindsay Stewart, Savanna Philipson, Michael Chandler, Steve Paulson, Erin Watson	
1:15	Poster Session		
2:30	Awards and Closing Remarks by Provost Dr. Sep Eskandari		

# **KEYNOTE SPEAKER**

### Dr. Jennifer Lynn

Professor, Department of History

Dr. Jen Lynn is a Professor in the Department of History, Co-Director of the Women's and Gender Studies Center at Montana State University Billings, and Chair of Academic Senate. She is originally from Wibaux, Montana, completed her B.A. in History at MSUB, and received her PhD from the University of North Carolina Chapel Hill in Modern German History and Women's and Gender History. She has been at MSUB since 2011. Her interest in photography and media closely inform her research and teaching related to modern Germany, women's and gender history, and visual history. She is also actively engaged in issues directly related to women's empowerment, equity, safety, and access to healthcare. She volunteers for Planned Parenthood of Montana and is a SANE Advocate for the YWCA. As Co-Director of the Women's and Gender Studies Center she works closely with campus and community partners to raise awareness about issues related to gender equality and to promote diversity and inclusion. Her book, *Contested Femininities: Representations of Modern Women in the German Illustrated Press*, 1920 – 1960 is forthcoming from Berghahn Books.

### Saving Democracy: What Research, Creativity, and Civic Engagement Mean for our Future

The role of the university is fundamental to democratic practices. Research, creative endeavors, collaboration and debate, civic engagement, and academic freedom are central to creating a pluralistic, democratic, and more equal society. Finding our intellectual home, asking new questions, challenging the status quo, working across disciplines – while developing the essential skills of critical thinking, problem solving, teamwork, and communication – are vital to the mission of universities and the foundation of democracy.

## THANK YOU TO ALL FACULTY MENTORS

Dr. David Butler Dr. Madison Collins Dr. Jason Comer Dr. Kari Dahle-Huff Dr. Hope Dewell Gentry Dr. Stephen Eliason Dr. Lynn George Dr. Susan Gilbertz Dean Tami Haaland Dr. Jennifer Lynn Dr. Ambrin Masood Dr. Paul Nash Dr. Kameron Nelson John Pannell Dr. Alex Shafer Dr. Shu-Chen Tsai Dr. Richard Warner Dr. Jeffrey Willardson Dr. Daniel Willems

# **Abstracts**

## Exploring the changes that were brought forth by the Iranian Revolution in Marjane Satrapi's *The Complete Persepolis*

Student Researcher: Krystal Adams Faculty Mentor: Dr. Jennifer Lynn Degree: B.A. History

In 1979, Iran underwent a governmental upheaval known as the Iranian Revolution and transitioned into a government with the clergy as the overseers. During this time the Iranian government under Reza Pahlavi was overthrown by Ayatollah Ruhollah Khomeini. Under Khomeini's control the country rejected westernized ideologies and brought forth a religious regime. *The Complete Persepolis* is a graphic novel that explores the childhood and young adulthood of Marjane Satrapi during this time period. Satrapi gives us a peek into the life of someone with firsthand experiences during the time of the Iranian Revolution and the aftereffects that occurred with the new regime. The three major themes explored are: the struggle of unveiling and reveiling connected to the fight for equal rights for women; how women found ways to protest without violence (wearing makeup, unveiling behind closed doors, and attending university); and how Satrapi's push and pull with her western and Iranian formed her identity.

#### Who is Jerusalem? An Examination of Guy Delisle's Jerusalem: Chronicles from the Holy City

Student Researcher: TJ Armstrong Faculty Mentor: Dr. Jennifer Lynn Degree: B.A. History

Jerusalem, the Holy Land, has compelled scholars, religious devotees, and humans from all over the world to visit and explore. Earliest accounts of life date back thousands of years before the rise of the three primary religions, Christianity, Judaism, and Islam, which currently perpetrate most aspects of the city. From the onset of Israel shortly after the end of World War II into the twenty-first century, there have been a series of conflicts such as the Six-days War, both intifadas, and two particularly provocative massacres in Hebron which have spurned religious animosity and civil strife. In this paper, I will examine the various civil and religious entities present in *Jerusalem: Chronicles from the Holy City*, with the goal of elucidating aspects of daily life which perpetuate infighting. Much of this can be attributed to dehumanization and a lack of knowledge pertaining to, or sympathy for, those outside of particular religious affiliations. What Delisle makes most clear throughout his graphic novel, is that those caught in the crossfire and chaos are ordinary humans.

# Effects of Culture on the Emotional Well-Being and Resilience among American Indian Freshman Students

Student Researcher: Donni Barman Faculty Mentor: Dr. Ambrin Masood Degree: B.S. Psychology

The culture of most universities is very different for American Indian (AI) students with close ties to their traditional communities. "Traditional" in this sense means multiple interconnections of emotional, physical, intellectual, and spiritual identity that define expectations for the American Indian way. This study will explore the impact of culture on AI college freshman students' emotional well-being and resilience. Participants took part in a series of focus group sessions where they viewed recorded interviews with American Indian Elders and successful MSUB AI graduate students. Participants were asked to discuss the videos considering their own campus experiences related to their culture and how these experiences affected their emotional well-being and resilience. The themes developed through these discussions highlight the complex impact of culture on the emotional well-being of AI students, along with the resilience gained through the inspirational stories of their Elders and other successful AI students. The results will further help broaden our knowledge about coping skills used by AI students, and how they are able to stay resilient in mainstream society.

#### **Correlation of Labelling Theory and Recidivism in Women Offenders**

Student Researcher: Tori Cundiff Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice, B.S. Sociology

Recidivism is an ongoing issue in the criminal justice field, and reducing these rates is critical in creating a safer and more crime-free community. In this study, we survey women offenders at a local facility to help determine the effect of labels on recidivism. We will be providing a survey to facility residents regarding their perception of labels and if they feel they have been labelled. Results will help in understanding whether negative labels directly or indirectly affect criminal lifestyles. The presentation will discuss the correlation found between recidivism rates and labelling, if any. We will be able to provide information regarding which labels were the most common and which labels may or may not have had the greatest effect on these women's criminal lifestyles.

# Functional Behavior Assessments and Behavioral Intervention Plans: Successful or More Work?

Student Researcher: Tayler Davison Faculty Mentor: Dr. Kari Dahle-Huff Degree: B.Ed. Interdisciplinary Studies

Special education staff members and classroom teachers are held to a certain standard of dealing with behaviors through functional behavioral assessments (FBAs) and behavioral intervention plans (BIPs). However, these may not be the best practices when dealing with touch tier three behaviors. We are seeing numbers of behaviors and intensity of behaviors rise across the nation. FBAs and BIPs have been a staple in tier three behavior intervention, and have worked in the past, but it is unclear if they are working for our current population of students and whether there might be better alternatives to support student behaviors. This project explores the State of Montana requirements for tier three interventions are working. Based on the findings, I will be giving policy recommendations to the State of Montana to help improve behavior intervention processes.

#### Characterizing S. aureus Hemolysis and Reactive Oxygen Species Production

Student Researcher: Wynter Doyle Faculty Mentor: Dr. Madison Collins Degree: B.S. Pre-Professional Nursing

There is a demonstrated role for the SaeR/S gene regulatory system in *S. aureus* that influences the ability of the immune system to perform effectively. Although initially considered a two-component system, SaeR/S is composed of four genes: *saeP*, *saeQ*, *saeR*, and *saeS*. The roles of *saeP* and *saeQ* are yet to be fully discovered, but previously published work suggests that *saeP* influences the regulation of the SaeR/S virulence gene. Using isogenic deletion mutants in a clinically relevant strain of *S. aureus*, we will continue to characterize USA300 $\Delta$ *saeP* and USA300 $\Delta$ *saeQ* both with and without neutrophil challenge. We will begin to characterize these new *S. aureus* mutants by quantifying hemolysis patterns after growing on human blood agar. Additionally, we will analyze how these *S. aureus* mutants influence the production of neutrophil reaction oxygen species (ROS) using chemiluminescent (i.e., luminol, isoluminol) and fluorescent dyes (i.e., Amplex Red<sup>TM</sup>). With these data, the role and impact of SaeP and SaeQ may begin to be understood during the early stage of infection. Collectively, these studies will fill clinically relevant gaps in our understanding of how *S. aureus* can initiate infection in healthy individuals and virulence factors that can be targeted for novel therapeutics or vaccine development.

#### Characterizing the in vitro growth patterns of novel S. aureus mutants

Student Researcher: Dominic Estes Faculty Mentor: Dr. Madison Collins Degree: B.S. Biology

Staphylococcus aureus (S. aureus) is a predominant infectious pathogen that causes significant morbidity and mortality and places a considerable burden on the healthcare industry. Although initially considered a hospitalacquired pathogen, community-associated strains have emerged that have increased ability to avoid normal immune cell killing and cause disease in healthy individuals. Mechanisms for how S. aureus can escape the build in immune defenses of the body are incompletely understood. It is recognized that a subset of the human immune system (neutrophils) are essential for resolution of S. aureus infections, but S. aureus has evolved several mechanisms to circumvent killing by these potent innate immune cells, mainly via the production of virulence factors during infection. The regulation of these virulence factors are primarily orchestrated by bacterial two-component systems that sense the host environment and respond accordingly via the expression of various genes. Specifically, the SaeR/S two-component system has been shown to be essential for evasion of human neutrophil killing and that the SaeR/S system in S. aureus influences the ability for the immune system to perform effectively. Although initially considered a two-component system, SaeR/S is actually composed of four genes: saeP, saeQ, saeR, and saeS, and the roles of saeP and saeQ have yet to be fully defined. We have begun to characterize the role of these accessory genes by using a mutants from a clinically relevant strain of S. aureus deficient in either saeP or saeO. Initial experiments have focused on quantifying the growth patterns of these mutants during in vitro broth culture. Growth curve experiments using Tryptic Soy Broth (TSB) media (supplemented with or without glucose) were performed with  $\Delta saeP$ ,  $\Delta saeQ$ , wildtype S. aureus and our well characterized mutant,  $\Delta saeR/S$ .

#### **Perception of Law Enforcement**

Student Researcher: Kyra Fortner Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Sociology

Individuals' perceptions of law enforcement can affect our communities; if people do not trust law enforcement in their community, they are less likely to report a crime and may try to take matters into their own hands. Getting people's perspectives on law enforcement can help open conversations to what law enforcement needs to improve on and work toward so people can trust and confide in them. Improvement could be different in every community and that is why it is so important to listen to what people in your community have to say. We are hoping to find out why some people may not trust the police, and possible changes they could undergo to help with their public perception.

# Does the effect of an individual's lack of assistance have a direct correlation to their decision to terminate a pregnancy?

Student Researcher: Denae Friesen Faculty Mentor: Dr. Hope Dewell Gentry Degree: B.S. Sociology

There is a lack of assistance to a lot of individuals in the U.S., which directly affects people's decision making, especially in higher stress situations including important healthcare decisions. This paper argues that there is a direct correlation between the lack of availability of assistance to individuals and the decision to terminate a pregnancy. This paper will go on to explain the presumed correlation between the two variables of a woman's choice to get an abortion and general consensus of feelings towards assistance to the poor utilizing information from different texts and the 2018 GSS Survey. This paper aims to demonstrate that without physical, emotional, financial and mental assistance, women will more likely opt to make the decision to terminate a pregnancy rather than carry to full term.

#### **Perception of Law Enforcement**

Student Researcher: Cole Goodale Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice, B.S. Sociology

Individuals' perceptions of law enforcement can affect our communities; if people do not trust law enforcement in their community, they are less likely to report a crime or turn someone in for committing a crime and may try to take matters into their own hands. Getting people's perspectives on law enforcement can help open conversations to what law enforcement needs to improve on and work toward so people can trust and confide in them. Improvement could be different in every community and that is why it is so important to listen to what people in your community have to say. We are hoping to find out why some people may not trust the police, and possible changes they could undergo to help with their public perception.

#### How Education Influences Television Watching

Student Researcher: Makiah Gotschall Faculty Mentor: Dr. Hope Dewell Gentry Degree: B.S. Criminal Justice

Television watching has escalated exponentially since the invention of the TV in 1927. People have become dependent on this form of entertainment, which can have a direct impact on many different factors in people's lives. Sedentary behavior associated with TV watching can lead to health concerns, especially for children and the elderly. In this study, we will consider all of the triggers for watching television, the concerns that come with excessive television watching, and how income and education can affect these outcomes. This study hypothesizes that the more educated you are the less television you will watch. To test this hypothesis, GSS 2018 data was utilized to review hours of television watched per day compared to an individual's education level, with an expected negative relationship between these two variables.

#### The Labeling Theory and Recidivism Rates on Woman Offenders

Student Researcher: Carson Green Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice

This project utilizes a survey of residents at a women's community correction center to assess the correlation between the labeling theory and recidivism rates. The survey includes questions that challenge the residents to think about how criminal labels have either caused them to offend in the first place or caused them to reoffend after their original charge.

#### The Correlation Between Mental Illness and Criminality

Student Researcher: Samantha Green Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice

The focus of this research is to find a correlation or pattern between mental illness and criminality amongst individuals with a criminal history. This topic is essential because it can help explain the reasons behind criminal activity and the effects a mental illness diagnosis label can cause. Studies have shown that individuals with mental disorders are more often the victim than the perpetrator of a crime, which can be seen in cases of schizophrenia and violence. Individuals with major mental illnesses, like schizophrenia, are more likely to be arrested and subjected to injustices within the criminal justice system. This study will investigate how widespread the issue of mental illness and crime is, along with whether the stereotypes/labels surrounding a mental disorder could play a part in law enforcement contact. By conducting anonymous surveys that ask about mental health, treatment, and criminal histories, we expect to find significant correlations between mental illness and criminal illness and criminal behavior/activity.

#### Effects of Peripheral Vision on Balance in Healthy Individuals

Student Researcher: Lillianna Hanson Faculty Mentor: Dr. Alex Shafer Degree: B.S. Health & Human Performance

There is no question that vision plays a predominant role in performance, accuracy, precision, and efficiency in motor learning and control. The role of vision is essential to our everyday movements, so much so that we aren't consciously aware of the significant impact it has on our ability to maintain postural control and balance every second of every day. A clinical understanding of the cause-and-effect relationship between vision and balance as well as the impairment of vision and disruption to postural control can assist with diagnosing sensory and motor deficits and disorders and developing effective and efficient treatments that can bring individuals with these disorders back to a level of successful functioning, improving their quality of life and all realms of health and assessment. To investigate the role that vision, specifically central and peripheral vision, has on the body's ability to process proprioceptive feedback and maintain postural control and balance. Post-hoc analyses will be used to determine significant differences between conditions. Intervention, or treatment administered will be a "no central vision, leaving their peripheral vision clear for peripheral visual feedback for treatment 1. The second treatment will be "no peripheral vision" impairment; participants will be wearing glasses that black out their peripheral vision, leaving their central vision clear for central visual feedback.

#### Toxoplasma Gondii Sensitivity to Beauvericin and Valinomycin

Student Researcher: Kaidyn Harris Faculty Mentor: Dr. Paul Nash Degree: B.S. Biology

*Toxoplasma gondii* is an obligate intracellular parasite that has been seen within implications surrounding pregnancy complications and AIDS deaths. Toxoplasma has the interesting effect of protecting host cells from killing by the mushroom derived toxins Beauvericin and Valinomycin. A remaining question, however, surrounds toxoplasma's ability to protect itself as it protects its host. We tested three strains of Toxoplasma: RH, S1T, and Me49, both in extracellular and intracellular conditions for susceptibility to these two toxins. For extracellular toxoplasma, we added the toxins directly to the parasites. For intracellular toxoplasma, we first infect El-4 with toxoplasma to then treat the infected cells with one toxin or the other. In both cases, El-4 were used to verify the effectiveness of the toxins. After two weeks, the number of wells in which toxoplasma is growing was counted and used to generate a TCID50 statistical analysis for result interpretation.

#### How the Incarceration of Parents Can Affect a Person's Thought Process

Student Researcher: Hannah Hayden Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice, B.S. Sociology

This study seeks to understand the effects and experiences many people have had to go through when dealing with the incarceration of a parent or parents. Previous studies focus on incarcerated parents with not much focus on the lives and thought processes of their children. To further this research, we surveyed individuals 18 and older regarding how they have been affected by their parent or parents' incarceration.

#### The Connection Between Mental Illness and Criminality

Student Researcher: Anna Howel Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice

This project explores the correlation between mental illness and criminality for those already in the criminal justice system, which may help in understanding the underlying reasons offenders commit crime. We hypothesize that those with unaddressed mental illness may be more likely to become involved with criminal activity. Individuals with a history of mental illness and related issues are more likely to become victims, as well as being more likely to be incarcerated than others with no or a more minor mental illness. We hope to find how prevalent this history of mental health disorders is in the population being surveyed, in addition to whether their mental health and the associated labels led them down the path of criminal behavior. Expected results are that many of the offenders we survey will state that their mental health and mental illness struggles were prominent at the time they committed criminal behavior, as well as in their lives leading up to that point. We also are expecting to see a difference in the type of mental illness or the level of struggle that led to criminal acts.

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

Student Researcher: Lamiya Husen Faculty Mentor: Dr. Lynn George Degree: B.S. Biology

Amyotrophic lateral sclerosis, also known as ALS, is a progressive neurodegenerative disease that causes the death of motor neurons. These motor neurons are primarily responsible for controlling muscle and voluntary movements. As the motor neurons deteriorate, individuals lose the ability to speak, eat, and even breathe. Despite being the most common motor neuron disease, there are currently no effective treatments available for ALS, and most patients typically die within four years after diagnosis. While familial ALS can be inherited, approximately 90% of cases are sporadic, meaning that the disease is not passed down from one generation to the next. Although the causes of sporadic ALS are not well understood, a recent study found that an early characteristic shared by both familial and sporadic ALS is the shrinkage of the nucleolus, the site of ribosome biogenesis. Neurons are some of the largest cells in the body and thus are particularly dependent on efficient protein synthesis which in turn depends on ribosomes. The George lab recently discovered the presence of a novel protein, titin, in the nucleolus of neurons. Titin is the largest protein encoded by the human genome, and although it is well-known for its function as a molecular spring in the sarcomeres of cardiac and skeletal muscles, a function for titin in neurons has never before been described. Our current project aims to identify the specific neuronal and glial cell types that contain titin in their nucleolus.

#### Cloning a Soluble Version of the B7-H3 Gene to Identify Protein Interactions in Melanoma

Student Researcher: Hank Jagodzinski Faculty Mentor: Dr. Richard Warner Degree: High School Dual-Enrollment

B7-H3 has been recently confirmed to have immune inhibitory functions in mouse models of carcinoma. This makes B7-H3 an exciting candidate for potential immunotherapy in cancer, as immune inhibitory proteins can be blocked to re-activate anti-tumor protective immunity. To identify B7-H3 associated proteins, we previously performed immunoprecipitations along with mass spectrometry. The top candidate identified from these experiments was a growth factor, midkine (MDK). MDK stimulates growth of some cancer cells and may be an interesting protein to target as part of B7-H3 signaling. Our goal is to develop a protein complementation assay (PCA) to confirm the direct interaction of these two proteins. To do this we will fuse complementary fragments of a reporter protein, Gaussia luciferase enzyme, to B7-H3 and MDK. Careful preparation has been undertaken to ensure success of the interaction of B7-H3 and MDK. We know that molecular cloning requires the correct placement of the insert into the vector to effectively produce the gene products. Our strategy allows for the creation of our fusion proteins (as seen in the objective diagram) to ultimately analyze this novel protein interaction in a cellular system and discover the potential of targeting this interaction in melanoma.

#### The Labeling Theory and Recidivism Rates of Women Offenders

Student Researcher: Isabella Jensen Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice, B.S. Sociology

Reducing recidivism is one of if not the main goals of the correctional system. Unfortunately, when one is convicted of a crime, they are given a label by society that can be hard to erase, even after serving time or completing parole/probation. The labeling theory assumes that once one is given a label and sees the reaction from members in society towards them, they internalize the label and decide to continue down the criminal path with the label they were given. There may be a strong correlation between the labeling theory and recidivism rates. This project surveyed a community corrections center in Billings to fully assess whether the labeling theory can explain why participants offended in the first place or reoffended after their original charge.

#### Student Self-Assessment in a High School Science Classroom

Student Researcher: Hannah Kellinger Faculty Mentor: Dr. Kari Dahle-Huff Degree: M.Ed. Interdisciplinary Studies

According to educational researcher John Hattie (2012), visible teaching and learning are vitally important to creating an environment in which students can thrive but can only occur when learning is the explicit goal. When both teachers and students reflect on the goal, its challenge, and provide feedback on the goal, visible learning is taking place. In explaining what visible learning is, Hattie asserts that "what teachers do matters" and that teacher clarity is essential for students to get the entire benefit of learning a specific content. One facet of teacher clarity is making sure students understand what they need to learn and how they know when they've successfully learned the material. To study this concept in my own high school science classroom, I implemented learning targets, or learning intentions, as well as success criteria for one unit of study. Learning targets are what students are expected to know while success students understand when they've met the target. A pre- and post-assessment was given to assess student learning increase after implementation of learning targets.

#### Montana clinically licensed behavioral health providers burnout rates

Student Researcher: Angelica Lechocinski Faculty Mentor: Dr. Kameron Nelson Degree: B.S. Psychology

Provider burnout is an area of concern not only for the providers but also for those looking for treatment and for the community. This research focused on surveying clinical behavioral health professionals to identify areas of concern and improvement to address gaps in client care and providers' needs. Methods: We gathered the contact information of those listed by the Montana Department of Labor and Industry as licensed psychologists, clinical social workers, clinical professional counselors, and marriage and family therapists. Once the contact information was gathered a survey was created and sent out to providers. With the data gathered we hope to not only make the needs of providers and areas of concern known, but we also plan to identify some methods or programs that are specific to Montana that can be implemented to help close those gaps in care and support providers to ultimately help individuals receive the care they need.

#### Identifying SaeR/S-dependent mechanisms of S. aureus in altering neutrophil autophagy

Student Researcher: Bryn Lien Faculty Mentor: Dr. Madison Collins Degree: B.S. Biology

Staphylococcus aureus (S. aureus) is a predominant infectious pathogen that causes significant morbidity and mortality and bears a considerable burden on the healthcare industry. Although initially considered a hospitalacquired pathogen, community associated strains have emerged that avoid normal immune cell killing and cause disease in healthy individuals. Mechanisms for how S. aureus can escape the defenses of the body are incompletely defined. Others have demonstrated a role for the SaeR/S gene regulatory system in S. aureus that inhibits the proper function of human neutrophils, the most important immune cell involved in the killing of S. aureus. Results from the proposed experiments will determine how SaeR/Sregulated factors influence neutrophil autophagy and other mechanisms of cell turnover and death. We will utilize a clinically relevant strain of S. aureus USA300 and an isogenic deletion mutant deficient in SaeR/S (USA300*\DeltasaeR/S*) to complete fluorescent microscopy colocalization experiments. Autophagy specific markers (i.e., LC3/LAMP1) for human neutrophils will be analyzed microscopically. Confirmation of SaeR/S-dependent changes in autophagy will be confirmed with Western Blot analysis of LC3-1 versus LC3-11 protein levels. Experiments will continue in a similar manner to observe if SaeR/S-effectors (i.e., leukotoxins) are able to impact neutrophil defenses including Reactive Oxygen Species (ROS) and NET formation using spectrophotometry and flow cytometry methods. Defining how this pathogen can initiate infection in healthy individuals will identify both host and pathogen factors that could be targeted for novel therapeutics or vaccine development.

#### The Connection Between Mental Illness and Criminality

Student Researcher: Benjamin Livesay Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice, B.S. Sociology

This research explores the correlation between mental illness and criminality in previous offenders to understand a possible root cause of criminal behaviors. The current justice system focuses on retribution and restitution, and those with mental illnesses may not receive the proper tools and care needed to prevent future offenses. Studies have found that society views those with mental illness and disorders as dangerous; however, data suggest that many are more likely to be victims than perpetrators. Those with mental health issues are also disproportionately incarcerated. The research will focus on mental health disorders' prevalence among those in the Montana Department of Corrections and whether societal labels/stigmas and individuals' mental health led them to criminal behaviors. Using a confidential survey, we will find if mental health issues were prominent in offenders before committing the criminal behaviors, to what extent mental health led to criminal behaviors, and how societal labels/stigma impacted their mental health, decision-making, and behaviors.

#### The Effect of Footwear on Peak Force During a Barbell Front Squat and Barbell Back Squat

Student Researcher: Shelby Marquardt Faculty Mentor: Dr. Jeffrey Willardson Degree: B.S. Health & Human Performance

There are many claims circulating in the field of strength and conditioning regarding the type of footwear that should be worn during compound squat movements. Some studies have found that running shoes' cushioned soles make it more difficult to drive force into the ground through the heels, decreasing the force, and creating an unstable surface that decreases power output. Weightlifting shoes, lifting barefoot, and lifting in flat sole shoes are claimed to improve squat performance, squat form, or both. More scientific studies need to be conducted, however, to support these claims. The purpose of this study is to investigate the effect of running shoes, flat sole, and no shoes on peak force during a barbell front squat and barbell back squat. Participants will perform three sets of one squat repetition with an unloaded barbell while on a force plate. Maximum force and average force will be measured and recorded. A Two-Way ANOVA will be used to identify any significant differences among footwear conditions.

#### Comparison of Gatorade vs Water as a Rehydration Supplement Prior to Sprinting Task

Student Researcher: Bryan Maxwell Faculty Mentor: Dr. Alex Shafer Degree: B.S. Health & Human Performance, Pre-Professional Physical Therapy

Sports drinks such are commonly consumed by athletes who compete in sports to replenish carbohydrates and electrolytes. The purpose of this study is to determine the effect of Gatorade on an athlete's performance time when it is used for rehydration during sprinting. It is hypothesized that rehydration with Gatorade by an athlete before performing the 40-yard dash will enhance their performance time. MSUB men's soccer athletes will be screened and measurements will be taken. The morning of testing, participants will go through a brief dynamic warm up. Next, each participant will complete the first 40-yard dash test with the body in a fasted state. After the first 40-yard dash is completed, participants will rehydrate with either water mixed with Mio flavoring or a bottle of Gatorade. Fifteen minutes after consumption of either the water/Mio flavoring mixture or the Gatorade, a second 40-yard dash test will be completed. On day two of testing, the same protocols will be used with the only difference being that if the athlete consumed Gatorade on day one then, on day two they will consume the water/Mio flavoring mixture and vice versa. A 2x2 ANOVA will be used to compare the data means of trial 1 to the data means of trial 2 when looking at overall performance of each condition.

#### Cloning a Soluble Version of the B7-H3 Gene to Identify Protein Interactions in Melanoma

Student Researcher: Brianne McCauley Faculty Mentor: Dr. Richard Warner Degree: B.S. Biology

B7-H3 has been recently confirmed to have immune inhibitory functions in mouse models of carcinoma. This makes B7-H3 an exciting candidate for potential immunotherapy in cancer, as immune inhibitory proteins can be blocked to re-activate anti-tumor protective immunity. To identify B7-H3 associated proteins, we previously performed immunoprecipitations along with mass spectrometry. The top candidate identified from these experiments was a growth factor, midkine (MDK). MDK stimulates growth of some cancer cells and may be an interesting protein to target as part of B7-H3 signaling. Our goal is to develop a protein complementation assay (PCA) to confirm the direct interaction of these two proteins. To do this we will fuse complementary fragments of a reporter protein, Gaussia luciferase enzyme, to B7-H3 and MDK. Careful preparation has been undertaken to ensure success of the interaction of B7-H3 and MDK. We know that molecular cloning requires the correct placement of the insert into the vector to effectively produce the gene products. Our strategy allows for the creation of our fusion proteins (as seen in the objective diagram) to ultimately analyze this novel protein interaction in a cellular system and discover the potential of targeting this interaction in melanoma.

#### A Characterization of Search Engine Results

Student Researcher Elizabeth McShane Faculty Mentor: John Pannell Degree: B.S. Mathematics

This study explores the impact search engine choice may have on search results by characterizing top results from several search engines. Previous research has relied on manual review of search results. Instead of taking this approach, we began developing and testing a set of tools to gather, analyze, and characterize search engine results automatically. Selenium will be used to run searches and record the top ten organic results. The URLs of the search results will be stripped down to their domains in a python-based program, then categorized using a URL Lookup API. Finally, the results will be analyzed using a python-based program. Research questions for this study include: On average, how many unique results are returned within the first ten results? Does the search engine show a preference for a given category of website? Inter-Search Engine Comparison: Will the user receive the same search results from any given search engine? Is there a difference in the type (category) of results returned by different search engines? Our conclusions can be used to help users choose a search engine that will retrieve the type of results that best suit their needs. Additionally, the tools developed in this study can be used to further examine search engine results in the future.

# Comparing Effects of Active Student Response with and without Differential Reinforcement on Receptive Identification of Children with Autism During Discrete Trial Training

Student Researcher: Abigail Meyer Faculty Mentor: Dr. Shu-Chen Tsai Degree: M.S. Special Education Advanced Studies w/ABA Emphasis

Previous research was evaluated to determine active student response (ASR) error correction procedures used during discrete trial training (DTT). Research specifically indicated teaching skill acquisition to individual learners with autism in order to shape potential benefits. This study will compare two teaching methods to identify which one leads to a higher percentage of correct responses, and fewer trials to mastery with participants who have less established vocal repertoires and are diagnosed with autism spectrum disorder. Method: The first method is to give the participants a reward with various levels of praise based on their correct answers. The second method is to give a reward and the same praise regardless of correct or incorrect answers. Baseline data will be collected prior to intervention to determine skill deficits. Expected Results: Active student response without differential reinforcement is expected to result in a higher percentage of correct responses, require fewer trials to mastery, and result in positive parental perceptions.

#### Yellowstone County DUI Drug Court Analysis

Student Researcher: Nathan Muri Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice

In our research we are hoping to find if people get DUIs more due to poor driving while under the influence or by being in an accident. We also hope to see if there are any hardline reasons as to why people drive under the influence. To accomplish this, we will be asking individuals from the STEER Court in Yellowstone County to participate in a survey regarding their DUI history. Based on overall numbers from the State Government on DUI arrests and fatalities in Montana, we are expecting to see more individuals respond they were brought in for a DUI after being in an accident. With this data we will hopefully be able to see if there may be an underlying cause for driving under the influence.

#### How the Incarceration of Parents can Affect a Person's Thought Process

Student Researcher: Mercedes Milam Faculty Mentor: Dr. Stephan Eliason Degree: B.S. Criminal Justice

Mental health is a huge problem in the United States, but most mental health is overlooked. Due to stereotypes, many don't realize mental health status can affect criminals as well. This research investigates the mental process of people who were children when their parent(s) got locked up and what it was like for them. I expect from the results that both parties do face mental health when a parent is incarnated. Parents missing milestones of their children has a huge impact on their mental health. And children can develop mental health issues through the stigmatization of their parents by other relatives and members of the community.

# The Effect of Acute Whole-Body Vibration on Ballistic Deep Squat Performance and the Correlation with Jump Height

Student Researcher: Ashley Mitchell Faculty Mentor: Dr. Jeffrey Willardson Degree: B.S. Health & Human Performance

Use of whole-body vibration (WBV) has become popular in athletic warmups as well as supplements to current routines for exercise programs. While there are many studies that look at the effects of various intensities of vibration and their effects on sprinting or the upper body, there are few studies that look at the effects of WBV on ballistic squats and their correlation with vertical jump height. The purpose of this study is to test and analyze the effects of acute whole-body vibration on ballistic deep squat performance and the correlation with jump height. Participants will begin by measuring vertical jump height and practicing ballistic deep squats while on the force plate. Afterwards, participants will perform and record data for a baseline ballistic deep squat, participate in full body vibration, and finally take a post-test for the ballistic deep squat performance. A Pearson's R test will compare ballistic deep squat height and vertical jump height, while a paired t-test will analyze the baseline versus post vibration performance for the ballistic deep squat.

#### Yellowstone County DUI Drug Court Analysis

Student Researcher: Nathan Muri Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice

In our research we are hoping to find if people get DUIs more due to poor driving while under the influence or by being in an accident. We also hope to see if there are any hardline reasons as to why people drive under the influence. To accomplish this, we will be asking individuals from the STEER Court in Yellowstone County to participate in a survey regarding their DUI history. Based on overall numbers on DUI arrests and fatalities in Montana, we expect more individuals respond they were brought in for a DUI after being in an accident. With this data we will hopefully be able to see if there may be an underlying cause for driving under the influence.

#### How the Incarceration of Parents Can Affect a Person's Thought Process

Student Researcher: Kira Nader Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice

This research study focuses on the potential change in thought process as well as other psychological factors when a person has or has had a parent(s) incarcerated. Society is quick to jump to the conclusion that incarceration only affects the person being incarcerated; however, there likely is an indirect effect on the children of the incarcerated even when those children are adults. The effect is not always physical or financial, but rather emotional and psychological. The levels of effect and severity of impact to those in similar situations likely vary from person to person. This research intends to evaluate exactly what effects are occurring as well as how severe they are once they have occurred.

#### **Toward Modern Medicine: Asiatic Cholera in Victorian Publications**

Student Researcher: John Plencner Faculty Mentor: Dr. Jennifer Lynn Degree: B.A. History

During the middle of the 19th century, Great Britain experienced the advent of epidemic Asiatic cholera. During the span of the four major outbreaks (1831 – 1866), Britain also underwent a transition from a multitude of medical providers and practices to a professional medical establishment with specific qualifications and licensure. The Asiatic cholera outbreaks present a particularly valuable tool to examine the evolution of medical practice in Great Britain during this time period, as the disease first occurred in 1817 and coincided with the span of time that encompassed the transition to a professional medical establishment. This paper is primarily concerned with how Asiatic cholera (and its prevention and treatment) was conveyed to the public, especially by the medical establishment, in the popular publications of the time (such as the press and in journals). The focus of the analysis will be on *The Illustrated London News*, which was the world's first illustrated weekly news magazine, and T*he Athenaeum: Journal of Literature, Science, and the Fine Arts*, which filled the role of the Sunday supplement of the major metropolitan newspapers today. Using primary sources and relevant secondary literature, this paper will reveal the contribution of contemporary publications to the understanding, prevention, and treatment of Asiatic cholera.

#### Contemporary and Ancestral Interpretation of the Sleeping Buffalo Rock

Student Researcher: Nicholas Redgrave Faculty Mentor: Dr. Susan Gilbertz Degree: B.A. Environmental Studies

The Sleeping Buffalo Rock, which sits in a semi-enclosed monument outside of Saco, Montana, is a site of historic significance to the Nakona People of the Fort Peck Indian Reservation. My approach to researching this site is through both contemporary and ancestral lenses, building upon modern understanding of what makes a site important to a certain culture. Research includes a literature review of twelve scholarly sources in the field of geography. Additionally, I would not be able to interpret this site without the oral history behind its conception provided by Kenny Ryan, my grandpa, who described Sleeping Buffalo Rock's history. I have found that the site used to be one of obligation and now has turned into a site of spiritual connection.

#### Traditional and Modern Bands of the Dene

Student Researcher: Nicholas Redgrave Faculty Mentor: Dr. Jennifer Lynn Degree: B.A. Environmental Studies

The Dene and its various bands that inhabit Canada's Northwest Territories occupy a swath of land that encompasses an approximated 300,000 square miles to which they have comprehensive land claims (i.e. the right to hunt, fish, and trap). *Paying the Land*, a graphic novel by Joe Sacco, beautifully depicts his journey, interviews, and Dene life within the Northwest Territories. The focal point of Sacco's book revolves around the Dene's collective struggle to integrate into modern society without cutting ties to their ancestral way of life, in turn creating identity complexes. To answer why the Dene struggle with identity, I looked into the Dene's history, accounts of the treaty era, and accounts of the boarding school attendees to find where cultural disconnect began. I found that the Dene people, in order to preserve and continue cultural attainment within their youth, must first accept the colonial practice of resource extraction to become economically viable, which could consequently fund educational institutions to teach the youth necessary skills that fit their lifestyles in Canada's harsh Northwest Territories.

#### Yellowstone County DUI Drug Court Analysis

Student Researcher: Rachel Robins Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice, B.S. Sociology

This study explores the number of local DUI convictions occurring as a result of being pulled over by law enforcement versus DUI convictions stemming from causing an accident. Through our research we expect to find that for every DUI or criminal endangerment charge, the offender will admit to having driven drunk at least 80 times prior to being convicted of a DUI. DUI offenders statistically have high recidivism rates, possibly because they view a DUI as a traffic ticket rather than a serious crime. The Yellowstone County STEER Court deals primarily with felony DUI offenders, or those who have at least four counts of driving under the influence on their records. A single DUI conviction likely places a financial and social strain on the lives of the convicted, and each subsequent conviction exacerbates their consequences. Through surveying members of the community who take part in the STEER Court, we hope to find what strains are put on DUI offenders and how they might impact a person's decision-making abilities and result in further criminal behavior.

# Applications of 3D modeling to research and education, a mechanism for intelligent drug design

Student Researcher: Amber Robinson Faculty Mentor: Dr. Daniel Willems Degree: B.S. Biology

Sixty-five percent of people self-report as visual learners and a lack of useful modeling systems significantly increases the time and cost requirements of scientific research. Recent technological advancements have provided new and exciting opportunities for visual learning experiences and cutting-edge research. Using these advancements, we have 3D-printed complex proteins, visualized molecular dynamics of proteins, and interacted with molecules in virtual reality. Commercially available additive manufacturing machines (3D-printers), physical models of dihydrodipicolinate synthase, insulin, phospholipase A2, and others have been manufactured to aid in understanding the molecular dynamics of protein-ligand interactions. Substantial progress has also been made in building interactive molecular dynamics in a virtual reality (iMDVR) platform, which we will use to generate enzyme-ligand molecules in the pursuit of intelligent drug design as it applies to potential Alzheimer's disease treatments. These modeling mechanisms promise to decrease time, cost, and other resources required to bring effective drug candidates to market. In addition, these modeling platforms provide interactive modeling systems for people to engage and learn complicated topics through both virtual and tactile models.

#### The Correlation Between Mental Illness and Criminality

Student Researcher: Sidney Romero Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice

This project studies the possible correlation between mental illness and criminality, and how instances of impulse control and various other symptoms of mental illness may contribute to criminal behavior. An article written by Seena Fazel and Martin Grann titled *The Population Impact of Severe Mental Illness on Violent Crime* found that 5% of violent crimes were committed by people with severe mental illness. This project further examines this concept, hypothesizing that acute mental illnesses may also contribute to the broad spectrum of crime. This study conducted a survey with Probation and Parole as well as the pre-release center Alternatives geared toward understanding histories of mental illness and criminality. In addition to our survey, we will be using the Labeling theory to consider whether or not negative labels impact a person's behavior. We suspect to find a positive correlation between mental illness diagnoses and criminal behavior, particularly if the mental health issues have gone unaddressed. We hope to launch a conversation about the failures of the criminal justice system and potential ways to correct these failings.

#### Montana's Gubernatorial Ban of Transgender Citizens Changing their Sex Designation

Student Researcher: Amanda Rouse Faculty Mentor: Dr. Hope Gentry Degree: B.S. Political Science

The LGBTQ community has been in battle over human rights for the past fifty years. Heteronormative ideologies create restrictions for those who do not identify as the ideal cisgender man/woman, leaving an entire population of people without proper documentation establishing their identifying gender. This has caused a division between the two political cultures, with legislation being passed from both sides protecting political and religious ideologies. During the fall semester of 2022, the MSUB Media, Polling, and Public Opinion class wrote and conducted the Mountain States Poll, surveying randomly selected Montanans and asking their opinions on current political issues. It is hypothesized the results would exhibit a relationship between a respondents' age and their support for banning changing sex designation on the birth certificate. This project also hypothesized the respondents' political partisanship would be a factor in how they answered the question.

#### Elongator's Modification of Ribosomal RNA in Yeast

Student Researcher: David Russell Faculty Mentor: Dr. David Butler Degree: B.S. Biology

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-carbonylmethyl group (cm5) to wobble uridines of tRNA. This reaction is required for efficient translation of codon-biased mRNAs. Interestingly, the tRNA modification, cm5U, has also been detected in eukaryotic ribosomal RNA (rRNA). This, in combination with the described localization of Elongator in the nucleolus, supports our hypothesis that Elongator may function in the modification of multiple RNA species, including ribosomal RNA. The goal of this project is to establish whether Elongator is required for cm5modifications of rRNA uridines in yeast.

## Optimization of DNA Extraction and Size Selection for NGS Sequencing Across Plant Families Found in Dover Memorial Park

Student Researcher: Olivia Schwartz Faculty Mentor: Dr. Jason Comer Degree: B.S. Biology

This project will investigate the plant biodiversity of local parks through species diversity (floristic collections) and phylogenetic diversity (next-generation sequencing) analyses. Plant specimens collected from Dover Memorial Park over the 2022 growing season were used to explore an optimized molecular workflow. Plants are well known for their secondary metabolites that interfere with downstream applications, such as DNA extraction and sequencing. To investigate phylogenetic diversity, optimized protocols for DNA extraction, fragmentation, and size selection. By optimizing extraction protocols, unique plant family characteristics will no longer affect yields and save time spent troubleshooting. Additional fragmentation of genomic DNA was determined to be unnecessary and automated selection was sufficient to select the optimum fragment size range.

#### Yellowstone County DUI Drug Court Analysis

Researcher: Gabriell Seibert Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice, B.S. Sociology

In our research we are hoping to find if people get DUIs more due to poor driving while under the influence or by being in an accident. We also hope to see if there are any hardline reasons as to why people drive under the influence. To accomplish this, we will have individuals from the STEER Court in Yellowstone County, under Judge Mary Jane Knisley, participate in a survey with relevant questions to the study. Due to overall statistics and numbers from the State government on DUI arrests and fatalities in Montana we are expecting to see more individuals say they were brought in for a DUI after being in an accident.

#### An Elongator Knock Out Mouse Model for ALS

Student Researcher: Magge Snow Faculty Mentor: Dr. Lynn George Degree: B.S. Biology

Amyotrophic Lateral Sclerosis (ALS) is a neurodegenerative disease that results in the death of motor neurons, which causes the muscles they innervate to atrophy and patients to lose their ability to walk, talk, eat, and eventually breathe. The George Lab studies a molecular complex called Elongator, and specific mutations in genes encoding Elongator subunits are associated with ALS. To determine whether motor neurons express Elongator, we used a genetically engineered reporter mouse that "reports" the expression of *Elp1*, encoding the scaffolding subunit for Elongator. Our results indicate that *Elp1* is in fact expressed by alpha motor neurons, a subpopulation of motor neurons in the spinal cord that is most impacted in ALS. To investigate Elongator's specific function in this cell type, we then generated a conditional knockout (CKO) mouse where *Elp1* is selectively ablated in motor neurons. These mice exhibit reduced motor function as evidenced by PaGE testing, motor fasciculations, diminished muscle mass and overall body weight ( $\sim \frac{1}{2}$  the weight of their littermate controls), and a shortened life span (averaging only 3 months). All of these symptoms are hallmark features of ALS. We hypothesized that the phenotype of our CKO mice is due to the death of motor neurons. To investigate this question, the number of alpha motor neurons in the lumbar enlargement was quantified in control and CKO mice using immunohistochemistry and Image J software. Alpha motor neuron numbers were found to be significantly decreased in the CKO. These data demonstrate that Elongator function is essential for the function and survival of motor neurons. Additionally, our Chat-Cre; Elp1LoxP/LoxP mice represent a new Elongator mouse model for studying the cellular and molecular mechanisms that contribute to ALS.

#### **Perception of Law Enforcement**

Student Researcher: Harrison Soueidi Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice

Individuals' perceptions of law enforcement can affect our communities; if people do not trust law enforcement in their community, they are less likely to report a crime or turn someone in for committing a crime and may try to take matters into their own hands. Understanding people's perspectives on law enforcement can lead to dialogue regarding possible improvements law enforcement could make to improve trust and confidence. Improvement could be different in every community and that is why it is so important to listen to what people in your community have to say. This project aims to discover why some people may not trust the police, and possible changes law enforcement could undergo to improve public perception.

#### Effect of Sodium Citrate on Blood Lactate Levels in College-Level Distance Runners

Student Researcher: Logan Straus Faculty Mentor: Dr. Alex Shafer Degree: B.S. Health & Human Performance

Repeated studies over the last few decades have taken a close look at acid/base balance in the body and its effects on sports performance. Lactic acid is an important source of energy for muscles but also leaves behind H+ (acidic) ions that impair contractile function of the muscle. Studies have also tested alkaline substances that might be able to buffer the H+ ions in the body. The delayed onset of acidosis which results in muscle fatigue ideally can lower blood lactate levels, and more importantly, improve performance. The purpose of this study is to test the effectiveness of sodium bicarbonate in buffering blood lactate levels in college-age distance runners when consumed before a graded exercise treadmill test. Participants will undergo a Costill & Fox Protocol Treadmill Test two separate times with and without ingesting sodium bicarbonate. Blood lactate levels as well as perceived rate of exertion (PRE) will be tested at different points throughout the test. The participant will go to 90% of their age-predicted HR max and hold it for 1 minute. Each participant will then become their own control to find if there is a statistically significant difference (p-value) in blood lactate levels between both tests.

#### Cell Phones in the Classroom: The Various Impacts on Student Learning

Student Researcher: Kari Stroble Faculty Mentor: Dr. Kari Dahle-Huff Degree: M.Ed. Interdisciplinary Studies

This literature review studies the overall impact cell phones have on student learning. Students want to use their cell phones in the classroom, which challenges traditional classroom settings. It has become a norm in society to multitask and students often overestimate their own abilities to multitask in the classroom. Schools need to implement cell phone policies and be consistent in the implementation of said policies. Cell phones can be great tools in education when used appropriately for academic purposes but can have a negative impact on student learning if used for nonacademic purposes. This review will shed light on the various impacts cell phones have on student learning, while also coming to new conclusions on how educators should incorporate or manage cell phones in the classroom to ensure student achievement.

#### Labeling Theories Effect on Inmate Recidivism Rates

Student Researcher: Chad Tamblyn Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice, B.S. Sociology

This research explores the effects of labeling theory by conducting surveys with female inmates/Passages residents. The research team will conduct additional research on recidivism rates of other states in North America and evaluate different projects that have had an impact on decreasing or increasing these rates.

#### The Acute Effects of a Caffeinated Beverage on HR, BP, and BG Post Step Test

Student Researcher: Ashley Tiffin Faculty Mentor: Dr. Jeffrey Willardson Degree: B.S. Health & Human Performance

Caffeinated drinks, such as energy drinks (EDs) have become very popular among college students and collegiate athletes, even though many EDs are NCAA banned because of substances like taurine and guarana. Many people think of EDs like coffee and assume that their body is affected in the same ways. However, EDs could cause negative effects to heart rate, blood pressure, and blood glucose that could be potentially dangerous. The purpose of this study is to determine energy drink consumption patterns and the acute effects they have on heart rate, blood pressure, and blood glucose. Ten female college-aged students participated in this study by answering a questionnaire about typical caffeine consumption and physical activity levels. In the lab the experimenter will collect each participant's anthropometric measures including height, weight, and body mass index. On two separate dates, they will then participate in both a control and experimental step test. The control group will consume a noncaloric placebo beverage and the experimental group will consume a 300mg caffeinated drink. Pre and post-tests will record heart rate, blood pressure, and blood glucose levels. Changes in measures will be recorded and then compared between the control and experimental groups.

## Effects of Social Dynamics on Native American Students' Motivation to Attend Predominantly White Colleges

Student Researcher: Emma Tolan Faculty Mentor: Dr. Ambrin Masood Degree: B.S. Biology

Native American (NA) college students encounter several barriers to academic persistence including motivation, cultural assimilation issues, limited access to career information services, and social dynamics -- an individual sense of duty and responsibility to remain tied to traditional spiritual values and beliefs systems, joined with family pressure to stay home. While the presence of NA students in colleges has increased, the number of students persisting through to graduation remains alarmingly low. To explore the impact of social dynamics on the NA college freshman student's motivation and resilience, NA undergraduate students were recruited to participate in a series of three focus group sessions, viewing and discussing videotaped interviews with Native American Elders and successful MSUB graduate students. Themes developed through these discussions will hopefully highlight the complex interactions between the impact of culture on the emotional well-being of NA students, along with the resilience gained through the inspirational stories of their Elders and other successful NA students.

#### Cloning a Soluble Version of the B7-H3 Gene to Identify Protein Interactions in Melanoma

Student Researcher: Lauryn Torres-Hernandez Faculty Mentor: Dr. Richard Warner Degree: B.S. Biology

B7-H3 has been recently confirmed to have immune inhibitory functions in mouse models of carcinoma. This makes B7-H3 an exciting candidate for potential immunotherapy in cancer, as immune inhibitory proteins can be blocked to re-activate anti-tumor protective immunity. To identify B7-H3 associated proteins, we previously performed immunoprecipitations along with mass spectrometry. The top candidate identified from these experiments was a growth factor, midkine (MDK). MDK stimulates growth of some cancer cells and may be an interesting protein to target as part of B7-H3 signaling. Our goal is to develop a protein complementation assay (PCA) to confirm the direct interaction of these two proteins. To do this we will fuse complementary fragments of a reporter protein, Gaussia luciferase enzyme, to B7-H3 and MDK. Careful preparation has been undertaken to ensure success of the interaction of B7-H3 and MDK. We know that molecular cloning requires the correct placement of the insert into the vector to effectively produce the gene products. Our strategy allows for the creation of our fusion proteins (as seen in the objective diagram) to ultimately analyze this novel protein interaction in a cellular system and discover the potential of targeting this interaction in melanoma.

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

Student Researcher: Lauryn Torres-Hernandez Faculty Mentor: Dr. Lynn George Degree: B.S. Biology

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease that causes the death of motor neurons. These motor neurons are primarily responsible for controlling muscle and voluntary movements, and as they deteriorate, individuals lose the ability to speak, eat, and even breathe. Despite being the most common motor neuron disease, there are currently no effective treatments available for ALS, and most patients typically die within four years after diagnosis. While familial ALS can be inherited, approximately 90% of cases are sporadic, meaning that the disease is not passed down from one generation to the next. Although the causes of sporadic ALS are not well understood, a recent study found that an early characteristic shared by both familial and sporadic ALS is the shrinkage of the nucleolus, the site of ribosome biogenesis. Neurons are some of the largest cells in the body and thus are particularly dependent on efficient protein synthesis which in turn depends on ribosomes. The George lab recently discovered the presence of a novel protein, titin, in the nucleolus of neurons. Titin is the largest protein encoded by the human genome, and although it is known for its function as a molecular spring in the sarcomeres of cardiac and skeletal muscles, a function for titin in neurons has never been described. Our current project aims to identify the specific neuronal and glial cell types that contain titin in their nucleolus.

#### Native Americans affected by stereotype threat: Resilience vs. Persuasion

Student Researcher: Destynee Two Moons Faculty Mentor: Dr. Ambrin Masood Degree: B.S. Bachelor of Science- Psychology

Stereotype-threat theory states that minority students underperform because of the pressure created by negative stereotypes about their racial groups. This qualitive case study will explore how first-year, Native American (NA) undergraduate students perceive the possibility of—or experience with—stereotype-threat as shaping their experiences in the light of their Elders' stories of resilience. Four NA undergraduate students were recruited to participate in a series of three focus group sessions involving videotaped interviews with NA Elders and successful MSUB graduate students discussing resilience. Participants were asked to discuss their feelings toward the videos in the light of their own campus experiences in relation to their culture, emotional well-being and resilience. Themes developed through these discussions will highlight the complex interactions between the impact of culture on the emotional well-being of NA students, along with the resilience gained through the inspirational stories discussed. The results will further help broaden our knowledge about coping-skills used by NA students, and how they are able to stay resilient in mainstream society.

#### How the Incarceration of Parents Can Affect Thought Processes

Student Researcher: Keegan Vanderhoef Faculty Mentor: Dr. Stephen Eliason Degree: B.S. Criminal Justice

This project evaluates the mental, emotional and psychological effects that a parent or parents being incarcerated has on their children growing into adulthood. Using quantitative research, we hypothesize that we will find that people who have had one or more incarcerated parents will have a more realistic worldview.

# The Effect of 6-Week Beetroot Powder Supplementation on VO2 Max in Collegiate Aerobic Athletes

Student Researcher: Ally Whitmer Faculty Mentor: Dr. Alex Shafer Degree: B.S. Health & Human Performance

Beetroot supplementation has been suggested to improve aerobic fitness and cardiovascular health. This is possible due to the nitrate uptake from beetroot ingestion, which then causes vasodilation when circulated in the bloodstream. There is a gap in research on the effects of vasodilation from long-term beetroot supplementation in collegiate aerobic athletes, particularly beetroot supplementation using a powder form of beetroot supplement. This study aims to determine if long-term chronic supplementation of beetroot powder shows greater improvements in VO2 max compared to a beetroot capsule treatment. The MSUB student-athletes participating in this study will undergo a longitudinal randomized control trial, where they will be randomly assigned to the powder or capsule group. Baseline and follow-up VO2 max measurements will be recorded to observe a change in VO2 max between the two groups.

# **Creative Projects**

#### **Time to Take Action**

Student Writer: Sydney Gustin Faculty Mentor: Dr. Hope Dewell Gentry Degree: A.S. General Studies

A reading from a short story about a girl in the 90's who meets a time traveler and has to save the future.

#### **Poetry Reading**

Student Poets: Samantha Eder, Luke Manthey, Lindsay Stewart, Savanna Philipson, Michael Chandler, Steve Paulson, Erin Watson Faculty Mentor: Tami Haaland

Students from the spring poetry workshop will read and discuss selections from their original compositions this semester.





Makalia Ament Anxiety Jar Ceramics, 6" × 3"



When nature needs a break. She builds her barriers.

Wesley Barnes Nature's Barrier Watercolor, 22" x 15"





**Emmit Bartsch** *againanagain* Video and Audio, 4:3. Duration: 31 seconds

#### **Terrin Bisel** *Decomposer* Ink, Pen, and Graphite on Watercolor Paper, 12" x 48"



**Lisa Blomquist** *Grandmother in Me* 3D Mixed Media, 33" × 44"



**Kyra Bruner** *A Surrender* Alcohol Markers and Acrylic Paint, 12" x 8½"



Faith Carreno Dreamscape Escapism Archival Pigment Print, 16" × 11"



**Isabelle Carroll** *Enmeshed* Gelatin Silver Print, 11" x 14"





Aiden Cole One Day, You'll Teach a \_\_\_\_\_ to Fish. Archival Pigment Print, 16" x 20"

Chloe Fields I celebrate my glad release, the tents of silence and the camp of peace India Ink on Yupo, 60" x 19"



Talan Halbig 2 Doves Oil, 20" x 16"



Hadassah Harris *ROCKSTAR!* Archival Pigment Print, 21" × 17"



Jaedon Hopson Untitled Ink on Paper, 22" × 22"



**Sophia Kelly** *Daniel in the Lions Den* Oil on Canvas, 10" x 8"



Nathan Levine Grasp Monoprint, 7" × 8"



Kaylin Millsap 3528 Wood, Acrylic, 27" x 13" x 25"





**Heather Oltrogge** *Safe* Charcoal on Paper, 41" x 8" x 5"

Nathaniel Parry *Mélange of Styles* Archival Pigment Print, 24" x 27"



**Isac Pratt**  *Apocalyptic Complexion* Archival Pigment Print, 16½" × 12"



Keona Rosales-Kakiuchi Silence of the Sun Ink on Paper, 30" x 18½"



















Madeline VanDyken Blue Vessel Clay, 8" × 7"

**Carter West** *Variation of Bouma* Oil and Graphite on Paper, 43" × 43"



Magnolia West beauty of decaying

Mixed, Ink, collage, acrylic paint, Stonehenge paper, 11" x 14"



**Ethan Whitefox** *A Future About Nothing* Archival Pigment Print, 22" x 16"



Kendra Woods Whose Body? Oil, 26" × 30"

#### JUROR STATEMENT - LISA RANALLO

This year is one of strengthening partnership and exchange between the Yellowstone Art Museum and MSUB's Art Department. I want to thank Robin Earles for inviting me to select work for this year's Juried Student Exhibition and for creating a friendly, inspiring space where all feel comfortable to gather and talk about art!

The curatorial process is creative, and selecting works for an exhibition can depend on a multitude of criteria. Sixtyfour objects from twenty-nine students were submitted. I chose one piece from each student, which piqued my interest and left me wanting to spend more time looking. However, I also wanted to honor the shared gallery space and consider any relationships or underlying themes among the disparate works of wide-ranging mediums and styles.

As I went through the selection process, I noticed a self-reflective mood and a seeking to explain the unexplainable. Many of the works seemingly respond metaphorically to the unprecedented conditions of our world. Expressions of fear, decay, and abandonment are countered with those of renewal, rebirth, and hope. In the ebb of a global pandemic and shifting social constructs, this exhibition shares an authentic look at our contemporary experience.

I want to thank the students for sharing their work and wish them the best as they travel an adventurous path forward.

Lisa Ranallo is currently the Curator of the Permanent Collection at the

Yellowstone Art Museum, Billings, MT. She is responsible for the growth and stewardship of the YAM's collections and curating exhibitions aligned with YAM's mission, vision, and values.



## Thank You to Our Research & Creativity Symposium Judges

David Airne, Academic Coordinator, Student Support Services/TRIO Dr. Melinda Aley, Assistant Professor, Communication Cindy Bell, Director, Grants & sponsored Programs Austin Bennett, Instructor, City College Dr. Melissa Boehm, Professor, Communication Dr. Joseph Bryan, Professor, History Liz Flom, Research Assistant, SCL Health Sarah Haight, Director of Development, MSUB Foundation Heather Hanna, Assistant Vice Chancellor of Finance Dr. Jana Marcette, Director, Graduate Studies & University Honors Program John Moffat, Program Coordinator, Office of Educational Access Hannah Olson, Owner, Narrator Creative Consulting (MSUB Alumna) Natalie Preston, Executive Assistant to the Chancellor Dr. Matt Queen, Professor, Analytical Chemistry Joann Stryker, Director, Institutional Research Kathleen Thatcher, Director, Assessment and Accreditation Dr. Amber West Martin, Director, Academic Support Center

### **Research & Creativity Symposium Committee**

Jenay Cross Matt Queen Cindy Bell Jana Marcette

### **Special Thanks & Appreciation**

Chancellor Dr. Stefani Hicswa Provost Dr. Sep Eskandari Dr. Jennifer Lynn – Keynote Speaker Patrick Williams – Multimedia Designer Robin Earles – Art Gallery Director Gulshat Garayeva – Grants Student Worker SUB staff – Event Setup and Coordination IT staff – Poster Printing and Sound/Tech

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