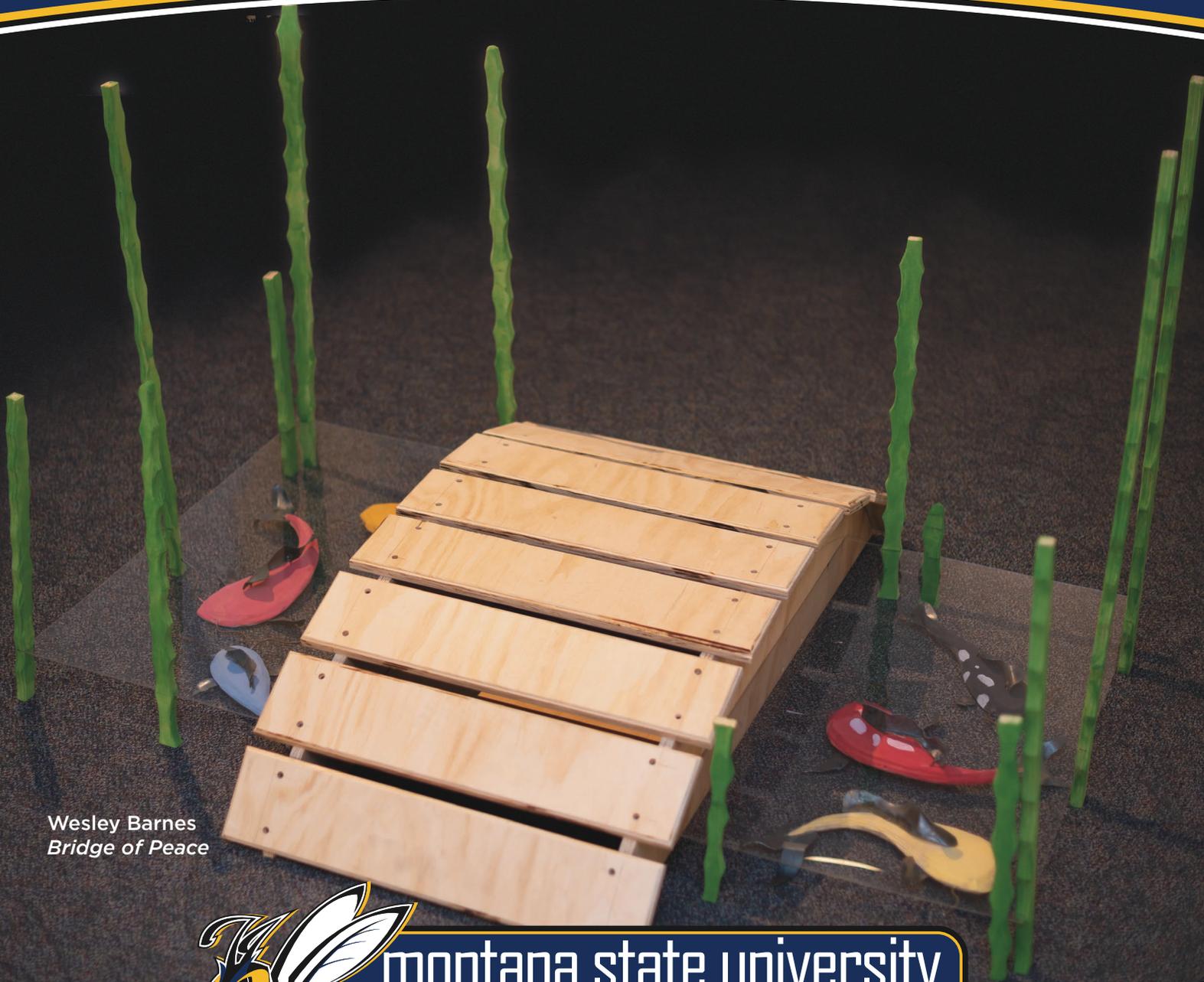


NINTH ANNUAL

MONTANA STATE UNIVERSITY BILLINGS

# RESEARCH AND CREATIVITY SYMPOSIUM

APRIL 22, 2022



Wesley Barnes  
*Bridge of Peace*



montana state university  
**BILLINGS**

# 2022 SYMPOSIUM

Montana State University Billings will hold its ninth annual Research and Creativity Symposium (RCS) in a mixed online and in-person format. Sponsored by the Office of Grants and Sponsored Programs, the University Honors Program, and Montana IDeA Networks of Biomedical Research (INBRE), the symposium provides the opportunity for undergraduate and graduate students of all majors 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: [msubillings.edu/research](https://msubillings.edu/research)

|   |   |  |   |
|---|---|--|---|
| <b>APRIL 21</b>   |   |  |   |
| <b>5:00</b>   | <b>Reception for Juried Student Exhibition</b><br>LA first floor  |  |   |
| <b>APRIL 22</b>   |   |  |   |
| <b>12:15</b>  | Symposium Welcome from <b>Chancellor Dr. Stefani Hicswa</b><br>Keynote Speaker <b>Dr. Cathy Whitlock</b><br>(Glacier Room and WebEx live streaming) |  |   |
| <b>1 - 3</b>  | Poster Session (Glacier Room)   |  |   |
| <b>1:30</b>   | Oral Presentations (Glacier Room)   |  |   |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"><i>Analysis of Montana Residents' Opinions of Universal Healthcare as Determined by the Mountain States Poll – Taylor Ellestad</i></td> <td style="width: 50%; padding: 5px;"><i>The VertiMax Platform and Its Optimization of Post Activation Potentiation in Collegiate Athletes – Shannon Reny</i></td> </tr> </table> |   | <i>Analysis of Montana Residents' Opinions of Universal Healthcare as Determined by the Mountain States Poll – Taylor Ellestad</i> | <i>The VertiMax Platform and Its Optimization of Post Activation Potentiation in Collegiate Athletes – Shannon Reny</i> |
| <i>Analysis of Montana Residents' Opinions of Universal Healthcare as Determined by the Mountain States Poll – Taylor Ellestad</i>  | <i>The VertiMax Platform and Its Optimization of Post Activation Potentiation in Collegiate Athletes – Shannon Reny</i>                             |  |   |
| <i>Weapons of Utility: Regional Variance Concerning the Public's Relation to Firearms</i><br><b>Benjamin Houser</b>   |   |  |   |
| <b>3:30</b>   | Awards and Closing Remarks by <b>Provost Dr. Sep Eskandari</b><br>(Glacier Room and WebEx live streaming)   |  |   |

# KEYNOTE SPEAKER

## Dr. Cathy Whitlock

Paleoecologist

Dr. Cathy Whitlock is a Regents Professor Emerita in Earth Sciences at Montana State University and a Fellow of the Montana Institute on Ecosystems. She is nationally and internationally recognized for her research and leadership activities in the field of climate and environmental change. Since the 1980s, she has been studying Yellowstone's environmental history by collecting sediment cores from lakes that provide information about past vegetation, fire, and climate. This research continues to the present day in Yellowstone and in comparable places around the world. During the course of her career, she has trained dozens of undergraduate and graduate students to join her in the field of paleoecology. Dr. Whitlock is also an author of the Greater Yellowstone Climate Assessment (2021) and Montana Climate Assessment (2017), which describe the impacts of past and future climate change in the region. She has received numerous awards and honors from professional societies and organizations, and in 2018, she became the first person from a Montana university to be elected to the National Academy of Sciences.

### Keynote Address: Yellowstone's Past, Yellowstone's Future

Yellowstone's importance goes beyond its boundaries—it is the largest remaining, intact ecosystem in the temperate latitudes of the planet, a place valued around the world for its “wildness.” But now, climate change and increased human pressure are transforming this fragile ecosystem and the livelihoods that depend on it. To what extent has the present Yellowstone ecosystem been shaped by a legacy of past environmental change? Pollen and charcoal records from Yellowstone's lakes reveal the evolution of the ecosystem from the last ice age to the present day as well as the dynamic linkages that connect changes in climate, vegetation, and fire regimes over thousands of years. This information provides a framework for understanding current ecosystem dynamics and offers an historical baseline for evaluating the consequences of future climate change in the region.

## **THANK YOU** **TO ALL FACULTY MENTORS**

|                        |                      |
|------------------------|----------------------|
| Dr. David Butler       | Dr. Ambrin Masood    |
| Dr. Jason Comer        | Dr. Matthew McMullen |
| Dr. Kari Dahle-Huff    | Dr. Paul Nash        |
| Dr. Hope Dewell Gentry | Dr. Suzette Nynas    |
| Dr. Stephen Eliason    | Dr. AJ Otjen         |
| Dr. Susan Gilbertz     | Dr. Matt Queen       |
| Dr. Rodrigo Lobo       | Dr. Alex Shafer      |
| Dr. Jennifer Lynn      | Dr. Jeff Willardson  |

# Abstracts

## Billie Eilish and Her Music Throughout the Years

*Student Researcher: Lyndie Ark*

*Faculty Mentor: Dr. Matthew McMullen*

*Degree: B.S. Psychology*

This study provides an analysis of Billie Eilish and her music as she became one of the most popular artists in the world. Using RStudio, we will see which songs or albums led to her fame. We will also analyze energy and frequencies used in each beat and compare her work to other popular artists, specifically in terms of uniqueness in music and expression. Her most popular song and least popular tracks will be analyzed to unpack the variables leading to her fame.

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## Effects of Medicine Ball Throws with or without Whole Body Vibration on Baseball Swing

*Student Researcher: Dominick Buso*

*Faculty Mentor: Dr. Jeffrey Willardson*

*Degree: B.S. Health & Human Performance*

**Introduction:** Whole-body vibration (WBV) has been used as a modality to improve a muscle's ability to generate maximal voluntary force and power. Researchers have used electromyography (EMG) to assess muscles that are activated in baseball players and concluded that the majority of force produced during a swing is generated from the legs, which is then transferred to the upper body. **Purpose:** The purpose of this study will be to investigate changes in bat speed, time to contact, rotational acceleration, and exit velocity with medicine ball throws while standing on a whole-body vibration platform. **Methods:** Collegiate baseball players will undergo baseline and experimental bat swings within two sessions. A sensor will be placed on the end of the bat to measure and record variables for each swing for the baseline and experimental condition, which consists of medicine ball throws while standing on a whole-body vibration platform. **Conclusion:** Bat speed showed a significant increase, exit velocity increased, and time to contact and rotational acceleration showed no significant difference. We conclude that there is statistical proof behind medicine ball throws coupled with WBV enhancing a baseball swing.

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## The Impact of MMIW on Perceptions of Safety of Indigenous Women attending MSUB

*Student Researcher: MarLynn Cloud*

*Faculty Mentor: Dr. Stephen Eliason*

*Degree: B.S. Sociology*

**Purpose:** The purpose of this project is to explore the various ways in which Indigenous women have been affected by the Murdered and Missing Indigenous Women (MMIW) epidemic in regard to their perceptions of safety. In particular, this study seeks to learn about their opinions towards data/analytics, media, law enforcement, and the various communities surrounding MMIW cases. **Methods:** Participants include Indigenous women attending MSUB who were interviewed regarding their perceptions of safety. Participants' answers were analyzed for key words of emotions, feelings, and thought and were then put together to create a series of poems reflecting MMIW and safety. **Significance:** This will be one of the few research studies conducted about MMIW in Montana and the U.S. that highlights Indigenous communities' resilience and strength, which is needed for awareness to be spread about the issue and for possible solutions to be discovered. Findings were presented in the form of a series of poems due to the importance of art and storytelling to Native American culture and epistemology.

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## **The Impact of Party Affiliation and Education on Opinion of Afghan Refugee Resettlement**

*Student Researcher: Brynne Dotson*

*Faculty Mentor: Dr. Hope Dewell Gentry*

*Degree: B.A. History Education*

With the withdrawal of American troops from Afghanistan last August, many Afghan citizens became displaced or faced violence from the instability created. Resettlement of refugees, especially resettlement in the US, was not universally supported among citizens. The purpose of this research was to determine how party affiliation and education level interact to contribute to one's level of support for refugee resettlement in Montana. Responses were gathered using the Mountain States Poll, a random, representative sample of 204 residents. In the case of Montana, it was found that those with higher education levels are more likely to affiliate with Democrats, and Democrats are more likely to support resettlement of refugees. The data collected here reinforces the results of research done on education levels in relation to party affiliation.

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## **Analysis of Montana Residents' Opinions of Universal Healthcare as Determined by The Mountain States Poll**

*Student Researcher: Taylor Ellestad*

*Faculty Mentor: Dr. Hope Dewell Gentry*

*Degree: B.S. Political Science*

This study examines how economic status, as measured by income of the respondent, as well as party ideology influence the formation of negative opinions about universal healthcare in the U.S. The 2021 Mountain States Poll was used to acquire quantitative data, with 25 questions centering on demographic information and political science issues. An analysis of the results found that 1) Democrats are more likely than Republicans to support universal healthcare and 2) those who have a higher level of income will be less likely to support universal healthcare than those of a lower income level. While it is true that those with higher incomes are less likely to approve of universal healthcare, a slight deviation from this trend exists at the \$100-150K level of income. For each approval and disapproval at this level, the trend is belied by a jump in the opposite direction, an uptick for approval and a downward move for disapproval. Then the trend resumes at the \$150K+ level of income. This is suggestive of another factor, perhaps costly fees for employee insurance programs born by the owners or employers who are making this level of income. This is an area for potential future study.

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## **Assessing Jump Roping and Box Jumps as Post-Activation Potentiation Methods in Vertical Jumps**

*Student Researcher: Aleksander Garza*

*Faculty Mentor: Dr. Jeffrey Willardson*

*Degree: B.S. Health & Human Performance*

Countermovement jumps on a force plate have become a significant method of measuring vertical jump height. When preparing the body for these performance measurements, the Post Activation Potentiation (PAP) response has frequently been utilized. The purpose of PAP is to implement a conditioned exercise that will temporarily boost performance values. **Purpose:** The purpose of this experiment is to analyze a possible PAP response with two pre-conditioned activities: repeated box jumps and jump roping. If a PAP response is observed, then vertical jump height measurements will follow a trend of having improved values. **Methods:** Nine participants are randomly assigned to an experiment group (treatment groups: jump rope or box jumps) or a control group. The two treatment conditioned groups will perform a set of repeated box jumps, or repeatedly jump rope for a fixed amount of time. The control groups will not perform any intervention in this given period. All groups will perform three baseline and three post jumps. The best vertical jump height in each set of three jumps will be recorded.

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## Relationship between Aerobic Fitness and Working Memory

*Student Researcher: Haylee Gunter*

*Faculty Mentor: Dr. Jeffrey Willardson*

*Degree: B.S. Health & Human Performance*

**Introduction:** It is well known that there are many different benefits that come with aerobic exercise on a regular basis. However, there hasn't been as much focus on how increased aerobic fitness can improve aspects of memory and brain function. The few studies that have focused on this relationship have found that as aerobic fitness increases, so does different aspects of cognitive function. **Purpose:** The purpose of this study was to test if there was a correlation between higher maximal aerobic capacity and working memory. **Methods:** First, the participant's working memory was tested using an N-back test provided online by PsyToolkit. Then, the participants underwent a 20-m shuttle run test to estimate their VO<sub>2</sub> max. A Pearson's r test was then used to determine if there was correlation between different variables from this study. **Discussion:** There is limited research and knowledge on the relationship between aerobic fitness and working memory. The main finding from this study was that there was a weak correlation between aerobic fitness and working memory.

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## The Effect of Mental Skills Training on Baseball Pitchers Performances

*Student Researcher: Matthew Hape*

*Faculty Mentor: Dr. Matthew McMullen*

*Degree: M.S. Psychology*

This study compares three groups of pitchers and how different forms of mental training skills could positively affect performance on the baseball field. The control group will pitch with no outside influences. The second group will be influenced by visualization, and the third group will receive mindfulness training and positive self-talk. These three groups will be tracked over a few weeks to see how each condition affects their pitching outcome. Pitches will be recorded based on a score card to where the pitch call was, compared to where the pitch is delivered. A total of fifteen pitchers will be utilized to collect data for this project.

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## Is Toxoplasma Sensitive to Killing by Beauvericin and Valinomycin?

*Student Researcher: Kaidyn Harris*

*Faculty Mentor: Dr. Paul Nash*

*Degree: B.S. Biology*

**Background:** *Toxoplasma gondii* is an obligate intracellular parasite that grows in three stages: Tachyzoites, which are fast growing; Bradyzoites, which make up tissue cysts; and Oocysts that make up the sexual stage. Human infection can occur when a person is exposed to Oocysts from cats or by eating undercooked meat containing Bradyzoite tissue cysts. While this parasite does not cause major harm to normally healthy people, it can be dangerous and deadly for those who are immunocompromised or pregnant. Toxoplasma is an inhibitor of apoptosis, which is the mechanism of programmed cell death to eliminate unwanted cells from developing, caused by the toxins Beauvericin and Valinomycin. While it is known that Toxoplasma has the ability to inhibit apoptosis by toxins in host cells, it is still unknown whether Toxoplasma can protect itself from these toxins. **Aim:** Our aim is to test the effect of these toxins on the viability of extracellular Toxoplasma tachyzoites, the fast-growing stage of this parasite. **Approach:** We have tested the effect of Beauvericin and Valinomycin on three different strains of extracellular Toxoplasma: S1T, RH, and Me49. At the time of this testing, the Toxoplasma was not inhibiting apoptosis in infected cells. In each experiment, Toxoplasma was treated with either Beauvericin or Valinomycin, and then incubated with cells to see if it could grow. A control with EL-4 cells was done each time to verify that the toxins were active. **Results:** All three strains showed sensitivity to both toxins. Toxoplasma, at least when it cannot protect its host cell, is sensitive to these toxins. Future research will be needed to test Toxoplasma that is actively inhibiting apoptosis, and at different stages of development.

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## **Strong Families - Strong Communities: How YMCA Members Are Lifting Billings Up**

*Student Researcher: Tessa Holshue*

*Faculty Mentor: Dr. AJ Otjen*

*Degree: B.S. Business Administration: Marketing*

This project involved the development of a new branding strategy and campaign for Billings YMCA that targeted both GenX and Millennial audiences. Researchers found that adults aged 35- to 55-years comprised a gap in current YMCA members. The marketing campaign focused on the high quality of facilities, equipment, and resources at YMCA Billings along with its community involvement and commitment to giving back locally. A focus group provided feedback on a preliminary billboard design and clarified that increasing awareness of the YMCA's charitable involvement while simultaneously promoting the facility would be most impactful. Using this feedback, a second design was created, followed by a second round of focus groups to ensure the design achieved the researchers' stated objectives. The final billboard design will be displayed near Billings roadways for 10 months.

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## **The Effect of Circadian Variation on Anaerobic Performance in College Athletes**

*Student Researcher: Matthew Houlihan*

*Faculty Mentor: Dr. Alex Shafer*

*Degree: B.S. Health & Human Performance*

**Introduction:** Training is the most effective way to create a meaningful change in anaerobic performance; however, it is unknown what time of day athletes should complete their training to see the most impact.

**Purpose:** To determine if the time of day of anaerobic testing influences performance in male and female collegiate athletes. It is hypothesized that anaerobic performance will be highest later in the day compared to earlier morning testing. **Method:** One experimental session analyzed anaerobic performance at 0900 while the second was assessed at 1500. The anaerobic testing strategies included measures of anaerobic power via the Wingate cycle test, and countermovement vertical jump on a force plate. **Conclusion:** The Wingate bike anaerobic test results demonstrated no significant difference between testing times in power output. The small statistical effect size suggests that these results may not be meaningful and could differ with more research in this area. On the other hand, countermovement jump showed a statistically significant difference in favor of the evening session. The results are virtually the same with vertical jump height.

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## **Weapons of Utility: Regional Variance Concerning the Public's Relation to Firearms**

*Student Researcher: Benjamin Houser*

*Faculty Mentor: Dr. Hope Dewell Gentry*

*Degree: B.A. History Education*

This paper seeks to analyze the difference between attitudes in Montana and attitudes nationwide concerning firearms regulation. The essential questions the paper asks are: How does region influence opinion of firearms? Does region play more of a role than politics concerning firearms? Finally, how does Montana differ from national attitudes regarding firearms? The central argument of the paper is that Montana Democrats will have fewer rigid feelings toward firearms regulations than their national counterparts. Using two polls, the Mountain States poll and a Gallup Poll, this paper will find differentiations between national attitudes, and attitudes in Montana concerning the regulation of firearms. The paper found that there is a difference between the two regarding firearms regulation.

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## **Google Searches of Mental Health Related Terms Around Mental Health Awareness Month**

*Student Researcher: Kaitlin Kavlie*

*Faculty Mentor: Dr. Matthew McMullen*

*Degree: M.S. Psychology*

The central research question of this investigation is whether Google searches for terms such as “suicide,” “suicide rate,” and “mental health” increase during or around the time of Mental Health Awareness Month in May. A previous study found that individuals who had been exposed to a mental health awareness campaign were significantly more likely to search for information associated with mental health issues. Therefore, as Mental Health Awareness Month is meant to draw attention to the importance of mental health, it is of interest to examine if Google searches for a few related terms increase around this month. The data was extracted and analyzed from Google trends with various packages via the software RStudio. The results are that the Google searches for each of these terms have their own individual fluctuation pattern with varying peaks and depressions at different points in the year. The results will be discussed in the context of how the searches for the three specific terms fluctuate throughout the year, specifically focused around the month of May.

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## **Floristic Survey of Two Moon Park, Billings, MT**

*Student Researcher: Jessica Kersh*

*Faculty Mentor: Dr. Jason Comer*

*Degree: B.S. Biology*

Native plant species are important to the indigenous wild fauna hosting scores of pollinators that are necessary for the local ecosystem to thrive. These plants also provide the habitat required for larger native species like birds, squirrels, and deer, which in turn are food for predators. This project gathered data on the native and invasive plant species located at Two Moon Park, providing valuable insight into plant distribution patterns and improving global understanding of biodiversity. Individual species were collected throughout Two Moon Park from May to June 2021. These specimens were identified and prepared for inclusion into the MSUB Herbarium. This data will be used to detect plant population changes. Expected results of this experiment will be population data on native and invasive plant species that can be used to map target population rate of spread.

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## **Preliminary phylogenomic assessment of *Convolvulus arvensis* L., a widespread noxious weed**

*Student Researcher: Jessica Kersh*

*Faculty Mentor: Dr. Jason Comer*

*Degree: B.S. Biology*

This project used a phylogenomic approach to understand the invasion biology of *Convolvulus arvensis* L. Native to Europe and Asia, *C. arvensis* is classified as an invasive species and noxious weed in Montana and the continental U.S. Invasive species are a serious threat to human health and safety as they harm human food crops harboring destructive insects and various pathogens, and directly compete for resources with crop species, as well as interfering with valuable ecosystem services. By tracking population dynamics of *C. arvensis* through genomic analyses a deeper understanding of invasion biology will provide insight into combating these invasive species, thus protecting human health and life. Target species populations were collected throughout Billings, MT, and surrounding areas. DNA was extracted from each specimen for downstream phylogenomic analysis. DNA extraction protocols and methods were modified to obtain high quality DNA for double digest Restriction Associated DNA analyses.

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## Assessing Vertical Jump Differences between the Polar V800 and Force Platform

*Student Researcher: Brian Kostelecky*

*Faculty Mentor: Dr. Alex Shafer*

*Degree: B.S. Health & Human Performance*

Vertical jump is important for most athletes and is very common in sports such as football, basketball, volleyball, and many more. Specific exercises such as plyometrics and dynamic stretching can be done to increase one's vertical leap. These types of jump testing include force platforms, contact mats, and vertec jump systems. The Polar V800 fitness tracker is a new jump test technique/tool that performs a series of tests to determine flight time and calculate vertical leap. This study will test the Polar V800 watch's ability to measure vertical leap by comparing results to other forms of jump test evaluations. Participants will partake in a series of six total jumps, three squat jumps and three countermovement jumps, which will be performed using the force platform and the Polar V800 watch. Multiple Pearson's  $r$  correlations will be used to determine the relationship between the Polar V800 watch values for both squat and countermovement jumps on the force platform.

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## Where Are Smartphones Leading Our Students?

*Student Researcher: Jody McIlvain*

*Faculty Mentor: Dr. Kari Dahle-Huff*

*Degree: M.Ed. Interdisciplinary Studies*

In today's education scene smartphones are everywhere, especially in the hands of high school students. Smartphones have such a strong pull on students that it is easy to hypothesize that smartphones have some kind of influence on students' education. When teachers purposefully incorporate the use of smartphones in class it can benefit student achievement, but this may not be the case in all areas of education. Most research focuses on the detriments of smartphones on student achievement. To minimize the detriments of smartphones on student achievement teachers and schools are creating policies that combat the noneducational use of smartphones in classrooms. This research investigates the positive and negative impacts of smartphones on student academics. It also looks at what policies schools currently use and ideas for creating policies that benefit all stakeholders.

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## The Association between Physical Activity and Body Adiposity

*Student Researcher: Lindsey Meyer*

*Faculty Mentor: Dr. Alex Shafer*

*Degree: B.S. Health & Human Performance*

**Introduction:** Obesity is a result of a positive energy balance in which energy intake is greater than energy expenditure. A high BMI and percent body fat are associated with an increased risk for many chronic diseases. Previous research has demonstrated that physical activity is associated with a lower BMI as it increases energy expenditure, increases metabolism, promotes preservation of lean muscle mass, and can potentially decrease appetite. However, conflicting research suggests many individuals may compensate for physical activity through increased energy intake and increased sedentary time. **Purpose:** This study seeks to determine the relationship between physical activity and body composition in young adult college students. **Methods:** 34 college-age students were recruited to fill out the Habitual Physical Activity Questionnaire to assess their physical activity levels. Participants' BMI and percent body fat data were gathered using the InBody Bioelectrical Impedance analysis device. The relationship between these variables was examined to determine any correlation. **Results:** Despite previous research, there was no correlation between physical activity scores and BMI. A weak correlation was found between percent body fat and physical activity levels for females but not males. **Conclusion:** The result of this study suggests that physical activity may play a role in body adiposity, but should not be relied on alone, as many other factors contribute to body composition. Regardless of the relationship between physical activity and body composition, individuals should aim to meet physical activity recommendations as it has been demonstrated to provide numerous health benefits.

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## **The VertiMax Platform and Its Optimization of Post Activation Potentiation in Collegiate Athletes**

*Student Researcher: Shannon Reny*

*Faculty Mentor: Dr. Suzette Nynas*

*Degree: B.S. Health & Human Performance*

**Introduction:** The effects elicited from post activation potentiation (PAP) have great ability to acutely enhance athletic performance. The traditional conditioning activity for eliciting PAP is a high intensity, high load back-squat. However, the VertiMax platform may elicit this same response by placing the body under high stress situations with the added resistance. **Purpose:** To determine if the VertiMax platform can produce the effects of post activation potentiation in a group of collegiate athletes. It is hypothesized that the experimental group will demonstrate a greater improvement from baseline to post-intervention vertical jump (VJ) tests than the control group. **Methods:** Thirty MSUB collegiate athletes were assigned to the experimental or control group using a matched pairs technique. The experimental group underwent a high intensity exercise protocol on the VertiMax platform between maximal VJ tests. The control group performed a light dynamic stretching routine between jumps. **Results:** No significant difference in physical performance was found between the experimental and control groups. **Conclusion:** The VertiMax protocol used in this study did not produce a significant potentiation effect in the participants.

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## **Google Trends Analysis of Seasonal Affective Disorder**

*Student Researcher: Micah Richter*

*Faculty Mentor: Dr. Matthew McMullen*

*Degree: B.S. Psychology*

This project will involve a Google trend analysis on the time of year that Seasonal Affective Disorder (SAD) is most searched. This analysis will be done using the online program Rstudio. The analysis will include both the United States and Canada, to compare the frequency of occurrence in both countries. SAD is a very common problem, especially among college students, perhaps particularly in those who go to college in a state with very different weather patterns than they are used to. The disorder can cause damage to students' academic standings and social lives. This study will also look into Google search trends for SAD over the years. This will provide insight to see if there has been an increased interest in this disorder in more recent years.

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## **Influence of Criminal Events on Public Interest in Mental Health**

*Student Researcher: Morgan Roggemann*

*Faculty Mentor: Dr. Matthew McMullen*

*Degree: B.S. Psychology*

Infamous criminals and mass shooters are known to have abnormal brain processes that affect their ability to feel empathy, understand consequences, have compassion for others, etc. As mass shootings and criminal cases increase, the public's interest in the subject grows as well. This paper will explore how the general population's curiosity about mental health rises or falls when an infamous crime comes to light as well as when a mass shooting takes place. The terms "mental health" and "criminal psychology" will be analyzed for how often they were searched on Google around the time of a well-known mass shooting (Las Vegas) and an infamous criminal case (Casey Anthony). The data will be compared to how often the same terms were searched in August of 2015 when there was not a large criminal event in the media.

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## Testing College Age Americans' Level of Fitness Compared to Normative Values

*Student Researcher: Lily Rosenblum*

*Faculty Mentor: Dr. Alex Shafer*

*Degree: B.S. Health & Human Performance*

**Background:** The World Health Organization recognizes obesity, cardiovascular heart disease, and type 2 diabetes as the three most severe non-communicable diseases. Research has found that poor diet and inactivity can increase the chance of disease and even contribute to higher mortality. The most common fitness measure often assessed and readily available for the general population is body mass index (BMI). However, research has found that health has multiple components, and there are even more accurate tools. **Purpose:** This study aimed to see which percent of students fall within the normative standards of good health. **Methods:** College-aged subjects received an in-depth examination of their fitness level based on multiple components. The subjects underwent anthropometric body composition, trunk and lower extremity flexibility, upper body muscular strength, lower body muscular strength, muscular endurance, and cardiorespiratory testing. The purpose of this study was to determine how the sample fits in with the general population's normative standards. **Results:** No participant in this study was determined to be of good health in every category. Analysis of the results revealed which percent of the participants fit within the standard of good health and the other normative categories.

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## Exploration of Soil Moisture and Morphological Trait Patterns of Local Populations of *Convolvulus arvensis* L.

*Student Researcher: Olivia Schwartz*

*Faculty Mentor: Dr. Jason Comer*

*Degree: B.S. Biology*

*Convolvulus arvensis* L., field bindweed, is a well-known, invasive agricultural weed. Multiple methods of management have been implemented to control invasions, combining biological and mechanical controls with limited success. Morphological traits and soil moisture of a Billings, MT, collection were used to evaluate patterns in the life history of *C. arvensis*. A principal components analysis was used to find associations between three leaf measurements, and soil moisture was compared across three locations to determine habitat preference. Correlations between soil moisture and *C. arvensis* distribution were not evaluated through the PCA, but *C. arvensis* was observed more frequently in drier loamy soil. There was a correlation between leaf length and width, with longer leaves having a wider width.

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## An Analysis and Application of the Appreciative Inquiry 4-D Framework

*Student Researcher: Amy Sexton*

*Faculty Mentor: Dr. Rodrigo Cortopassi Goron Lobo*

*Degree: B.S. Business Administration: Accounting*

The appreciative inquiry, 4-D cycle includes the 4 core topics: discovery, dream, design and destiny. When these topics are appropriately applied to a problem or subject, the core element of change is unearthed through the process. The appreciative inquiry concept has been analyzed in the context of experiential learning and the benefits this process provides to students. I will show the benefits of applying this approach to a business study case. The study case involves analyzing the financing options of Montana Instruments, a technology company based in Bozeman, MT. This analysis and example will show the benefits of using appreciative inquiry and the 4-D cycle when approaching real-world problems in business.

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## **Economics of Vampirism & Witchcraft: Elisabeth Bathory**

*Student Researcher: Amy Sexton*

*Faculty Mentor: Dr. Jennifer Lynn*

*Degree: B.S. Business Administration: Accounting*

Elisabeth Bathory was a wealthy, well-connected 17th century Hungarian countess accused of murdering hundreds of women, setting a Guinness World Record for the most prolific female murderer. Historians have attributed the inspiration for *Dracula* to Countess Bathory's story. While she was accused of these murders, she was never convicted and lived out the remainder of her life confined to her castle. The King of Hungary and other powerful nobles were anxious to acquire her vast wealth. Why, while at the height of the witch trials in Europe, was Countess Bathory never accused of or tried for witchcraft? Lyndal Roper's *Witch Craze* explores in detail the witchcraft trials of the 16th and 17th century and provides context for why a trial for Countess Bathory would be expected. Kimberly Craft's *Infamous Lady: The True Story of Countess Erzsebet Bathory* details the life of Countess Bathory. Through historical analysis, this study shows that while Countess Bathory was an excellent candidate for a witchcraft accusation and trial, the unintended consequences of such an accusation were too costly. While a successful trial would have accomplished the aims of Countess Bathory's enemies, they could not risk opening the door to further witchcraft accusations amongst the nobility.

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## **Comparing Internet Searches for the names "Trump or Biden" Before, During, and After the 2020 Election**

*Student Researcher: Julia Shiryayev*

*Faculty Mentor: Dr. Matthew McMullen*

*Degree: B.S. Psychiatric Rehabilitation*

The names Trump and Biden have taken on a new meaning in the past few years. The purpose of this project is to compare Google searches in the U.S. between the names "Trump" and "Biden." The names will be searched for comparison during the years 2019, 2020, and 2021. We will also analyze which states Googled "Trump" and "Biden" the most. Results will be shown using graphs and were found using RStudio. The goal is to show whether "Trump" or "Biden" names were searched more before, during, and after the 2020 elections and which area of the country either name was searched more often.

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## **Honors Inquiry and Research about the Efficiency of Interpersonal Intervention for Coping with Anxiety, Depression and Stress among Graduate Students**

*Student Researcher: Kennedy Skinner*

*Faculty Mentor: Dr. Ambrin Masood*

*Degree: B.S. Human Services*

This study of graduate level students hopes to examine the difference learning coping skills can make on depression, anxiety, and stress screening scores. It will further examine any score difference between older and younger students to see if age has a correlation with how much their scores are affected. This A-B-A research design will use a 21-item DASS-21 questionnaire to screen 40-50 graduate level students, enrolled in the mental health program at MSUB for depression, anxiety, and stress as a pretest. After completing the screening, the subjects will be taught strategies for coping. DASS-21 will be administered again as a post-test after the intervention to measure the effectiveness of teaching coping skills. A paired t-test will be used to evaluate the data. These findings could help the subjects who are already enrolled in the mental health program to manage their own mental health and be a better counselor. Furthermore, evaluating the level of effectiveness of coping mechanisms by age could help Student Health Services account for resource management that is tailored more advantageously to the students they serve.

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## **COVID-19 and Its Effect on Flight Patterns**

*Student Researcher: Erika Smith*

*Faculty Mentor: Dr. Matthew McMullen*

*Degree: B.S. Psychology*

This project seeks to analyze flight patterns to detect changes resulting from the COVID-19 pandemic in 2020. An analysis of flight patterns will be conducted through statistical computing software R-Studio and as well as an online data source. It is hypothesized that flight patterns after the year 2020 will be significantly different than before 2020. Possible changes might be fewer flights, shorter routes, and fewer people on flights.

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## **Propaganda and Nuclear Non-Use**

*Student Researcher: Oscar Thomas*

*Faculty Mentor: Dr. Hope Dewell Gentry*

*Degree: M.Ed. Curriculum & Instruction*

In the modern field of political science, one of the prominent theories of international conflict is the concept of the nuclear taboo, which suggests that Cold War fears of retaliation and a diminishing acceptability of violence created a cultural taboo against nuclear use. This cultivated a norm of nuclear non-use that prevents state powers from truly weaponizing nuclear weapons against enemies. However, this project's hypothesis is that the acceptability of nuclear weapons' use or non-use is influenced by propaganda. To understand the issue, we need to examine different propaganda efforts and how they succeeded or failed in different cultural contexts in influencing public thought. Several studies have examined the relationship of the public and nuclear issues through different frameworks and theories. This project will compare the relationships among the U.S., Japan, and India and their unique conflicts and experiences with nuclear use. Through this analysis, we can gain a greater understanding of the nuclear taboo and how propaganda and international tensions shift or sway the public into supporting or opposing nuclear use.

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## **Electrochemical and anion binding properties of redox-tagged, hydrogen bonding-based anion receptors**

*Student Researcher: James Unzaga*

*Faculty Mentor: Dr. Matt Queen*

*Degree: B.S. Chemistry*

Chloride-based salts are used for a variety of purposes including de-icing. Despite their utility, many of these salts pollute lakes and rivers due to runoff. The resulting elevated chloride concentrations are acutely toxic to freshwater aquatic life. We seek to develop anion receptors that can capture chloride ions upon external stimuli for better controlled chloride separation, as well as offering modes of chloride sensing. As a prototype receptor, we have synthesized a molecule that has multiple hydrogen bonding donor sites for anion recognition together with a ferrocene moiety to reversibly control the receptor's affinity for anions via redox processes. In this study, we investigated the electrochemical and anion binding properties of the receptor using cyclic voltammetry (CV). We measured CV data of the receptor at different tetrabutylammonium chloride (TBACl) concentrations at a glassy carbon electrode (GCE) in Ar-bubbled acetonitrile solution containing tetrabutylammonium hexafluorophosphate (TBAPF6) as a supporting electrolyte. We used Pt counter and pseudo-reference electrodes with decamethylferrocene as an internal standard to minimize chloride contamination. We observed diffusion-controlled voltammograms, suggesting the negligible adsorption of the receptor onto the GCE. More interestingly, we observed a negative shift of both the anodic and cathodic peak potentials of the receptor with increasing TBACl concentration. The shift was more significant for the cathodic peak, implying that the higher affinity of the oxidized ferrocenium-based receptor for chloride ions is due to the electrostatic attraction. In addition, we estimated the binding constant (K) by fitting the shift of the peak potential.

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## **The Invasion of Ukraine and Google Trends**

*Student Researcher: Amanda Valnes*

*Faculty Mentor: Dr. Matthew McMullen*

*Degree: M.S. Psychology*

In the past two years, the world has been experiencing major events that have made an impact on all of us. With the powerful search engine Google at our fingertips, it is easy to pick up a device and search anything we are curious about. The theory is that what people search for reveals their interests in a way that might be more honest than other means. One of the more recent happenings in the world has been the invasion of Ukraine by Russia. In this research project, Google trends were analyzed for searches on both the terms “Russia” and “Ukraine” by time and by location. To do this, RStudio was utilized along with the packages trendyy, tidyverse, DT, and lubricate. RStudio was also used to generate graphs and data tables to display the results. Results from this study show that there was a major increase in Google searches for both the terms “Russia” and “Ukraine” in 2022. More specifically, “Russia” and “Ukraine” had the most searches during the month of February, with “Ukraine” having more searches than “Russia” did. To add to that, the top two cities in the United States that searched these terms were in Alaska. In a broader approach, America and Canada are both NATO countries so data were analyzed to look at both countries’ search patterns for the terms. Canada searched both “Russia” and “Ukraine” more than the United States has. These results make sense considering February 2022 was the date that Russia invaded Ukraine and Alaska’s close proximity to Russia.

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## **Investigating Dwelling: A Narrative Approach**

*Student Researcher: Nicholas Wagner*

*Faculty Mentor: Dr. Susan Gilbertz*

*Degree: B.S. Environmental Studies*

Cultural and historical contexts are needed to better understand the strong attachment humans harbor towards places they call home. The concept of dwelling provides an opportunity to explore the dynamics of constructing “home.” This study applies narrative analyses to interviews and texts gathered from individuals whose homes are near the Yellowstone River. We found that emotional attachment among residents with deep historical connections to the Yellowstone River reveal increased attachment to it as a place of dwelling. We conclude that addressing the emotional bonds expressed by landowners along the river can reduce the undesirable activities of building houses in unsafe territory.

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## **Alcoholism in Google Trends**

*Student Researcher: Carlyn Whitney*

*Faculty Mentor: Dr. Matthew McMullen*

*Degree: B.S. Psychology*

This project studies the Google trends of alcoholism over time, by country. These results showed that the United States searched for the term alcoholism more frequently than Australia or Canada. This project also looks into the correlations in Google searches between the coronavirus outbreak and alcoholism. More specifically, looking into how these trends vary across countries. By using Rstudio to look at when trends for coronavirus or alcoholism peaked, conclusions can be made as to if the two are correlated. This is important because it could show if lockdowns on a large-scale influence alcoholism.

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## Honors Inquiry and Research about the Efficiency of Interpersonal Intervention for Coping with Anxiety, Depression and Stress among Graduate Students

*Student Researcher: Kathleen Wiersema*

*Faculty Mentor: Dr. Ambrin Masood*

*Degree: B.S. Health & Human Performance*

This study will focus on measuring the effectiveness of teaching coping strategies to overcome anxiety and depression and how age affects the coping strategies of participants. College students struggle with these problems for a variety of reasons, such as workload, finances, and pressure of college life. This research will use the DASS-21 in order to determine the effectiveness of instruction on coping. Participants will be given a pre-test then an intervention and again a post-test. Using a paired t-test analysis, this study aims to find out how the students' stress, anxiety, and depression changed. It is predicted that the coping strategies will help the students manage stress, anxiety, and depression and that the coping skills will be better adapted by the younger participants (20-30 years old).

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## SARS-CoV-2 Testing at Montana State University Billings Student Health Services

*Student Researcher: Devin Williams*

*Faculty Mentor: Dr. David Butler*

*Degree: B.S. Biology*

In January 2021, MSUB opened their Clinical Testing Laboratory in response to the COVID-19 pandemic. The lab conducts diagnostic SARS-CoV-2 testing of students experiencing symptoms of respiratory disease, as well as asymptomatic "surveillance testing" for the Athletics Department. The lab recently implemented testing for Influenza A and Influenza B respiratory viruses. This poster will highlight the technology, protocols and results of the Student Health Services testing program.

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## Has the Popularity and Production of Sad Music Increased over the Years

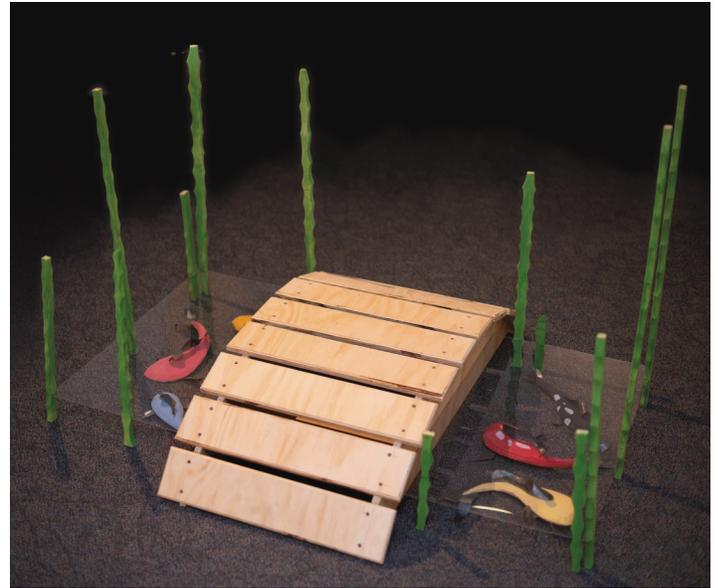
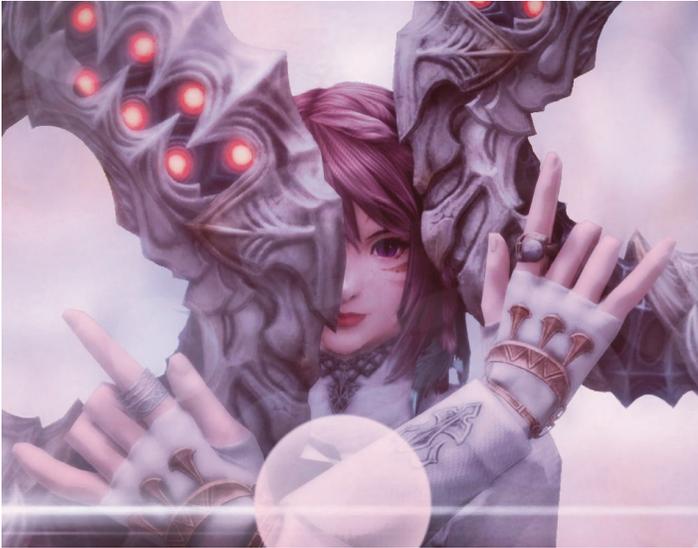
*Student Researcher: Aunnika Woods*

*Faculty Mentor: Dr. Matthew McMullen*

*Degree: B.S. Psychology*

**Background:** Music has been known to have significant effects on the brain and varying effects on emotional states, a reflection of an individual's current mental state. There have been studies that suggest the popular music of today has gotten more negative, both in the sound of the songs and in the lyrics. **Method:** This study uses RStudio to analyze hit music from 2021 and the 1970s using data from Spotify to compare the valence or "musical happiness" of the songs. It also uses YouTube searches to compare the popularity of sad songs versus happy songs over the past decade based on the frequency of searches. **Results:** A t-test on the results show that the popular music of 2021 has statistically significant lower valence. The amount of YouTube searches for sad music has increased drastically compared to happy music, which has remained fairly consistent over the years. **Conclusion:** There has been an increase in people seeking sad music over happy music and the music being produced and reaching peak popularity generally has a lower valence than what people were seeking out in the 1970s.

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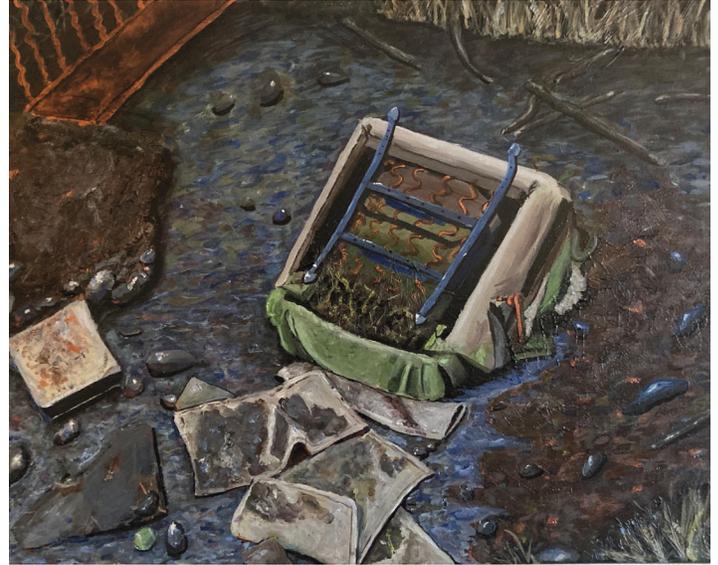
**Makaila Ament**  
*Lyla Dhrmonte*  
digital art  
16 in x 20 in

**Wesley Barnes**  
*Bridge of Peace*  
Plywood, Metal, Plexiglass and Acrylic  
4 ft x 5 ft x 3 ft



**Terrin Bisel**  
*Time is of Decrescence*  
Video/New Media  
6:40

**Isabelle Carroll**  
*To Remember, To Forget*  
Digital Photograph  
11" x 14" each, 11.5" x 29" together



**Isabelle Carroll**

***A Hiding Place***

Digital Photograph

11" x 14" each, 11.5" x 29" together

**Aiden Cole**

***Recliner in the River***

Acrylic on Canvas

16 in x 20 in



**Courtney Dickerson**

***Big Dreams***

Chemistry notes (collage), stretched canvas, and acrylic paint

36 in x 84 in



**Sandy Dvarishkis**

***cup series (7 cups)***

porcelain, slips, glazes

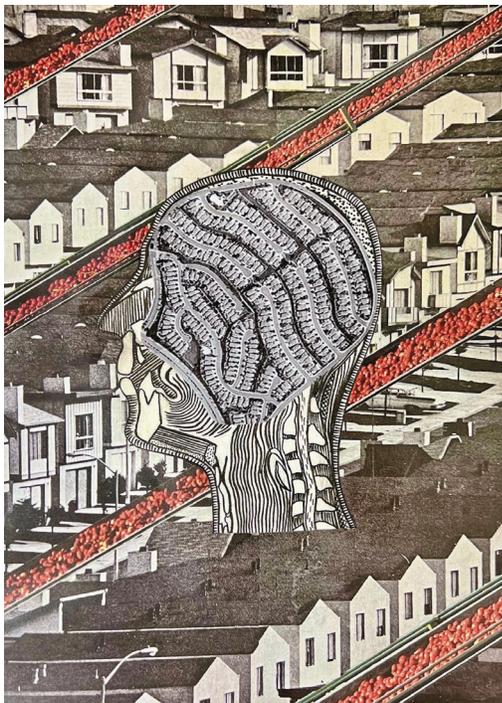
3 in x 3 in x 3 in



**Sandy Dvarishkis**  
*plate series (7 plates)*  
porcelain, slips, glazes  
10 in x 1 in



**Keona Kakiuchi**  
*Japanese: 抑制の文化。(A Culture of Restraint.)*  
Plywood  
21.5 in x 10.5 in x 26in



**Nathan Levine**  
*Efficient/Elevate*  
Mixed Media / Collage  
5 in x 7 in



**Vince Long**  
*Tool in a Tutu*  
Mixed  
2 ft x 2 ft x 4 ft



**Madison Mars**  
*Don't look, see.*  
Acrylic and gold foil  
18.5 in x 14 in



**Shannon Mustari**  
*Planta Pottum*  
Ceramics  
2 in x 8 in



**Jessica Nelson**  
*To Be Brave*  
Watercolor  
13.5 in x 13.5 in



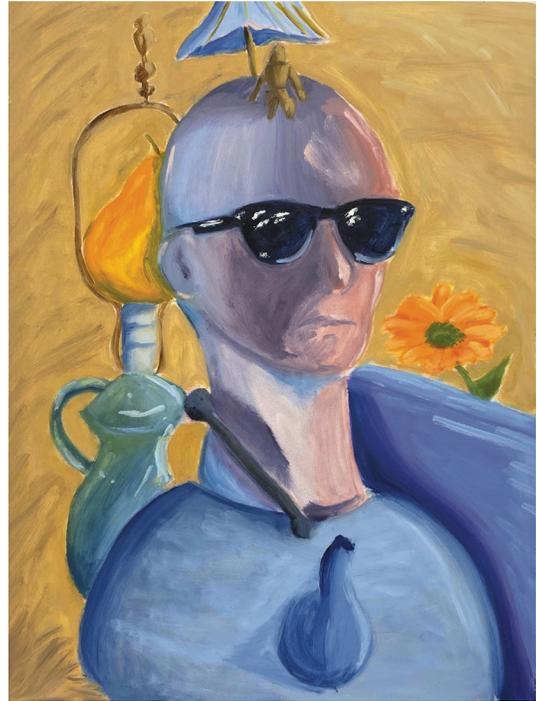
**Jessica Nelson**  
*Notes to Self*  
India Ink  
11 in x 14 in



**Heather Oltrogge**

*Boisterous*

Graphite  
22 in x 30 in



**Daphne Picard**

*Somebody Call Wheezer*

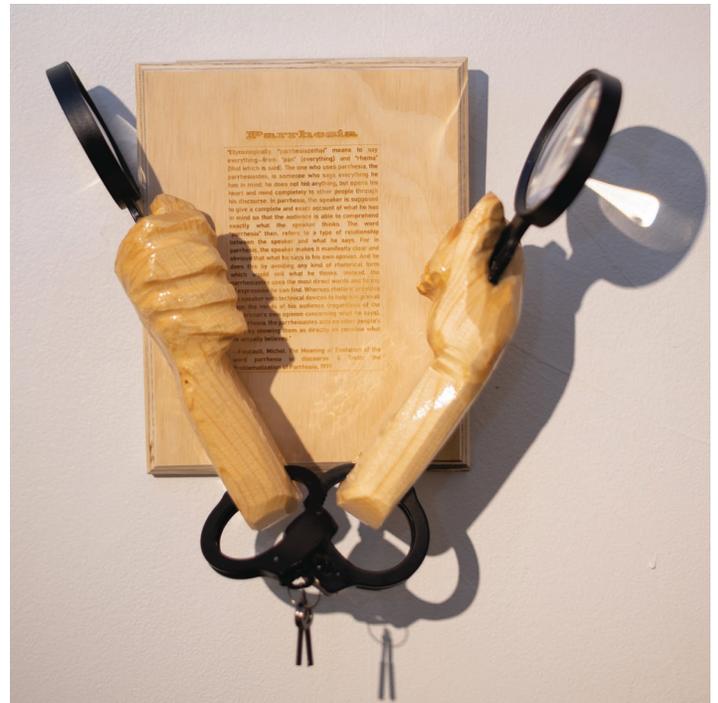
Oil Paint  
18 in x 24 in



**Daphne Picard**

*Pink View*

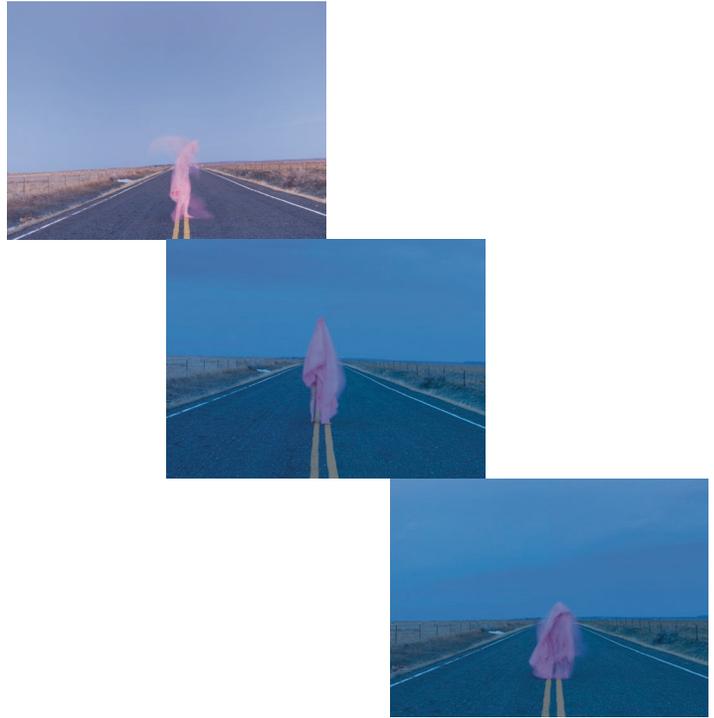
Oil Paint  
15 in x 22.25 in



**Terri Porta**

*Marriage*

Wood, plastic, resin, metal  
12 in x 14 in x 4 in



**Angel Shandy**  
*Determined, Desperate-exploratory sketch from Until All Worlds End*  
pencil, permanent marker, india ink, acrylic paint on roll craft paper with torn edges. 8 ft x 14 ft

**Morgan Syring**  
*'in a thin voice' series*  
Archival prints with audio recording  
20 in x 15 in each



**Julia Torna**  
*Clumsy Balancing and My Exploding Head*  
Collage and watercolor on illustration board  
15 in x 20 in

**Julia Torna**  
*Clumsy Balancing and My Exploding Head*  
Collage and watercolor on illustration board  
15.2 in x 20 in



**Magnolia West**  
*accident*  
 ceramics  
 1.5 in x 8 in

## JUROR'S STATEMENT

### John Knight

As an artist and curator, I am concerned with how to democratize and decentralize the process for exhibiting works of art. For students and artists working in the intermountain west and on the high prairie, coming together to support one another through exhibition making is an excellent way to promote community and provide support to each other. With the MSU Billings Juried Student Exhibition, I decided to accept works of art by each artist who submitted to the exhibition open call. In this process, themes of abstraction, materiality, experience and fantasy were most notable. These themes are the foundation for strong arts communities. It should also be acknowledged that in taking the step to submit pieces to this exhibition open call, each student is in community with each other. This is an important moment in the development of student-artists. I believe a democratized exhibition that includes all who submitted art for consideration fosters community and builds support. My role as such, is to understand how and which artworks submitted for consideration can be displayed together. Thank you to the students and staff of MSU Billings for entrusting me to the role of Juror for this exhibition. The caliber of works submitted marks a bright future for all the artists in the 2022 Student Exhibition.



**John Knight** (b. 1986, Cincinnati, OH, USA) is a Montana based conceptual artist and independent curator. His work is often site-specific and concerned with the intersection of architecture, design, class and histories of painting. Knight has presented solo exhibitions internationally at BSMNT Gallery in Leipzig, Germany, and Rheum Room in Basel, Switzerland. In the United States, he has exhibited solo and two-person projects at: GCADD in Granite City, Illinois (with Nicolo Gentile); Window Mine and the Holland Project in Reno, Nevada; Final Hot Desert in Salt Lake City, Utah; Private Places, Muscle Beach and Portland State University (with Rebecca Peel) in Portland, Oregon; the American Institute of Thoughts and Feelings in Tucson, Arizona; and Julius Caesar in Chicago (with Matt Morris). Knight is currently a curator in residence at the Montana Open Air Residency program in western Montana. Upcoming projects of Knight's includes a solo exhibition at the Northcutt Steele Gallery at Montana State University Billings and two curatorial projects with Open Air during the summer of 2022. As a curator, he has initiated various artist-run spaces and curatorial projects which include: Williamson | Knight Gallery, Cherry and Lucic, and H. Klum Fine Art in Portland; THE PINK HOUSE (Jan. 19, 1995) at Bad Reputation in Los Angeles, California; and FreeSpace Projects in Cincinnati, Ohio. Knight has participated in residencies at the Carrizozo Artist in Residence Program in Carrizozo, New Mexico; the Rainmaker Residency at Yale Union in Portland; and with the New York Arts Practicum in New York City, New York. Currently Knight works full time as a Registrar at the Missoula Art Museum and is curator-in-residence with the Open AIR Residency program in western Montana.

# **Thank You to Our Research & Creativity Symposium Judges**

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David Airne, Academic Coordinator, Student Support Services/TRIO

Nikole Bakko, Outreach Coordinator, Eastern Montana Area Health Education Center

Austin Bennett, Instructor, City College

Ed Garding, Interim Dean, College of Business

Dr. Michael Havens, Professor, Psychology

Dr. Joseph Hoover, Assistant Professor, Social Sciences and Cultural Studies

Dr. Jana Marcette, Director, Graduate Studies & University Honors Program

Dr. Paula McMahon, Professor, Rehabilitation and Human Services

Dr. Char Ogborn, Program Coordinator, Graduate Studies & University Honors Program

Amber Peretz, Community Ambassador, Native American Achievement Center

Dr. Matt Queen, Professor, Analytical Chemistry

Sunny Day Real Bird, Director, Native American Achievement Center

Joann Stryker, Director, Institutional Research

Kathleen Thatcher, Director, Assessment and Accreditation

Dr. Melissa Walker, Assistant Professor, Educational Theory and Practice

# Research & Creativity Symposium Committee

Jenay Cross, RCS Manager

Jason Comer

Cindy Bell

Matt Queen

Jana Marcette

Sheryl Shockley

Kurt Toenjes

Danielle Loomer

## Special Thanks & Appreciation

Chancellor Dr. Stefani Hicswa

Provost Dr. Sep Eskandari

Patrick Williams – Multimedia Designer

Robin Earles – Art Gallery Director

Nicholas Drzycimski – WebEx Cohost

Dr. Matt McMullen – WebEx Session Moderator

IT staff – Poster Printing and Sound/Tech

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