



# UP<sup>3</sup>RC

UNDERGRADUATE PROJECTS, PERFORMANCES,  
PRESENTATIONS & RESEARCH CONFERENCE

## Third Annual UP<sup>3</sup>RC

April 2, 2024

Student Event Center, Taylorsville Redwood Campus

Salt Lake Community College

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Report program corrections on this form:



<https://tinyurl.com/correctprogramuprc>

The program will be reviewed for errors and finalized following the event.

# Agenda

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## Tuesday, April 2, 2024

8 a.m.-9 a.m.: Check-In Begins

8 a.m.-9 a.m.: Continental Breakfast is Served

8:45. a.m.: Opening remarks Room the Oak Room: by Dr. Kamal Bewar

9:15 a.m.-11:15 a.m.: Morning Poster Sessions and Oral Presentations\*

11:30 a.m. to 1 p.m.: Lunch.

12:00 p.m.: Opening remarks by Dr. Kamal Bewar

12:05.p.m: Keynote Speaker - Oak Room

1:30 p.m.-3:30 p.m.: Poster Sessions and Oral Presentations\*

3:30. p.m.-4:15 p.m.: Closing Remarks by David Hubert

3:30.p.m Raffle and social interaction -Room STC 201, Oak Room

4:30.p.m End of the conference

\* All Poster Sessions will be in STC 130. Most of the Oral Presentation locations will be in the Oak Room, but they will all be held in the STC in either the Oak Room, 221-223, or 207.

# Welcome Messages

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## Welcome from the Interim Provost of Academic Affairs



On behalf of the entire academic community at Salt Lake Community College, I extend a warm welcome to all of you participating in this year's UP<sup>3</sup>RC. Your work is a testament to your dedication to scholarship and your commitment to pushing the boundaries of knowledge. I am deeply impressed by the hard work and perseverance you have demonstrated in pursuing research and other projects that go beyond the traditional classroom experience. Your curiosity, initiative, and willingness to delve deeper into your chosen fields are truly commendable. Engaging in research not only allows you to contribute new insights and discoveries to your disciplines, but it also equips you with invaluable skills in critical thinking, problem-solving, communication, and collaboration – skills that will serve you well throughout your academic and professional journeys.

As you navigate your academic journey beyond Salt Lake Community College, I want to impress upon you the immense potential and responsibility you hold. The world around us faces complex challenges, but in you, the next generation of thinkers and doers, we have our greatest hope. I strongly encourage you to continue asking challenging questions and developing innovative solutions. Whether you're passionate about environmental sustainability, social justice, technological innovation, or any other field, your unique perspective and acquired knowledge are invaluable assets in tackling the world's most pressing issues.

At Salt Lake Community College, you've taken the first steps on this important journey. Embrace the challenges, harness your potential, and use your unique abilities to shape a brighter future. Remember, learning is a lifelong journey, so continue to seek out enriching experiences that expand your horizons and pave the way for success in your chosen field. Congratulations once again on your achievements, and I wish you all the very best in your continued academic endeavors.

Jason Pickavance  
Interim Provost for Academic Affairs

## A Message from the Deans



*“I’m just here to take my generals.” It’s a comment I have heard many times from students as they make their way through our halls. Yet, SLCC offers so much more than just classes! For students seeking to explore their ideas and cultivate the habits of mind that build true thought leaders, the opportunities for research and creative projects are there for anyone to experience. The innate curiosity we all possess make us unique as explorers, thinkers, and crafters of our own destiny. SLCC is invested in offering opportunities for students to explore the remarkable human capacity for wonder and we celebrate them in this event so that others are inspired to do the same. With thanks to everyone that worked to make this event possible, I welcome you to the SLCC Undergraduate Project and Research Conference and invite you to be inspired by the projects and discoveries you will find here.*

*Together we are pushing the boundaries of what it means to be a member of the SLCC community.*

Dr. Craig Caldwell - Dean, School of Science, Math and Engineering

*It is both an honor and a privilege to collaborate on this opportunity to provide our students the space to showcase their intellectual curiosity through undergraduate research. As we seek to be a model for inclusive and transformative education, participation in undergraduate research empowers and invites students to be innovative, share their ideas, inventions and findings with their peers, faculty, staff, and the broader community. Engaging in this high impact practice of undergraduate research, at a community college, situates students to be better prepared as they continue their academic pursuits at a four-year institution. Having this research experience provides a platform for students to balance between individual and collaborative work, discover a passion for research, puts them on a trajectory for graduate studies, and is a catalyst for their careers as future researchers and potentially future faculty.*

*There are many benefits for students and faculty alike, who engage in undergraduate research. As such, we invite faculty, staff, and students to spread the word and invite others to join in this worthwhile endeavor.*

**GO BRUINS!**

Dr. Roderic R. Land - Dean, School of Humanities and Social Sciences

## Keynote Speaker: David Parrott, Ph.D.

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### “Climate Change and a Shrinking Great Salt Lake”

Dr. Parrott is interested in the interactions between plants and the microbes they share the soil with. He is specifically interested in those interactions which might help in better understanding how plants tolerate drought or high soil salinity. He has a profound curiosity for the halophilic bacteria and fungi found in and around Great Salt Lake, and is also interested in the practical applications those microbes might lend themselves to. He teaches a variety of biology classes including cell biology, plant biology and microbiology. He is committed to training students to not only communicate with other scientists, but to engage the public in ways that promote science learning, foster excitement and curiosity, and to inspire future scientists in the community.

Dr. David Parrott is currently the Assistant Director of the Great Salt Lake Institute at Westminster University in Salt Lake City. He received his bachelor's and master's degrees in botany and plant physiology at Humboldt State University in Northern California, and his Ph.D. in plant biology at Utah State University in Logan. He studies soil microbes growing around the roots of salt loving plants on the shore of Great Salt Lake. He is curious to see if the microbes help the plants survive in this extremely salty and dry environment. Dr. Parrott works with a variety of environment interest groups, including Friends of Great Salt Lake, HEAL Utah and Save our Great Salt Lake, to raise awareness of the impacts that population growth and climate change are having on the lake.

## About UP<sup>3</sup>RC

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Thanks to the team in Institutional Marketing, Printing Services, the Support of SHSS and SME, and the Planning Committee:

- Tami Bunker
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- Lane Law
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- Margarethe Posch
- Tom Hanson
- Lon Schiffbauer

# Presentation Abstracts

## ACLU V. Utah

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Natalie Sierra

School of Humanities and Social Sciences, Oral Presentation

What is separation of church and state? It is exactly what it sounds like, although this topic has never had its own bullet point in the constitution, we're able to see it appear in this quote, pulled from the first amendment. "Congress shall make no law respecting an establishment of religion". In the United States the government does not favor one religion over the other. History has showed us that this is easier said than done. This can be seen in Utah especially, where separation of church and state has always been a topic of controversy. This presentation will discuss the battle of saying prayers at high school graduations, between the American Civil Liberties Union (ACLU), and Utah that started around 1990 and stayed a topic of interest until 1995.

## ADHD & Interpersonal Relationships

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Kambri Law

School of Humanities and Social Sciences, Poster Presentation

While there has been a significant amount of research on the interpersonal relationships in children with ADHD, much less research is available related to the interpersonal relationships in adults suffering with ADHD. However, based on that data, romantic relationships are particularly impacted. ADHD has been found to reduce marital satisfaction, relationship quality, and intimacy levels. There are numerous symptoms that cause issues in relationships and communication with others, including emotional dysregulation, impulsivity, inattention, poor self-control and difficulty in reading social cues. Misattribution of those symptoms can build resentment and hostility between people, and a lack of communication makes it difficult to solve problems and resolve conflict.

## Adolescent Mental Health: The Stigma Surrounding it & Why They Don't Get Help

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Kylynn Hamberlin

School of Humanities and Social Sciences, Poster Presentation

Mental health is something everyone has experienced whether that be minor or debilitating, and with that comes stigma. I have found multiple reasons for this, and in this paper, I highlight two reasons, a reason why people may not get help, and a way to help get rid of stigma. The



two reasons are parental influence, and peer influence. The reason people may not get the help they need is that it costs too much to see a therapist, or specialist. Most people make barely enough to pay their rent and get groceries, so they can't get the mental help they need. And a way people may be able to help other is through getting more knowledge on the subject and helping to educate others on the stigma and how to combat it. There are many ways to help fight the stigma, majority of them is getting educated and by trying to not listen to what other people say about people with mental illnesses.

## American Identities in the Eyes of Children

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Mendrita Kurti

School of Mathematics, Science and Engineering, Oral Presentation

As a child of immigrant parents, I conducted a research project to explore how young people perceive the concept of "American-ness." During my conversations with middle and high school students, I discovered that youth had strong opinions on what it means to be an American and how their experiences in American society have influenced their lives. The young respondents, who belonged to the Gen Z category, valued the opportunities, education, and lifestyle offered by America and envisioned a promising future for themselves in this country. By being open-minded and empathetic, I was able to connect with their responses and realized that personal histories and past experiences can significantly shape one's perspective on American identity. I believe that an individual's personal background plays a crucial role in determining their outlook and their eagerness to work towards a better future for themselves and future generations. Overall, these interviews provided me with a deeper understanding of the perspectives and emotions of young people as they navigate life in America.

## Aquatic Biodiversity in Utah

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Cassandra Grisham

School of Mathematics, Science and Engineering, Poster Presentation

Do bodies of water nearest to urban development have lower microbial biodiversity than those farther away? This was the chosen research aspect for me because of my interest in the wetlands of the Farmington Bay Waterfowl Management area that I overlook from where I live, and how the surrounding urban development may be impacting this habitat. I collected samples from two bodies of water nearest to sites of urban development, and two samples from differing bodies of water much farther from any urban development. From those samples I looked at multiple wet mount slides from each under the microscope, and recorded the various organisms observed. So far from my preliminary observations there are more organisms, and biodiversity of organisms in the samples farther from urban development than

nearest to it. My conclusions are still in the preliminary stages of analysis and not yet complete to make a definitive statement of my research.

## Backyard Bird Buffet: Investigating the Relationship Between Choice of Food and Nutrient Stoichiometry

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Julia Walker

School of Mathematics, Science and Engineering, Poster Presentation

The purpose of this project was to determine whether birds would make a choice based on their ecological stoichiometry when presented with food varying in nutrition. Placing two feeders to attract birds in my backyard, one feeder was filled with seed covered in a vitamin powder and a second was filled with seed covered in cornstarch (which has little nutritional value). It was hypothesized that over the course of the experiment, there would be more birds and more variety of species visiting the nutritious feeder because the more nutritious food would better meet their ecological stoichiometry needs. Through performing ethological observation periods, data was collected on the number and species of visitors to the feeders. Factors like winter weather may have reduced the number of species visiting the feeders, with species variety limited to mostly house sparrows and mourning doves. However, while the feeder preference started out similar, the trend of visitors ultimately changed by the end of data collection. Data analysis revealed a statistically significant result showing the birds did have a preference for the feeder with the vitamin covered seed.

## Beans & Bladders: Caffeine and the Urinary Tract

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Aljawhara Aleissa, Sierra Anderton, Jeshuelle Buccat, Kelsy Palomino

School of Health Sciences, Poster Presentation

This study explores caffeine's impact on the urinary system among college students aged 20 to 25, focusing on urine output and composition changes. Over a six-week period, we monitored daily caffeine intake and analyzed urine for specific gravity, pH, and calcium levels among participants. Initial findings suggest that caffeine consumption may increase urine production and alter its composition, potentially affecting renal health and calcium excretion. This research aims to contribute to the understanding of how caffeine affects the body's fluid regulation and overall renal function, highlighting the importance of moderation in caffeine consumption for maintaining optimal urinary and bone health.

## Benefits of Exercise

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Hamed Karimi

School of Humanities and Social Sciences, Poster Presentation

## Birds Vs. Windows

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Joshua Kuhre, Artur Azizyan, Dean Smith, Chase Hagen

School of Mathematics, Science and Engineering, Poster Presentation

We are researching the collision rates of birds hitting windows and comparing the size of windows, effects from seasonal changes, and how often this occurs. Each week, all four members of the group check two different locations that we each selected at the beginning that have larger windows and the other location has smaller locations. We take a photo of the birds that we find that collided with the window and record it as well. We expect to find that the winter season has less occurrences of collisions than in the summer as well as window size being a factor for more collisions of birds. We expect to find that our results show that window size and warmer weather causes more collisions.

## The Black Handers of Carbon County

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Keyahn Vedadi

School of Humanities and Social Sciences, Oral Presentation

The first three decades of the 20th century saw extensive activity of extortionists applying their trade throughout Utah. Many of these individuals were of Italian descent and were regarded by others as being part of a society known as the “Black Hand,” a mysterious organization that supposedly operated across the whole country. While many of these “Black Handers” would settle in places such as Ogden, others would come to settle in Carbon County. With threats of murder and arson that would often be acted upon, these extortionists terrorized wealthy citizens of their communities and would even target their fellow countrymen to realize the American dream that some of them had traveled all the way across the Atlantic to turn into a reality. Using newspaper articles as well as police files, this paper will focus on a little-known group of Italians in Carbon County that took what opportunities they had to carve out a living in this strange new place thousands and thousands of miles from their homeland. This paper will show how minority groups often turn to crime when in a new place where they are perceived as outsiders with little to contribute to their communities.

## Boost Your Brain Power with Caffeine and Exercise

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Jason Wilde, Addie Epperson, Michelle Kipruto

School of Health Sciences, Poster Presentation

Short-term and long-term memory are extremely significant and essential to maintain quality of life. Memory is the framework for learning and reflecting and plays a crucial role in having the ability to recall past events and store information for different periods of time. So how can we increase our short-term memory? On memory improvement techniques, researchers used two variables in our experiment over a six-week period. Participants will exercise or consume caffeine and will record: the quickness of completing the memory game before the introduction of the variable, and then again after either exercising or consuming caffeine and the number of times the cards were flipped, so researchers can determine differences and similarities between both types of stimulation. This was conducted as follows: we would take our initial assessment of our memory through a game online, and then consume caffeine/exercise, and then take another assessment of our memory using a different memory game found online.

## Caffeine and Sleep Latency

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Yunus Ashtijou, Kyla Simmons, Taylor Emery, Savannah Page  
School of Mathematics, Science and Engineering, Poster Presentation

Caffeine is one of the most used drugs to countermeasure declining performance and to reduce fatigue during circadian misalignment among adults. Caffeine has also been known to affect core body temperature through vasoconstriction, which has been documented to affect sleep latency depending on the magnitude of the decrease in core body temperature. Increased sleep latency can lead to poor sleep health, which is common among adults and is associated with poor health outcomes. This study examines the relationship between time of consumption of caffeine and sleep latency. Over a six-week period, time of consumption and sleep latency data is collected from participants. Sleep latency data is collected through questionnaires and smart watch sleep tracking, and drug tolerance factors are considered through participant's responses to surveys. We expect our findings reveal a positive correlation between delayed time of consumption and sleep latency. These findings will contribute to a better understanding of the effects of caffeine consumption timing on sleep latency, providing insights into optimizing sleep health and overall well-being among adults.

## Caffeine Intake and its Effect on Blood Pressure and Heart Rate

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Bailey Gardiner, Calista Anderson, Haleigh Miles  
School of Mathematics, Science and Engineering, Poster Presentation

This study is an evaluation of how varying caffeine levels affects blood pressure and heart rate, and whether sleep and mood have an additional effect on these measurements. Stress level was noted and kept into consideration for how it could have affected some of the test results. Over the course of six weeks participants collected blood pressure and heart rate data after average caffeine intake, increased caffeine intake, and decreased caffeine intake.

Using a survey system, participants reported their blood pressure and heart rate for three days of the week, taken three times daily. Participants also noted their sleep, mood, and stress levels by stating if they were up, down, or neutral. Participants each used an automatic blood pressure machine and were expected to be at rest for a short time before taking vitals to report in order to maintain consistency with data collection.

## Caffeine: Slay? or Nay?

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Trina Friend, Taylor Lloyd, Ademar Ortega, Kiran Valenzuela

School of Health Sciences, Poster Presentation

Caffeine is a substance in which people have supplemented to increase their performance during exercise. Although they may be seen as beneficial, do these substances come with a variation of physiological risks? Are there predisposing factors involved that may alter your body's homeostatic levels? In this experiment, there will be four female participants consuming different sources of caffeine (black tea, an energy drink, and pre-workout) before walking, and measuring each person's  $VO_2$ , heart rate, oxygen, and blood pressure once the individual has completed their 1.5 mile walk. In completing this experiment, the effects of the pre-workout is believed to have a greater result in increasing each variable that is being measured. Our findings will be concluded by the time of presenting.

## Can Nasal Breathing Boost Your Test Scores?

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Tiffany Hermansen, Aubrey Rice, Mercy Dowe, Hailey Hansen, Rachel Wakefield

School of Health Sciences, Poster Presentation

The Impact of Nasal Breathing on Cognitive Performance: An Oximetry-Monitored Study. This research investigates the influence of nasal breathing on cognitive test performance by conducting a comparative analysis between mouth and nose breathing modalities. Participants undergo cognitive tests in both conditions, with oxygen levels monitored using an oximeter. Preliminary findings suggest a potential correlation between nasal breathing and improved cognitive outcomes, shedding light on the physiological implications of respiratory habits during test-taking scenarios. This study contributes to a deeper understanding of the interplay between respiration and cognitive function, opening avenues for further research on optimizing cognitive performance through controlled breathing techniques.

## Can Porn Cause Depression?

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Trevor Blair

School of Humanities and Social Sciences, Poster Presentation

## Can Short Walks Improve Overall Health?

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Jessica Rowley, Judina Korok, Ella Valley

School of Health Sciences, Poster Presentation

Do minor changes to our physical activity impact our overall health? Such as taking the stairs instead of the elevator, when we walk to the shop 3 blocks away instead of driving, do the little things add up? Our experiment aims to measure the impact that minor changes to physical activity have on our overall health. We will be adding a walk of 1 mile to our daily routines, the average person can walk one mile in approximately 2000 steps and 15 minutes. We will perform this experiment and record findings over 2 months, regularly testing our muscle recovery and lung capacity. With an overall aim to discover if minor changes to our physical activity routines improve our health.

## Carbohydrate Supplementation in Madagascar Hissing Cockroaches

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Jatziry Calderon Aguirre

School of Mathematics, Science and Engineering, Poster Presentation

Our Madagascar hissing cockroaches current diet consists of a high protein diet of cat food. The cat food provides the cockroaches with nutrients for growth and reproduction. This study observed whether the cockroaches would supplement their original protein food with carbohydrates. For this study I used apples to represent a high carbohydrate diet and their original food which contains a high protein diet. I placed both sexes in a different bin and put them by each other to see which sex will supplement their current diet with carbohydrates. Males are supplementing their food with carbohydrates more than the females are. These result may conclude that the male Madagascar hissing cockroaches supplement their diet with carbohydrates to provide them with energy and escalate their reproductive fitness to be more attractive to the females.

## Chemical Synthesis of Aerogel Fabrics using Standard Lab Conditions

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Antonio Ruiz-Ayala, Cristina Kinosian

School of Mathematics, Science and Engineering, Poster Presentation

Aerogels are a fascinating material that function as great insulators. Nasa has partnered with Aspen Aerogels to produce a commercially viable product that aims to tackle a variety of problems such as space shuttle insulation, space particle collection, thermal safety, and cryogenic applications. The main objective of our project is to reproduce an aerogel blanket using standard lab conditions and chemicals. We will be producing the blanket using the silica gel process. We will compare properties of durability, cost, and thermal conductivity. We plan to pinpoint a procedure that provides the most cost effective, durable, and thermally conductive material under standard lab conditions.

## Circadian Rhythm

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Dede Gabiam, Lindsey Khiev

School of Health Sciences, Poster Presentation

Sleeping is part of the human body that needs to recover and rest then start the day again. Many humans sleep in different ways for example how many blankets, or the temperature, the position of the body, etc. It shows that sleep at a higher temperature can cause your body to have different complex relationships, mostly the sleep cycles. Sleeping too hot can cause the core temperature of the body to get restless and have a harder time falling asleep. Having a good quality sleep can help improve your health in many ways including having a balance of hormones, supports health growth and development, decreases your risks of health problems, and heals and repairs the body.

## Cognitive Function Related to Post-Traumatic Stress Disorder (PTSD)

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Emily King

School of Humanities and Social Sciences, Poster Presentation

## Communist Party of America in 1940s Utah

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Noah Hammerschmidt

School of Humanities and Social Sciences, Oral Presentation

This paper looks at the communist party in 1940s Utah. Before the 1940 election, the communist party presented a petition with around 600 signatures nominating their candidates as independents. Initially, their petition was rejected by Secretary of State E. E. Monson because according to Utah attorney general Huffaker the use of a party name disqualified them from running as independents and they had failed to file before the primary elections which was required for party-affiliated candidates. They would later appeal to the Utah Supreme

Court which would rule that they didn't constitute a official party and order a writ mandamus to Monson to put them on the ballot. This ruling would also grant the Socialist party a place on the ballot. This paper focuses on why the Supreme Court made this decision when they had pressure from both the public and the federal government to uphold Monson's ruling. Other states had barred the communist party from the ballot which makes the decision even more interesting. The majority of research for this project was done through newspaper research, looking at articles written at the time. Despite having opportunities to rule in favor of Monson the Utah Supreme Court ruled apolitically even though the communist party was a widely disliked and radical group.

## Comparing Muscular Endurance and Rest Time in Between Sets

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Ammon Julia, Angel Estevez, Hamda Muktar, Oyinkansola Orekoya

School of Mathematics, Science and Engineering, Poster Presentation

We conducted a study observing the effects that rest time has on muscular endurance and performance. Our objectives were to see how different rest times of 30 seconds, 60 seconds, 2 minutes, and 3 minutes have on the number of reps you can complete on the following two sets that would be performed after, totaling three sets per day. We performed this experiment three days a week Monday, Wednesday, and Friday each day performing 3 sets. Each subject was asked to perform seated dumbbell lateral raises and to choose a weight they could only do for a maximum of 10 reps. We designated each of the four subjects to different rest times to find which rest time would provide the most optimal rest time for performance. The first week was used to find their baseline as each subject's strength levels are at different levels. The dumbbell lateral raises were chosen because of the ability of the deltoid being a smaller muscle, it can recover quicker therefore we can receive more data experimenting multiple times a week without skewing reps due to fatigue. Each subject was then asked for 5 consecutive weeks to perform the guidelines explained above to find over the weeks which if any, muscular adaptations would occur. The way to measure if adaptations are occurring is to measure the number of reps performed each day and evaluate if they are increasing, decreasing, or staying the same compared to the previous week.

## Comparison of Pre-Exercise Meditation on Post-Exercise Recovery

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Braydon Cutak, Jared Lasseche, Cecily Lewis

School of Mathematics, Science and Engineering, Poster Presentation



This study endeavors to elucidate the potential association between pre-exercise meditation practices and post-exercise recovery. The investigation delves into the realm of mind-body connections, aiming to uncover the influence of meditative techniques on various facets of recovery. In order to test this hypothesis, the study was established as a 6-week testing period in which the participants would be expected to perform the activities of the experiment on four separate days in one week. Participants will be separated into groups allowing for a control and two variable groups. Study protocol will dictate the activities including a brief warm up on a stationary bicycle followed by a bout of rigorous activity and then will immediately enter into the recovery phase in which they will enter a supine position and continue to monitor heart rate and SPO2 levels at predetermined intervals. As of yet, this study has not yielded any remarkable results, however the findings of this study are anticipated to contribute valuable insights to the fields of sports science and exercise physiology, by way of, demonstrating how intentional mindfulness practices may impact the overall exercise experience of a person by enhancing their recovery outcomes.

## Conodonts Near the Permian-Triassic boundary in Millcreek Canyons Preliminary Findings

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Jaydon Anderson, Ethan Chase, Northrop Garfield, Jacklynn Hardman, Jefferson Pettey, Braxton Powell, Quillan Purcell, Matthew Yeager

School of Mathematics, Science and Engineering, Poster Presentation

Conodont microfossils are a foundational method for dating and correlating sedimentary rock formations. This study seeks to identify conodonts within the Thaynes, Woodside, and Park City Formations of the Late Permian-Early Triassic strata in Millcreek Canyon, Salt Lake County, Utah. While the conodont biostratigraphy of the Thaynes Formation has been documented by others, the Woodside and Park City Formations remain relatively unexplored in this area. Twenty limestone samples were collected in Millcreek Canyon, crushed to approximately ½ in. pieces, dissolved in 10% glacial acetic acid per the standard non-calcareous microfossil method. The conodonts were further separated by density with a mixture of tetrabromoethane (s.g. 2.96) and hexane (s.g. 0.65) to a s.g. of 2.8. Heavy fractions with conodonts were then captured on filter paper and dried. Picking the samples under a microscope yielded 86 conodonts. The most complete conodonts were imaged in a scanning electron microscope at SLCC. Seven conodont taxa were identified, including *Ellisonia sp.*, *Neogondolella jubata (?)*, *Cyprododella sp.*, *Pachycladina sp.*, *Neospathodus sp.*, *Prioniodella sp.*, and *Parachirognathus ethingtoni* Clark. The conodonts allow us to conclude that these strata in Millcreek Canyon are Olenekian in age (251.2 – 247.2 million years old). This project has generated opportunities to collaborate with the Utah Geological Survey in further defining the Permian-Triassic boundary in Northern Utah. This collaboration may lead to additional knowledge of this problematic stratigraphic boundary.

# Designing a PID Cruise Control System for Slick Science Robotic Cars

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Daniel Bagley, Cedric Baker, Maria Herrera, Jett Kearney, Quentin McRae

School of Mathematics, Science and Engineering, Poster Presentation

In this report, we present the development of a Proportional-Integral-Derivative (PID) controller tailored for small robotic cars used in Slick Science summer camp. Our focus is on creating an effective cruise control system that enhances both performance and useability of the existing hardware. Slick Science camp provides an excellent platform for young learners to explore robotics and autonomous systems. Our small robotic cars serve as engaging tools for teaching fundamental concepts related to GPS, programming, control theory, automation, and many other topics. Our objective is to design a PID-based cruise control system that allows these small robotic cars to maintain a consistent speed while navigating predefined tracks. The system should be nearly transparent to camp participants with varying levels of technical expertise. We develop and implement the hardware necessary to implement a PID controller. This primarily involves implementing hardware that allows us to take real-time measurements of the vehicle's speed. We develop a PID controller that takes into account the car's velocity, error from the desired speed, and accumulated error over time. The proportional, integral, and derivative terms are tuned to achieve stable and responsive control. Real-world testing involves setting up track scenarios within the camp premises. Participants can observe how the PID controller adjusts throttle or braking to maintain the desired speed. The PID cruise control system becomes an integral part of Slick Science vehicles. We use this controller so that as batteries decline, surfaces change, or elevation rates change, the car can maintain a constant speed, making it possible for the camp attendees to focus on the other aspects of the vehicle's performance. Our PID cruise control system demonstrates reliable speed regulation, even in the presence of disturbances such as inclines, declines, or sudden obstacles. This allows us to focus the camps on the programming and other aspects of the camp while the vehicle continues to perform independent of external conditions. By introducing PID control concepts through robotic cars, the Slick Science students will be able to learn about GPS, programming, and other camp-specific topics regardless of the conditions the vehicle is run in. This also allows the counselors running the camp to be less concerned about battery charge and other issues that cause the cars to run too slow, allowing them to focus on the needs of each student.

# Differentiation of VOC Emissions in Heat Stressed Populus Trichocarpa with Varying Levels of Mycorrhizal Colonization

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Luis Valdez

School of Mathematics, Science and Engineering, Poster Presentation

Plants emit a diverse and substantial amount of Volatile Organic Compounds (VOCs) into the atmosphere. These compounds play important roles in the plant's responses to environmental stressors, multi-trophic interactions w/other organisms, plant-plant communication and have been shown to participate in atmospheric chemistry. Although variations in plant VOC emissions have been extensively studied, there are gaps in knowledge on how symbiotic interactions with soil microbiota shape the VOC profile of plants in the context of environmental stress. Arbuscular Mycorrhizal Fungi (AMF) are fungi that form symbiotic associations with plants by colonizing their roots & providing enhanced micronutrient & water retention in exchange for photosynthates. These associations have also been shown to induce systemic metabolic changes in the plant that include changes to pathways that lead to the synthesis of certain VOCs. In this study, we will look at how the VOC profiles of *Populus trichocarpa* change in relation to heat stress & AMF availability in the soil. Plants will be exposed to heat treatments of 25° C, 35° C, & 40° C for an extended period. VOCs will be collected using dynamic headspace extraction & analyzed using GC-MS. For each temperature, emissions will be compared between saplings planted under different levels of AMF availability (low, medium, & high). We expect high mycorrhizal availability to strongly affect VOC emissions with variation in the profile being reflective of how much time has passed since the heat treatment.

## Do Cooler Temperatures Improve Sleep Quality?

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Danielle Kemmer

School of Mathematics, Science and Engineering, Poster Presentation

There have been numerous studies done concerning how temperature affects sleep quality. Our study hypothesized that cooler temperatures will have improvements on overall sleep quality. In the experimental portion of the study, different temperatures were tested during sleep by decreasing home temperatures by two degrees every week for a total of four weeks. The participant's home temperature was maintained for a week to act as a control. During each of these four weeks, daily sleep surveys were conducted upon waking to monitor and assess sleep quality. These sleep surveys asked various questions about the previous night's sleep and computed a score between 0-27. The findings of this study show that cooler temperatures do improve sleep quality. Increased physical, mental and emotional health benefits can happen as a result of improved sleep quality.

## Do Fad Diets Really Work?

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Riley Hebdon, Cody Madsen, Meg Thorsen, Avery Young

School of Mathematics, Science and Engineering, Poster Presentation

Based on research, it is known that dietary choices play a crucial role in influencing an individual's cardiometabolic and overall health. Understanding the specific impacts of various diets is essential for individuals to make informed health decisions. With many "fad" diets being pushed in society today, this study is aimed to investigate the anticipated changes in cardiometabolic health by focusing on blood cholesterol and glucose as well as total body fat composition, across participants adhering to different diets: non-restricted, paleolithic, intermediate Atkins, and vegan (plant-based). The results from this study will help draw conclusions as to which dietary restrictions allow for the best overall health for an individual in the shortest amount of time.

## Does Gym Culture Affect Body Image

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Joshua Mullen

School of Humanities and Social Sciences, Poster Presentation

This literature review was focused on finding how gym culture affects body image. In recent times, the gym has had a surge of popularity. Social media and fitness influencers have played a huge role in boosting the gym and the culture surrounding it. Recent trends on social media relating to disliking one's body have flourished in gym cultures. This raises the question of how the gym affects one's self-image. The research used contained five studies that had something to do with the gym and body perception. From these studies, it was found that the gym has an overall improvement in body image. This is especially true for beginners in their first year attending a gym. But as experience level and time working out increase there is also an increase of muscle dysmorphia. Athletes also have higher rates of psychopathologies such as muscle dysmorphia and eating disorders. There was a difference in goals between genders as well. Men strive to be more muscular and stronger, while women work to be slimmer and toned. Most studies used were done outside of the United States. All studies did not focus on gym culture but on the gym overall. The data found shows that the gym has effects on body image and most likely gym culture does as well.

## Does Sex Skew the Diagnoses of Borderline Personality Disorder?

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Avery McKendrick

School of Humanities and Social Sciences, Poster Presentation

There have been many studies and much research done on how the diagnosing criteria for Borderline Personality Disorder (BPD) is biased depending on what sex is being tested for it. By discussing the criteria and how the sexes represent the symptoms, we can come to a logical conclusion on why men are under-diagnosed with this disorder. Using articles that tested this theory of sex bias, either through firsthand experiences or data, we can see as to why this bias exists. BPD is normally diagnosed through emotional circumstances and how the emotions are shown and when they are shown, but men with BPD tend to show little to no emotion. This leads to men being misdiagnosed with Antisocial personality disorder (ASPD) instead of BPD.

## Early Last Meal vs Blue Light Reduction for Improved Sleep and BMI

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Jaxton Anderson, Jose Torres, Rossmir Contreras, Diana Figueroa, Alberto Ramos

School of Mathematics, Science and Engineering, Poster Presentation

This study was created to prove a correlation between quality of sleep and BMI. Six weeks of data was collected plus one control week at the beginning of the experiment with two main independent variables, blue light exposure which was measured according to the time the participants stopped using any type of electronic devices before going to bed, and the time of the last meal of the day. The intervals were performed weekly, and BMI was checked every Wednesday before the first meal of the day and workout using the electronic body composition analyzer(TBF400). Probability of confounding variables affecting our data was reduced by having multiple participants doing the same independent variables at the same time, that way we can get an average result that will be much closer to the true value we are trying to prove.

## The Effects of Caffeine on Endurance

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Nhu Tran, Juliana Johnson, Autumn Crandall, Murray Geist

School of Health Sciences, Poster Presentation

Caffeine is a well-known stimulant that is frequently taken for the purpose of the enhancement of physical performance. The purpose of this study is to determine the effect of caffeine on muscle endurance and exercise performance. A total of four participants were included in the experience. They underwent two running sessions: a placebo/control group (with no caffeine ingestion) and an experimental/intervention group that consumed 300mg of caffeine before running for a total of 6 weeks. The goal of this experiment is to measure the body's endurance level for each participant while they are running on both runs. Hence, all the parameters of given activity were kept the same except the run time. As a result, the caffeine group might see positive effects in skeletal muscle endurance and running performance better than the control group who did not consume caffeine. An example of such a possibility might be improved

endurance for muscle, less perceived exertion, or any other measure that reflects body condition. Although this study is also important for the individual responses to caffeine which might produce the different effects depending on tolerance, genetic vulnerability, habitual caffeine consumption, etc., it might not be easy to generalize the results of this research for athletes if their purpose is to optimize their exercise endurance.

## Effect of Changes in pH on Microorganisms

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Kaitlyn Erickson, Jennifer Martinez-Flores

School of Mathematics, Science and Engineering, Poster Presentation

We have collected samples of water from various locations and have added a pH buffer that has changed the pH of the water. Over time, we are both going to observe the activity present from the microorganisms in our controls, a +2 pH from the baseline sample, and -2 pH from the baseline. Three days after the addition of the buffer solutions, we created cultures with agarose plates and will be examining the growth possibly present from each sample. Over time, we hope to see the presence of either acidophiles or alkaliphiles in the respective samples. The implications of this can be compared to how pollutants put into our water systems impact life on the microscopic level. Better understanding this can help us better understand when action needs to be taken when pollutants are brought into a natural environment.

## Effect of Cold Showers on Mood

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Gabriel Spackman, Tabitha Wanjiru, Bryson Percival, Diana Teasdale, Chelsea McIntyre

School of Health Sciences, Poster Presentation

This study investigates the effect of frequent cold showers on an individual's overall mood and nervous system stimulation. It is hypothesized that cold showers will positively influence mood and stimulate the nervous system. The participants for this study were selected from the research group along with additional individuals. Over the course of 6 weeks the male and female participants were asked to spend 2 minutes of their shower using the coldest setting possible. The participants had the cold shower on Sunday through Wednesday of each week. Conversely, they maintained their normal shower temperature on Thursday through Saturday as a control measure. Before and after each cold shower, the participants measured their heart rate and recorded it. At the end of each day, they rated different areas of their mood using the POMS (Profile of Mood States) survey. This evaluation monitors areas such as anger, confusion, depression, fatigue, tension, vigor, and overall mood disturbances. The study aims to provide insights into the potential mood-enhancing effects and nervous system stimulation associated with cold shower therapy. Results from this study may contribute to understanding alternative methods for mood regulation and nervous system stimulation.

# The Effect of Psychedelic Assisted Therapy on Post-Traumatic Stress Disorder

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Malik Enloe

School of Humanities and Social Sciences, Poster Presentation

Post-Traumatic Stress Disorder (PTSD) is a condition that is debilitating for many with high dropout rates for its currently mandated treatment plans. This is especially true for populations that are vulnerable to PTSD including women and combat veterans. Psychedelic-based treatment programs, primarily psychedelic-assisted therapy, have shown great promise in clinical and experimental trials for evoking long-term symptom remission for PTSD and Major Depressive Disorder (MDD), which is another disorder that has high comorbidity with PTSD. Adequate research must be conducted into the potential harms associated with psychedelic use and how to minimize them for the greatest positive impact on long-term symptom relief for PTSD patients. Psychedelic-assisted therapy could become a vital new resource in treating PTSD, which is especially necessary considering the relative inefficacy for symptom remission shown in current PTSD treatments.

# The Effects of Aerobic Exercise on Blood Pressure and Resting Heart Rate

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McKenzie Alvarez, Micah Day, Melissa Davis, Tracy Lewis

School of Mathematics, Science and Engineering, Poster Presentation

The purpose of this project is to test whether completing the amount of aerobic exercise recommended by the CDC will decrease the participants' blood pressure and resting heart rate over an 8-week period. Participants will all be doing various types of aerobic exercise, and are different ages with different medical and family histories. Each participant will take their blood pressure and resting heart rate each morning right when they get up for the day, and record the results. The stress of aerobic exercise does increase blood pressure and heart rate during the activity, but it helps lower the resting levels due to the activity overall strengthening the heart. When the heart becomes stronger then it is able to pump more blood-carrying oxygen, nutrients, and wastes at a faster pace with less strain on the heart itself and the arteries. The CDC recommends 150 minutes weekly of moderate to intense physical activity to promote the body's function and health. In short, this study asks whether regular aerobic exercise will lower the participants' blood pressure and resting heart rate over the 8 weeks.



# The Effects of Caffeine Consumption on Heart Rate and Blood Pressure

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Kinnley Davenport, Annika Nye, Lindsey Pollock, Hanh Tran

School of Mathematics, Science and Engineering, Poster Presentation

Cardiovascular health remains a prominent topic in health science, with extensive research exploring the impact of caffeine on the human heart. In this study, caffeine pills were consumed to understand its effect on blood pressure and heart rate among college-aged participants over a six-week period. During the initial week, participants took their blood pressure and pulse when they did not take any caffeine pills. Subsequently, over the next three weeks, participants took one 100 mg caffeine pill every day. They recorded their blood pressure and heart rate before taking the caffeine pill and 20 minutes exactly after. For week five, the participant did the same methods except that they doubled the amount of caffeine taken. For the last week, week six, hours of sleep besides blood pressure and pulse were also recorded with only one 100 mg caffeine pill. The hypothesis posited that caffeine pills would increase participants' blood pressure and pulse. Findings from this study may contribute to a better understanding of caffeine's cardiovascular effects and aid individuals in selecting appropriate caffeine doses to mitigate potential health risks.

## Effects of Caffeine on Blood Pressure and Heart Rate

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Yesenia Aguilar Perez, Heather Cordes, Hannah Muselmann, Jayden Thompson, Hunter Glad

School of Mathematics, Science and Engineering, Poster Presentation

Caffeine is part of most people's everyday routine, you wake up and make a cup of coffee or get to work and chug an energy drink for an extra boost. As college students specifically many of us rely on caffeine just to make it through the day. Whatever the case may be, have you ever thought of how your consumption of caffeine affects you physiologically? Specifically what it may do to your heart rate and blood pressure with moderate activities such as walking up a hill on your way to class? This paper oversees the experiment of 5 female college students who test how just one sugar free RedBull energy drink affects their heart rate and blood pressure after a rather simple walk on the treadmill. The importance of this experiment is to show how an everyday choice may be affecting your health in a way you're not aware of.

## The Effects of Caffeine on the Body

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Paige Tschampel, Kirra Johnson, Megan Kearl, Elise Beller



School of Mathematics, Science and Engineering, Poster Presentation

Be honest how often do you think about how your daily coffee or soda is affecting your heart health? “During the past decade or so, research has attempted to clarify the health benefits or harms related to coffee drinking.” For our project we put it to the test. Here is our hypothesis, if we increase our coffee intake per day, our heart rate, blood pressure, and respiratory rate will increase. In an article by Hu Gang, it states “Recent meta-analyses have shown a relation between coffee and caffeine intakes and an increase in blood pressure”. Meaning there have been studies trying to prove the relation of coffee and caffeine on health. We chose this specific topic for our project because caffeine has a significant impact on our group members' lives. Whether it is a daily necessity to have a nice awake day, or where any sort of caffeine will cause headaches, or other problems throughout the day. This project will help us see the differences in our mood, feelings, energy, and hunger with certain amounts of caffeine throughout the day. We also want to see the effects of caffeine on our cardiorespiratory system if we increased our caffeine intake by so much per week. And to see if it will improve or set back our cardiac and respiratory health. We believe that our project's results show that the increase of our caffeine will increase our blood pressure, heart rate, and respiration rate. Our research will help others hopefully build a correlation between our heart health and caffeine that was not there before. It will also help people be more aware of their drinks containing caffeine and how it can affect your health and mental wellbeing. In our background research articles we found there were things that helped us produce what information we wanted to gather, as well as a correlation between the cardiovascular, respiratory system, and caffeine intake, here we see in the article there may be a correlation “coffee drinking has been linked to both elevated and reduced blood pressure (BP) and has even been shown to have no effect on BP.” These articles also helped us build our hypothesis to what we have now and helped us form questions such as problems and complications with ingesting caffeine, by saying “Possible health hazards have been related to its main ingredient, caffeine. Activation of the sympathetic nervous system by coffee may enhance cardiovascular risk; however, it is unclear whether this effect of coffee is related to caffeine or other substance(s) also contained in decaffeinated coffee.” Which goes along with what we are testing in our project by stating the risks of caffeine and the cardiovascular system.

## The Effects of Cardio on Your Circadian Rhythm

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Wala Ibrahim, Zyanya Juarez, Jamie Rosales, Aurora Ruiz Velazquez

School of Mathematics, Science and Engineering, Poster Presentation

This study investigates the impact of cardio workouts on sleep quality and mood regulation over a seven-week period. With the understanding that the circadian rhythm plays a crucial role in determining sleep patterns and mood stability, the experiment aims to determine if engaging in cardio exercise before noon compared to in the evening affects these variables differently. Following an initial week of baseline data collection, participants complete mood surveys while tracking any sleep disruptions. For the subsequent 6 weeks, participants engage in cardio

workouts three times a week before noon one week, followed by workouts after 5:00 pm the next week, alternating morning and evening times every week. Researchers anticipate that exercising earlier in the day will lead to improved sleep quality and mood compared to evening workouts, based on previous findings suggesting that early exercise advances the body clock.

## Effects of Cold Showers on Oxygen Levels in the Blood

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Hailee Hiatt, Taylor Kochevar, Yessy Rangel-Huerta, Heidi Reynoso

School of Mathematics, Science and Engineering, Poster Presentation

While cold showers were popular for quite some time for various health benefits, we decided to test them for ourselves. We decided to specifically test the effects cold showers had on our oxygen saturation levels (spO<sub>2</sub>). Our control consisted of four showers for one week, while taking a shower in our normal temperatures and recording our oxygen saturation levels before and after the shower. For the following five weeks we showered in cold water four times every week and collected data on our oxygen saturation levels before and after our showers. We began the first week with thirty seconds and increased the following week by an additional fifteen seconds, for five weeks, until we reached a minute and thirty seconds for the final week. After we completed our experiment, we compared our results to see how the cold showers overall affected our oxygen saturation levels. After reviewing the data, we concluded that cold showers do have a positive correlation on our oxygen saturation levels as we have seen an increase in our oxygen saturation levels in the third week of the experiment.

## Effects of Exercise on Mental Health

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Malak Alsammarraie, Raeleigh Thomas, Mallory Krum, Isabella Cordova

School of Health Sciences, Poster Presentation

According to Harvard Health, consistent exercise helps to reduce long term stress by increasing the levels of natural painkillers and mood boosters such as endorphins and also lowers levels of stress-related hormones such as cortisol and adrenaline. As students with busy lives with work and school we experience a lot of stress. So we decided that we would see if there was a way like exercise to help relieve that stress so we can live healthier lives. In order to find out what forms of physical exercise help to reduce stress the most, we will be undergoing an experiment where over the next six weeks, we will be trying five different forms of common stress-reducing exercises and taking a stress-level quiz to see any changes between before and after doing these activities. The five exercises we will be doing are yoga, stretching, tai chi, dancing, and walking. We acknowledge that there has been a noticeable improvement in our mental health since the beginning of this project. Regular exercise releases endorphins, a brain chemical that is naturally present and is linked to happy thoughts and overall wellness in people, according to

Mayo Clinic. Thus, we anticipated not just a shift in our physical health but also an understanding of the science underlying the "feel good chemicals."

## Effects of Hydration on Muscle Recovery and Soreness After Moderate Exercise

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Aubrie Martinez, Preston Hagen, Bridger Baker, Erin Tabler, Vicente Forero

School of Mathematics, Science and Engineering, Poster Presentation

Effective muscle recovery is essential for maintaining a healthy and sustainable workout routine. This study investigated whether drinking larger quantities of water, or water with electrolytes, helped reduce muscle soreness when maintaining a consistent workout routine. The hypothesis suggested that increased hydration would improve muscle recovery and minimize post-workout soreness. Five participants of varying age and fitness levels tracked their workouts, pain levels, water intake, and lactate levels over the course of the study. Workouts, lasting between 45-60 minutes, were conducted three days per week and incorporated diverse muscle exercises, targeting a heart rate of 100-150 BPM to ensure adequate muscle exertion. One participant served as the control maintaining a consistent intake of water and electrolytes throughout the study to determine other variables that could contribute to pain levels post workout. Baseline data collected in week one established each participant's water intake and pain levels during and after workouts. The remaining participants increased their water and electrolyte intake to determine if there is a difference in soreness after increasing hydration in the body. The data collected is conclusive. The findings of this study hold potential to inform individuals seeking to optimize their fitness training and effectively manage post-exercise discomfort.

## Effects of Increased Cardiovascular Exercise on Response Times

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Brayden Davies, Moises Flores, Taylor Hunt, Thomas DeMasters

School of Humanities and Social Sciences, Poster Presentation

There are many benefits to cardiovascular exercise, including improvements in cardiovascular health, weight management, and mental health. While the effects of cardiovascular exercise have been widely studied, there is less information available regarding the effects of exercise on reaction time. This brief study looks to examine the connection between exercise and improved reaction to visual stimulus. Over the course of five weeks participants in the study will carry out increasing amounts of aerobic exercise and record their reaction times both daily and

before and after workout sessions. It is expected that consistent cardiovascular exercise will increase performance on reaction time testing.

## Effects of Meditation on Heart Rate and Quality of Sleep

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Kimberly Adams, Ashlyn Childrey, Kennady Heitmann, Sandra Martin Gomez

School of Mathematics, Science and Engineering, Poster Presentation

The objective of the study was to evaluate the effectiveness of guided meditation on improving sleep quality and lowering heart rate. This study spanned four weeks and aimed to investigate the correlation between the length of guided meditation and heart rate and sleep improvement. Participants followed a guided meditation in a quiet environment in their homes, shortly before going to bed. They recorded heart rate before and after meditation sessions, subjective sleep quality rated on a 1-5 scale, and how rested they felt the next day on a 1-5 scale. The first week was the control period to establish baseline data, there was no meditation this initial week. The following weeks introduced guided meditation in increments of five minutes. Week two being five minutes, week three being ten minutes, and week four being fifteen minutes. Increasing the time meditating each week aimed to determine if the duration of meditation had a direct effect on self-reported sleep quality and restfulness. It was predicted that an increase in meditation length would improve sleep quality and energy levels the following day, showing that guided meditation is an effective way to improve quality of sleep and restfulness.

## Effect of Mg on Sleep

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Fabiola Espinoza, Jacey Crawford, Benjamin Judd, Grace Roberts, Gian Opiniano

School of Mathematics, Science and Engineering, Poster Presentation

## The Effects of Oxygen and pH on Our Wetlands

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Sara Ravangard, Doris Campos

School of Mathematics, Science and Engineering, Poster Presentation

There will be higher biodiversity in waters with higher oxygen levels and pH closer to neutral. The reason we choose this topic is because we believe it's important to know the effects on organism survival. If we find that higher oxygen levels and neutral pH are beneficial to organism survival then it's useful to know as a biologist. Also to contribute information to our community so we can save more organism in our wetlands. Measuring pH by using strips and oxygen levels by using dissolved oxygen meter. We ended up finding more organisms/biodiversity in waters that had pH and oxygen level closer to 6. For our hypothesis regarding pH we were more accurate because 6 is close to

neutral. However, for our predictions regarding oxygen level we were pretty off. We predicted that oxygen levels that are higher would have more organisms present. But we ended up finding more organisms closer to oxygen levels around 6.

## Effects of Physical Activity on Body Composition

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James Alex Arnold, Dalfino Sandoval, Kuntal Bastakoti, Kent Christensen

School of Mathematics, Science and Engineering, Poster Presentation

The purpose of this project was to investigate the effects of physical activity on body composition over a period of 10-11 weeks. We enlisted four participants, who we divided into two groups: one that followed a high minimum step count (starting with 10,000 steps per day) and one that performed a daily workout (starting with 30 push-ups, 50 sit-ups, and 50 squats per day). We monitored changes in their BMI, body fat percentage, and lean muscle mass over the course of the experiment. Our goal was to determine if there was a significant difference in body composition at the end of the experiment compared to the beginning, as well as to determine if this change was greater for one group compared to the other. Preliminary results showed that while all participants experienced a decrease in body fat percentage and all but one participant saw some increase in muscle mass, there was no observable difference of trend between the step count group and the workout group.

## Effects of Various Disinfectants on the Productivity Of Yeast

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Maxwell Holmes

School of Mathematics, Science and Engineering, Poster Presentation

I began taking an interest to yeast in this regards after learning that their cell walls are fundamentally different than other bacteria, so I wanted to test agents that are normally used to kill bacteria on yeast. I collected data regarding the productivity (CO<sub>2</sub> produced, Size of mother, sucrose to ethanol conversion) of a yeast under a variety of different circumstances related to brewing. I expect that the control will outperform all the experimental groups, with the hydrogen peroxide group doing the worst of all the groups. If this is the case then that will mean that some methods that chemically purify water won't affect yeast which could choose which water disinfection methods I use when out camping or cleaning a wound.

## Empathy & Personality Correlation and Connection

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Danna Tuiono, Brian Ruelas

School of Humanities and Social Sciences, Poster Presentation

This study is investigating the relationships between the Big 5 Personality traits and how people express empathy in three dimensions: Cognitive behavior, Emotional identification, and Social interaction. Using the Empathy Assessment Scale (EAS) to measure empathy, and the Big 5 Inventory (BFI) to scale personality with O.C.E.A.N. (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism). Through the collection of data and its analysis, the hypothesis is that individuals with Higher Neuroticism and Agreeableness are more strongly linked with empathy than those with Low Neuroticism and Agreeableness. The majority of responses gathered came from community college students.

## The Encouragement of Women's Exercise, Specifically Basketball, in Utah Between 1900-1940

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Elsa Wybrow

School of Humanities and Social Sciences, Oral Presentation

The topic of this research is about the encouragement of women's exercise through the perspective of basketball in Utah between 1900-1940, which will answer the central questions of, "why were girls exercising looked down upon in the first place?" Throughout history, we have learned that men and women had specific duties according to their gender. The man provided, while the woman was known for staying home and either doing the household chores or nurturing her children. But this topic is important because it gives history on the evolution of girls in athletics to where it is in today's society. The traditional woman has been able to change throughout the years, and equality opportunity between men and women has become more prevailing. A majority of this research has been done through local newspapers in Utah. Lots of information was provided in these various articles by valid doctors, athletic directors, and women athletes that have helped in answering the central question to this topic. Overall, this paper proves that the encouragement of girls' exercise, and basketball, contributed to the change in dynamic and roles and responsibilities of women to what it is today.

## Establishing a Common Framework for Triangles

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Jordan Gertino, Bryan Wilson

School of Mathematics, Science and Engineering, Poster Presentation

This study investigates the inscribing of a tetrahedron within a unit circle, presenting a unique approach to generate a comprehensive array of all triangles with a specific scale and orientation. While this endeavor is a work in progress, the ultimate objective is to establish a mapping between the creation angle and the resulting transformation of the triangle. This research aims to yield a set of triangles characterized by consistent side ratios, which can serve as a benchmark for scalable transformations. By creating a standard family of triangles this

research may provide a different framework in geometric manipulation with potential applications in various fields.

## Exercise and Cardiovascular Health

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Andy Sekutowski, Hamdi Gabo

School of Health Sciences, Poster Presentation

This experiment looks at the effect of exercise on cardiovascular health over six weeks, with three participants aged 21 to 26 performing various kinds of exercise routines. To determine exercise efficacy, the researcher tracks heart rate, blood pressure, cholesterol levels, and stress. The hypothesis is that six weeks of exercise will cause a drop in resting heart rate and blood pressure, an increase in cholesterol and HDL, and a decrease in LDL and triglyceride levels. Potential confounding factors such as diet, sleep, and stress have been taken into account, and participants' exercise habits and lifestyle changes will be evaluated using before and post-survey questions.

## Exercising Memory

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Cynthia Irakoze, Emma Turner, Adrielle Victoria Vieira

School of Mathematics, Science and Engineering, Poster Presentation

For this study, we developed a series of experiments to test the claims found in research, that exercise is directly correlated with memory development. More specifically, our hypothesis was that engagement in regular aerobic exercises is directly correlated with short-term memory retention. Our preliminary research indicated that engagement in regular cardiovascular exercises is linked to brain neuroplasticity, and the development and retention of short-term memory. To test our hypothesis, we designed a study with stationary bicycles and memory puzzles, where the participants had workouts designed for at least thirty minutes daily for five weeks and engaged with the memory puzzles after working out. We wanted to see if, with consistency and increased workout intensity, the participants would finish the puzzles faster overtime.

## Experience, Freedom, or Diplomas? The 1892 Medical Legislation Debate in Utah

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Lori Billings

School of Humanities and Social Sciences, Oral Presentation

From 1870-1920 in the territory, and then, state of Utah, there was a gradual shift from the use of midwives and Jeffersonian doctors to trained and educated “diploma” nurses and doctors. This movement reflected a nationwide trend to professionalize the medical professions. In the late 19<sup>th</sup> century, Utah had an unusually high number of trained female doctors who received their degrees at various medical schools in the eastern United States and who then returned to Utah to open medical practices and to train women as nurses and midwives. This widespread local training of nurses and midwives through private schools, hospital training programs, and church and local club sponsored efforts to increase the general medical knowledge of all women, contributed to lowered rates of infant mortality, and by the 1930s Utah had joined the ranks of states with the lowest infant mortality rates. From 1890-1893, attempts to further unify and standardize practices and credentials for nurses and doctors in the Utah territory, led to a local public debate on the proposed laws and regulations. The opposition to the legal professionalization of medical personnel occurred for a variety of reasons including inter-doctor power struggles, the argument that it limited freedom choice, and the conflict over which government entity had the right to choose personnel for medical boards. Using data from newspaper articles of the time, and secondary sources of books and theses, this public debate will be examined, as well as the challenges of the subsequent need for enforcement. The gradual increase in laws and legal oversight, as well as a local push and support for female education, led to a significant increase in the health of Utah’s population.

## Exploring Diverse Perspectives on ADHD: A Comparative Study Across College Majors

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Camille Thompson

School of Humanities and Social Sciences, Poster Presentation

## Exploring Exercise Modalities and Respiratory Resilience

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Peyton Summer-Gonzales, Karla Zavala, Ai-Nhu Tran, Matt Wakeman

School of Mathematics, Science and Engineering, Poster Presentation

People tend to make exercise choices that reflect their lifestyle. However, it is important that those exercises not only meet the needs of convenience, but also fit health needs as well. We compared four common exercise routines for 6 weeks to find which exercise is best for lung health and body composition. We tracked a multitude of variables to find the effects of weightlifting, cycling, dancing, and HITT workouts. We asked participants from the study to focus on only performing one of these exercises until exhaustion. We then asked them to increase the time they spent doing the activity by an hour each week. We have found that the lowest body fat was from performing regular HITT workouts and the highest forced vital capacity (lung strength) was from performing cycling regularly. Dancing and weightlifting produced similar



results, trailing behind by only a few percentiles. Which would suggest that different exercises will give you different physiologic results. Implying above all else that most exercise with high expenditure on a regular basis will be beneficial for lowering body fat and increasing lung volume.

## Exploring the Psychological and Physical Impact of Abortion

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Madison Middleton

School of Humanities and Social Sciences, Poster Presentation

This review explores the multifarious impact of abortion on women's physical and psychological health. Despite widespread rumors, many claims lack support from primary source statistics. This analysis aims to highlight symptoms stemming from this significant procedure, presenting information supported by accredited peer-reviewed research. Additionally, it discusses limitations inherent in these studies, offering insights into the challenges of conducting ideal research. By acknowledging these limitations, we can leverage them to enhance future psychological studies, striving for a more refined understanding of this complex topic.

## Farmington Creek: Aluminum and Copper

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Jaydon Anderson

School of Mathematics, Science and Engineering, Poster Presentation

Farmington Creek in Farmington, Utah, has been identified by the Utah Department of Environmental Quality (DEQ) as impaired for aluminum and copper per the Clean Water Act. To investigate potential sources for these impairments, this study focused on the aluminum and copper concentrations at eight sample locations. Samples were collected through a 0.45 um filter in the field and analyzed for trace elements at SLCC's inductively-coupled plasma – optical emission spectrometer (ICP-OES) device. Results show elevated concentrations of aluminum and copper downstream of the right fork drainage and before the mouth of the stream, near the Great Salt Lake. This suggests that the abandoned mining activity in the right fork drainage combined with the downstream effects of urbanization, are the sources of the high concentrations. Further investigation of the right fork drainage may reveal the true source of impairment.

# Feasibility Analysis of Mixed Solvent Waste Recycling: A Green Chemistry Project

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Amanda Pay, Kaylee Anderson, Jie Mai Chong, Amber English

School of Mathematics, Science and Engineering, Poster Presentation

This research project explores the first of the 12 principals of green chemistry, waste reduction through solvent recycling. Solvents are widely recognized to be a considerable environmental concern. Many industrial chemical processes generate significant amounts of hazardous and toxic chemical waste due to solvents used to facilitate chemical reactions. The reduction of their use is one of the most important aims of green chemistry. In response to this, solvent recyclers have been created which attempt to clean and purify solvents for re-use, thus reducing the amount of solvent waste a chemical company generates. In this project we analyzed before and after samples of mixed solvent containing hexanes, ethyl acetate, and other solvents processed with a CBG biotech solvent recycler. The results were used to improve recycler settings for solvent resolution and assess the effectiveness of waste reduction using such methods.

## Fight or Flight, See More, Do More

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Damelys Borrego Rubio, Shaelynn Jackson, Miguel Puga

School of Health Sciences, Poster Presentation

The fight-or-flight response, a fundamental survival mechanism, plays a pivotal role in shaping our physiological and cognitive responses to stress. This project will investigate potential variations in stress levels among individuals subjected to diverse physiological experiments, aiming to recognize if specific experimental conditions trigger heightened stress responses. Research suggests that the fight-or-flight response plays an important role in shaping the dynamics of the nervous system and influencing cognitive ability. In this study, we explored the intricate relationship between stress, the fight-or-flight response, and their impact on the nervous system with a focus on cognitive development. To determine, a diverse set of physiological experiments were conducted to mimic stressful situations and activate our fight-or-flight response. Under these stressful conditions, our cognitive ability and how well the body responds to these situations. This topic appeals to those intrigued by understanding how stress affects our minds and shapes our cognitive abilities, by delving into the impact of various physiological experiments on stress, individuals choosing this subject aim to find a deeper comprehension of human behavior and mental processes.

# Fluoride Speciation Analysis of the Great Salt Lake Utah

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Danielle Kemmer, Dillon Reynolds, Alyssa Brown, Benjamin Judd, Dean V. Smith, Tyler Jenkins, Asha Ahmed, Amber Thornton Miller, Dalan Jenkins, Nashly Cruz-Guzman

School of Mathematics, Science and Engineering, Poster Presentation

The Great Salt Lake in Utah was at historically low levels during the extreme summer conditions of 2022. This was followed by very rapid melt and run off waters being fed into the lake in 2023. The lake has gained a few feet in depth, but it is still at a very low level. A study to develop methods to measure Fluoride in its different species forms has been commenced. This research group has reported using a Fluoride Ion Selective Electrode for speciation via three sample pretreatments methods for Dental and Pharmaceutical products. The same pretreatments have been used to study a number of samples from different locations in the Great Salt Lake. The treatment combined with the Fluoride Ion Selective Electrode allow the free fluoride ions,  $\text{HF}^-$  and therefore  $\text{HF}$ . Also the total F is determined and by difference the F bound to metals as coordination complexes such as Al, Fe and Ti. The high ionic strength of the samples and the low fluoride levels results working near the detection limit of the Electrode. The speciation and detection limits are reported.

## Focus on Fiber

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Adrielle Bezzant, Kristy Gardner, Andrew Spencer Jones, Victor Sandoval

School of Health Sciences, Poster Presentation

This experiment explored the significant impact of maintaining optimal fiber intake on overall health. Through a six-week study, with the initial week as the control phase, participants closely monitored daily metrics of weight, blood pressure, and bowel movements. Weekly assessments of lipid count and blood sugar levels further enriched the information obtained through the experiment. This study aimed to prove that increasing fiber intake would directly correlate to improved overall health, but at the end of the six-week experiment, results did not indicate conclusive evidence to back such a claim.

## Foraging Behavior at Bird Feeders

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Allison Call

School of Mathematics, Science and Engineering, Poster Presentation

Sunflower seeds have been recognized as a preferred food choice at backyard bird feeders worldwide. This study examines the preference of sunflower seeds and its relation to predation

avoidance and the optimal foraging theory. Identical bird feeders were filled with two feed choices, shelled sunflower seeds and sunflower chips without a shell, and placed at the same backyard location within close proximity. Data was collected on visitation rates, handling times, and quantity consumed at both feeders. Visitation and consumption rates displayed a preference for sunflower chips without a shell, with an influence from intraspecific competition. This study supports the optimal foraging theory, noting higher intake with shorter handling time, and suggests that competition and predation influence food choice.

## Fort Douglas Civilian Training Camp

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Blaine A. Villaplana

School of Humanities and Social Sciences, Oral Presentation

The United States of America was initially vehemently opposed to involvement in European affairs during the Great War and was predominantly isolationist. However, during the months leading up to the entry of American forces during World War I, there was a shift in favor of pro-war sentiments, creating a surge of training camps that would follow the Plattsburg, New York model in 1916-17. These camps were designed to train local civilian men in the art of war, conduct military indoctrination, and provided lectures that would educate the men in various subjects that would prove useful for the challenging times to come. Fort Douglas was one of several training camps; being selected to represent the Intermountain section of the nation, aimed at supporting training for the entire state of Utah, and peripheral areas in states such as Colorado, Idaho, and Wyoming. This forgotten period of Utah's history will hopefully be better illuminated by uncovering the turbulent feelings that Utahns had about the war, the men who volunteered to train at Fort Douglas, and the curriculum taught to these average, everyday Americans during a time not so different from the present day.

## Freezin' 4 a Reason

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Jamie Ahn, Stacie Aho, April Springer, Meaghan Sharp

School of Mathematics, Science and Engineering, Poster Presentation

This study explores the impact of extended cold water immersion on mental and physical well-being. Participants undergo a six-week bi-weekly regimen of ice baths, progressively increasing from 30 seconds to 3 minutes. Maintaining a water temperature of 50°F (+/- 5°F), key parameters, including mood, heart rate, and body temperature, are measured before and after each session. The hypothesis suggests that prolonged cold exposure correlates with improved health. Weekly assessments involve DEXA scans, body fat percentage, and heart rate monitoring. The study adheres to a meticulous timeline, with responsibilities assigned for systematic data collection, analysis, and presentation. The research aims to provide concise insights into the benefits and optimal frequency of cold water immersion.

# The Future of Telomerase

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Patricia Baxter

School of Mathematics, Science and Engineering, Poster Presentation

The goal of this project is to explain the role of telomeres, as well as telomerase, the effects that they have on cancer cells, and the effects of wnt/B-catenin. The project is exploring possible effects of the combination of these enzymes, proteins and beta blockers. My goal is to elucidate how telomeres shorten, which causes mortality. Using telomerase can be beneficial, but combined with wnt/B-catenin, it can promote the proliferation of malignant tumors to form, since telomerase activity is so high in cancer cells. If we're able to use beta blockers like OMP-18R5 and others. They can block Wnt/ $\beta$ -catenin signaling by binding to Frizzled. NVP-TNKS656, Genistein and SR3029 can be used on Axin, GSK3 $\beta$  and CK1, to stabilize the 'damage complex' and can promote the degradation of B-catenin, which blocks Wnt signaling. If we can do this successfully, we can possibly eliminate cancer, as well as delay mortality. My main goal is to promote the study of this and contribute to the research so we can lengthen the telomeres of pets to make them live longer.

## La gentrificación es una forma de colonialismo moderno y es nocivo a la gente de México (Gentrification is a form of modern colonialism, and it is harmful to the people of Mexico)

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Citlaly Guzmán De La Rosa

School of Humanities and Social Sciences, Oral Presentation

En años recientes, específicamente después de COVID-19, ha surgido un resentimiento por parte de varios mexicanos hacia los extranjeros o como muchos se identifican, *expats*. Esto es debido a los efectos que siguen el movimiento de los *expats* en sus ciudades. Las zonas turísticas (que siguen siendo el hogar de los mexicanos) se convirtieron en las propiedades más codiciadas para los extranjeros. En esta investigación, interpreto lo que es la gentrificación y planteo que es una forma de colonialismo moderno. Para ello, uso la perspectiva y las experiencias de los mexicanos de CDMX en los últimos años. Sin embargo, la noción que permanece es la que dice, erróneamente, que la economía se beneficia y, por lo tanto, también los mexicanos. Para esta noción, incluyo las formas en la que México no se beneficia y dos factores que aportan ello. Al final, introduzco un problema de doble estándar ante la situación. El problema de la gentrificación todavía está siendo estudiado, pero pasa en casi todos los países del mundo. Tenemos que poner a lado nuestras perspectivas privilegiadas para ser más

conscientes que nuestras decisiones afectan a otras personas. Solo así podemos navegar el mundo de forma responsable y empática.

In recent years, specifically after COVID-19, resentment has arisen from several Mexicans towards foreigners or as many identify themselves, expats. This is due to the effects that follow the movement of expats in their cities. Tourist areas (which are still home to Mexicans) became the most coveted properties for foreigners. In this research, I interpret what gentrification is and argue that it is a form of modern colonialism. To do this, I use the perspective and experiences of CDMX Mexicans in recent years. However, the notion that remains is that which says, erroneously, that the economy benefits and therefore also Mexicans. For this notion, I include the ways in which Mexico does not benefit and two factors that contribute. In the end, I introduce a double standard problem to the situation. The problem of gentrification is still being studied, but it happens in almost all countries of the world. We need to put aside our privileged perspectives to be more aware that our decisions affect other people. Only then can we navigate the world responsibly and empathetically.

## H<sub>2</sub>O, Movement, Zzz's: Charting the Course for a Healthy Heart

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Kaitlyn Barker, Angeles Dominguez, Hailey Prestenbach, Leslie Sanchez

School of Mathematics, Science and Engineering, Poster Presentation

Cardiovascular disease is the leading cause of death not just within the United States, but globally. Our research project aims to investigate common practices when approaching how to improve cardiovascular health. Starting with the addition of 90 minutes of cardiovascular exercise into weekly routines. Next, testing the effects of adequate hydration for our individual body compositions. Then for the last tested method, getting at least the recommended amount of sleep for the target age group. For each method, weekly data collections will be assessed relating to heart health. Collecting data points such as cholesterol levels, blood pressure, heart rate, and cardiovascular exercise endurance using a treadmill. Utilizing these methods of testing, the effects of these short-term lifestyle changes will begin to improve cardiovascular health.

## How Anaerobic Exercise Effects Sleep Quality

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Megan Wilkowski, Michelle Fernandez-Hazoury

School of Mathematics, Science and Engineering, Poster Presentation

## How Daily Factors Affect Sleep

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Savanna Moody, Emily Timpson, Amy Soriano

School of Health Sciences, Poster Presentation

There are many variables that can affect circadian rhythm, especially the sleep cycle. Some variables that the majority of the population have are consumption of caffeine, exercise, taking melatonin supplements and medication. These variables can have an effect on the body's circadian rhythms, especially when it comes to sleep. They can positively or negatively affect sleep habits. A good sleep habit can be a predicament in how the body will function throughout the day. Not only does sleep help regulate the energy we will have, but it can also regulate the hormones throughout the day, heartbeats per minute, oxygen levels, and reaction time, among other variables. Consuming caffeine throughout the day performing medication exercises before going to sleep can have a mediocre effect on the sleeping cycle. Whereas taking a melatonin supplement before bed and exercising can have a positive effect on sleeping habits.

## How Do Alarm Sounds Effect Awareness?

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Chloe Messer, Kasandra Martinez, Megan Yett, Izabella Miller-Swaner

School of Mathematics, Science and Engineering, Poster Presentation

## How Does Generational Trauma Impact Mental Health, Cultural Identity, Social Relationships Withing Native American Communities

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Megan Declay

School of Humanities and Social Sciences, Poster Presentation

Historical trauma is trauma that can be transferred to future generations through biological, psychological, environmental and social means. Historical Trauma among Native American Tribes is getting more recognition and what is it? Historical Trauma affects marginalized communities that have undergone genocide, Imperialism, colonization, and loss of cultural Identity. Native Americans have suffered greatly throughout history with boarding schools, loss of land, and genocide. How does this show up in communities and one's own mental health? Today, Native Americans have the lowest income, least education, and highest poverty of any group in the United States (Denny, Holtzman, Goins, & Croft, 2005). It is essential not to make generalizations in future research as well or add to the many harmful negative public narratives

that perpetuate. Learning more with future research can provide effective approaches and models that will be available for mental health providers or practitioners.

## How Does Second Hand Vicarious Trauma from Witnessing Abuse as a Child Affect Mental Health?

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Carhuatnata Santiago

School of Humanities and Social Sciences, Poster Presentation

## How Partial Derivatives are Used in Electromagnetism

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Kenyon Brown, Logan Madsen, Michael Wall

School of Mathematics, Science and Engineering, Poster Presentation

What are partial derivatives and why are they used? Partial derivatives are a very important part of the real world. They can be used in many different areas of physics, economics and engineering. Partial derivatives can be described as showing the relationship of how one variable changes in a two-variable function. This allows for analysis of how multiple variables can affect the outcomes of functions in physics, economics and engineering. One very important example of a use for partial derivatives is that of electromagnets. An electromagnet is a type of magnet in which the magnetic field is produced by the flow of electricity through a conductor. Electromagnets can be turned on and off and the power of the magnet can be manipulated. This is why partial derivatives have an important role with electromagnets. Because the power of the magnetic field can vary along with the change in electrical current. This introduces multiple variables to manipulate. Electromagnets are used in everyday devices. Without those who understand partial derivatives, these types of devices would not exist. The applications of electromagnets continue to shape our growing world and the need to have more efficient and better devices. As electromagnets continue to be used there becomes a need for those who will be able to understand how to implement them into technology. STEM has never been more important and it is necessary that the upcoming generations focus on these systems to further the development of these and other technologies.

## Humidity and Frog Coloration

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Kahlea Vassau

School of Mathematics, Science and Engineering, Poster Presentation

Each of the five frogs experienced their own independent coloration alterations containing no sort of specific pattern due to their individually genetically different chromatophores.



# A Hydrologic Report of Little Cottonwood Canyon and Tributary Streams

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Ericka Downs

School of Mathematics, Science and Engineering, Poster Presentation

Per the Clean Water Act, copper, zinc, and cadmium have a history of impairing Little Cottonwood Creek (LCC) in the Central Wasatch. This study illustrates the relationship of inactive mines and metal impairments in LCC below Snowbird Resort and includes the Red Pine and White Pine tributaries. The mines operated from 1860's to 1970's but leave lasting geologic impacts with mine drain tunnels still connecting old mines to streams. Within the 13 water samples taken, 6 out of 13 had traces of cadmium and 10 out of 13 had traces of copper. The copper ranged from 0.77 ppb to 30.75 ppb. Cadmium ranged from 0.23 ppb to 1.27 ppb. Both the copper and cadmium had the highest concentrations upstream of the confluence of the White Pine Fork and Little Cottonwood Creek. This suggests the Alta Superior tunnel may be an important source of cadmium and copper. Red Pine Fork had no significant copper or cadmium concentrations even where it flowed directly into LCC (Sample 3). The White Pine Fork had the highest traces of copper and cadmium suggesting it might be the source of loading into the LCC. This concludes that further sampling could be done upstream in the White Pine fork to find the source of loading of copper and cadmium into White Pine.

# The Impact of Brief Exercise Sessions on Short-Term Memory

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Joanna Brewer-Bowman, Guadalupe Rubio, Thomas VanLeeuwen, Rawisiriporn Walsh

School of Health Sciences, Poster Presentation

This study investigates whether a short burst of physical exercise increases cognitive function and improves short-term memory. Recognizing the potential for physical activity to serve as an effective and accessible intervention for improving student outcomes on exams, our research aims to test the effects of exercise on memory retention and recall capabilities. Over six weeks, from February 5 to March 11, 2024, four participants were subjected to controlled memory tests before and after engaging in a brief exercise. The exercise consisted of a two-minute period of physical activity, which included running up and down several flights of stairs. Memory performance was assessed through a variety of online memory games, with game types switched weekly to avoid familiarity and learning effects, thus eliminating confounding variables. Control data were gathered from tests conducted before any physical activity, while experimental data were collected after the exercise session. To account for potential confounding factors such as sleep, diet, mood, and overall health, participants were surveyed on these variables before and after the exercise. Preliminary findings suggest an improvement

in short-term memory performance following the exercise, compared to control conditions. This improvement aligns with our hypothesis, indicating that short bursts of physical activity may enhance cognitive functions such as memory. The study provides initial evidence supporting the beneficial effects of short-term physical exercise on memory. By addressing potential confounding variables and employing a methodological framework, our research contributes to the growing body of knowledge on the cognitive benefits of physical activity.

## Impact of Morning Coffee/Caffeine Consumption on Morning Wellness

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Abigail Arnoldson, My Huynh, Rhianne Smith, Tamara Yabar

School of Health Sciences, Poster Presentation

The purpose of this study is to investigate the impact of coffee/caffeine consumption on morning blood pressure and overall wellness. The study aims to evaluate how consuming coffee/caffeine in the morning affects variables such as blood pressure, heart rate, mood, and energy levels compared to baseline. The study consists of experimental weeks with coffee/caffeine and a control week. The participants undergo pre-assessments, consuming either coffee, caffeine, or water and completing post-assessments over seven consecutive days for each condition. The primary variable of interest is blood pressure; participants will be responsible for timely consumption of products and report vitals/questionnaires daily over three weeks. Data collection is currently in progress, with participants providing information on sleep, stress, mood, and menstrual cycle. Findings from this research should provide basic knowledge of how coffee/caffeine compounds impact blood pressure among participants. While the population size is small, this research allows for precise and controlled testing among subjects. This type of controlled experiment will allow for subject-based implications regarding the correlation and causation of blood pressure changes. Once all data is collected, analysis will be conducted to determine the peak concentration level effects of morning coffee/caffeine consumption on morning wellness.

## The Impacts of Cold Water Immersion on Cardiovascular Health

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Karli Frank, Charstar Phim, Maria Clara Ramalho, Savannah Rose

School of Health Sciences, Poster Presentation

This study explores the impact of consistent cold water immersion on our cardiovascular health. Previous research has shown that exposure to cold water can trigger various physiological responses that could affect heart health. This paper will examine the short and long term

effects of cold water immersion on heart rate. Each participant in this study took a cold water bath daily for six weeks. The water was kept at fifty degrees and participants spent ninety seconds in each bath. The findings of this study will be shared.

## The Influence of Screen Time on Sleep Quality

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Tuyen Nguyen, Braelyn Backayon, Meredith Hoffer

School of Mathematics, Science and Engineering, Poster Presentation

## Is Night Shift Killing You?

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Will McKay, Nick Mitchell, Janelle Pace, Sophie Price

School of Health Sciences, Poster Presentation

Night shift is said to be one of the most thrilling and highest paid roles across many fields of work. But what if it's also the deadliest? In this research study, the goal is to investigate how human bodies operate and change on regular and irregular circadian rhythms by comparing the effects of night shift to day shift over a 6 week period. It is hypothesized that night shift work correlates with an overall decrease in metabolic function. Blood pressure, average amount of sleep, and psychosocial effects are the variables that will be analyzed to determine this decrease. At the conclusion of this project, the information will be collected to provide visual and literary concepts to further educate on potential negative effects of working night shifts.

## Is Synesthesia and Autism Linked?

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Kimberly Leyva Hernandez

School of Humanities and Social Sciences, Poster Presentation

There are many types of synesthesia, the condition is not very uncommon, and autism is also a condition which affects many people, some people have both at the same time. It is argued by many that both the conditions synesthesia and autism are linked due to many reasons like genetic factors, similarities between the two, and how common it is for people who have autism to also have synesthesia. Due to this there have been many studies which usually consist of surveys asking participants questions to figure out if these conditions are common within the family, making them hereditary. Another purpose of the studies is not only to figure if synesthesia is more prevalent in people with autism but also if having extraordinary abilities or special skills plays a role in the two conditions being linked together as well. The conclusion of many of the studies have found synesthesia to be more common in those who have autism for different reasons.

# Isopods, Nano-Plastics and Beyond: Isopods' Astounding Chemical Discernment

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Peter Doust

School of Mathematics, Science and Engineering, Poster Presentation

This study investigates the feeding and behavioral responses of isopods to chemical compounds commonly present in organic and non-organic foods. It hypothesizes that isopods will exhibit distinct feeding and behavioral patterns when exposed to such compounds, with variations observed between organic and non-organic counterparts. Furthermore, the study anticipates detecting differences in isopod feeding behaviors in the presence of chemicals from plastic-wrapped foods, particularly non-plastic contaminants. The research suggests that isopods could serve as reliable bioindicators for detecting and responding to chemical contaminants in various types of foods commonly consumed by humans. Three identical containers were prepared, each containing the same number of isopods initially. The containers utilized the same soil type and dish to hold foods. Regular misting with spring water was administered to maintain similar humidity levels in each container. To ensure uniformity in the experiment, all foods were purchased, transported, and stored from and in the same locations. This rigorous approach aimed to minimize external factors that could influence isopod feeding and behavior and ensure the reliability of the results. Preliminary data analysis reveals that isopods exhibit a preference for consuming non-organic food with plastic packaging over other food types, followed by organic food without plastic packaging. Conversely, the least consumed food type is organic food with plastic packaging. While these findings provide insight into isopod feeding behavior, it's important to note that no correlations were found to support the original hypothesis regarding their behavioral responses. This underscores the necessity for further investigation and analysis to clarify the relationship between isopod feeding behavior and chemical contaminants in food.

## Just Breathe

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Mia Ahn, Yue Chen, Vanessa Escobedo, Arleth Espinoza

School of Health Sciences, Poster Presentation

There has been a growing interest in lung health especially after the Covid-19 pandemic. Lung health is closely related to whole-body health and physical performance. Moreover, the lung capacity indicates how efficiently our lungs can intake oxygen. Lung capacity can be influenced by various conditions such as age, gender, and race. Interval exercises and breathing exercises are believed to increase lung capacity. In order to compare the effectiveness of HIIT exercises and breathing exercises, we gathered data from 4 female participants: 2 Hispanics and 2 Asians. We expected the participants who did HIIT exercises, in their 20s, and Asian could increase their

lung capacity faster than other participants. The 4 participants were divided into two groups. Each group contains 2 individuals: Hispanic female in their 20s and Asian female in their 30s. The first group were assigned to practice 5 minutes of diaphragmatic breathing exercise on 1<sup>st</sup> – 2<sup>nd</sup> week, 10 minutes diaphragmatic breathing exercise on 3<sup>rd</sup> – 4<sup>th</sup> week, pursed lip breathing exercise for 15 minutes on the 5<sup>th</sup> – 6<sup>th</sup> week. The second group participants were assigned HIIT exercises, 4 sets of 30 seconds with 1 minute rest between each set. On the 1<sup>st</sup> – 2<sup>nd</sup> week, the participants were assigned jumping jacks, planks and high knees. For the 3<sup>rd</sup>- 4<sup>th</sup> week, they were assigned jump squats, stairs/steps and sit ups. For the 5<sup>th</sup>- 6<sup>th</sup> week, they were assigned to do burpees, mountain climbers, and jump rope. The results and conclusion will be provided after the 6<sup>th</sup> week.

## Lichen Growth Patterns and Air Pollution Levels Throughout the Salt Lake Valley

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Chris Morris, Camilla Whatcott

School of Mathematics, Science and Engineering, Poster Presentation

Lichens are an important part of Utah's ecosystems, both as a component of biocrusts and as bioindicators for environmental factors such as air quality. As pollutant levels continue to rise in the Salt Lake Valley, it's vital to understand how lichen diversity and abundance are impacted by the declining quality of the surrounding atmosphere. In our study, we compare the abundance of various lichen growth types with data regarding several different pollutant categories throughout the valley. Lichen growth types were characterized by growth pattern and color. We hypothesize that overall lichen abundance and growth type diversity will be negatively correlated with the concentrations of one or more specific pollutants, that crustose lichens will be the most abundant type, and that the proportion of crustose versus other growth forms will increase as pollutant levels increase. To test these hypotheses, we selected sample locations throughout Salt Lake Valley that had air pollution monitoring stations going back over two decades. At each location, we noted the abundance, growth form, color, and reproductive status of lichens within our sampling quadrats. Lichen growth type and abundance were compared to several air pollutant categories.

## Light Therapy for the Treatment of Seasonal Affective Disorder (SAD)

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Melissa Newsome

School of Humanities and Social Sciences, Poster Presentation

This paper gives a thorough look at the research and the use of various methods of light therapy for the treatment of seasonal affective disorder (SAD). Research has shown that an increasing number of students on college campuses have mental health problems that require

counseling and treatment especially during the fall and winter seasons. Other research has shown that the human circadian rhythm system is abnormally affected during fall and winter seasons. Also, depressive affective disorder is the principal mental health problem that occurs at the same time every year seriously impacting many people's lives, notably college athletes, college students in general and people in the workplace. Other research has shown that SAD affects the entire general population, especially young adults, particularly females. Various types of light therapy have been experimentally used on various groups in different places at different times and the results have been recorded and compared. The experiments differ greatly in how the light is applied to the group involved in the experiment. The groups themselves differ greatly from one another. The lights used range from light boxes to string of lights to differences in light shades and intensity to directness of light on the individuals to the time of day that the light is used from a short span of light exposure to a long span of exposure to intermittent spans of exposures.

## Meditation Practice and Stress

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Temper Johnson

School of Humanities and Social Sciences, Poster Presentation

Meditation has been found to benefit cognition and has been associated with reducing stress. It reduces sympathetic nervous system activity in the brain causing slowed breathing, heart rate, and lower blood pressure according to Arora, et al., (2021) 181-187. This is why many individuals may have experienced feeling calmer after the practice. This article also mentions how the practice strengthens cognition specifically in memory, attention, and focus. Meditation practice changes can influence the stressors an individual may have. Stress can be good or bad and is controlled by multiple different factors. Depending on something we can control to the things we cannot, this makes studying stress and meditation can be difficult. Since many studies don't account for those other influences causing stress and even if they did it would be very time-consuming to incorporate them all. Other studies done on the effects it has on cognition and emotion have shown it has benefits that can be related to improving stress levels. This is relevant to study because we all experience stressors, and this may be a good way to cope with them.

## Mindfulness-Based Therapies (MBT) and Anxiety Reduction

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Marc Holloway

School of Humanities and Social Sciences, Oral Presentation

This literature review examines the effectiveness of mindfulness-based therapies (MBTs) in reducing symptoms of anxiety. This paper thoroughly draws from numerous key studies in the field which include systematic reviews, meta-analyses as well as empirical research. This paper reviews and explores MBTs' impact across various demographics and contexts such as chronic illness management, cancer care, youth mental health, while carefully considering diverse cultural settings. Fisher et al. (2023) and Zhou et al. (2020) demonstrate the efficacy of MBTs in managing mental health in chronic illnesses and among young populations. Fumero et al. (2020) provide a meta-review focusing on anxiety disorders, while Hofmann and Sawyer (2021) and Zhang et al. (2015) explore psychological mechanisms MBTs have and their effectiveness in relieving anxiety in cancer patients. Additionally, this review also addresses patient experiences, the viability of whether MBTs are culturally adaptable, and the integration of technology in the delivering MBTs. Also, this paper broaches the subject of the challenges in standardizing MBTs, ensuring long-term efficacy, and implementing them in diverse healthcare systems. This paper highlights the immense need for more standardized as well as culturally sensitive, and long-term research in order to optimize MBTs for specific populations, conditions and contexts. This literature review concludes by emphasizing the potential of MBTs in revolutionizing mental health care, suggesting directions for future research, particularly in technology integration, economic analysis, and the potential cultural adaptation of MBTs.

## The Mormon Cannibal

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Mialyn Cameron

School of Humanities and Social Sciences, Oral Presentation

The stereotype of the “Mormon Cannibal” was prolific across English-speaking countries in the nineteenth century. As early as eight years after the LDS church was founded, people were associating Mormonism with cannibalism. The practice of polygamy is the most notable cause, but the stereotype was also shaped by slavery, imperial ideologies, and Christian’s fears of their own religion’s extremes. Using newspaper reports, personal accounts, historical records, and actual instances of Mormon cannibalism, the history of this stereotype is explored from the church’s inception (1830) until Utah gained statehood (1896).

## Music Moves the Heart

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Alisa Dayhuf, Dana Harrell, Jason Jimenez, Stefani Rivero-Jerez

School of Mathematics, Science and Engineering, Poster Presentation

This study aims to explain how the connection between music genres and the cardiovascular response has various effects on blood pressure and heart rate. We have applied a technique to listen to 10-15 minutes of music exposure in different genres which is followed by a collection of heart rate and blood pressure data. During a four-week experiment, data was collected three times a week, specifically during the night just before bedtime. All participants were in a

relaxed sitting position at home. Each listened to pre-made playlists in a controlled environment, which ensured consistency between sessions. Participants recorded data while following normal operating procedures to account for potential confounding variables such as mood and time of day. All participants sat in a comfortable position in a quiet set environment in which the participant would be listening to a pre-made playlist everyone agreed on. Each participant gathered data after proceeding normal operating methods to handle any confounding variables such as time of day and mood. Based on the hypothesis, pre-and-post music reviews serve as signs for changes in blood pressure and heart rate that are specifically unique on the type of music that participant listens to. This guides us to share light on the physiological effects of music and allow us to expand in enhancing well-being.

## Native vs. Introduced Plant/Bird Species Along the Jordan River

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Nina Myers, Riley Gray

School of Mathematics, Science and Engineering, Poster Presentation

Our question for this research project was looking at how the frequencies of native vs introduced species of plants/birds vary in rural environments vs. natural environments along the Jordan River. We tested this by conducting 2 transect surveys at two different sites 20 days apart and comparing the frequency of native vs introduced species of birds and plants. We hypothesize that as areas become more urbanized the rate of invasive species will increase due to factors such as landscaping and habitat loss.

## Observing Bessbugs Adaptation to Urban Environments

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Toni Ott, Jatziry Aguirre

School of Mathematics, Science and Engineering, Poster Presentation

This study aims to explore the behavioral adaptation of bessbugs (Passalidae family) to various urban shelter conditions, with an approach to understand insect adaptation and survival in anthropogenic habitats. Initiated on February 21, 2024, and set to conclude on March 7, 2024, with an additional observation week for the least adaptive shelter, our research investigates bessbug behavior in three artificial shelters—cardboard, plastic, and wood—each housing four beetles, provided with 15g of wood stick for food and water. Given an unexpected shift from our initial focus on cockroaches to bessbugs, modifications were necessary to accommodate the insects ability to consume both wood and cardboard, prompting the use of a plastic container surrounded by cardboard and a wood box within a larger container to prevent escape. Our hypothesis states that bessbugs will exhibit a preference for wood shelters, mimicking their natural habitat more closely than other materials. Preliminary observations have unfortunately revealed a significant mortality rate in the wood shelter, with all four



bessbugs deceased by February 26, 2024, under unclear circumstances. This outcome requires a closer examination of environmental factors and bessbug physiology that may influence survival. The ongoing study continues to monitor bessbug activity in the remaining shelters, focusing on interactions with food and water, escape attempts, and activity levels. The significance of this research lies in its potential to contribute valuable insights into the adaptability of bessbugs to urban environments, with implications for urban biodiversity conservation and the design of insect-friendly urban habitats. By understanding the preferences and survival strategies of bessbugs in urban settings, this study aims to inform future urban planning and conservation efforts to support insect populations within metropolitan areas.

## Parenting Tactics and the Connection to Adolescent Dating Abuse

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Victoria Wilson

School of Humanities and Social Sciences, Poster Presentation

Parenting styles have long been examined for their effects on childhood development, as well as their longer-term effects. Parenting styles with high levels of both control and warmth have long been regarded as the most effective in regard to social development, safety, and trust. However, serious long-term problems in a child's life, specifically abuse in romantic relationships during adolescence, are also affected by parental control and warmth levels. Furthering an understanding of harmful and helpful parenting techniques can discourage perpetration and victimization rates. Recognizing and addressing these patterns will help to further future research of abuse within romantic relationships.

## Pinball Machines and Gambling

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Zach Cloward

School of Humanities and Social Sciences, Oral Presentation

Gambling in Utah has been illegal in Utah since the 1890s, however there have been many times that the state and city governments had to deal with people trying to dodge around the laws. Using clips from news articles, the laws and codes, and court records this paper will explain the case of Charles Meyers bribing former Ogden City Mayor Kent Bramwell. Meyers, who ran an illegal gambling pinball operation, attempted to bribe Bramwell to get him to look favorably on gambling.

## Poker Playing Programs: A Mathematical Exploration of Game Theory

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Timothy Kirk, Lloyd Livengood

School of Mathematics, Science and Engineering, Poster Presentation

This poster explores a few concepts in Game Theory including Nash Equilibrium and the Monte Carlo Simulation. We describe how Advanced AI can beat any human in poker, a statistical approach to considering the strength of your hand, and how computational tools can demystify the game of Texas Hold'em. Our poster is accompanied by a program we have written to provide players a tool to play a simple pre-flop strategy.

## Pressure Sensor Resistance Changes in Varying Biocompatible Metals

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Kasielynn Bussard, Dakota Stringham

School of Mathematics, Science and Engineering, Poster Presentation

We are two students from Salt Lake Community College who participated in a summer research workshop in the cleanroom at the University of New Mexico. We were taught the pressure sensor fabrication process, along with the post-production testing methods. For our research project we decided to test how using different biocompatible metals, and different combinations of said metals, for the circuit would affect the pressure sensors functionality. To test this, we prepped five 4" inch wafers and used photolithography to create the Wheatstone bridge pressure sensors, followed by sputter coating. When sputter coating, we coated each half of the wafer in different metals, creating a sort of Venn Diagram. This left us with two areas of a single metal on the outside edges, and an area in the middle with both metals present. We then measured the resistance of each section to determine how it changed with different metals.

## Protein Powder and Muscle Mass

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Julius Manzi, Roldan Buenavista, Marlie Davis, Momina Goesse

School of Mathematics, Science and Engineering, Poster Presentation

## Purity and Yield Comparison Between Entry-Level Technicians to Experienced Technicians in the Synthesis of Phenytoin, Using Microwave-Assisted Extraction and a Traditional Round Bottom Flask Reflux Method

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Katherine Christensen, JaNean Frandsen, Mahaila Owen, Sarah Fairweather, Danielle Kemmer

School of Mathematics, Science and Engineering, Poster Presentation

Phenytoin is listed by the World Health Organization as an Essential Medicine that is one of the most cost-effective anti-epileptic (AED) treatments available. Low commercial production, political instabilities, and/or financial barriers prevent the equitable access of phenytoin worldwide. Previously the goal of this research was to incorporate a more efficient and accessible low-cost synthesis method and alleviate some of these barriers. Traditionally, a small-scale synthesis and purification of phenytoin using base-catalyzed addition of urea to benzil, followed by pinacol rearrangement and recrystallization is used. Procedures for this experiment were utilized by both entry-level and experienced chemists using the synthesis method of Microwave Assisted Extraction (MAE), and laboratory equipment found in the most basic of pharmaceutical grade laboratories. Using the International Pharmacopoeia guidelines for pharmaceutical purity, over 98% purification levels were achieved. Verification of pharmaceutical grade purity was accomplished through High-Performance Liquid Chromatography (HPLC). The objective of this project was to compare entry-level and experienced chemists' ability to produce pharmaceutical grade products and yields. This project outlines the comparison of product yield and purities between entry-level and experienced chemists using our low-cost synthesis method compared to traditional methods. Results show the purity levels are consistent with each synthesis. The data confirmed that entry-level chemists were able to achieve comparable results to those previously achieved by those with more experience.

## (pH)un With Basils, the Correlation Between Environmental pH and Basil Plant Growth

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Feng Guo, Bjorn Luken-Scott, Caleb McDade, Matt Valora

School of Mathematics, Science and Engineering, Poster Presentation

We used solutions of varying pH to determine which pH provides the best environment for basil plants to grow. Although it is common practice to use a neutral pH solution for watering all plants, our project hopes to shift this paradigm. This information may be beneficial for personal or commercial use. The documentation of growth in each basil plant, with respect to their given pH, is the primary focus of the experiment. Our current findings reject the social paradigm, but instead suggest that using an extremely basic solution allows the basil plant to grow better than its neutral pH counterpart.

## The Role Pets Play in Decreasing Depression

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Madelyn Ferrer

School of Humanities and Social Sciences, Poster Presentation

Depression is a very common mental illness that affects about 8.3% of adults in the United States. Doctors are researching medicines and other treatments that can help decrease this mental illness in children and adults. Medications like antidepressants work by increasing neurotransmitter chemicals in our brains like serotonin and norepinephrine. This study focuses on a different approach to decrease depression, owning a pet. It questions how having a pet makes people feel more responsible, decreases feelings of loneliness, and encourages people to go outside more. The goal is to analyze the long-lasting effects having a pet has on your mental health.

## Scanning Electron Microscopy Analysis of Heterogeneous Micro- Nanostructures Grown Using Redox Chemistry Confined In a Student-Assembled Microfluidic Cell

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Christopher W. Peak, Kasielynn Bussard, Jacquelin Hutch, Kyle Keelty, Tristan Hammack, Piero Solis Morales, Linsey James, Ruslan Mavlanov

School of Mathematics, Science and Engineering, Poster Presentation

A faculty-guided student research project involving the synthesis of heterogeneous, metal structures in the voids of a microfluidic cell is presented. Students are introduced to microfluidics by constructing a closed polydimethylsiloxane (PDMS) cell modified with hydrophilic polymers for the confinement of an aqueous electrodeposition solution. Students use redox chemistry to create two-component assemblies by first reducing a silver-ammonia complex in the channels of the cell, followed by reduction of copper (II) ions. This project incorporates an inquiry-based learning component that exposes students to scanning electron microscopy (SEM) and energy dispersive x-ray spectroscopy (EDS). Participating students use SEM imaging and EDS to confirm linear, end-to-end assembly of the metal structures in the channels of the cell.

## Shut Your Mouth: How Mouth Taping Influences Sleep and Health

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Caroline Capell, Sierra Geiss, Heidi Lundberg, Tran Huynh

School of Humanities and Social Sciences, Poster Presentation

Based on the research that has been conducted to determine if mouth taping helps those with different sleep disorders, it also begs the question if mouth taping helps those without sleep disorders. Our research looks at variables such as sleep quality, heart rate, and blood oxygen

saturation as objective measurements of the efficacy when taping one's mouth closed while sleeping. The hypothesis that was established was that over time, taping one's mouth shut during sleep would lead to a decrease in heart rate and respiratory rate while also increasing blood oxygen saturation and the amount of time spent in REM sleep. To test this hypothesis, a longevity study over 5 weeks where the test subjects taped their mouths closed for 3 nights per week. During these nights, the participants gathered objective data points stated above as our research variables before sleep and immediately upon waking. After analyzing these results, we determined how effective this intervention was.

## Sleep Shift: Physiological Effects of a Single Night's Sleep Aberration

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Kenneth Armstrong, Caroline Foley, John Happ, Jiajun (Kevin) Li  
School of Health Sciences, Poster Presentation

This research study aims to answer the question "How does a single night's aberration to an established sleep pattern affect us physiologically?". As humans, we know the quality of our sleep has a deep impact on our daily lives. Sleep affects our mood, our cognition, and our metabolism. We know that a single night of bad sleep can leave us feeling less able to meet the demands of life. During this study we aim to quantify specific physiological changes that occur under variable sleep conditions during a single night.

Over a six-week period we will be recording our sleep patterns and making intentional changes. Our intervention will be to modulate our sleep duration by +/- 2 hours by shifting our bedtime. Our wake-up time will remain constant. We will record data under conditions of normal sleep duration, extended sleep duration, and limited sleep duration. We will be observing physiological metrics that are indicative of cardiovascular and metabolic stress; namely resting, active, and recovery vital signs and fasting glucose.

## Sleep, Screens, and Sugars

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Jessica Ames, Kayleen Canelas, Graziela Drogueti, Jordan Sparks

School of Mathematics, Science and Engineering, Poster Presentation

During a 24-hour period, a person's mental and physical characteristics undergo self-sustaining, regular changes that occur throughout the course of their day as well as throughout their lifetime. Maintaining a healthy Circadian Rhythm has become increasingly difficult in today's society. People need more hours in the day, resulting in less sleep, poor mental and physical health, making the quality of sleep even more crucial. This project aims to identify the effect of blue light exposure and both decreased and increased carbohydrate intake on the sleep cycle and blood pressure.

# Sleeping Under Stress: Investigating the Trifecta of Circadian Rhythms, Sleep Quality, and Stress

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Emma Brough, Kristal Rudy, Rose Watson

School of Health Sciences, Poster Presentation

Stress is defined as a mental or emotional strain stemming from internal or external challenges or demands. It intricately intertwines with the circadian rhythm, our innate temporal regulator of the behavioral, physical, and mental fluctuations throughout each daily cycle. This study aims to scrutinize the intricate interrelations among daily stress levels, sleep quality and patterns, and physiological metrics. Our hypothesis poses that heightened stress levels engender diminished sleep quality and disturbed sleep cycles. Methodologically, we will assess individual stressors alongside aggregate stress levels on a daily basis, utilizing physiological metrics including heart rate, blood oxygenation, and body temperature to furnish empirical data. Subsequently, we will scrutinize this dataset with nightly sleep metrics to delineate correlations. The study cohort will comprise exclusively of the investigators, ensuring consistency and minimizing confounding variables. Data collection will span six weeks, permitting a comprehensive examination of temporal trends and potential causative relationships. Findings from this research may inform strategies for stress management and sleep optimization, ultimately enhancing overall well-being and quality of life.

# Speeding Up the Burn

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Alex Buetler, Herb Cossano, Akeakamai Davies, Erik Galbraith

School of Mathematics, Science and Engineering, Poster Presentation

Increased physical activity through different activities, such as cardiovascular exercise and resistance training, has been controversial on its effect on basal metabolic rate (BMR). Due to the variability of diet, frequency of exercise and duration, and the variability of response to exercise it is unclear what duration of activity as well as what rate of perceived exertion is required to achieve an increase in the BMR. To assess this controversial effect there will be 4 male participants in this study using 3 different activities and 1 control (no added activity) to find any effect of activity on increased BMR. During a weekly weigh-in the participants will calculate their resting metabolic rate and gather data such as body fat%, total body weight, and total water weight to assess any changes that may contribute to an increased BMR. Results are still being analyzed.

## Substrate Preference & Isopods

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Sam Canettieri, Rosa Garcia, Liz Myers

School of Mathematics, Science and Engineering, Poster Presentation

In this study we will investigate the relationship between soil acidity levels and the dietary preferences of terrestrial isopods. We believe that increased levels of acidity in soil leads to more productive behavior in isopods, e.g. breeding or recycling soil into fertilizer. Our reason for this is that increased acidity allows terrestrial isopods to better regulate their calcium intake, which is essential for good exoskeleton development in young isopods and to assist adult isopods with molting. Previous studies have overlooked the importance of soil pH and its influences on how isopods forage. Our study aims to address this gap by testing two varying levels of acidity with 5 isopods to see which they prefer. We decided to use sphagnum moss, as it has a much lower pH (3.0 to 4.5) compared to organic topsoil (between 5 and 6). 16 oz plastic containers with tin foil were used. The tin foil was used as a barrier split between the middle to prevent the two substrates from mixing, but still allowing safe passage for the isopods to move between the two. In our ongoing research of observing 15 total terrestrial isopods (*Armadillidium vulgare*), our findings indicate a notable preference for the organic topsoil, since on average, we are finding at least 3 isopods buried comfortably deep in the soil. As a result, it is clear that our findings do not support our hypothesis.

## Testing Slime Mold

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Daniel Coronel, Aurora Gomez, Thomas Mellen

School of Mathematics, Science and Engineering, Poster Presentation

In this Study we will be evaluating the Slime mold's reaction to different environmental factors. Specifically, we will be looking at how slime mold reacts to different sources for food and different temperatures. A maze will be used to test the slime molds problem solving capabilities under these conditions. The goal is to see which food sources and temperatures does the slime mold problem solve faster or slower with.

## Traces of Heavy Metals in Big Cottonwood Creek

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Bryan Christensen

School of Mathematics, Science and Engineering, Poster Presentation

Big Cottonwood Creek is impaired for cadmium and copper per the Clean Water Act, but the location is unknown. I collected water samples from ten sites along the creek over the course of four days in a five-day period in mid-October 2023. Three samples were from the valley floor

and seven samples were in the canyon. Samples were collected from the shoreline directly using large syringes with 0.45 um filters. Water was then deposited into plastic vials for analysis. Sample analysis was done with the SLCC campus' inductively-coupled plasma – optical emission spectra (ICP-OES) analyzer. I mapped the sites using ArcGIS and graphed the water analysis results. Sample 010 had a Copper level of 1.42 ppb and sample 009 had a level of 1.88 ppb. Copper was not found in any other sample. No Cadmium was present in any sample. Arsenic concentrations varied but were not present in all samples. Concentrations ranged from 1.74 ppb to 1.367 ppb, excluding the outlier results from sample 008. There was a very high contamination of Arsenic (32,929.76 ppb) and Uranium (31,877.29 ppb) in sample 008. Uranium levels decreased rapidly from 31,877.29 ppb at site 008 to 6.003 ppb at site 007, and to 7.024 ppb at site 006. No Uranium was found in lower samples or in samples 009 and 010. Sample 008's outlying Uranium and Arsenic concentrations may be from nearby construction runoff. This survey was done in the Fall, when little to no runoff was coming through the older mining washes. This may affect the interpretation of the results as the Copper or Cadmium impairments are likely coming from an abandoned mine. I plan to repeat the survey in Spring 2024 during high runoff. It is important to locate the source of the contamination so appropriate safety measures can be implemented.

## Traditional V. Modern: Housewives in Modern Day Society

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Natalie Sierra

School of Humanities and Social Sciences, Oral Presentation

What is a housewife? If we wanted to get technical, housewives are defined by Merriam-Webster as a "married women in charge of a household." That definition while technically correct, is not reality. A housewife is not simply a woman in charge of a household, especially today. These women hold many different positions in the home and have different reasons for being there. Looking at this topic through an anthropological framework, three different aspects of types of this lifestyle are explored: women who stay home due to economic influence, women who desire to stay home because they have the opportunity to be a one income household, and women whose desire to stay home is influenced by their religious beliefs.

## Transfection of Cyanobacteria with BPH to Facilitate the Breakdown of PCBs, and Knockout of Microcystin Gene, to Facilitate a Reduction in Lake Water Toxicity

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Amber Murphy

School of Mathematics, Science and Engineering, Poster Presentation



In this project we attempt to alter the genetics of Utah lake cyanobacteria in two ways. One, to insert a BPH gene to break down PCBs in Utah lake. Two, to knock out one of the microcystin genes. Both microcystin and PCBs are harmful toxins to the environment, animals, and humans that can cause a myriad of adverse health effects to the immune, endocrine, and reproductive systems. PCBs are also known animal carcinogens and probable human carcinogens. In the first phase of this project BPH gene fragments were ligated into the pSHDY vector. That completed plasmid was then transformed into E.coli for proof of gene uptake and amplification of the plasmid. Proof of gene uptake was verified by restriction digestion. The protein product was then verified by a SDS PAGE analysis and Western Blot analysis. Once a sufficient stock of plasmid was made from bacteria cultures, the plasmid was transfected into cyanobacteria. PCB levels in samples of LB, LBkan, LBcmr, and BG11 (+MO) standards were recorded before transformed E.coli or transfected cyanobacteria were introduced and after, to determine if the gene product had the desired result.

## Tubby Time Blues

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Kaitlin Adams, Jaucalyn Boone, Kaelie Chapman, Noah Zenger

School of Mathematics, Science and Engineering, Poster Presentation

Cold water immersion (CWI) has gained popularity as a therapeutic intervention, extending its reach beyond athletes to the general population. This study aims to investigate the effects of CWI on circadian rhythm by assessing changes in body temperature, heart rate, and sleep/wakefulness quality. Methods: A group of healthy participants underwent CWI sessions twice a week. The protocol involved immersing the torso in a controlled cold bath at 15 degrees Celsius (+/- five degrees C). The duration of immersion began at one minute and increased by 30 seconds each week. Measurements were taken at both AM and PM except for sleep data taken the two nights following the ice bath. The data captures variations in body temperature (intraoral thermometer), heart rate (smartwatch), and sleep quality and duration (Health sleep app). Independent variables: Temperature of cold water 15 degrees Celsius (+/- one degree C). The extent of body submersion (torso and arms). Dependent Variables: Time of day when CWI is performed (AM or PM)- Weekly increase in immersion duration (starting from one minute). Results to follow the completion of the experiment.

## The Unified Structure of Space and Time

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Nathan Delaney, Izen Longhurst, Noelle Phillips, Cooper Pons

School of Mathematics, Science and Engineering, Poster Presentation

Hermann Minkowski's model of spacetime underpins our understanding of modern physics. Fundamentally influencing Einstein's General Theory of Relativity, Minkowski's model unlocked

the mathematical tools necessary to understand spacetime intervals independent of their frame of reference. This poster aims to present the principles and implications of Minkowski Spacetime suited to the understanding of a general audience.

## Urban Density Impact Upon Aquatic Biodiversity

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Bryan Lenear, Eli Perez-Ezparza

School of Mathematics, Science and Engineering, Poster Presentation

Our objective was to see how the lakes around extreme urban development have had their biodiversity affected by humans. Our hypothesis is that the more urban development nearby, the less diverse the lake's ecosystem will be. Our main method of data collection was taking samples from 4 lakes, 2 near extreme urban development, and 2 further away. Preliminary data does indicate that urban development negatively impacts aquatic biodiversity, leading to a less diverse ecosystem.

## Utah State Industrial School: Student Admittance and Treatment

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Anna Wyatt

School of Humanities and Social Sciences, Oral Presentation

The Utah State Industrial School in Ogden was active from 1889 to 1983. Such schools were created near the end of the Industrial era for the purpose of juvenile reformation and the intention to prepare adolescents for the working world. Those admitted were typically between ten and twenty-one years of age and were admitted as an alternative to serving time in jail or prison upon miscellaneous charges. Primarily focusing on newspaper articles and a variety of secondary sources, this study explains that these schools were often utilized as a last resort for those with delinquency tendencies, physical and mental issues along with those without homes that were no longer welcomed within the other programs. Articles between the 1900s and the 1930s show that many students ran away due to the school's employment of corporal punishment.

## Walk Your Way to a Healthy Heart

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Leslie Carranza, Ava Hirt, Ashlie Stout, Ellen Thompson, Skye Williams

School of Mathematics, Science and Engineering, Poster Presentation

The purpose of this research experiment was to analyze heart rate and its overall correlation with exercise. We hypothesize that over the course of 5 weeks the increase of daily exercise will

be met with a decrease of resting heart rate. Five participants were asked to go on a fifteen minute walk, outdoors and without technology, five days a week for five weeks. Each participant was asked to track their resting heart rates prior to the walk, immediately after finishing the walk, and five minutes after concluding their walk. Over the course of the five weeks the results would be evaluated to determine whether or not you could walk your way to a healthy heart. We are expecting to see the resting heart rate of the five participants slowly decrease over the course of the experiment. This information could encourage individuals to be more active throughout the day in order to improve their heart health.

## We Hate Running

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Brayden Talbot, Sebastian Gomez, Zach Staten, Chandler Anderson

School of Health Sciences, Poster Presentation

Most Americans suffer from high blood pressure and don't even know it. This study is designed to test which cardiovascular exercise will lower your blood pressure and resting heart rate the most over time. In order to do this we got four participants and had them perform four different types of cardiovascular workouts. We had one participant assigned swimming, another participant assigned the stair-master, another participant assigned cycling, and the last participant assigned stationary workouts (specified what workouts later in the experiment). Every week on Thursday at 7:00 AM we obtained the resting and fasted blood pressure, heart rate, and oxygen of each participant to see how the cardiovascular workload efficiency was affected overtime.

## We Like Big Butts and We Won't Lie: Resistance Bands vs. Free Weights

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Audrey Smith, Mele' Estioko, Bailey Paxman, Zoe Hoopes-Jones

School of Health Sciences, Poster Presentation

Hypertrophy is the process of increasing muscle mass through strength training. In recent years, strength training has been used to "body sculpt," which means to use hypertrophy to obtain a specific aesthetic result. One area that is largely focused on for aesthetics is the gluteal region. There are many ways to build muscle in all glute muscles, and this experiment targets each muscle through resistance band training or conventional weight lifting. With many fitness regimens claiming to "build a better butt" in six weeks, this study aims to find accurate information for how much muscle growth is actually possible in this time frame for the average person.

# What is EMDR, and What does it Treat Most Effectively?

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Joseph Smith

School of Humanities and Social Sciences, Poster Presentation

# Which Sleep Aids Affect Your Circadian Rhythm the Most?

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Carter Christensen, Lexi Heaton, Madi Koopman, Saul Talavera

School of Health Sciences, Poster Presentation

Researchers are investigating which sleep aids affected their sleep the most. There were several ideas of certain sleep aids such as drinking cherry juice before bed, meditation before bed, exercise in the evening before winding down to go to sleep, minimizing screen time and phone usage before bed, and reading a book within minutes of falling asleep before bed. Each night for the first week participants will simply record how much sleep they get, no special sleep aids, just a control week. Each night for the second week participants will track how much sleep they get while using sleep aids. The third week participants will continue to track their sleep but monitor when their last meal was. This includes late night snacks. Week four they will combine both sleep aids and monitoring when the last meal was eaten all while sleep is still being recorded. Week five will be a repeat of week two in recording only sleep based on sleep aid usage, not last meals. The final week will be a repeat of week three, sleep time based on last meals and snacks. Results are still being analyzed so there are no findings to report.

# The Wim Hof Breathing Technique and its Effects on Respiration and Body Temperature

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Sarah Brown, Andrew Bue, Jessica Haney, Jalen Seward

School of Health Sciences, Poster Presentation

Ice baths are widely recognized for their potential health benefits, including stress reduction, immune system support, and hormone regulation. The Wim Hof Breathing Technique is, as stated, a breathing technique to help raise your body temperature while you are submerged in an ice bath of varying degrees, usually around the range of 35-50 degrees Fahrenheit. Many have questioned this technique and its effects it claims to have and aid in the human body, or if the effects are relative to one another. Wim Hof advocates for this breathing technique as a means to return the mind and body to its natural state. His methods and technique of taking the mind body back to its natural state are to combat a lifestyle of screens and warm computer rooms filled with chairs creating an environment meant for sitting all day. The intent of this

paper is to examine the Wim Hof breathing technique and its effects of respiration during ice baths, whether a direct correlation exists between the two and whether this connection influences changes in body temperature. College students plan to use a target group of people to examine the Wim Hof method and whether it affects the human body during ice baths, over a period of 4 weeks to see if implementing this method has an effect on the physiological aspect of respiration and body temperature while being submerged in an ice bath.

## Your Own Shadow Demon

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Zachary Nixon

School of Humanities and Social Sciences, Poster Presentation