

MINNESOTA UNDERGRADUATE SCHOLARS



Posters at St. Paul

February 28, 2019



Welcome

Welcome to the 6th annual Minnesota Undergraduate Scholars Poster at St. Paul! This event provides undergraduate students the opportunity to share their scholarly work with state legislators and other state government officials. These student researchers have been selected to share their work because of the important messages their research can share with the state of Minnesota and the community. It is our hope that this experience will showcase the incredible influence that research has on preparing students in becoming leaders in their future accomplishments. This year's event welcomes projects from 23 students across 8 different campuses.

Through the combined efforts of the Minnesota Undergraduate Scholars Council, this event was made possible. We are appreciative for the dedication of the faculty mentors to their students. In addition, we want to recognize the student presenters for their commitment to excellence.

Sincerely,

A handwritten signature in black ink that reads "K. Agarwal". The signature is written in a cursive, slightly slanted style.

Kuldeep Agarwal
MN Undergraduate Scholars Posters at St. Paul

MINNESOTA UNDERGRADUATE SCHOLARS



Minnesota Undergraduate Scholars is a consortium of institutions that supports the research, scholarly works and creative activity of undergraduates by providing avenues for funding, presentation resources and opportunities for undergraduates to present their work. We are committed to engaging undergraduate students throughout the Minnesota State Colleges and Universities system in scholarly activities that will enrich their collegiate experience, open doors to career opportunities and lead to a life-long love of learning.

Minnesota Undergraduate Scholars Council

Anoka-Ramsey Community College

Kristen Genet

Bemidji State University

Mahmoud Al-Odeh

Inver Hills Community College

David Higgins

Metropolitan State University

Alex Layne

Minneapolis Community & Technical College

Renu Kumar

Minnesota State University, Mankato

Kuldeep Agarwal

Minnesota State University, Moorhead

Oscar Flores

Rochester Community and Technical College

Heather Sklenicka

Southwest Minnesota State University

Emily Deaver

St. Cloud State University

Jennifer Howland, Jodi Kuznia and Megan Robillard

Winona State University

Mingrui Zhang

Participating Colleges & Universities

Anoka-Ramsey Community College

Metropolitan State University

Minneapolis Community and Technical College

Minnesota State University, Mankato

Rochester Community and Technical College

Southwest Minnesota State University

St. Cloud State University

Winona State University

Schedule of Events

Thursday, February 28

8:00 – 9:30 am

Arrival and Poster Set up

9:30–11:30am

Poster Session in Capitol Rotunda

11:30-12:00pm

Conclusion and Certificate Distribution

12:00pm- Evening

Students can meet with Legislators

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The Effect of Long Term Trends in Temperature and Precipitation on Ice Out and Lake Level in Four MN Lakes

Alise Cook

Kristen Genet, *Faculty Mentor*

Anoka-Ramsey Community College

Since lakes have been seen to be reliable indicators of climate change, this study set out to see how temperature and precipitation impact lake level and ice-out over time. Historical climatological data were used to analyze their influence on lake level and ice-out date. Temperature was hypothesized to influence ice out and lake level, and precipitation to influence lake level. If long term trends towards warming and increased precipitation were seen, we predicted that ice-out would become earlier and lake level would increase over time. It was found that both precipitation and temperature are increasing over time in MN. Concomitantly, lake level has increased and ice-out was earlier. Climate change is significantly impacting lakes in MN. Given the number of lakes in MN and their environment and economic importance, significant changes to lakes could profoundly influence the future of MN.

An Attempt to Discover Novel Antibiotics Production in Antibiotic Resistant Bacteria

Jason Vaysberg, G.B. Rossi, Alma Boric, and Victoria Krawiek

Renu Kumar, *Faculty Mentor*

Minneapolis Community & Technical College

Antibiotics are naturally occurring antimicrobial compounds. They are classified based on their cellular/molecular targets, bacterial processes they impede, or based on their structures chemically. Because of this, antibiotics do not behavior similarly to proteins, in that they are not encoded for by DNA and RNA, but rather, they undergo a biosynthesis pathway with many steps involving catalyzation and enzymatic processes that leads to modification of amino acids, fatty acids and sugars. These pathways allow for antibiotics to be classified in a variety of ways. In previous work, 47 bacterial colonies have been isolated from the soil gathered from the area near feedlot where feed-additive antibiotics are used, demonstrating antibiotic resistance. These strains have been purified using the streak-plate technique. The strains were classified morphologically and characterized for gram staining. These strains were then tested as resistant to ampicillin, penicillin, and sensitive to tetracycline. Current project desires to expand on this work in the hope to find novel antibiotics. Four strains that showed resistant to antibiotics were selected for this study as the most likely to produce antibiotics. These strains have been regrown, and purified 5 times, to ensure for isolation of pure strains. These strains were then further characterized morphologically using gram stain. The properties of these strains demonstrate a capability to resist antibiotic targets and it is the goal of this project to determine if they may be able to produce their own novel antibiotics.

Connective Tissue Infiltration into Three-Dimensional Sintered Cobalt Chrome Alloy

Bethany Haus and Eryn Zuiker

Michael Bentley, *Faculty Mentor*

Minnesota State University, Mankato

The biomaterial used in medical implantable devices must sufficiently integrate within the biological system and be compatible with surrounding tissue. In this study, cobalt chrome (CC) will be utilized, offering high biocompatibility while minimizing immune reactivity. CC will be used in conjunction with Hydroxyapatite (HA), a bioactive material that is an essential component of normal bone and teeth. HA's bioactivity leads to high biodegradation when implanted alone, which can result in clinical implant failure. In our study, we will test the biocompatibility of a mixture alloy, fabricated using a three-dimensional printer. To test the biocompatibility of the fabricated metal implant *in-vivo*, one-by-two-by-four millimeter metal pieces (20% HA, 80% CC) mixture alloys will be inserted on rat skulls through a small incision made via sterilized surgery. After five weeks, the implants and surrounding tissue will be removed and observed using scanning electron microscopy. The surrounding connective tissues will be examined for inflammation and other signs of tissue damage or rejection. We hypothesize that the metal alloys will be encapsulated by dense connective tissue continuous with the periosteum and will show no signs of inflammation or rejection. Furthermore, connective tissue will infiltrate into spaces within the alloy, between and around the alloy spheres to form a dense matrix of cellular and fibrous material throughout the implant. These findings will help contribute to the science of medical implantation and tissue rejection and improve our understanding of medical device alloys used for hip, femur and other implants.

Politics, Personality, and Poor Decision-Making? Assessing Psychological Variables' Impact on Changing False Knowledge

Steven Arriaza, Sungjin Kim, and Isabella Villafane

Karla Lassonde, *Faculty Mentor*

Minnesota State University, Mankato

With the rising accessibility, and distribution of news through different media sources, the ability to discern factual from fake information becomes crucial. A theory called conceptual change explains that learning depends on abandoning prior knowledge and experiencing dissonance that comes with being incorrect. This theory has been widely used to design methods to revise misconceptions. Thus, a person has to realize their knowledge is incorrect to incorporate new, correct information. A similar approach has been employed for addressing misconceptions on social or political issues with little success. The term 'backfire effect' has been used to name the process in which people, in the face of factual evidence, double down on their beliefs. Research indicates that when facts challenge our personal beliefs or moral values then we tend to discredit them as counterfactual, even in the face of overwhelming evidence. In this study we examine how political beliefs, the personality trait open-mindedness, and need for cognition interact with refutation text that are designed to correct false knowledge. The first stage of this study focuses on assessing beliefs. In the second, experimental stage, we present a series of passages about common misconceptions with half of them being shown a refutation and explanation that the misconceptions is untrue and half with no refutation or explanation. We hypothesize that individuals who are found to be more politically extreme in their views, less open-minded, and have little desire to think deeply will be less likely to correct misconceptions when reading refutation texts.

Diversity and amalgamation of Indian subcontinent through wall throw clay art : A cultural perspective

Shveta Agawal

Todd Shanafelt and Mika Laidlaw, *Faculty Mentors*

Minnesota State University, Mankato

Ceramics using clay is a traditional process that uses hand building and wheel throw. These processes however involve many steps like the use of pug to make clay, wheel and kilns. All these steps are energy intensive and require lot of electricity and time. Art has a deeper meaning that should not depend on resources like electricity to express itself. In third world countries, electricity is a very expensive and scarce resource. Thus, a new kind of ceramic art was developed in India by tribal and villagers that uses a special type of clay that can be “thrown” on the wall and shaped by hand. This clay does not require any kiln to dry (can be dried in sun) and form and thus does not need any electricity. The clay is completely organic and uses no harmful chemicals. In this project, I recreated this clay and art form (called “wall throw”) and depicted the multicultural and diverse culture of India in a novel manner. My art will show the different prints and motifs used in the architecture, clothes and jewelry of the different regions of India.

Implementation of Greener Labs for the Organic Chemistry Curriculum

Rebecca Seemann

Heather Sklenicka, *Faculty Mentor*

Rochester Community and Technical College

Developing safer labs is critical for students and the environment. Green chemistry aims to minimize the use of hazardous substances during lab procedure by using less toxic solvents or no solvent, optimizing atom economy, and utilizing sustainable resources. This method is used in engaging labs to develop safer labs as well as bring out the most effective learning and a reduced environmental impact. The goal of this project is to verify the outcome of two labs that have been published in a “Green Organic Chemistry Lab Manual” by Beyond Benign. These labs include the formation of an alkene from alcohol using a clay catalyst instead of sulfuric acid, and a lab focusing on polymerization of aspartic acid to create thermal poly(aspartate) (TPA), which is a biodegradable polymer alternative compared to poly(acrylate) polymers (PAC). Engaging green labs prepare students for the current workforce and help them be conscious of the environment.

The Impacts of Homework Timing for Introductory Chemistry Students at RCTC

Joseph Kinzer

Heather Sklenicka, *Faculty Mentor*

Rochester Community and Technical College

One of the primary goals of education and learning is to not only impart new knowledge and material to students, but to deepen their understanding of the material presented in a course to the greatest extent possible. One of the ways student internalize and learn new information is through their independent work at home, outside of the in-class activities and lectures. Students additionally gain insights and understanding of the course material through the lecture process and in-class activities and these together form the students overall understanding of the material presented. Because Chemistry is a critical subject for many students that will be entering any of the STEM fields, we have decided to focus our study on an introductory chemistry course (CHEM 1127) taught at Rochester Community and Technical College (RCTC). Through statistical analysis of data obtained for this course, this study will analyze and attempt to ascertain what, if any, are the impacts on students' outcomes (measured by exam scores and letter grades) when instructors require homework be completed prior to attending the lecture on that material versus the instructor requiring homework to be completed after the lecture. The hypothesis tested in this study is that by requiring students to complete their homework prior to attending the lecture, they will lay a better foundation of understanding the material prior to the lecture which will then result in a deeper overall understanding of the material after the lecture, which can then be measured by exam scores and overall letter grades.

Seasonal effects on water quality and biota in the McFarland Pond

Cody James Friedges

Emily Deaver, *Faculty Mentor*

Southwest Minnesota State University

The changing of seasons causes changes in wetland environments. Phenomena such as fall turnover and precipitation rates can have a drastic effect on water quality. Biota inhabiting these wetland environments are also affected by seasonal changes either directly or indirectly. LaMotte water quality test kits were used once weekly every Thursday in the early afternoon to measure dissolved oxygen, nitrogen, phosphate, alkalinity, and pH levels in the McFarland Pond near Southwest Minnesota State University. Observations of biota were recorded, and abundance and frequency were noted. Water quality results changed in response to heavy rain events. The biota of the pond also responded to seasonal changes as expected. As it grew colder vegetation began to go dormant or die, waterfowl became less common as time went on, and water bound organisms responded to water quality changes. Overall the wetland followed the expected trends for the seasonal change being observed.

Continuous Nowhere Differentiable Functions

Brook Stang

Mathew Zabka and Heather Moreland, *Faculty Mentors*

Southwest Minnesota State University

In mathematics, a function is continuous if the graph can be drawn without picking up the pencil. A function is differentiable if the graph is smooth. So, if there is a sharp point on the graph, then the function is not differentiable at that point. Without picking up your pencil, try drawing a graph that has a sharp point everywhere. This is impossible to do, so intuitively it seems that functions that are continuous but nowhere differentiable do not exist. However, we will see that this is not the case and construct a couple of examples of these continuous but nowhere differentiable functions.

Robots Finding Robots: Using Machine Learning to Distinguish Synthetic Speech from Human Speech

Gregory Bowen

Daniel Kaiser, *Faculty Mentor*

Southwest Minnesota State University

Advances in machine learning have allowed computers to utilize more realistic voices. Current technology allows for voices that sound so similar to a real person that other people cannot tell them apart. This raises a question: If people cannot tell the difference, could a machine? Our research focuses on the use of machine learning to isolate the differences between recorded human voice and popular synthetic voices such as Apple's Siri and Amazon's Alexa. Ultimately, this technology could be used to establish confidence in the authenticity of a caller, or to reduce the incidence of "robo-callers" in the telecommunications world.

Impact of Time Restricted Feeding on Muscular Strength Within a Healthy Adult Population

Eric Norman and Nicole Schweitzer

Justin Geijer, *Faculty Mentor*

Winona State University

Time restricted feeding (TRF) has been shown to produce several health benefits. One such benefit is increased strength, though only seen in mouse models. Muscular strength and nutritional intake have been strongly researched prior to this study. Little research exists investigating the impacts of TRF on muscular strength in human subjects. **PURPOSE:** This study was to identify the potential impacts of TRF on muscular strength. **METHODS:** Participants tracked caloric intake, sleep duration, sleep quality, exercise, and medications for two, four-week periods. Statistical analyses quantifying within subject effects were performed with a repeated measures ANOVA. Post-hoc analyses were performed to elicit differences between testing periods. **RESULTS:** Mean torque flexion at 60 degrees/second (MTF 60) ($83.92 \text{ Nm} \pm 29.53 \text{ Nm}$ vs. $95.63 \text{ Nm} \pm 28.95 \text{ Nm}$) and mean torque flexion at 180 degrees/second (MTF 180) ($66.75 \text{ Nm} \pm 25.9 \text{ Nm}$ vs. $69.01 \text{ Nm} \pm 21.29 \text{ Nm}$ vs. $75.55 \text{ Nm} \pm 23.9 \text{ Nm}$; $f=7.920 \text{ Nm}$) had an increase from pre-test to TRF, and non-TRF to TRF. Post-hoc testing revealed differences between pre-test and TRF MTF 60 increased ($p\text{-value}=0.001$). Similar results were found for MTF 180 as well ($p\text{-value}=0.037$). When observing respiratory quotient (RQ) at rest (0.716 ± 0.077 vs. 0.73 ± 0.077 vs. 0.08 ± 0.79 ; $f=8.352$) showed increase from pre-test to TRF ($p\text{-value}=0.008$), and non-TRF to TRF ($p\text{-value}=0.034$). Analyzing total strength training days from non-TRF to TRF ($8.11 \text{ days} \pm 1.18$ vs. $5.22 \text{ days} \pm 1.48$). **CONCLUSION:** Post TRF, participants showed an increase in muscular strength and resting RQ despite a decrease in strength training. Future studies are needed to identify physiological mechanisms behind these findings.

Minnesota Traffic Accident Analysis

Bo-Ting Wu and Ya-Wei Tsou

Mingrui Zhang, *Faculty Mentor*

Winona State University

National Highway Traffic Safety Administration (NHTSA) of United States releases vehicle accident information each year. However, it is very difficult to interpret the information in its original CSV format and discover factors attributed to the accidents. The objectives of our project are to develop a web-based tool to visualize the information in more readable ways and help users to identify factors related to the accident. Our web-based application is implemented using Model-View-Controller architecture. The Apache Tomcat server is used in controller component. MySQL, as a robust database server, is used to support queries of large amounts of data. In view component, we use two freeware AdminLTE and Chart.js. The AdminLTE is a skeleton template of front-end website, and Chart.js is a library that is used to produce diagrams dynamically. Data obtained from NHTSA is normalized so it may be presented in elegant charts. Our web-based tool includes ten functional use cases such as number of accidents certain brand of vehicle are involved, ages/genders of drivers who are involved.

Experimental Impact Craters in Sloped and Layered Targets

Leah E. Dechant and Jordan M. Ebel

Jennifer L.B. Anderson, *Faculty Mentor*

Winona State University

Impact cratering is the dominant geologic process affecting the surfaces of solid bodies throughout our solar system. Because the impact cratering process is (luckily) rare on Earth, it is studied through experiments, numerical modeling, and theory, all of which make the simplifying assumption that the target surface is horizontal and uniform with depth. To investigate crater formation in more realistic targets, we conducted two separate suites of impact cratering experiments into sloped targets and layered targets at the Experimental Impact Laboratory at NASA Johnson Space Center. Experimental impacts were performed in a near-vacuum, with aluminum projectiles moving at 1.5 km/s. The targets consisted of a fine-grained sand either at a known slope angle or with a stronger subsurface layer slightly below a thin layer of sand. A 3D scanner was used to record the topography of the original target surface and the final impact crater allowing us to compare the pre- and post-impact topography in detail using ArcGIS. Sloped-target analysis shows little to no crater rim on the upper slope, substantial slumping within the crater, and a shift in the deepest point of the crater in the downslope direction. Layered-target analysis shows visible change to the crater morphology with the addition of even a relatively deep substrate layer when compared to the uniform target, resulting in a shallower and wider crater. These results have implications for how craters on sloped targets or potentially layered targets are interpreted on planetary surfaces such as the Moon.

Effects of Time Restricted Feeding on Resting Energy Expenditure and Respiratory Quotient

Lauren Kaminski and Cassondra Fileccia

Justin Geijer, *Faculty Mentor*

Winona State University

Introduction: Time restricted feeding (TRF) limits feeding time in a day. An increase in resting energy expenditure (REE) has been associated with increased physical activity. Respiratory quotient (RQ) demonstrates the ratio between CO₂ production and O₂ uptake, determining substrate utilization at rest. Studies indicate high carbohydrate diets increase RQ whereas high fat diets lower RQ. RQ has also been found to decrease with endurance training. **Purpose:** The intent of this study was to determine the impact TRF may have on REE and RQ. **Methods:** Thirty-four apparently healthy adults participated in 4 weeks non-TRF and 4 weeks of TRF with a nine-hour feeding window. Participants were provided journals over the course of the study to self-record caloric intake and exercise data. REE and RQ were measured using a metabolic cart initially, after 4 weeks of non-TRF, and 4 weeks after TRF. Data was analyzed using IBM SPSS statistics. **Results:** RQ increased significantly between pretest (0.721 ± 0.015) and TRF testing (0.808 ± 0.02) ($p=0.01$). No significance was found between non-TRF and TRF. REE had no significant difference between any of the three testing periods ($p=0.233$). There was no significant change in caloric intake throughout the testing ($p=0.94$). A significant decrease was found in total exercise days between non-TRF and TRF periods ($p=0.023$). **Conclusion:** This study found no significant change in REE during TRF. The increase in RQ may be attributed to increases in carbohydrate intake. Future studies should investigate the impact of TRF on macronutrient intake and carbohydrate utilization at rest.

Enterobacteriaceae: Desiccation Survival and Thermal Tolerance of Closely Related Genera

Jharez H. Tecsihua Tamariz

Ryan C. Fink, *Faculty Mentor*

St. Cloud State University

Salmonella is able to acquire thermotolerance after extended exposure to low water activity. This adaptation raises significant public health concerns as it is able to survive common thermal food processing such as pasteurization. Prior studies have shown that Salmonella Typhimurium exposed to dry conditions differentially expresses 719 genes. Among them, two virulence genes (*sopD* and *sseD*) were identified to be critical to Salmonella Typhimurium's ability to survive desiccation. From those genes, *sopD* is conserved at the genus level whereas *sseD* is specific to the species *S. enterica*. Escherichia coli, though it is a closely related genus within the Enterobacteriaceae family, does not acquire thermotolerance post desiccation. The main objective of this study is the evaluation of desiccation survival and thermotolerance of genera related to Salmonella Typhimurium to provide a concrete scientific basis to advise food safety control and thus safeguard public health.

To accomplish our objective, we expose Enterobacteriaceae family members (*Citrobacter freundii*, *Escherichia coli*, *Proteus hauseri*, *Shigella flexneri*, *Salmonella bongori*, and all subspecies of *S. enterica*) to low water activity ($a_w = 0.1$) to determine their ability to survive desiccation. Finally, we heat shock the desiccated samples at 90, 95, 100 and 105 °C to determine thermal tolerance through cell enumeration and the calculation of D-values. Furthermore, we conduct a genome-wide association study to determine gene conservation across the Enterobacteriaceae family with respect to 290 upregulated genes identified from prior work with Salmonella Typhimurium. This allows for a predictive model of thermotolerance across the Enterobacteriaceae family.

Economic Success Among Post 9/11 Veterans

Ryan Bolduc

Monica Garcia-Perez, *Faculty Mentor*

St. Cloud State University

The war on terror is officially the longest conflict in United States history. Starting on September 11, 2001 it is estimated that nearly 2 million men and women have returned to civilian life after having served on active duty. Using data from the American Community Survey (ACS) 2016, this research paper examines the economic success of post 9/11 veterans when compared to their civilian counterparts. Economic success is defined as individual total income, income from wages, and college graduation. Empirical analysis shows that veterans, on average, have higher income from wages, higher total income, but are less likely to be a college graduate. With seemingly contradicting results it is still unclear whether being a veteran has a positive impact on economic success.

Social isolation and mental health in Minnesota: Results from a random sample of Minnesotans

Holly Goodwin

Amanda Hemmesch Breaker, *Faculty Mentor*

St. Cloud State University

The goal of this study was to examine the association between self-reported mental health and two measures of social relationships: social isolation and satisfaction with support. Telephone surveys were used to collect data from a sample of 502 adult Minnesotans (50% women, 92% white, age mean = 51.79 years, SD = 19.10) generated through Random Digit Dialing. Participants were asked two questions about their social relationships: one about how many family/friends they feel they can call on for help, and one about satisfaction with family/friend relationships. Participants self-reported if they had been diagnosed with a mental health condition. Approximately 94% of participants reported being somewhat or very satisfied with the quality of their social relationships; 6% of participants reported having two or fewer people they could call on for help. There was a significant difference in relationship satisfaction by social isolation (chi-square = 17.79, $p < .01$): 24% of isolated participants were dissatisfied with relationships, compared to 5% of participants who were not isolated. Hypothesis testing focused on social isolation. There was a significant relationship between mental health diagnosis and social isolation (chi-square = 3.96, $p = .05$): 40% of socially isolated participants self-reported a mental health diagnosis, compared to 24% of participants who were not isolated. Data suggests that most adult Minnesotans are not socially isolated, and that there is a significant relationship between social isolation and mental health. Data is cross-sectional; it is not possible to determine which variable might be driving the relationship between social isolation and mental health.

You Give Love A Bad Name: An Investigation of Toxic Masculinity and its Characteristics in the "Incel" Community

Camille Smith

Caitlin Mahoney, *Faculty Mentor*

Metropolitan State University

In the ride of internet sub-cultures, a community of "incels", men who self-identify as involuntarily celibate and turn their blame on women, are on the rise. Much of the incel discourse can be found in online forums, such as Reddit, with posts vividly describing isolation, scorn, and even violence. We hypothesized that these forums would show characteristics of toxic masculinity, particularly key characteristics of aggression, misogyny, patriarchal values, and violence against women. In the current study, content analysis was utilized on several forums and web posts made by individuals within this culture and identified common characteristics and themes. We found support for the toxic masculinity hypothesis and the key characteristics listed above. This first stage establishes common threads among members and their community. Moving forward, we hope to investigate the components of incel culture, including feelings of alienation, blame and aggression towards women. We hope that future research into this subculture can prevent the kind of harassment and violence they are proponents of, as well as prevent other men from initiation into this group.

Double-Edged: Bilingualism and its influence on self-esteem

Lionel Fuentes

Metropolitan State University

This study looks at the relationship between bilingualism and self-esteem. It's hypothesized people who are fluently bilingual will show higher levels of self-esteem than people who are more dominant in one language or are limited bilingually. Previous research has found that early heritage language education can have a positive effect on the self-esteem of minority language students (Wright & Taylor, 1995). This study uses secondary data from a longitudinal study from 1991 to 2006. The original study looks at the adaptation process of the immigrant second generation children with at least one foreign-born parent or children born abroad but brought to the United States at an early age (Portes, Alejandro, Rumbaut, Rubén, 2012). This study found that participants who are fluently bilingual display higher levels of self-esteem versus participants who aren't fluently bilingual. The information from this study can be used in order to help second generation children psychologically and adapt better to their host country.

Big school, big bully?: The influence of school enrollment size on adolescent bully victimization

Eric Muchow

Metropolitan State University

Adolescent bullying victimization is a common phenomenon that reliably contributes to negative outcomes relating to mental health, academic attendance, academic achievement, drug use, self-esteem, and behavior. Past research has studied bullying both at the level of the perpetrator-victim relationship and beyond to examine possible classroom-level and school-level contributing factors. For the current research, I investigated the influence of school enrollment size on adolescent bully victimization. The National Crime Victimization Survey: School Crime Supplement (2015) was used to collect data. This was a national, governmental survey in which 650 students ages 12-18 answered questions regarding school related victimization via either a face-to-face meeting or phone interview. Results indicated that for those who experienced bully victimization, the frequency of being bullied differed significantly by school enrollment size. Those in the smallest school enrollment category (i.e., less than 300) had the greatest frequency of bullying while those in the largest school enrollment category (i.e., 2000 or more) had the lowest frequency of bullying. In addition, the reported frequency of bully victimization went up sequentially from smallest to largest school category (six categories total). These preliminary findings suggest that adolescents from smaller school may indeed get bullied more frequently than those students in larger schools. It may, therefore, be useful to explore, among other factors, school enrollment size for those adolescents transferring schools due to bullying victimization.

Don't be a prick: Influences of type one diabetes on mental illness?

Stephanie Koller

Metropolitan State University

What effects does type one diabetes have on teens being diagnosed with mental illness? In a recent study with the United States Department of health and human services they ran surveys asking subjects about the age which they were diagnosed with diabetes as well as asking them about their mental health. Previous research has suggested that adolescents that have been diagnosed with type one diabetes are more effected by depression and other mental illness. This study used secondary data from a longitudinal study conducted by National Center for Health Statistics, using a nationally representative sample of approximately 5,000 subjects each year, located across the full United States. This research has provided the data to conclude that type one diabetics tend to suffer from mental illness due to the effects of diabetes (2002).

Faith and feminism: The influence of religion on attitude towards women's rights.

Mary F. Stinson

Metropolitan State University

The issue of women's rights has gained great momentum over the years, with growing emphasis on women in the workforce, the wage gap between males and females, equal consideration for jobs/promotions, the role of women at home, women in politics, a woman's right to control her own body, and many others. Past research has studied the impact of women's rights movements and the opposition and acceptance of women's rights within many religious groups, given that the historical force that drives many religions often creates conflict between the two subjects. The current study investigates the influence of religious preference and religiosity on attitude towards women's rights. Data for this research was collected from The General Social Survey, 2016 (GSS). The GSS is a national survey conducted every two years, targeting English or Spanish speaking adults (18+) from urban, suburban, and rural areas throughout the United States. In the 2016 survey, there were 2,867 participants, answering a variety of demographic, behavioral, and attitudinal questions about civil liberties, intergroup tolerance, morality, social mobility, psychological well-being, and more via face-to-face interviews. Preliminary results indicate a significant difference in attitudes toward women based on level of religiosity and religious preference. Given these findings, it would be beneficial to explore the impact of women's rights movements on each religion or denomination in order to further investigate groups unaffected by current movements and identify better educational opportunities for specific groups.

I Double Dog D.A.R.E. You; Influence of School Drug Education Programs on Rates of Drug Abuse

Samantha O'Brion

Metropolitan State University

Does being exposed to drug education programs in school influence the rates of drug usage throughout high school beyond? Previous research has indicated that drug education programs in schools are not effective at reducing rates of drug abuse across a population. This study used secondary data from a longitudinal study conducted by Harris and Udry, which used a nationally representative sample of the United States population where data was collected from participants' adolescence through early adulthood about various behaviors and education. An analysis of this information concluded that drug education programs are not only ineffective, but actually increased drug usage among the drug educated population when compared to those who were not exposed to drug education programs (2010). This information implicates the need for a change in how drug education is provided to the public as form of harm reduction and in order to create a healthier future in the United States.

Student Presenter Biographies and Pictures



Alise Cook is a sophomore at Anoka Ramsey Community College. She hopes to transfer to the University of MN - Twin Cities to pursue a degree in Neuroscience. Her professional goal is to become a physician assistant or a neuroscientist. During high school, she considered becoming an English professor or a musician, but realized her love of nature and people was calling her towards the natural sciences, especially medicine. She hopes to profoundly impact people's lives through research and medicine. When she isn't busy writing research papers or studying for tests, she enjoys hiking, playing piano, and volunteering at her church.

Jason Vaysberg is a University of Minnesota graduate, now back in school working toward medical school. In addition to his coursework, Jason is involved in microbiology research and tutoring chemistry/biology during the week and works as an activity coordinator at a senior community during the weekends. Eventually, Jason hopes to work as a psychiatrist.





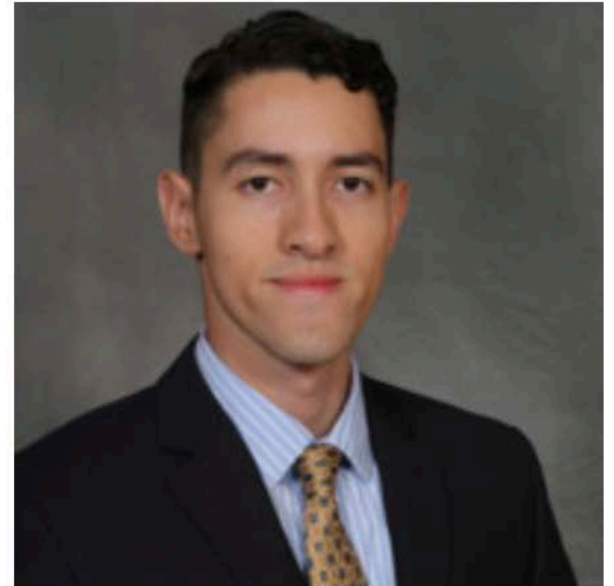
Bethany Haus is currently attending Minnesota State University, Mankato. She is a junior who is majoring in Biomedical Sciences and minoring in Psychology. She has presented this research at multiple conferences, including NCUR in 2018. After receiving her degree, she plans on attending medical school to become a pediatric physician.

Eryn Zuiker is currently a junior at Minnesota State University, Mankato. She is studying biomedical sciences and minoring in chemistry. She has presented at several conferences, including the 2018 Health and Biomedical Sciences Summit at MNSU Mankato. After completion of her undergraduate degree, Eryn plans on furthering her education through a combined MD-PhD (medical scientist) program.

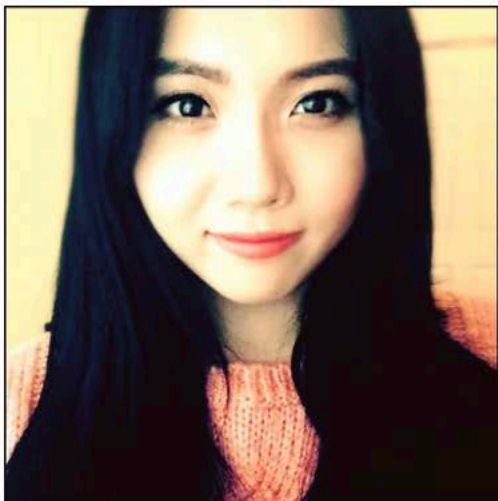




Isabella Villafane Graduated with a Bachelor's in Psychology from Minnesota State University, Mankato in 2018.



Steven Arriaza Psychology student at Minnesota State



Sungjin Kim graduated with a Bachelor's in Psychology from Minnesota State University, Mankato in 2018.



Shveta Agarwal is a student majoring in Ceramics in the Department of Art at MSU Mankato. I am originally from India and have been passionate about art since a young age. I moved to Mankato in 2012 and started my BFA in 2014. I love working with different art forms and trying new materials to create art. I can do woodworking, welding and ceramics. I also love traveling, cooking and watching movies.

Rebecca Seemann was born and raised in the Rochester area. This is her second year attending Rochester Community and Technical College, and she is currently planning on majoring in chemistry.





Thy Duong is a prospective chemistry major currently attending Rochester Community and Technical College, and will be transferring to University of Minnesota-Twin Cities to pursue B.S. in Chemical Engineering and B.S. in Chemistry. She is interested in Chemistry and wants to further her education after graduation at her dream school, University of California-Berkeley in their Chemical and Biomolecular Engineering graduate program.

Joseph Kinzer graduated with honors from the University of Saint Thomas in 2006, with a B.S. in Economics. He is currently enrolled in RCTC's Science Foundations II certificate program with an expected completion date of 2019. Joseph is currently working in the field of Supply Chain Logistics and is in the process of transitioning careers into the health sciences.





My name is **Cody Friedges** and I am a junior at Southwest Minnesota State University. I am majoring in biology with a special interest in the ecological branch. My future goals are to become a Fisheries Biologist with the Minnesota Department of Natural Resources.

My name is **Brook Stang**. I am a senior at Southwest Minnesota State University double majoring in computer science and applied computational math. After I graduate, I am hoping to get a job as a Software Engineer or Application Developer. After a couple years of working, I might go back and get my master's in data science. Once I get my master's degree, I would find a job as a Data Analyst or something similar.





Gregory Bowen is a recent graduate who currently works as a Software Engineer at Digi-Key Electronics. Before starting at Digi-Key, Gregory completed a Computer Science degree at Southwest Minnesota State University where he focused his interests on both understanding and improving how people and computers interact. He hopes to take the skills he has acquired and use them to make computer technology more accessible to everyone. In his spare time, Gregory enjoys reading, hiking, and working with stained

Eric Norman is currently pursuing a Bachelor's degree in Movement Science with a nutrition and psychology minor at Winona State University. He is from Princeton, MN and will be attending the University of New England's Doctor of Physical Therapy Program starting the Fall of 2019.





Nicole Schweitzer is currently pursuing a degree in Movement Science with a psychology minor at Winona State University. She is from Hartford WI and currently she is applying to graduate schools to become a Masters in Occupational Therapy.

Bo-Ting Wu is keenly interested in solving problems with computer programming, Bo-Ting Wu, also known as Andy Wu, had won first prize of Tamkang Hackathon 2017 among freshmen and sophomore teams. He is currently an overseas student majoring in Computer Science at Winona State University.





Ya-Wei Tsou is a student who came from Taiwan, currently study in the department of Computer Science at Winona State University. She devoted most of the spare time to explore the mystery of web technology, both the front-end and the back-end design. Familiar with: HTML, CSS, Javascript, PHP, Java, C.

Lauren Kaminski is in her senior year of college at Winona State University. Lauren is obtaining a Major in Movement Science and a minor in Nutrition. Lauren is actively involved in the Movement Science club and the Special Olympics club. Lauren is planning on furthering her career through an accelerated nursing program to receive her RN.

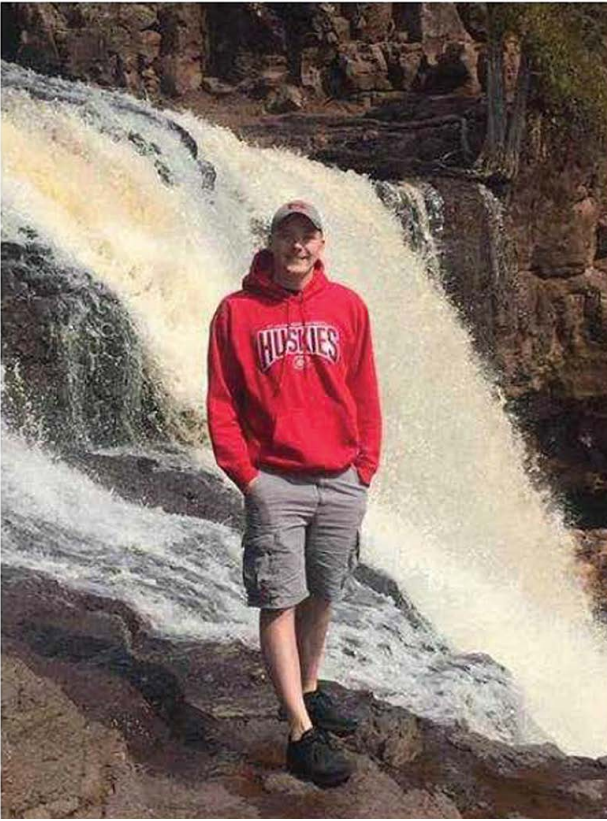




Cassandra Fileccia is a senior at Winona State University obtaining a major in Movement Science and a minor in Psychology. After graduating in the winter of 2018, she plans to attend East Carolina University and join the Biomechanics Master's program.

Jharef Tecsihua Tamariz is an international freshman at St. Cloud State University (SCSU) majoring in Biochemistry and Molecular Biology: Biotechnology. He is from Lima, Peru. As an inquisitive student at SCSU, he is currently researching thermal tolerance in the Enterobacteriaceae family due to desiccation survival under the direction of Dr. Ryan Fink. **Jharef** is the vice president of the Residence Hall Association (RHA) at SCSU and the president of Lawrence Hall Community Council. In his spare time, he enjoys watching informative videos, finding new music, playing the **cajón**, and dancing. He is sincerely grateful for the support he has received from family, friends, and faculty.





Ryan Bolduc grew up in Princeton, MN and was involved in both hockey and baseball and is happy to be back in his hometown coaching hockey for the third year. During his senior year of high school, Ryan enlisted in the Army Reserves. Ryan graduated from St. Cloud State University in December 2018 with a degree in Mathematical Economics and a minor in Military Science. Over his four years at St. Cloud State University he spent many hours with the ROTC program and has now commissioned as a Second Lieutenant. As a Military Intelligence Officer, Ryan will head to Fort Huachuca, Arizona in March to complete Basic Officer Leadership Course and will graduate from that in July. His goal is to continue doing research on different career fields in both the public and private sectors and upon his return from training, he hopes to begin his job search.

Holly Goodwin: I am a student at St Cloud State University pursuing a career in psychology. Originally, I am from Oshkosh, Wisconsin. I am interested in continuing research in social isolation and mental health, as well as research regarding trauma. I currently conduct research with the faculty and staff in the SCSU Survey Center, which conducts phone interviews through Random Digit Dialing to gather data.





Leah Dechant grew up in Woodstock, IL, and graduated from Woodstock High School in 2016. She currently attends Winona State University in Winona, MN. Leah is an Environmental Geoscience major with a Sustainability minor. Aside from classes, her time at WSU has been occupied with Environmental club, serving as a student representative on WSU's sustainability committee, working for WSU's Sustainability office, and working with Dr. Jennifer Anderson making impact craters in the laboratory. Leah started her work with Dr. Anderson in the spring of 2017. Since then Leah has traveled to and worked at NASA's Johnson Space Center in 2017 and 2018 to conduct a number of experimental impacts, specifically looking at impacts on sloped and layered targets. Leah will continue this work with Dr. Anderson until her graduation in the spring of 2020.

Jordan Ebel grew up in Cary, IL, and graduated from Cary Grove Highschool in 2015. He currently attends Winona State University in Winona, MN, and is studying Environmental Geoscience. Jordan found a passion for geographic information systems (GIS) after taking a class offered at Winona State. In the fall of 2017 he became a part of the impact cratering research group run by Dr. Jennifer Anderson. Jordan's focus in the research is using GIS to process and analyze 3D scans from impact craters made at the Experimental Impact Laboratory at NASA's Johnson Space Center. Once he graduates in the spring of 2019, Jordan hopes to use his knowledge of GIS in the field of remote sensing.

