MINNESOTA
UNDERGRADUATE
SCHOLARS

11ᵗʰ Annual Minnesota State Undergraduate Research Scholars Virtual Symposium

April 28, 2022

All Events are hosted by Anoka-Ramsey Community College on Zoom. Links to online sessions are found on the Symposium Schedule and online in Symposium

8:00am	Minn State Scholars Council Planning Meeting (invited faculty and administrators only)
9:00-9:30am	Welcome and Opening Remarks
9:30-10:30am	Concurrent Session A: Student Professional Development
	1. Grad School 101
	2. Publishing your Undergraduate Research
10:45-11:45am	Session B: Student Presentations
11:45am-1:00pm	Lunch
1:00-2:00pm	Session C: Student Presentations
2:15-3:15pm	Session D: Student Professional Development
	1. Alumni Research Showcase
	2. Career Services
3:30-5:00pm	Poster Session and Social Reception

Concurrent Session Descriptions

Session A1: Grad School 101

Facilitators: Alyssa Anderson and Marina Cetkovic-Cvrlje

Considering graduate school but not quite sure what to expect, how to find an advisor, or what type of program to pursue? This session is for you! Come learn from a student panel and hear about their experience and advice.

Student Panelists:

1. Alise Mendoza-ARCC/UofM: Alise transferred from Anoka Ramsey to the University of Minnesota in 2019 and graduated with her bachelor of science in Biology summer of 2021. She is currently working as a drug safety specialist for a pharmaceutical consulting company and is pursuing further education in medical writing and editing.

2. Christos Robertson -ARCC/UofM: Christos returned to school three years ago. I was a chef for a decade and grew a passion for cooking and growing food that was sustainably grown and healthy for you. I am now in the college of biological sciences at the University of Minnesota Twin-Cities in the department of Plant and Microbial Biology. I am doing research on plant-bacteria symbiotic interactions under Dr. Ford Denison. I have been accepted into the Trio-McNair Scholars program and am preparing my applications for graduate school and a NSF grant. I plan on getting my PhD in plant and microbial sciences.

3. Taylor Borgman-ARCC/Columbia University: In 2018 I transferred from Anoka Ramsey community college to the University of Minnesota where I obtained my bachelor's degree in Biochemistry with a minor in Nutrition. I am now attending Columbia University to pursue my PhD in Nutritional and Metabolic Biology. The majority of research I've conducted has a central focus on mechanisms of disease and medicine, including biochemical development of antibiotics, potential therapeutics for hepatocellular carcinoma, and mechanistic studies of ER stress, which occurs in neurodegenerative and metabolic diseases.
4. Kelsie Becklin-ARCC/UofM: Kelsie transferred from ARCC to the UMN College of Biological Sciences and graduated with her bachelor of science in Biology spring of 2017. She immediately entered the Comparative and Molecular Biosciences program at the UMN college of vet med where she studies childhood cancer using genetic engineering and stem cell biology.

Session A2: Publishing Your Undergraduate Research
Facilitator: John Sinko, SCSU
Pre-career student publications meaningfully document your research as you participate in the critical scientific process of sharing out discoveries. Published work demonstrates communication skills and work ethic for employers or graduate school committees. This workshop, intended for students who are new to academic publication, will explore the broad context of publishing, and discuss options, guidelines, and potential pitfalls.

Session B: Student Oral Presentations
1. Jessica Strand, Anoka-Ramsey Community College: *White-tailed Deer (Odocoileus virginianus) Behavior in an Actively Restored and Maintained Minnesota Wetland Ecosystem*
2. Joey Heinen, Southwest Minnesota State University: *Aggression in male Madagascar hissing cockroaches and its correlation with body size*
3. Adam Pagnano, Rochester Community and Technical College: *Analysis of Peroxide Bleach*

Session C: Student Oral Presentations
1. Kristopher Honetschlager, Winona State University: *A Brute Force Method of Discovering Information Hidden in Datasets*
2. Tim Lux, St. Cloud State University: *Putin and the Czar: Autocracy and Dissent*
3. Suad Ali, St. Could State University: *Is what you remember real? Quantitatively investigating the recognition of synthetic Generative Adversarial Network pictures (GANs)*

Session D1: Alumni Research Showcase
Facilitator: Kristen Genet
Undergraduate Research Students (including some who have presented at prior Minnesota Undergraduate Scholars Symposia!) have gone on to continue undergraduate research as they have finished their Bachelor's Degrees and pursued additional advanced degrees. Come hear about some of the fascinating work they're doing!

1. Kelsie Becklin-ARCC/UofM
   Bottom-up Cancer Modeling: Harnessing the Power of Genetic Engineering and iPSC to Understand Cancer Initiation and Development
   I will cover the basics of the emerging field of bottom-up cancer modeling using genetic engineering and stem cell biology strategies.

2. Christos Robertson -ARCC/UofM
   The Fitness of Rhizobia and the Plants They Inhabit.
   In alfalfa rhizobia create a chemical called rhizopine. What are the fitness implications of this chemicals production and use both on the rhizobia themselves and the plants they inhabit? We will attempt to answer this by testing these hypotheses: 1) Reproductive rhizobia use rhizopines created by their non-reproductive sisters. 2) Making rhizopines diverts enough resources from nitrogen fixation to negatively affect the plant and 3) this effect is enough to trigger sanctions by the plant aborting or reducing resources to the nodule. To test these hypotheses, we will be conducting two concurrent six-week experiments: one with single inoculated plants to measure the cost to the host plant of rhizopine synthesis, and the other with dual inoculated plants to measure effects of rhizopine synthesis and use on rhizobial fitness. We have not yet attained results due to death or lack of germination in over half of the plants in the first trial. Corrections to procedures have been made and we expect to see results soon.

3. Taylor Borgman-ARCC/Columbia University
   A Novel Role for Lipid droplets in ER Proteostasis
   ER stress is associated with a wide array of diseases including type 2 diabetes, obesity, fatty liver disease, cancer, inflammatory diseases, and neurodegenerative diseases. ER stress occurs when the endoplasmic reticulum (ER) exhausts its capacity to properly fold proteins leading to an increase in unfolded proteins and disrupted protein homeostasis. This in turn activates the unfolded protein response (UPR), which upregulates degradation of these toxic misfolded proteins through pathways such as ER-Phagy and ER-associated degradation (ERAD). Recently it has also been shown that ER stress induces lipid droplet (LD) biogenesis and autophagy (lipophagy) in yeast, suggesting a possible role for lipophagy in ER proteostasis. A novel mechanism discovered in yeast showed that unfolded proteins are recruited to lipid droplets from the ER and brought to the vacuole for the degradation of both the LD and its unfolded protein cargo in response to ER stress. This novel mechanism of ER proteostasis in yeast is dependent on vacuolar fusion and the endosomal sorting complex required for transport (ESCRT) machinery, which is thought to mediate membrane invagination and scission. However, mediators of this pathway are still unknown and are currently being studied in the Pon Lab.

Poster Session

- Breakout Room 1
  - ✓ Himanshu Bhushan, WSU: Automatic Polyp Detection in Colonoscopy using Deep Learning
  - ✓ Bethany Lieser, ARCC: The Conservation of the GlyP Gene Across Highly Divergent Species of Drosophila
  - ✓ Jessica Strand, ARCC: Analysis of eIF4E1 Conservation and Synteny across Drosophila Species to Understand the Evolution of the Insulin Pathway
  - ✓ Courtney Snyder, SMSU: Mapping and Quantifying Bird Window Strikes at the SMSU Campus
- Breakout Room 2
  - ✓ Hunter Harnett and Asma Yusuf, SCSU: Does Coca-Cola consumption potentiate diabetes development in NOD female mice?
  - ✓ Sierra Bermudez and Ujala Chawla, SCSU: Study of Immune Cells in Streptozotocin-Induced Diabetic C57CL/6 Mice Consuming Coca-Cola
  - ✓ Andrew Nardi, Wengelawit Molla and Ridwan Yussuf, SCSU: *The effects of Coca-Cola on diabetes incidence and glycemia levels in C57BL/6J mouse model*
  - ✓ Mitchell Fournier and Lacey Hallstrom, SCSU: Effects of Coca-Cola consumption in healthy mice
  - ✓ Alli Beste and Enock Ombengi, SCSU: T-Cell Function and Composition in NOD Mice Exposed to Coca-Cola
- Breakout Room 3
  - ✓ Megan Reis, Jenna Dale and Skylar Fedoravicius, WSU: Emotional Experiences Among College Students Returning to Campus Amid the COVID-19 Pandemic.
  - ✓ Sean Bresnahan, SCSU: Online Eating Disorder Recovery Communities: Levels of engagement and perceived recovery help
  - ✓ Haneum Claude Lee, SCSU: Effect of Teleworking on Retirement Age

Project Descriptions/Abstracts

Oral Presentations
Presentations B1-B3 in Session B, Presentations C1-C3 in Session C
Presentations P1 – P12 in Virtual Poster Session

B1 - Jessica Strand, Anoka-Ramsey Community College
White-tailed Deer (Odocoileus virginianus) Behavior in an Actively Restored and Maintained Minnesota Wetland Ecosystem
Faculty Mentor: Kristen Genet
Wetland loss and damage is a significant result of anthropogenic manipulation of the landscape, which has promoted efforts to restore these critical ecosystems. White-tailed deer behavior can be evaluated to understand how this prevalent species responds to restoration efforts in the Blaine Wetland Sanctuary, an approximately 500 acre protected open space, and the results have implications for conservation and management of wetlands in urban and suburban landscapes. This study hypothesized that deer behavior would vary in different habitat types, regions of the wetland sanctuary, and over time with ecological restoration and maintenance. Camera traps were used to capture deer behavior, and contingency table analyses were used to evaluate whether the observed behavior differed from expected. No statistical difference in deer behavior was found when comparing upland and wetland habitats (p = 0.329), however deer behavior differed significantly across regions of the wetland sanctuary (p = 0.011) and with restoration history (p = 0.019). The results indicate that White-tailed deer prefer using habitats and areas of the wetland sanctuary in later stages of restoration. Resource availability is vital to White-tailed deer survival, and this is what ultimately determines deer presence and activity in the Blaine Wetland Sanctuary.

B2 - Joey Heinen, Southwest Minnesota State University
Aggression in male Madagascar hissing cockroaches and its correlation with body size
Faculty Mentor: Alyssa Anderson
*Male Madagascar hissing cockroaches (*Gromphadorhina portentosa*) rely on aggressive displays to establish a hierarchy within their social groups and prevent fighting. There is conflicting evidence about whether cockroach aggression correlates with body size. This experiment aims to determine whether body size correlates with aggression in similarly-sized males, as well as to measure the consistency in aggression against rivals of different sizes. Eighteen male cockroaches were divided into small, intermediate, and large size classes. First, individuals were paired against others in the same size class, using a random female to induce aggressive behavior. Subsequently, they were paired with males of different sizes. Data were analyzed using Fisher's exact tests. Results suggest no strong correlation between body size and aggression. These findings allow us to better understand the species' behavior for*

conservation and husbandry purposes, as well as how social hierarchies may work in other species.

B3 - Adam Pagnano, Rochester Community and Technical College
Analysis of Peroxide Bleach
Faculty Mentor: Heather Sklenicka
All too often Chemistry students learn about a topic but have no way to relate it to a real life situation. In an attempt to mitigate this, a lab was created which incorporates real world elements while still incorporating chemistry topics. In this lab, various commercial non chlorine bleaches were titrated using a potassium permanganate solution. The active ingredient in the bleaches is hydrogen peroxide. The titrations were done to calculate the percentage of peroxide in the bleaches and compare the calculated results with the stated amounts. In order to help increase precision an electronic redox probe was used to alert when the titration should be stopped. The probe also helped when the solutions were colored as it would give an indication as to when the titration should be stopped when typical visual cues could not be used. Sets of trials were conducted on three different brands of bleaches.

C1 - Kristopher Honetschlager, Winona State University
A Brute Force Method of Discovering Information Hidden in Datasets
Faculty Mentor – Collin Engstrom
This presentation is regarding a brute force method, developed in the Python programming language, for testing the ability of any one or n columns to indicate the values present in any other selected column of nearly any flattened dataset. This method achieves the result of showing not readily apparent relationships between columns of data in a flattened dataset. The benefit of this method when it is applied practically, is that more knowledge can be obtained regarding the subject of the dataset, which was probably subconsciously my objective when developing it during my independent study last fall semester with my independent study advisor Collin Engstrom. The origin of this method is a theory set out in a popular mushroom dataset from the UC Irvine machine learning repository, which is roughly to test just one column or label against every possible column, not including the label, in a dataset to discover any strong relationships between them. My method by contrast scans the dataset for every possible combination of columns by iterating through every possible label and testing it against every possible column not including the current label. Once printed out, the results from my method are searchable to find relationships with high ROC values (a key metric for machine learning predictive performance) which should indicate a strong relationship between the columns and potentially show relationships that were previously unknown, which could be beneficial.

C2 - Tim Lux, St. Cloud State University
Putin and the Czar: Autocracy and Dissent
Faculty Mentor: Maureen O'Brien
This project will explore the analogies between Russian foreign and domestic policies from contemporary times and from the late Russian Empire of the early 20th century. Both Czar Nicholas II and Vladimir Putin are leaders committed to autocratic rule and repression of internal dissent. Both leaders have a track record of intensifying repression as their time in power progresses. A further link is the impact that foreign policy plays on the internal politics of Russia, with success or failure in foreign conflict providing either solidification of power or the spark for popular unrest. We will explore topics such as the similarities between the crackdowns on socialist and Jewish dissidents in Imperial Russia and Putin's expansion of the surveillance state and increased attack on political dissidents such as Alexie Navalny's democratic reformers. The progression of Nicholas II's rule and the impact of failed foreign policy tied with a disregard for dissatisfaction at home could give us insight into how Putin's future decisions and outcomes may play out, as well as provide a warning for the instability and suffering that may come with said endgame. We will also take into consideration key differences between the two rulers, such as personal political aptitude or competence, an empire trying to maintain its power versus a country trying to reassert lost prestige, and a Russia that is interconnected with the wider world versus one retreating further into isolation.

C3 - Suad Ali, St. Could State University
Is what you remember real? Quantitatively investigating the recognition of synthetic Generative Adversarial Network pictures (GANs)
Faculty Mentor: Leslie Valdes
Generative Adversarial Network (GAN) can create realistic examples of things that do not exist (e.g., pictures of cats). GAN creates synthetic images using algorithmic architectures that set up two neural networks against each other. The generator which produces the fake pictures, and the discriminator that specifies whether the pictures are real or fake. The present study will investigate if synthetic GAN pictures are recalled differently from real pictures. Thirty participants will study 20 pictures of cats and indicate if each picture is synthetic or real. Half of the pictures will be synthetic, and the remaining pictures will be photographs of actual cats. After a short delay, when participants indicate their feelings about cats, they will do a recognition test. Half of the pictures will be from the first part of the study, and the other half will be new. It is expected that the synthetic pictures will be remembered better than the real pictures. There may be a higher false alarm rate for synthetic pictures than real pictures because they are prototypes. GAN images are becoming more popular, along with 'fake' information. In addition to whether or not to believe synthetic information, studies are needed

to explore if synthetic images are more memorable and thus more able to persuade individuals.

P1 -Himanshu Bhushan, Winona State University
Automatic Polyp Detection in Colonoscopy using Deep Learning
Faculty Mentor: Ming Ma
Polyp detection in gastroscopy has attracted much researchers' attention over the past few decades. Early detection and removal of polyps plays a crucial role in gastric cancer prevention. However, it is a challenging task for physicians to detect various types of polyps. To facilitate this process, we propose to use a deep learning-based method for automatic polyp detection. The proposed method employs the YOLO model that is based on the convolutional neural network (CNN). The model is trained and tested in a dataset of 10,802 images obtained during gastroscopy. Out of these 10,802 images, 8417 images were used for training, 1026 were used for validation and 1359 were used for testing. Experimental results show that the proposed method achieved 89.9 % image precision on the testing dataset. With the Intersection Over Union (IoU) being 0.5, the mean area precision (mAP) was 81.2 %. The trained model can detect the polyps on 10 testing images in 0.135 seconds. The trained model detected 1146 frames with polyps in real time from a YouTube stream. This demonstrates that the proposed method can efficiently detect the gastric polyp in real time and has the potential to be applicable in clinical practice.

P2 -Bethany Lieser, Anoka-Ramsey Community College
The Conservation of the GlyP Gene Across Highly Divergent Species of Drosophila
Faculty Mentor: Paula Croonquist
The Insulin/Tor signaling pathway is responsible for the uptake of glucose into cells and its metabolism. It has also been linked to cell growth, fat and protein metabolism, and longevity. Its dysregulation in humans plays a major role in type II Diabetes, cardiovascular disease, and cancer. GlyP, a member of the Insulin signaling pathway, encodes for the glycogen phosphorylase enzyme which is responsible for glycogen breakdown in the cell by releasing glucose into the bloodstream. Previous evidence has indicated that a gene's selective constraint is influenced by its protein connectivity and position in the pathway, among other factors, so that genes with less molecular interactions and a closer location to the membrane evolve faster than those with more protein-protein interactions and located closer to the nucleus. We hypothesized that GlyP would exhibit high selective constraint in D. busckii, D. hydei, D. kikkawai, and D. suzukii when compared to D. melanogaster, the reference species, due to its high connectivity and downstream position in the insulin pathway. The GlyP gene was annotated in each species utilizing the Genomics Education Partnership (GEP) tool pipeline, namely, the UCSC Genome Browser, tBlastn, Blastp, the Gene Record Finder, and

verified in the Gene Model Checker. Genes models were proposed based on synteny, RNAseq data and other lines of evidence. The protein alignment of GlyP in all species was examined. All species were within 97% similar to the reference species despite D. busckii being the furthest diverged species from D. melanogaster. This supports our hypothesis that highly connected genes, also known as hubs, are under high selective constraint even in species vastly separated by evolutionary time. The gene's downstream position may also provide evidence that GlyP is highly conserved and a cornerstone enzyme in the insulin pathway.

P3 - Jessica Strand – Anoka-Ramsey Community College
Analysis of eIF4E1 Conservation and Synteny across Drosophila Species to Understand the Evolution of the Insulin Pathway
Faculty Mentor: Paula Croonquist
The Insulin/Tor signaling pathway regulates important physiological functions such glucose and lipid metabolism, cell growth and survival. It is highly conserved from fruit flies to mammals. This pathway is also critical for homeostasis and its dysregulation results in prevalent human diseases such as in type II Diabetes, cardiovascular disease and even cancer. The eukaryotic translation initiation factor 4E1 (eIF4E1) encodes for a member of the eIF4F cap-binding complex that is required for cap-dependent translation of mRNA. The purpose of this study was to determine the conservation of the eIF4E1 gene in multiple species of Drosophila relative to D. melanogaster. It was hypothesized that the species highly divergent from the reference species would exhibit less eIF4E1 conservation than those closely related to the reference species. It was predicted that this gene would be most conserved in D. serrata *and least conserved in* D. arizonae. *Gene models were proposed utilizing the UCSC Genome Browser, BLAST, Flybase gene record finder and verified by Gene Model Checker. The synteny analysis and protein alignments observed suggest that eIF4E1 in* D. takahashii *is the most conserved* and D. arizonae *is the most divergent. However, all five species had a high eIF4E1 protein identity ranging 81-94%. Previous evidence has demonstrated that position in the insulin signaling pathway may affect selective constraint, with downstream genes evolving at a slower rate than genes closer to the membrane. This may explain the high level of conservation for the eIF4E1 gene. Further studies should aim to investigate the impact of position, connectivity and/or other factors shown to influence this pathway's selective constraint.*

P4 - Courtney Snyder, Southwest Minnesota State University
Mapping and Quantifying Bird Window Strikes at the SMSU Campus
Faculty Mentor: Elliot Vaughan
Since 1970, bird populations have declined by 29 percent, which is equivalent to about three billion birds. Approximately one billion birds die each year in the United States alone from striking windows on buildings. The purpose of this study was to map and quantify bird window strikes on the Southwest Minnesota State University (SMSU) campus and evaluate whether window strikes occur more

frequently in academic buildings linked by glass hallways. Over the seven weeks of this study in fall 2021, 141 bird strikes comprising at least 32 species were observed, of which 134 died. The data show clear spatial and temporal patterns of bird strikes on the SMSU campus. Bird strikes were greatest during fall migration and around the glass links. Based on these data, making bird-safe retrofits to a small number of windows on campus could significantly reduce window strikes.

P5 - Hunter Harnett and Asma Yusuf, St. Cloud State University
Does Coca-Cola consumption potentiate diabetes development in NOD female mice?
Faculty Mentor: Marina Cetkovic-Cvrlje
It is known that the Westernized diet in the United States contains excess sugar, and paired with minimal exercise, can lead to health impairments like type 2 diabetes. Whereas a correlation with minimal exercise and increased sugar intake has been found with type 2 diabetes, yet this influence is unknown for type 1 diabetes. Type 1 diabetes, which has a prominent autoimmune background, may be affected by excessive consumption of soft drinks. Thus, a model of a spontaneous type 1 diabetic, non-obese-diabetic (NOD) mouse, will be used to test the effects of Coca-Cola on the development of the disease. We hypothesize that Coca-Cola will exacerbate type 1 diabetes onset and glycemia levels in female NOD mice. Young pre-diabetic 5–7-week- old female NOD mice will be randomly put into the groups that will either drink Coca-Cola (n=15), sugar-water (n=15), or autoclaved water (n=31). The mice will be taken off Coca-Cola or sugar-water after six weeks of treatment and will continue to drink autoclaved water until 24 weeks of age, when about 60-80% of the control mice should become diabetic, based on our animal colony's historical data. The glucose levels and body weights will be recorded weekly. At either 24 weeks of age or when hyperglycemia is present for two consecutive measurements, the mice will be sacrificed. Data will be analyzed for a statistical difference in diabetes incidence, glycemic levels, and body weight gains between the treatment groups.

P6 - Sierra Bermudez and Ujala Chawla, St. Cloud State University
Study of Immune Cells in Streptozotocin-Induced Diabetic C57CL/6 Mice Consuming Coca-Cola
Faculty Mentor: Marina Cetkovic-Cvrlje
Type 1 diabetes (T1D) is a chronic autoimmune disease in which specific lymphocytes (T-cells) destroy insulin-producing pancreatic β-cells. T-helper (Th) and cytotoxic T-cells (Tc) are two main subclasses of T-cells. Th cells release cytokines which trigger activation of Tc cells to begin destruction of β-cells, whereas regulatory T-cells (Treg) suppress this process. B-cell destruction can lead to insulin deficiency resulting in the inability of cells to uptake glucose and hyperglycemia. T1D can be chemically induced in C57BL/6 male mice by administering streptozotocin (STZ), a selective pancreatic β-cell toxin that causes minor damage to β-cells in low-doses and attract T-cells to destroy them. Sugary drinks are the largest source of calories

and added sugar in the U.S diet. Individuals consuming 1-2 cans of sugary drink daily have a 28% greater risk of developing type 2 diabetes (T2D) than those who do not. Although there is strong evidence relating sugary drinks to the development of T2D, data is lacking regarding their effects on T1D, which is our purpose for the experiment. Four-week-old mice will be randomly separated into treatment (Coca-Cola) and control groups (sugar water and water). After 6 weeks of treatment, mice will be injected with a 40mg/kg of STZ for five consecutive days. After five weeks, euthanasia and splenectomy will be performed to prepare single-cell suspension followed by cell staining with particular monoclonal antibodies. We hypothesize that administration of Coca-Cola will potentiate T1D development in experimental C57BL/6 mice by acting on T-cells, increasing levels of Th and Tc cells, while decreasing Treg cells. This hypothesis will be tested by extracting lymphocytes from splenic cells of treatment and control C57BL/6 mice and analyzing cell types and their frequency using flow cytometry.

P7 - Andrew Nardi, Wengelawit Molla and Ridwan Yussuf, St. Cloud State University
The effects of Coca-Cola on diabetes incidence and glycemia levels in C57BL/6J mouse model
Faculty Mentor: Marina Cetkovic-Cvrlje
In autoimmune type 1 diabetes (T1D) pancreatic beta cells are compromised due to an attack by cells of the immune system. The beta cells fail to produce insulin, a hormone molecule that serves to reduce blood glucose levels, resulting in hyperglycemia in affected individuals. Soda, and sugar are known to be unhealthy, especially when consumed in excess. The purpose of this study is to determine whether Coca-Cola or an analogue mixture of sugar water, can potentiate incidence of T1D along with increasing glycemia following T1D onset in C57BL/6J (B6) mice. B6 mice serve as an excellent experimental model for studying T1D, since a toxin that targets beta cells, streptozotocin, induces autoimmune T1D in them. Our study will be performed by administering Coca-Cola (n=10) or 10.6% sugar water (n=10) to a group of 6- to 8-wk-old B6 males, and water to the control group (n=20) six weeks before administering STZ. After STZ administration body weight and blood glucose measurements will be taken bi-weekly for the next seven weeks of observation. Blood glucose levels will be measured via lateral vein puncture in the tail and analyzed with a glucometer. The results of this study will show whether Coca-Cola and sugar water potentiate diabetes or increase glycemia to a significant degree.

P8 - Mitchell Fournier and Lacey Hallstrom, St. Cloud State University
Effects of Coca-Cola consumption in healthy mice
Faculty Mentor: Marina Cetkovic-Cvrlje
The everyday consumption of Coca-Cola and other sugary drinks is very frequent in the United States. This can influence weight gain and increase blood sugar levels in both children and adults who drink Coke. Excessive drinking of sugary drinks is believed to lead to disorders such

as type 2 diabetes. Some studies reveal that drinking sugary drinks such as Coke have a similar effect on the body as using other hard drugs. This addictive reaction can lead to increased drinking and lead to users consuming more sugar. We hypothesize that drinking Coke and other sugary drinks will raise blood sugar levels and the accumulation of body weight in mice. In order to test this hypothesis, we will investigate Coke's effects in C57BL/6J male mice and NOD female mice by giving them Coke to drink in place of water. These mice were also compared to mice drinking only sugar water and plain water. During a 6-week period, body weight will be measured 3 times a week and blood glucose levels measured at the beginning of the experiment and at the end. We anticipate that mice of both strains who drink Coca-Cola will show a gain in body weights and an increase of glycemia at the end of the study. The data has shown the link between gains in bodyweight and glycemia levels and Coke is not as strong as expected. Since Coke's relationship with weight gain and raising blood sugar levels is seen strongly in humans, it is expected to be similar in mice. Although results are mixed, more studies need to be done in order to get more concrete results to establish a link between the two.

P9 - Alli Beste and Enock Ombengi, St. Cloud State University
T-Cell Function and Composition in NOD Mice Exposed to Coca-Cola
Faculty Mentor: Marina Cetkovic-Cvrlje

Type I diabetes is an autoimmune disease with the body's T-cells destroying the insulin-producing pancreatic β-cells. Helper T-cells (Th) activate and recruit cytotoxic T-cells (Tc) to destroy pathogens in the body as a normal immune response. In type I diabetes, pancreatic β-cells are destroyed by activated T-cells and cannot produce enough insulin to restore blood glucose concentrations to physiological levels. Research has shown that increased sugar consumption via soft drinks increases type II diabetes incidence due to increased glycemia. This has not been confirmed with studies for type I diabetes. We hypothesize that Coca-Cola consumption over eight weeks would aggravate the β-cells' destruction in a mouse model of spontaneous type I diabetes, non-obese diabetic (NOD) mice. We anticipate an associated increase in function and levels of pathogenic T-cells in treated mice. To investigate this, five-week-old mice will be divided into treatment groups (drinking either Coca-Cola or sugar water with the same concentration of sugar) or a control group (drinking autoclaved water) for five to seven weeks. At twenty-four weeks of age, the mice will be euthanized, and single-cell suspensions will be made from the harvested spleens for analysis of T-cell function (by spectrophotometrically analyzing proliferation of cultured T-cells induced by a reagent) and splenic T-cell composition (by flow cytometry). Flow cytometry provides the quantification of different T-cell types. If Coca-Cola would potentiate type I diabetes development, we expect to find increased proliferation of T cells and an increased number of pathogenic Tc cells in the spleens of treated mice.

P 10 - Megan Reis, Jenna Dale and Skylar Fedoravicius, Winona State University

Emotional Experiences Among College Students Returning to Campus Amid the COVID-19 Pandemic.

Faculty Mentor: Amanda Brouwer

Introduction: Since the beginning of the COVID-19 pandemic, there have been over two million confirmed cases. Of those cases, the majority (57.4%) occurred among young adults aged 18–24 years old (CDC, 2021). Although existing research demonstrates that following recommended health behaviors (e.g., vaccinations, hand washing, social distancing) reduces the risk of contracting COVID-19, less research has explored the emotional experiences of young adults returning to campus during the COVID-19 pandemic. The experiences of young adults during this time frame are important to study as they are going through natural shifts in their lives. Changes due to COVID in their routines, education, employment have had significant effects on the emotional well-being of young adults. The long-term effects of these changes are unknown, but opinions and experiences of COVID-19 in the eyes of young adults can help us understand their willingness to engage in preventative health behaviors. Therefore, the purpose of the current study was to qualitatively explore the emotional experiences of college students as they returned back to campus in the Fall of 2020. Methods: Participants were college students (N=24) who participated in focus groups held in July and August 2020. Questions about COVID-19 experiences and returning to campus during a pandemic were discussed. Data were qualitatively analyzed for themes. Results: Participants expressed a variety of emotional experiences ranging from concern about themselves and others, to anxiety and uncertainty about COVID-related changes. A commonly expressed emotion was one of loss; loss of academic, social, and community experiences. Participants also expressed loss of control over their environments and fear regarding others' behaviors. Stress and the challenge of coping with COVID-related demands was also frequently described. Despite many negative emotions, participants also expressed some degree of understanding and acceptance about needed changes and that they felt safe returning to campus. Discussion: Overall, results demonstrate that emotional experiences varied, and at times, was subjective. Loss was an underlying, common experience, especially for college students who have many diverse opportunities. Loss seemed to play a strong role in affecting others lives and other emotional experiences. Coping skills also varied, especially under conditions where participants felt stressed by the ongoing need to manage new skills and behaviors related to COVID-19. Overall, participants concern surrounding COVID-19 was for others and not themselves. Despite the myriad of emotions, students indicated that they felt safe returning to campus.

![Minnesota Undergraduate Scholars logo]

P11 – Sean Bresnahan, St. Cloud State University
Online Eating Disorder Recovery Communities: Levels of engagement and perceived recovery help
Faculty Mentor: Maegan Jones

Online communities are often utilized by those in eating disorder recovery[JM1] , as they provide safe places to express feelings and gain support (Aardoom et al., 2014; Kendal et al., 2017). However, less is known about what level of involvement in a community may be needed to elicit such positive perceptions; this question is of particular importance given the proliferation of unmoderated communities on social media sites. The present research aimed to investigate what types of activities, and what level of participation in those activities, were associated with users' belief that the community aided in their eating disorder recovery.A voluntary response sample of participants (N=29) was gathered; participants ranged in age from 13-X (M = x) and XX% identified as female. The survey was posted on Tumblr using relevant tags (e.g., #recovery, #Edtreatment). For this study, we focused on two items. The first asked how much the Tumblr eating disorder community helped; responses included "No, A Little, Sometimes, Often, and Most of the Time." The second measured how engaged the participants were in the community; specifically, frequency of reblogging, creating posts, commenting, and messaging other members was measured, with the options "never, occasionally, and frequently." Chi square analyses were used to examine differences in perceived recovery help, depending on activity engagement. Response options were condensed for the purposes of these analyses (e.g., No/A little/Sometimes and Often/Most of the time).Analyses indicated no significant differences in perception of recovery help based on activity frequency, with one exception. While the majority of activity engagement types were coded as 1 = No, 2 = Yes (Occasionally/Frequently), no participants indicated that they never reblogged posts. As such, response options were coded as 1 = occasionally and 2 = frequently. This result was trending towards significance, X2 (X, N= X) = X, p=.063.The present study investigated how differing levels of participation in an online eating disorder recovery community affected participants' perceptions of recovery help. Though varying levels of engagement in more "active" types of community participation (e.g., creating content, messaging) did not seem to affect perceived help, frequency of reblogging posts did, such that more frequent reblogging was related to greater perceived recovery help. This suggests that even more "passive" involvement in a recovery eating disorder forum may be helpful.

P12 - Haneum Claude Lee, St. Cloud State University
Effect of Teleworking on Retirement Age
Faculty Mentor: Monica Garcia-Perez

More older adults are retiring in the U.S. since the COVID-19 pandemic has begun. This is an unusual pattern for the labor market after a negative economic shock, as the previous

recessions decreased the percentage of retirees among older adults. Answering what caused COVID-19 to have an opposite effect on retirement requires studying the unprecedented changes that emerged from the event. One of the fundamental changes that the labor market has experienced since the pandemic is the sharp rise in the availability of teleworking options for many jobs, which may have discouraged older workers from working, resulting in early retirement. Given these puzzling results from the current crisis, the presentation analyzes the potential effect of teleworking in retirement age, especially in early retirement. The research uses a logistic regression on the recently-retired status *of workers based on their age and their previous occupation's teleworking share, using **Current Population Survey***'s Work Schedules Supplement and Annual Social Economic Supplement samples from 2001 and 2004 (IPUMS-CPS). Comparing the level of retirement age by occupations with the availability of teleworking options for workers reveals how teleworking relates to the retirement decision. Understanding this effect provides economic evidence of a telework mechanism in retirement that can revert the previously procyclical relationship between recession and retirement age.*