GVSU SUMMER SCHOLARS SHOWCASE

September 8, 2022

Grand River Room
Kirkhof Center
Allendale, MI
4:00 p.m. - 6:30 p.m.

Grand Valley State University
Office of Undergraduate Research and Scholarship

Order of Events

Welcome and Remarks 4:00 P.M.

Susan Mendoza, Ph.D.
Director, Center for Undergraduate Scholar Engagement
Program Director, OURS Student Scholars Programs

Jennifer Drake, Ph.D.
Dean, College of Liberal Arts & Sciences

Oral Presentations by: 4:15 P.M.

Phuc Dang • Rebecca Hanson • Adrian Llanes • Ian McGuckin • Thomas Stutz • Christina Vann • Jessie Webb

Introduction of Posters 5:25 P.M.

Robert Smart, Ph.D.
Vice Provost for Research Administration
Executive Director, Center for Sholarly and Creative Excellence

Poster Presentations by: 5:30 P.M.

Rachelle Baumann • Jared Bengston • Elizabeth Borton • Jefferson Cano • Noelle Charbonneau • Mary Fergus • Natalie Grantham • Lauren Harmon • Jaysen Holly • Simon Kailing • Brianna Kleikamp • Owen Laverty • Sofia Mansoor • Molly McCarthy • Emily Murray • Leah Pierce • Lindsey Schmidt • Evan Sidebotham • Megan Smith • Isabelle Villanueva • Zane Walters • Samuel Webb • Madison Wheeler

Welcome to the 2022 GVSU Summer Scholars Showcase!

On behalf of the Office of Undergraduate Research and Scholarship and the Undergraduate Research Council, I welcome each of you to the 2022 GVSU Summer Scholars Showcase. Today, we celebrate the scholarship, research, and creative work of undergraduate scholars in Library Scholars, Student Summer Scholars (S3), Modified Student Summer Scholars (MS3), REU Program in Mathematics, and McNair Scholars.

Each scholar began the summer with a research question, a methodological roadmap, and the guidance of a faculty mentor. These tools provide scholars with a solid foundation to engage in mentored inquiry. In doing research and scholarship, they begin to direct their own educational paths and familiarize themselves with the requirements and structure of professional research. Successful projects require tenacity, courage, and patience. These attitudes, in concert with a foundation of academic and critical thinking skills, help scholars further their knowledge in a specific area while learning to incorporate academics with professional work.

The research and creative work you will see today is not complete. Rather, the presentations represent scholarship in process. We hope that you take a moment to connect with our scholars, listen to their presentations, and inquire about their work and future plans.

Dr. Susan Mendoza, Founding Director
Center for Undergraduate Scholar Engagement

Library Scholars

Noelle Charbonneau
Simon Kailing

Student Summer Scholars

Rachelle Baumann, MS3
Jared Bengston (Ott-Stiner Scholar)
Elizabeth Borton, MS3
Jefferson Cano, MS3
Mary Fergus (Ott-Stiner Scholar)
Natalie Grantham
Rebecca Hanson
Lauren Harmon
Jaysen Holly
Brianna Kleikamp
Owen Laverty
Sofia Mansoor, MS3
Molly McCarthy (Keoze Fellow)
Ian McGuckin (Stiner Scholar)
Emily Murray, MS3

Lindsey Schmidt, MS3 (Schroeder Fellow)
Evan Sidebotham (Schroeder Fellow)
Megan Smith
Thomas Stutz
Christina Vann, MS3
Isabelle Villanueva (Stiner Scholar)
Zane Walters, MS3
Madison Wheeler

REU Program in Mathematics

Samuel Webb

McNair Scholars

Phuc Dang
Adrian Llanes
Leah Pierce
Jessie Webb

2022 Library Scholars

Noelle Charbonneau

Faculty Mentor: Leigh Rupinski, University Libraries

Marginalized in Academia: A Guide to Disability Studies

Although many academic institutions in recent years have begun researching disability outside of a clinical context, few have dedicated programs of study or resources available to scholars. Considering this gap and the University Libraries' commitment to inclusion and diversity, I set out to create a library resource guide to introduce GVSU students to disability studies research. In doing so, I discovered several challenges that could hinder students' research, including limited resource availability and antiquated search terms. After identifying these issues, I sought to expand the guide's purpose to also include research tips and explanations about gaps in resources to help students who get stuck while researching. Through this project, I was able to reflect on my abilities as a researcher to address an underrepresented subject in our University Libraries catalog.

Simon Kailing

Faculty Mentor: Amber Dierking, University Library

Research Guide for Rosseau, Burke, and Revolution in France 1791

This project aims to provide students playing the Reacting to the Past game Rosseau, Burke, and Revolution in France 1791 with research guides tailored to their characters and to the factions to which those characters belong. There is one main Research Guide and forty individual Role Sheets. The main Research Guide includes: An introduction to the document's purpose and to the game itself, a section titled "Disclaimers" designed to outline the limits of the document, a section titled "Databases" which provides information on the use of the library's various databases, a section titled "Research Tips" that contain the author's best research-related advice, a list of the game's five factions and a brief description of each along with a few recommended readings for each, and a Works Cited page for the documents listed in the Suggested Reading sections for the factions.

2022 Student Summer Scholars

Rachelle Baumann, MS3

Faculty Mentor: Brad Wallar, Chemistry

Characterization of new inhibitors of ADC-30: combatting a clinically relevant variant involved in antibiotic resistance

β-lactam antibiotics are becoming increasingly less effective due to bacteria expressing β-lactamase enzymes. Multiple β-lactamases exist in the pathogenic bacterium, *Acinetobacter baumannii*, that bind and inactivate β-lactam antibiotics. The specific β-lactamase, *Acinetobacter*-derived cephalosporinase (ADC), plays a significant role in resistance to a wide range of antibiotics. While an initial ADC enzyme has been characterized, recent small mutations have resulted in ADC variants; some of which have provided for increased antibiotic resistance. In this study, we have begun kinetic characterization of the most common variant, ADC-30, with a panel of different antibiotics. While ADC-30 is efficient at binding and inactivating numerous cephalosporins, we plan to determine the structure of the enzyme with antibiotics bound in the active site. Developing a structure/function relationship of ADC-30 can allow for a more comprehensive understanding of bacterial resistance to antibiotics.

Jared Bengston (Ott-Stiner Scholar)

Faculty Mentor: Brad Wallar, Chemistry

Structural and functional characterization of ADC-73 and ADC-218 β-lactamase: new clinical variants involved in antibiotic resistance

Resistance to β-lactam antibiotics is becoming a serious health

issue, primarily due to expression of β-lactamases; enzymes that can inactivate β-lactam antibiotics. *Acinetobacter baumannii* has many mechanisms of resistance to a wide range of antibiotics, primarily derived from the β-lactamase, *Acinetobacter*-derived cephalosporinase (ADC). Unfortunately, small mutations rapidly occur within β-lactamases, which causes new clinical variants to form; many with increased resistance. This research characterizes the functional and structural properties of two new variants: ADC-73 and ADC-218. Kinetic analysis confirms that ADC-218 has the ability to inactivate larger cephalosporins. In order to understand how this occurs, we have begun X-ray crystallographic studies to determine structural differences between variants. Advancing our understanding of the structure/function relationships of these ADC variants may contribute to a better method of defeating these antibiotic resistant bacteria.

Elizabeth Borton, MS3

Faculty Mentor: Kristin Renkema, Biomedical Sciences

Utilizing Pro-Inflammatory Cytokines from T Cells in Mouse Model to Understand Hygiene Hypothesis

Our research dives deep into the Hygiene Hypothesis, which is the hypothesis of how increasingly sterile and antimicrobial we are as a society is now impacting the quality of the immune response to any antigens or pathogens. We looked at the relationship between the Hygiene Hypothesis and the onset of cancer, B16 melanoma, using clean vs. dirty mice. The research used an ELISA kit to detect any amount of IFN-gamma, a pro-inflammatory cytokine that is produced by T cells in the immune system, in both types of mice. Mice were challenged with B16 melanoma to determine IFN-gamma production. Utilizing light spectroscopy, two wavelengths were used to evaluate if there were any amounts of IFN-gamma in various tissue sample types. Spleen and tumor cells were tested. In conclusion, more samples will need to be tested as our sample sizes for both types of mice

were relatively low. The results are showing that being dirtier from birth is more beneficial to combat the onset of cancer.

Jefferson Cano, MS3

Faculty Mentor: Ruijie Liu, Biomedical Sciences

Studying the Effect of Fuel Overabundance on Biochemical Changes of Cardiac Muscle Cells

A chronic overabundance of fuel such as sugars, amino acids, and fatty acids in a person with a sedentary lifestyle or diabetes can lead to toxic effects causing cell death in the heart. Although the exact pathology of diabetes-induced heart failure is unknown, the mitogen-activated protein kinases (MAPKs) have been implicated in this process. The study aims to study whether ERK1/2 activity is influenced in rat cardiac H9c2 cells treated with either high glucose or high fatty acid conditions. We found that high glucose (33 mM) or high palmitate acid (150 μM) stimulation of H9c2 cells for 24 and 48 hours resulted in significant ERK1/2 phosphorylation. Our data is consistent with literature on the role of ERK1/2 in the heart cells. However, the detection of cell death-related proteins BAX, BAK, BCL2 was not successful. Whether this increase in ERK1/2 phosphorylation is beneficial or detrimental to the cells is still unknown, a question to be further studied in our future research.

Mary Fergus (Ott-Stiner Scholar)

Faculty Mentor: Rachel Powers, Chemistry

Exploring cross-class inhibition of key antibiotic resistance targets in the multidrug resistant pathogen *Acinetobacter baumannii*

Acinetobacter baumannii is an emerging threat level pathogen with resistance to β-lactam antibiotics, the most clinically relevant

and effective treatment for bacterial infections. β-lactamases are the primary defense mechanism for the breakdown of β-lactam antibiotics through hydrolysis of the amide bond in the conserved β-lactam ring. *A. baumannii* possess all four classes of β-lactamases, therefore it would be advantageous to design molecules to inhibit multiple classes. Currently, there are no known cross-class inhibitors of class C and D βlactamases. Class C ADC-33 and class D OXA-146 were tested against a novel series of boronic acid transition state inhibitors (BATSIs) through kinetic assays and X-ray crystallography. One compound tested was identified to inhibit both ADC-33 (Ki 680 nM) and OXA-146 (Ki 7.14 μM). The structural basis for inhibition provides insight into differences between the two classes that may suggest ways to optimize BATSIs for improved binding affinity.

Natalie Grantham

Faculty Mentor: Brian Smith, Chemistry

Analysis of the ATP Structure Requirements for ANT-6

Due to the surfacing of antibiotic resistant bacteria, it is becoming increasingly difficult to treat common illnesses and infections with existing drugs. One prevalent form of resistance is caused by the bacterial enzyme ANT-6, which inactivates the antibiotic streptomycin by attaching AMP from ATP to the drug. Understanding the structural features of ATP that are recognized by ANT-6 would be invaluable to the development of inhibitory drugs that inactivate ANT-6 and revive the efficacy of streptomycin. Using steady-state kinetics, we characterized the ANT-6 modification reaction with various nucleotide triphosphates and structural ATP analogues. No activity was observed with pyrimidines CTP and UTP or ADP and GDP. Moreover, characterization of various ATP analogues suggests that functional groups in the purine ring and ribose are not required for substrate recognition. These results suggest that the essential portions of ATP are the triphosphate moiety and purine ring structure.

Rebecca Hanson

Faculty Mentor: Sookkyung Cho, Music, Theatre and Dance

The Integration of Performance Practice and Stylistic Understanding in the Realization of Schubert's Sonata D. 845, I. Moderato

Franz Schubert's Piano Sonata in A minor, D. 845 was written in 1825 and is considered to be one of his late works. The first movement shows Schubert's mature and unique approach to Sonata Form while reflecting his song, dance, and orchestral writing styles. To develop an artistic and informed conception of this piece, a seasoned performer must have an approach that integrates numerous areas of music scholarship, including a stylistic comprehension of the music and its composer. One complication in interpreting this movement originates from the inconsistency between its original instrumentation 'the fortepiano' and the most probable modern choice of instrumentation 'the piano' as the fortepiano has unique sound capabilities that impact the work's "affekt." This research explores a pianist's approach to D. 845, mvt. I that combines music scholarship, stylistic understanding, and conclusions from the fortepiano's impact on D. 845 to engender an informed interpretation of the movement.

Lauren Harmon

Faculty Mentor: David Geenen, Physician Assistant Studies

Intercellular Communication Via Gap Junctions Influences Cell Survival During Hypoxia

Stem cell therapy can be used following myocardial infarction. However, when bone marrow-derived mesenchymal stem cells (BM-MSCs) are injected into the ischemic area, a large percentage of these cells undergo apoptosis resulting in decreased therapeutic

benefits. We hypothesize that the loss of these BM-MSCs is regulated by intercellular channels or gap junctions (GJs) that provide apoptotic signals passed between ischemic cardiomyocytes and BM-MSCs. Our research aims to attenuate these GJs by suppressing Connexin-43 (Cx43) expression, the predominant channel-forming protein. We will accomplish this by transiently transfecting a Cx43 siRNA into BM-MSCs. Our data demonstrates that intracellular fluorescent dyes and FACS analysis can quantify cell-cell coupling between BM-MSCs in co-culture. Disrupting Cx43 expression will identify a potential therapeutic target for increasing the retention of BM-MSCs following myocardial infarction.

Jaysen Holly

Faculty Mentor: Zeni Shabani, Biomedical Sciences

The potential involvement of TAAR1 in combating opioid abuse

Opioids are often used to manage pain though they also activate rewarding brain centers which mediate addiction. One genetic risk factor for drug use known as the trace-amine associated receptor (TAAR-1) could be targeted for reducing opioid use. Activation of TAAR-1 is aversive and can curb rewarding effects of specific drugs. In this study, we explored whether TAAR1 activation with RO-5256390 drug that selectively binds to TAAR1 would block morphine rewarding effects. The rewarding effects of morphine were tested with conditioned placed preference procedure using a mouse model. In this procedure we measured drug preference, locomotor activity and thermic responses. Our results showed that RO-5256390 blocked rewarding effects of morphine only partially, and it also induced a significant drop in body temperature and suppressed locomotor activity. The results suggest that drugs that activate TAAR1 are good potential candidates for developing medications that curb opioid use.

Brianna Kleikamp

Faculty Mentors: Lisa Kenyon, Physical Therapy & John Farris, Engineering

IndieTrainer: Enabling Individuals with Cerebral Palsy to Receive Gamified Power Mobility Training in Their Own Manual Wheelchairs

Purpose: This study will provide gamified power mobility training to individuals with cerebral palsy. Method: An open-label, single arm clinical trial will be conducted with 25 participants. Gamified power mobility training will be provided twice a week for 3 weeks using the IndieTrainer. The main outcome of improving participants powered wheelchair skills will be assessed by the Assessment of Learning Power Mobility use, the Canadian Occupational Performance Measure, and the Wheelchair Skills Checklist. A qualitative interview, conducted pre- and post-intervention and the Client Satisfaction Questionnaire will be used to assess parental satisfaction. The Linguistic Inquiry and Word Count Program will be used to objectively analyze the qualitative data. Conclusion: The IndieTrainer is the first system to provide power mobility training to users in their own manual wheelchair.

Owen Laverty

Faculty Mentors: Vijay Gondhalekar, Finance & Chandresh Baid, Management

Right-to-Work Laws and Creativity

We examine the relationship between Right-to-Work (RTW) laws and creativity. There is substantial evidence indicating that RTW laws reduce unionization, increase industrial jobs, and improve profitability of firms. Therefore, it is likely that such states provide an environment appropriate for launching creative projects. Exactly the opposite view is suggested by the research on the creative class of people because they prefer liberal environments and tend to vote democratic.

Sofia Mansoor, MS3

Faculty Mentor: Brian Smith, Chemistry

Mutagenic analysis of antibiotic resistant enzyme aminoglycoside nucleotidylyltransferase-6 (ANT-6)

The use of antibiotic drugs for the treatment of infectious diseases has been jeopardized due to the rise of multidrug-resistant bacteria, a globally recognized issue. Antibiotics known as aminoglycosides function by inhibiting the essential protein synthesis process in bacteria. However, some species of bacteria contain the enzyme aminoglycoside nucleotidyltransferase-6 (ANT-6), which transfers an adenosine monophosphate (AMP) from ATP to the antibiotic. This modification changes the antibiotic's structure, obstructing function against its target in bacteria.

Molly McCarthy (Keoze Fellow)

Faculty Mentor: Georgette Sass, Biology

The First Meal of Your Life: Parental Influence on Acquisition of Gut Microbiota in Drosophila melanogaster

The first exposure to bacteria that will contribute to the human gut microbiome occurs during birth. The gut microbiome is heavily implicated in long-term fitness, so understanding how it is acquired is of great interest. In the model organism, Drosophila melanogaster, acquisition of a fruit flies gut microbiota is hypothesized to occur through larval ingestion of maternal fecal matter left behind upon egg deposition. Ingestion of fecal matter is a type of maternal-dependent vertical transmission, much like occurs in humans. The similarity between the first microbiological contact occurring in human infants and D. melanogaster larvae and its role in individual fitness will be examined. Acquisition of gut microbiome in fruit flies will be tested through exposure to fecal matter. Abundance and specificity of the microbiota acquired will be assessed via 16S gene sequencing and its contribution to individual fitness measured in relation to larval development, fecundity, and longevity.

Ian McGuckin (Stiner Scholar)

Faculty Mentor: Grace Coolidge, History

Syncretism in Spanish Latin America: Survival, Power, and Resistance

This paper explores the theory of religious syncretism and its application within early modern Latin America. It proposes a new model for understanding religious syncretism in order to eliminate the previous bias in the scholarship and misconceptions inherent in the term and seeks to discover why cultures chose specific religious elements over their counterparts in syncretic scenarios. Reviewing primary and secondary sources analyzing the religious characteristics and atmosphere of this period revealed that there was a pattern to syncretism and religious selection in Spanish Latin America. Europeans, Indigenous Peoples, and Africans in the New World selected religious elements based on three factors: survival, power, and resistance. This paper shows that religious elements in this region took on a Darwinian sense in which they became traits which individuals employed to survive and prosper.

Emily Murray, MS3

Faculty Mentor: Amanda Karsten, Psychology

Effects of Remote Vignette-Based Training on Social Initiations of Young Adults with Autism

People with Level 1 autism have few work opportunities compared to neurotypical peers due to differences in soft skills. This study evaluates a training package for conversational initiations at work. Participants are young adults with autism who have interest in new jobs or internships. Prior to the study, an employer survey was conducted to examine (a) the social validity of experimenters definition of appropriate conditions to initiate conversation and (b) whether vignettes were ecologically valid with respect to common conversational opportunities in the workplace. Participants with autism will receive vignette-based training via videoconference on when to initiate conversation

based on three contextual decision-making factors (e.g., whether the individual was expecting to interact with them at that time). Additionally, investigators will assess initiation decisions in simulated work scenarios before and after training.

Lindsey Schmidt, MS3 (Schroeder Fellow)

Faculty Mentors: Jessica VandenPlas, Chemistry & Brittland DeKorver, Chemistry

The Effect of Instructor Feedback on Student Motivation in Undergraduate Chemistry

According to social constructivism and the self-determinism theory, knowledge is constructed via social interaction and social factors have the ability to undermine and facilitate intrinsic motivation. This implies that the relationship between a teacher and a student can have a major impact on the student's learning. Though current research indicates that student motivation tends to decrease upon receiving disrespectful or vague feedback from instructors, there is little of this type of research done on undergraduate chemistry students. This project aimed to further investigate the relationship between instructor feedback and student motivation in chemistry courses by interviewing students currently enrolled in undergraduate chemistry classes. We assessed their reactions to different types of feedback that differed on levels of specificity and respectfulness. This poster will present our methods, the data we have collected, and the conclusions we were able to draw from this data.

Thomas Stutz

Faculty Mentor: Lisa Feurzeig, Music, Theatre and Dance

Musical Life in Grand Rapids at the Turn of the 20th Century: An Archival Study

This project focuses on painting a picture of the Grand Rapids

soundscape in the first decade of the 20th century. We explored musical events and organizations, including a concert series called the May Festival (1903-5 and 1909); visits by world-famous musicians; the Schubert Club and St. Cecilia Society; music in church services; and the interest in American music, women composers, and Native American traditions. We produced a database of music in 1903 and analyzed it statistically, with attention to the balance of European/American music and older/newer music. We noted the focus of the all-male Schubert Club on large public events and sociability, and that of the mostly female St. Cecilia Society on a more nuanced intellectual approach to music that it shared with many other women s musical clubs in this period. Grand Rapids was a small Midwestern city with a diverse musical life and great cultural ambitions that were only partly fulfilled.

Megan Smith

Faculty Mentor: Jessica VandenPlas, Chemistry

Investigating best practices for engaging chemistry students in online learning

This project investigated two online delivery methods to identify how to best support student learning. Students were grouped based on chemistry background and took part in one of two content lessons appropriate to their experience. These two content groups were then divided based on delivery method: asynchronous or synchronous. Participants completed a pre- and post-test around the lesson, with only content delivery method differing within groups; asynchronous students watched a video lecture, while synchronous students participated in a real-time lecture online. Both quantitative and qualitative data were collected. While student test scores improved pre-post, no statistical significance was seen in this pattern based on content delivery method. Qualitative data showed that students care more about teaching style rather than modality. This research suggests that instructors cannot be the same teacher they are in person as they are online, regardless of delivery method.

Evan Sidebotham (Schroeder Fellow)

Faculty Mentors: Derek Thomas, Biomedical Sciences & Ian Cleary, Biomedical Sciences

Exploring Altered Gene Expression of Candida albicans During Spaceflight using QPCR and Immunoprecipitation

The fungus Candida albicans is one of the most common nosocomial infections in the US, and biofilms play a large role in the microbe s ability to cause disease. Spaceflight alters gene expression in the opportunistic pathogen C. albicans in ways that may enhance biofilm formation and thus increase its pathogenicity. Based on a published transcriptional analysis from space flight, we explored strains that contain overexpression constructs for genes that have this altered expression in an attempt to learn more about their functions and their role in biofilm formation. We conducted real-time PCR on these strains, and quantified the expression of known adhesins compared to a wild-type strain to explore what was causing biofilm enhancement. We also attempted to isolate the proteins produced by these genes through immunoprecipitation and western blotting so mass spectroscopy and further analysis could be done.

Christina Vann, MS3

Faculty Mentor: Huafang Li, Health, Hospitality and Tourism Management

Using Information Technology to Improve Prosocial Outcomes: A Literature Review

This literature review delves into technology acceptance research to lay the foundation for a discussion on the use of information technology (IT) in the nonprofit sector. Referring to the literature, it is determined that nonprofit organizations are not using technology to the fullest extent to achieve their social missions. The review then outlines a variety of prosocial outcomes of IT implementation including the development of critical spatial

thinking, social capital, and increased community awareness. These prosocial outcomes suggest that nonprofits must work to advance their technological capacity. Experiential philanthropy is also discussed as a potential setting for IT training to be implemented. Finally, the research surrounding short, single-session training reveals positive learning outcomes indicating that short training may be a more affordable and accessible opportunity for nonprofits and philanthropic entities to engage in IT training and adoption.

Isabelle Villanueva (Stiner Scholar)

Faculty Mentor: Cara Singer, Communication Sciences & Disorders

Bibliotherapy in Speech-Language Pathology

This survey study examines the use of bibliotherapy (the use of books to help clients cope with challenges and emotional problems by connecting with a character in a book) in the speechlanguage pathology (SLP) field. Certified SLPs practicing in the United States were eligible to participate. Recruitment materials were disseminated through social media. The survey, which was completed electronically via Qualtrics, consisted of a series of questions developed to understand how SLPs are implementing bibliotherapy in their practice. Data was analyzed using SPSS Statistics and based on 81 participants who completed the survey in its entirety. Participants were mainly female and worked in the school setting (K-12). Results indicate that many SLPs were unaware of the term bibliotherapy, but after being given a definition, 66.7% of the participants reported using this therapy. SLPs also use bibliotherapy most often with children who have language disorders and ASD between the ages of 6-10.

Zane Walters, MS3

Faculty Mentor: Sok Kean Khoo, Cell and Molecular Biology

Effects of microRNAs on alpha-synuclein gene expression in Parkinson-like cells

Parkinson's disease (PD) is a neurodegenerative disease characterized by dopaminergic neuron deterioration and accumulation of alpha-synuclein (aSyn) protein in the midbrain. aSyn expression is regulated by the microRNAs (miRNA) miR-7 and miR-153. Our objective is to measure how these microRNAs affect aSyn expression in SH-SY5Y cell culture, a human neuroblastoma cell model. We optimized miRNA transfection by culturing SH-SY5Y cells with varying concentrations of miRNAs, then measuring miRNA expression via quantitative real-time PCR (qRT-PCR). We then transfected cells at 50pmol of miRNA and measured aSyn expression via qRT-PCR. These measurements proved with 95 percent confidence that miR-7 and miR-153 reduce aSyn expression in SH-SY5Y cell culture. One future drug-development strategy may be to reduce aSyn accumulation using miR-7 and miR-153.

Madison Wheeler

Faculty Mentor: Lawrence Burns, Psychology

The narcissism/vanity distinction: exploring advantages and disadvantages in regard to social bondedness, selflessness and self-image management

The purpose of this study was to explore vanity and narcissism as personality constructs. The main research question sought to answer whether narcissism and vanity could be distinguished as two distinct personality traits. All hypotheses were exploratory. The results found that multidimensional vanity and narcissism traits reveal differences in their associations with pride, empathy, and the theoretical social outcome variables of bondedness, selflessness,

and communal self-image management. Our findings suggest that differences between vanity and narcissism may be useful to better understand intrapersonal motivations and feelings in which the predictors may differ at their core, and how this may translate into social behaviors. Future research should be conducted to further establish vanity apart from narcissism, to better understand these traits within a broad spectrum of personality and social behavior.

2022 REU Program in Mathematics

Samuel Webb

Faculty Mentor: Lauren Keough, Mathematics

Fault-Free Tilings with L-Trominoes

A tiling of a rectangular board is a filling of the board with tiles in such a way that each space is covered by exactly one tile. In 1981, Ron Graham defined a fault-line of a tiling as a straight line (parallel to one of the sides of the board) that cuts through the board but does not cut through any tile. A fault-free tiling is a tiling without any fault-lines. In 2019, Montelius extended the notion of fault-free tilings of $p\times q$ rectangles with 2×1 dominoes to boards that were cylinders, tori, or Mobius strips. We extend this research to tilings with L-trominoes, which is an L-shaped tile of area 3, formed by connecting unit squares along edges. This research was conducted as part of the 2022 REU program at Grand Valley State University.

2022 McNair Scholars

Phuc Dang

Faculty Mentor: Mihaela Friedlmeier, Psychology

Values and Their Contribution to Financial & Subjective Well-Being

Financial literacy is important for emerging adults in their attainment of financial success (Pew Research Center, 2016) and overall well-being (Archutela et al., 2011). Financial socialization models describe how personal and environmental agents influence financial outcomes (Gudmonson & Danes, 2011). Personal values have been shown to influence these processes (Shim, 2009) and extend their influence on subjective well-being (Kasser & Ryan, 1993). Compared to the United States, social and economic instability in Romania has led to different value prioritizations (Frost & Frost, 2000) warranting cross-cultural considerations. College students from the United States (N=374) and Romania (N=175) answered questionnaires on values, financial outcomes, and life satisfaction. The present study highlights the importance of considering cultural and social aspects when investigating the connection between values, aspirations, and well-being in emerging adults attending college.

Adrian Llanes

Faculty Mentor: Jeffrey Rothstein, Sociology

The Decline of Organized Labor and its impact on Workers

Relying on the research conducted by labor scholars from 2008 to 2022, the decline of labor unions in the United States can be attributed to four main factors. The outsourcing of traditionally unionized jobs combined with a failure of labor to organize workers in growing industries. Advanced antiunion campaigns mounted against organized labor, sowing distrust, and fear of unions. The state ignored its obligation to protect workers right

to organize, allowing illegal antiunion campaigns to go unchecked. And the alleged complacency of organized labor in allowing the aforementioned factors to accumulate, abandoning worker solidarity and direct action. We can observe a plethora of disastrous consequences from de-unionization. Workers face stagnant wages, losses in benefits, and a rise of income and wealth inequality.

Leah Pierce

Faculty Mentor: Rachel Powers, Chemistry

Exploring inhibition by boronic acids in OXA-24 and OXA-146: an analysis of a single amino acid duplication within the omega loop

β-lactam antibiotics are a staple in the fight against bacterial infections due to their broad efficacy. Unfortunately, resistance has developed, predominantly mediated by β-lactamases. The multidrug resistant pathogen *Acinetobacter baumannii* contains carbapenem hydrolyzing class D β-lactamases (OXAs). OXA-24 and OXA-146 differ by an Alanine duplication in the Ω loop and this change has been implicated in expanding resistance to a widerrange of β-lactams. β-lactamase-mediated resistance can be overcome by inhibition. Boronic acids are a class of β-lactamase inhibitors but have little effect on the class D enzymes. A series of boronic acids were tested for inhibition of OXA-24 and OXA-146 to explore the impact of the duplication on inhibitor binding. None inhibited OXA-24 well, but several inhibited OXA-146 (best Ki 4.57 μM). The advantage introduced by the Ala duplication, allows for more effective inhibition by boronic acids, providing a new way to target expanded-spectrum enzymes.

Jessie Webb

Faculty Mentor: Brian Deyo, English

The American Dream in Crisis: How Student Debt Impacts the Educational Experiences of BIPOC

Students

In a society riddled with inequities, student debt can be viewed as a crisis for which long term solutions are a necessity. For Black, Indigenous, and People of Color (BIPOC), student debt has detrimental effects on their overall college experience, including negative implications on their economic status, academic performance, emotional/mental well-being, as well as inhibiting social engagement. This research will highlight the financial disadvantages that BIPOC students undergo, which leads to an oppressive cycle of student debt and limits social mobility. With the stressors of student debt, BIPOC students lose out on engaging socially with peers, as well as having enough time to focus on their academics. From continuous anxiety to constrained decision-making in order to get the most of their education, often these students will choose less satisfying careers with better wages –all in order to maximize the "return on investment" from their intake of student debt –.

GRAND VALLEY STATE UNIVERSITY

CENTER FOR UNDERGRADUATE SCHOLAR ENGAGEMENT