

Northwestern

UNDERGRADUATE RESEARCH



**UNDERGRAD
RESEARCH
EXPO &
CREATIVE ARTS
FESTIVAL**

MAY 17 - MAY 18, 2023

Dear exposition attendees,

The 2023 Undergraduate Research and Arts Exposition is the culmination of a year of tremendous growth and accomplishment for our students. Many programs have returned to pre-COVID levels of participation, and some undergraduate research programs have even exceeded those levels.

Undergraduate research is a high-impact practice, and this event showcases how influential these experiences can be for students. When you listen to their presentations, we encourage you not only to offer comments and thoughts on their projects but also to ask them about their experience.

We recently did a retrospective survey on the first 10 years of the Office of Undergraduate Research, and alumni shared about the profound impact of their experiences. For some, it was a direct gateway to a current professional career or graduate school acceptance. For others, it was the first time they were compensated for their artistic practice, helping to validate their voice as an artist. For many, they learned crucial project management skills as they navigated the complex reality of research explorations, adapting and solving problems in new ways that gave them a better understanding of how data in all fields are interpreted and how new knowledge is obtained. For all, undergraduate research allowed them to take their classroom education to the next level, exploring in-depth topics of deep, personal interest and determining how they can make a difference in the world. We are proud of their accomplishments and their willingness to learn and challenge themselves. It is that mindset that helps to make the world a better place.

This year's expo features the work of 40 students giving oral presentations, 70 students giving poster presentations and 10 performances at the Creative Arts Festival. These presentations and performances cover the range of student experience at Northwestern, from the laboratory to the stage, and from Evanston to Chicago to Qatar. Of course, these students have not done this work alone. They have been supported by our amazing and generous faculty who recognize in their students the spark of creativity and skill. These faculty offer their time and dedication to help mentor their students forward.

I congratulate the students and faculty involved in the 2023 Undergraduate Research and Arts Exposition, and the Office of Undergraduate Research for hosting this celebratory event. I hope you enjoy their work as much as I do.

Sincerely,

Kathleen Hagerty
Provost and Professor



Join us on May 25, 2023 from 4:00 to 6:00 PM for the second annual Winner's Circle Event. We will celebrate the top Oral Presenters, Poster Presentations, and Festival Winners with University executive leadership.

Norris – Louis Room.



The 2023 Virtual Undergraduate Research and Arts Exposition

Northwestern University's
twenty-first annual celebration of
undergraduate research and creativity

**Wednesday, May 17 -
Thursday May 18, 2023**

Virtually Hosted by Symposium



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Program of Events

LINK TO ASYNCHRONOUS POSTER PRESENTATIONS AND ORAL PRESENTATIONS

symposium.foragerone.com/nuexpo23

Wednesday, May 17, 2023

12:00-1:00 PM

Oral Presentation Q&A Session One:

Examining Life's Internal Contexts

<https://northwestern.zoom.us/j/98853954029?from=addon>

4:00-5:00 PM

Oral Presentation Q&A Session Two:

Making a Difference in Our World

<https://northwestern.zoom.us/j/93226511678?from=addon>

Thursday, May 18, 2023

12:00-1:00 PM

Oral Presentation Q&A Session Three:

Understanding the External Contexts of Our World

<https://northwestern.zoom.us/j/91049468394?from=addon>

4:00-5:00 PM

Oral Presentation Q&A Session Four:

New Knowledge in Science & Engineering

<https://northwestern.zoom.us/j/95293692706?from=addon>

Office of Undergraduate Research Advisory Council

Neal Blair, Professor, McCormick School of Engineering and Applied Science

Wes Burghardt, Associate Dean, McCormick School of Engineering and Applied Science

Ricardo Court, Assistant Dean, Weinberg College of Arts & Sciences

Yoshi D'Souza, Student Representative, TEDx NU

Renee Engeln, Professor of Instruction, Weinberg College of Arts and Sciences, Chair of the Undergraduate Research Assistant Program Committee

Bella Gibb, Student Representative, TEDx NU

Jenna Greenzaid, Student Representative, Northwestern Undergraduate Research Journal

Mei-Ling Hopgood, Professor, Medill School of Journalism, Chair of the Undergraduate Research Grant Committee

Rosalie Liu, Student Representative, Humanities

Molly Losh, Professor, School of Communication

Daniel MacKenzie, Associate Director for Student Life, Medill School of Journalism

Andrea Mendoza, Program Coordinator, Global Safety and Security

Marina Micari, Associate Director, Undergraduate Programs, Searle Center for Advancing Learning and Teaching

Nyame Ishmael, Student Representative, NU-Q

Beth Pardoe, Director, Office of Fellowships

Megan Powell, Program Coordinator, School of Professional Studies

Ken Powers, Senior Advisor, School of Education and Social Policy

Onnie Rogers, Assistant Professor, Weinberg College of Arts and Sciences

Colin Runt, Advisor, Athletics

Miriam Sherin, Associate Provost for Undergraduate Education

Jorja Siemons, Student Representative, Social Science

Bianca Simon, Research Administrator, NU-Q

Andrew Talle, Associate Professor, Bienen School of Music

Lee West, Director of Undergraduate Education, Office of the Provost

Brian Whetsell, Student Representative, Associated Student Government

Kaua'i Wu, Student Representative, Natural Sciences & Engineering

Adelaide Young, Student Representative, Arts

Exposition Planning & Organization

Office of Undergraduate Research

Peter Civetta, Director

Megan Wood, Associate Director

Saralyn McKinnon-Crowley, Education Program Manager

Diamond Jones, Advisor & Student Outreach Coordinator

Tori Saxum, Administration, Finance, & Communication



Guide to Undergraduate Research Programs at Northwestern University

Below is a partial listing of current Northwestern programs supporting undergraduate research and creative projects. More are available on the Office of Undergraduate Research web site. You can also search for research opportunities from across the university through the Global Research Opportunities database. Many departments and programs have other opportunities that are not widely advertised. External agencies fund a number of programs, such as the National Science Foundation or the Fulbright IIE government grants. The Office of Fellowships can help students identify these external opportunities.

Office of Undergraduate Research Programs

Academic Year Undergraduate Research Grants:

undergradresearch.northwestern.edu/funding/ayurg/

Summer Undergraduate Research Grants:

undergradresearch.northwestern.edu/funding/surg/

Undergraduate Research Assistant Program:

undergradresearch.northwestern.edu/funding/urap/

Conference Travel Grants:

undergradresearch.northwestern.edu/funding/ctg/

Undergraduate Language Grants:

undergradresearch.northwestern.edu/funding/language-grants-ulg/

Circumnavigators Travel-Study Grant:

undergradresearch.northwestern.edu/funding/circumnavigator-grant/

Emerging Scholars Program:

undergradresearch.northwestern.edu/funding/emerging-scholars/

Other University-Wide Programs and Resources

Center for Global Engagement:

gloapp.northwestern.edu/index.cfm?FuseAction=Programs.ViewProgramAngular&id=10200

Global Research Opportunities: globalresearchopportunities.northwestern.edu/

Global Learning Office: northwestern.edu/abroad/

Institute for Policy Research: ipr.northwestern.edu/who-we-are/students-postdocs/summer-undergraduate-research-assistant-program/

Northwestern Scholars: scholars.northwestern.edu

Weinberg College of Arts and Sciences

African Studies: africanstudies.northwestern.edu/research/funding/index.html

Anthropology: anthropology.northwestern.edu/research/index.html

Guide to Undergraduate Research Programs at Northwestern University, continued

Astrophysics: ciera.northwestern.edu/Education/REU

Biological Sciences: biosci.northwestern.edu/research/

Chemistry: chemistry.northwestern.edu/undergraduate/programs/index.html

Chicago Field Studies Program: internships.northwestern.edu/

Economics: <https://economics.northwestern.edu/undergraduate/econ-lab/index.html>

History: Leopold Fellows of the Center for Historical Studies:

historicalstudies.northwestern.edu/fellowships/leopold-fellows/

Mathematics: math.northwestern.edu/undergraduate/research-opportunities/index.html

Neurobiology:

neurobiology.northwestern.edu/undergraduate/Research%20Opportunities/index.html

Physics and Astronomy: physics.northwestern.edu/undergraduate/research.html

Political Science: polisci.northwestern.edu/undergraduate/research-opportunities

Psychology: psychology.northwestern.edu/undergraduate/research

WCAS Baker Program in Undergraduate Research: baker.northwestern.edu

School of Communications

EPICS: External Programs, Internships, & Career Services: epics.soc.northwestern.edu

School for Education and Social Policy

Research in SESP: sesp.northwestern.edu/ugrad/opportunities/research.html

McCormick School of Engineering and Applied Science

Biomedical Engineering: mccormick.northwestern.edu/biomedical/undergraduate/research-opportunities/index.html

Chemical & Biological Engineering:

mccormick.northwestern.edu/chemical-biological/academics/undergraduate/research-opportunities.html

Electrical Engineering: mccormick.northwestern.edu/electrical-computer/research/undergraduate-research.html

Computer Science: mccormick.northwestern.edu/computer-science/research/groups-labs.html

International Institute For Nanotechnology:

iinano.org/northwestern-university-nanotechnology-reu

Materials Research Science and Engineering Center: mrsec.northwestern.edu/undergraduate-opportunities

McCormick Opportunities: mccormick.northwestern.edu/students/undergraduate/research-opportunities/

Next Steps for your Research

The most important step in research, and often the most over-looked for undergraduate researchers, is sharing research findings. This final step allows for the vital process of peer review and contributes to the ongoing development of our knowledge about the world. Moreover, research is a cumulative process that grows from one project to another. It is also important to think about how your research can be transformed into new and related projects. Below are some examples of programs that have been developed at both Northwestern and nationally to help undergraduate researchers participate in and learn from the final step in the research process.

Present Your Research

Northwestern's Annual Undergraduate Research and Arts Exposition:

undergradresearch.northwestern.edu/expo

Chicago Area Undergraduate Research Symposium: caurs.com

Academic Conferences:

Consult with your advisor for major conferences in your field and apply for funding through the Conference Travel Grant program: undergradresearch.northwestern.edu/ctg

Council on Undergraduate Research: cur.org/engage/undergraduate/presentation/

Publish Your Research

Northwestern Undergraduate Research Journal: thenurj.com

Council on Undergraduate Research: cur.org/engage/undergraduate/journals/

Directory of Undergraduate Research Journals (UNC Office for Undergraduate Research):
our.unc.edu/share/publish/

Transform Your Research

Apply for National & International Research Grants: northwestern.edu/fellowships

Apply for Graduate School. Consult with your advisor for the best programs in your field and apply for funding through the Office of Fellowships:
<https://www.northwestern.edu/fellowships/find-fellowships/fellowship-finder/>

EXPO KEYNOTE ADDRESS

THURSDAY, MAY 25TH – 4PM

NORRIS LOUIS ROOM



Patty Loew, Ph.D.

Patty Loew, Ph.D., is a professor in the Medill School of Journalism and former director of the Center for Native American and Indigenous Research at Northwestern University. A citizen of Mashkiiziibii-- the Bad River Band of Lake Superior Ojibwe, Dr. Loew is the author of four books, including *Indian Nations of Wisconsin: Histories of Endurance and Renewal*, now in its second edition; *Native People of Wisconsin*, which is used by 20,000 Wisconsin school children as a social studies text; and *Teachers Guide to Native People of Wisconsin*. Her book, *Seventh Generation Earth Ethics*, won the 2014 Midwest Book Award for Culture. Loew has produced many documentaries for public and commercial television, including the award-winning *Way of the Warrior*, which aired nationally on PBS in 2007 and 2011. For 20 years, she hosted news and public affairs programs, including *WeekEnd* and *In Wisconsin*, for PBS Wisconsin. Dr. Loew, a 2019 inductee of the American Academy of Arts and Sciences and recipient of Wisconsin's 2019 Martin Luther King Jr. Heritage Award, has written extensively about Ojibwe treaty rights, sovereignty, and the role of Native media in communicating Indigenous world views.

☞ Judges

Katherine Amato	Anthropology
Alina Arslanova	Chemical and Biological Engineering
Antonio Auffinger	Mathematics
Sherif Badawy	Department of Pediatrics
Neal Blair	Earth and Planetary Sciences
Brian Bouldrey	English/Creative Writing
Larissa Buchholz	Communication Studies
Santiago Canez	Mathematics
Stephen Carr	Materials Science and Engineering
Rives Collins	Theatre
Noshir Contractor	Industrial Engineering & Mgmt Science, Communication Studies, Mgmt & Organization, CS
Chris Davidson	Libraries
Sumit Dhar	Communication Sciences and Disorders
Christos Dimoulas	Computer Science
Michelle Driscoll	Physics & Astronomy
Derrick Fields	Radio, Television, and Film
Abigail Foerstner	Medill
Judy Franks	Medill IMC
Sharon Ann George	Biomedical Engineering
Branden Ghena	Computer Science
Ben Gorvine	Psychology
Andrea Graham	Department of Medical Social Sciences
Michelle Guittar	University Libraries
Tracy Hodgson	Molecular Biosciences
Daniel Horton	Earth & Planetary Sciences
William Horton	Psychology
Amy Kehoe	Office of Fellowships
Stephanie Knezz	Chemistry
Istvan Kovacs	Physics and Astronomy
Yevgenia Kozorovitskiy	Neurobiology
Jason Kruse	University Libraries
Hojoon Lee	Neurobiology
Peter Locke	Global Health Studies
Luisa Marcelino	Civil and Environmental Eng
Jeannette Moss	University Library
Alessia Para	Neurobiology
Elizabeth Lewis Pardoe	History
Christine Percheski	Sociology
Andrew Roberts	Political Science
Jason Roberts	Office of Fellowships/Department of Radio, TV, Film
David Schieber	Sociology
Lilah Shapiro	SESP
Mark Sheldon	Philosophy
Karrie Snyder	Sociology
Nicole Spigner	Black Studies
Lindsay Stolzenburg	Innovation and New Ventures
Dayne Swearer	Chemistry & Chemical and Biological Engineering
Reza Vafabakhsh	Molecular Biosciences

Erin Waxenbaum Anthropology
Kelly Wisecup English and Kaplan Institute for the Humanities
Mark Witte Economics
Ingrid Zeller German

∞ Guide to Oral Presentations

∞ Oral Presentation

Question and Answer Session One

Examining Life's Internal Contexts

Wednesday, May 18th 12:00-1:00pm (CST)

<https://northwestern.zoom.us/j/98853954029?from=addon>

Chloe Chow, “Touch Me and You'll Burn: Fire and Foresight in Statius' Achilleid”

Zidi Mu, “The Role of Motive Disposition, Sense of Calling and Parental Opinion in College Students' Career Decision-Making”

Peirong She, “Factor Analysis of Neuroticism”

Rebecca Wu, “Maternal Stress Associated With Infant Gut Microbiota in Cebu, Philippines”

Malena Otero, “Affection, Friendship Quality, and Loneliness in Friendships: A Dyadic Interaction Study”

Palak Shah, “Modeling Individual Sleep Needs from Wearable-Device Data”

Nikhil Sriram, “Psychotropic Medications in Foster Care: Documenting trends in drug use, patient characteristics and outcomes using large administrative data”

Stephanie Torello, “Effects of Early Life Factors on the Infant Gut Microbiome”

Jillian Umstead, “Unstable, Unfaithful: Perception of Bisexual People in Relationships”

∞ Oral Presentation

Question and Answer Session Two

Making a Difference in Our World

Wednesday, May 18th 4:00-5:00pm (CST)

<https://northwestern.zoom.us/j/93226511678?from=addon>

Ella Bartt, "The Modernist Portrait of Chabela Villasenor: Artistic Femininity in Post-Revolutionary Mexico"

Vivian Bui, "Understanding Intergenerational Trauma from Vietnamese Refugees through Graphic Memoirs"

Angela Davis, "Evaluating Crowdworkers' Ability to Identify Visual Triggers for Photosensitive Epilepsy in Media"

Chelsea Guzman, "Pervasive Citizenships: Cultural Citizenship, Transnationalism and Migrant Illegality in Angie Cruz's *Dominicana*"

Emily Lam, "Social Networks in South Asian Healthy Lifestyle Intervention"

Lucy London, "A Pipeline Flows Both Ways: Contradictions of an Activist Trajectory"

Chantel McCrea, "Love Letter to a Trick"

Josè Medina, "'Si No Te Gusta, Adiòs': Mexican Temporal Assimilation in the Workplace"

Irena Petryk, "Measuring Risk-Sharing in a Developing Economy: A Study of Rural and Peri-Urban Thailand"

Aru Singh, Irene Quan, Jain Rishi, Valentina Velasco, "Project MED (Medicine, Exposure, and Development): Promoting Access to Healthcare Education for Historically Underrepresented Groups Through Community Engagement, Sustainability, and Technology"

Oral Presentation

Question and Answer Session Three

Understanding the External Contexts of Our World

Thursday, May 19th 12:00-1:00pm (CST)

<https://northwestern.zoom.us/j/91049468394?from=addon>

Maayan Abouzaglo, "Outsiders in the Promised Land: Young Adult Mizrahi Identity in Israel"

Kate Bowman, "Wheying Your Options: Commercialization and Consumer Understanding of Protein Claims"

John Cao, "How Market Maker Inventory affects Options Liquidity"

Jake Geil, "The Impact of School Security on Student Wellbeing"

Claire Mason, "Examining the Utility of Refutation Replies to False Social Media Content"

Samantha Powell, "Race, Place, and Disaster: Newspaper Narration of Displaced Populations After Hurricane Katrina and the California Camp Fire"

Albert Wang, "Exploring Climate Change Discourse on Social Media with Natural Language Processing"

Isabella Wu, "The Effect of Work from Home on City Structures and Inequality"

Melinda Xu, "The Impact of Telehealth on Health Equity in Opioid Use Disorder Treatment"

Oral Presentation

Question and Answer Session Four

New Knowledge in Science and Engineering

Thursday, May 18th 4:00-5:00pm (CST)

<https://northwestern.zoom.us/j/95293692706?from=addon>

Mohammed Alzergani, "Family of Approximations for Dirichlet L-functions"

Carina Biar, "Machine learning and genome editing to resolve variants of uncertain significance in TSC2"

Sofia Bonfigli, "Probing the Relationship Between Signaling Epitopes and Cell Receptors in Dynamic Biomaterials"

Kate Carver, "Precision Medicine Discovery in African-Americans: Investigating the Effects of DNA Methylation on Gene Expression and Disease Phenotypes"

Josie Chou, "Role of DEPP1 in regulating lung microvascular endothelial cell autophagy under hypoxia"

Anika Gupta, "Converting Carbon Dioxide into a Universal Chemical Building Block using Cell-Free Biomanufacturing"

JoJo Holm, "A Protein Mimic Towards a Novel Therapeutic for Incurable Neurodegenerative Disease"

Heather Humbert, "Quantification of opsin+ neurons reveals the dynamics of head regeneration in *Hofstenia miamia*"

Stephanie Kim, "Genetic Mechanisms Underlying Temperature Preference Adaptation in *Drosophila melanogaster* from Africa and Europe"

Shae Murphy, "Standardization of Bioactive PA Injection Coordinates and Concentrations in the Mammalian Brain"

William Schirmer, "Reducing Biofilm Formation through CRISPRi Mediated Mutation of *Pseudomonas Aeruginosa* for use in novel therapeutics"

∞ Oral Presentation Abstracts

Alphabetical by presenter's last name

Maayan Abouzaglo

Faculty Advisor: Lilah Shapiro

Outsiders in the Promised Land: Young Adult Mizrahi Identity in Israel

While Israel is heralded as a democratic state in which all Jewish citizens are equal, Israeli Jewish society is marked by ethnic cleavages between Jews of European descent, Ashkenazim, and those of Middle East and North African descent, Mizrahim. Historically and today, Mizrahim are overrepresented in Israeli Jewish society's lower class, receiving lower wages and rates of educational attainment than Ashkenazim, despite comprising approximately half of the Israeli Jewish population. Early Israeli governments envisioned the formation of a common Israeli identity within three generations and ceased collecting ethnicity-related data in the 1980s after the second generation of Mizrahi presence in the country. Current Israeli discourse disagrees about whether Mizrahim, especially those in the third and fourth generations, continue to experience discrimination and structural barriers. The present study provides insight into how this population perceives their standing in Israeli society and relates to their Mizrahi identity. I conducted semi-structured interviews with 15 third- and fourth-generation, 20 to 30 year old, college-educated Mizrahim in Israel. The interviews were analyzed using a grounded theory approach; three primary themes emerged: (1) Shared processes of "Ashkenazification" to blend into the dominant Ashkenazi culture; (2) A desire to challenge stereotypes that construe Mizrahim as uneducated and aggressive; (3) Concealing their Mizrahi identity to their advantage. These emerging themes challenge the narrative that all Jews in Israel are equal and may inform policy efforts to work towards equality. The project may speak to larger issues with respect to the generational effects of immigrant experiences with acculturation and discrimination.



Mohammed Alzergani

Faculty Advisor: Maria Nastasescu

Family of Approximations for Dirichlet L -functions

Dirichlet L -functions are the type of functions that my research focuses on that are defined by adding infinitely many terms. While they hold significant importance and connections to number theory, cryptography, and other related fields, their properties are often elusive, especially within an area on the complex plane called the critical strip. To work around this, I introduce an infinite family of approximations for a Dirichlet L -function $L(s, \chi)$ arising from the first few terms of an infinite product (called the truncated Euler product). These approximations satisfy some important known properties of $L(s, \chi)$. I made computations to provide numerical evidence of the accuracy of estimating values of $L(s, \chi)$ in the critical strip using these approximations. I then provide a precise expression for the error of the approximations and show that the error has exponential decay in the largest prime considered in the truncated Euler product, thereby proving that the approximations are strong approximations. This project opens the door to utilizing the approximations to indirectly study Dirichlet L -functions and their properties. It can be especially useful in studying the behavior of Dirichlet L -functions within the critical strip, a black box area where it is difficult to study properties of Dirichlet L -functions. This

project opens the door to utilizing the approximations to indirectly study Dirichlet L -functions and their properties.



Ella Bartt

Faculty Advisor: Jorge Coronado

The Modernist Portrait of Chabela Villaseñor: Artistic Femininity in Post-Revolutionary Mexico

Isabel (Chabela) Villaseñor (1909-1953) is a key figure of post-revolutionary Mexico, as her art served as a practice of redefining national ideas of race and femininity. How she constructed her public persona through her artistic practice has been largely overlooked in studies of the modernist canon's leading artists. Following the 1910-1920 Revolution, Mexico experienced a cultural revolution surrounding the creation of a new national identity according to gender, race, and politics. Therefore, by closely examining her portrait we can begin to fill the knowledge gap surrounding the era. By examining her woodcuts, photographs, and film along with previous, albeit limited, scholarship on her life we can begin to posthumously reconstruct her artistic persona. Through close examination of the most salient aspects of her projected identity in these objects, I discovered a complicated puzzle of *mestizaje*, indigeneity, motherhood, and sexuality—amongst other themes—that inform her larger public portrait. These themes clearly inform Villaseñor's work in a unique manner, yet also inseparable from the larger cultural context of Mexican nationalism. Her representation of *mestizaje* reflects race ideology surrounding the simultaneous proposed assimilation of indigenous people and rejection of European colonial standards. Femininity, inseparable from her own race, plays into her representations of her own motherhood and sexual expression, as she challenges traditional gender roles yet also reflects somewhat normative messaging around sexuality. The portrait of Chabela Villaseñor helps fill the research gap of female Mexican modernists and leads to a more comprehensive understanding of the movement.



Kristina Bell

Faculty Advisor: Melissa S. Rosenzweig

The Great Outdoors? Discrimination Theory and Black Park Use

Leisure study scholars discuss four prominent theories for Black park disuse: marginality, ethnicity, assimilation, and discrimination. The marginality theory proposes marginalized people are lacking in resources that facilitate park use due to historical discrimination. The ethnicity theory suggests attending parks is not how Black people prefer to spend their leisure time while the assimilation theory argues that park-based activities were not originally part of Black culture, but eventually Black people will assimilate and adopt it as part of their culture. Much of the support for these theories is ahistorical and does not consider how history has affected Black people's relationships with the environment. To

address this literature gap, this presentation engages in historical anthropology and political ecology to discuss the four prominent Black park disuse theories. Through these frameworks, this project argues that discrimination theory, the idea that discrimination is the primary factor in Black park disuse, is the primary reason for Black park disuse. Furthermore, this project asserts that the other theories are products of discrimination. This presentation will consist of a literature review and two case studies about Black National and State park use. Furthermore, this project will address the questions How has *history* shaped Black people's relationship with public leisure spaces? and Why has Black park use remained low?



Carina Biar

Faculty Advisor: Gemma Carvill

Machine Learning and Genome Editing to Resolve Variants of Uncertain Significance in *TSC2*

Tuberous sclerosis (TS) is a disorder characterized by drug-resistant epilepsy and other manifestations, affecting 1 in 6,000 individuals born in the United States. TS is predominantly caused by loss-of-function variants in the gene *TSC2*, which result in constitutive mTOR signaling. Ongoing clinical trials are testing mTOR inhibitors as precision therapies for TS, but access to precise treatment requires a genetic diagnosis. Variants of uncertain significance (VUS) pose a growing problem to genetic diagnostics, as their functional effects are unclear; they cannot be classified as disease-causing or benign. More than 2,600 VUS in *TSC2* have been reported from genetic tests for TS, while only ~200 variants have been classified as disease-causing or benign. Hence, there is a critical need to develop tools to resolve the functional impacts of VUS in *TSC2*. Our long-term aims are to (1) develop a *TSC2*-specific machine learning (ML) algorithm for variant effect prediction and (2) establish a high-throughput functional assay for characterizing *TSC2* variant effects. We developed a ML model which utilizes 42 traits associated with variants in *TSC2*, including measures of variant effect on protein structure, for example. We also validated a functional assay wherein a well-characterized biomarker of mTOR pathway activity distinguishes disease-causing from benign variants. As functional characterization data comprises the most reliable method for benchmarking ML performance on VUS, this functional data will be crucial in testing and refining the performance of the ML model. This gene-specific workflow is readily adaptable for improving the rate of VUS resolution across mTOR pathway genes.



Sophia Bonfigli

Faculty Advisor: Samuel Stupp

Investigating the Binding and Motility of Sliding Peptides on Self-Assembling Nanofibers

Capturing the complex dynamic of living tissues in fully artificial biomaterials is paramount to the development of therapies for the regeneration of permanent or otherwise long-term injuries. From embryonic development to growth and healing processes, controlled delivery and trafficking of growth factors is essential to the healthy development of the human body. In my research, I designed dynamic peptide-based materials that mimic the extracellular matrix in its architecture. These peptide-based materials comprise nanotracks, nano-size fibers that form a network of paths, on which small peptide growth factors mimetic can walk to explore the chemical space and find cells to promote signaling. I characterized the materials and their dynamics by means of Fluorescence Recovery after Photobleaching (FRAP) and addressed the morphology (shape) of the nanofibers by atomic force microscopy (AFM) and cryo transmission electron microscopy (cryo-TEM). The growth factors mimetic peptides bind and move along the nanotracks in a walking fashion and do not destabilize the nanofiber's architecture. Moreover, these materials have been evaluated on human fibroblasts and promote activation of the integrin receptor they were designed to bind. These findings pave the way toward a general strategy for the development of dynamic materials in regenerative medicine, and we are currently exploring the impact of these materials on human microglia, a type of brain cell.



Kate Bowman

Faculty Advisor: Reed Stevens

Whewing Your Options: Commercialization and Consumer Understandings of High-Protein Products

In recent years, there has been an increased interest in high protein diets, and the associated high-protein claims on food packages. The increased demand for protein products signals a need for research into the use of protein claims and how consumers interpret and internalize their messaging. This study aims to understand consumer behavior and perceptions regarding high-protein claims on food products. The research used both a semiotic analysis of high-protein products and semi-structured interviews with 14 Northwestern University students. Findings demonstrate that high-protein consumption is heavily influenced by both socio-cultural and institutional factors. A semiotic analysis identified five consumer lifestyle trends — natural, weight loss, keto, fitness, and vegan — that corporations target with high-protein products. Additionally, companies target specific genders through product marketing. “High-protein” versions of products were also common, even if the high-protein version was not substantially higher in protein. And, packaging almost always emphasized high-protein content, rather than the product’s overall nutritional quality. Initial interview findings found that participants who preferred high-protein diets were more likely to buy products based solely on a protein claim. The participants’ understanding of protein was mainly based on reputation and education, and they generally trusted the accuracy of high-protein claims. The participants expressed an awareness that people consume too much protein, but did not believe that they themselves

consumed too much. Understanding the sociocultural and institutional factors contributing to the recent uptick in protein consumption is crucial for promoting healthy food choices and addressing broader issues related to food consumption and production.



Vivian Bui

Faculty Advisor: Kalyan Nadiminti

Understanding Intergenerational Trauma from Vietnamese Refugees through Graphic Memoirs

After leaving a war-torn country and surviving life-threatening migration journeys, Vietnamese refugees were greeted with racism and pressure to assimilate by White Americans. Their trauma compounded on itself, remained in their subconscious and continued to develop before it was transferred to their children, who attempted to understand their parents' loss. Trauma scholars have studied how trauma is unique for the children of victims by analyzing how trauma is transmitted across generations and speculating what happens during transmission. Asian American scholars have contributed to the discourse by considering how factors unique to the Asian American experience affect trauma. However, little research has been done to analyze how Asian American literature, specifically graphic memoirs, can contribute to the discourse on intergenerational trauma and understanding trauma transmission. Analyzing Thi Bui's *The Best We Could Do* and GB Tran's *Vietnamerica* as case studies using codified themes of repressed silence and internalized violence, this project suggests that the graphic memoir is the best medium of bearing witness and understanding war-induced trauma. Graphic memoirs offer a unique perspective on intergenerational trauma due to its ability to aestheticize trauma and visually reflect the melancholia and transformation of trauma that takes place during trauma transmission. This project contributes to how the war-induced trauma experienced by Vietnamese refugees and their children is both understood and treated by American society.



John Cao

Faculty Advisor: Robert McDonald

How Market Maker Inventory Affects Options Liquidity

Market makers ensure smooth trading on financial exchanges, like the New York Stock Exchange, by posting prices at which they are willing to buy or sell and maintaining an inventory of contracts, allowing investors to trade even when there are no opposing orders on the exchange. As financial intermediaries, they are fundamental to the speed and availability, i.e., the liquidity of trading. Thus, it is important to understand how risks to market makers impact overall market liquidity. Inventory - defined as existing contracts in market makers' portfolios - is a significant risk factor that influences market makers' behavior. Most previous finance literature analyze liquidity and inventory risk separately; studies that combine the

two in a causal relationship only focus on singular risks, such as rebalancing. I broaden this relationship to include three risk measures (gamma, vega, and skew) derived from the canonical Black-Scholes pricing model. I utilized 7 years of daily trading data from the Chicago Board of Options Exchange to construct each risk measure. To test for the hypothesized relationship, I ran linear regressions with measures of market liquidity as the dependent variable and the three measures of inventory risk as independent variables. The results robustly show that market maker inventory risk can explain up to 40% of the variation in market liquidity. The results are also robust to various controls, such as the level of market turmoil, and demonstrate that more comprehensive inventory risks can contribute to liquidity fluctuations, which can serve as instigating factors for market instability.



Kate Carver

Faculty Advisor: Minoli Perera

Precision Medicine Discovery in African-Americans: Investigating the Effects of DNA Methylation on Gene Expression and Disease Phenotypes

Precision medicine promises to improve health outcomes for all by tailoring treatments to individuals' specific genotypes. However, African-Americans are severely underrepresented in genetics research, and neglecting to include this population in precision medicine studies will further amplify racial disparities already present in healthcare. To address this problem, we performed an exploratory analysis to identify novel genetic variants and methylation sites that affect gene expression and disease phenotypes in individuals of African descent. Expression quantitative trait methylation (eQTM) analysis is a computational method that identifies methylation sites associated with changes in gene expression. Methylation quantitative trait locus (methQTL) analysis is another computational method used to identify genetic variants associated with changes in DNA methylation. eQTM and methQTL analyses were performed using genotype, methylation, and RNA sequencing data from 78 primary liver cell cultures taken from African-American patients. We found that DNA methylation at the methylation site cg23645476 is linked to decreased expression of GSTM3, a gene whose expression is linked to Hepatitis B. This association is of particular interest because African-Americans suffer from Hepatitis B disproportionately, and this finding may provide insight into a causal disease pathway specific to this racial group. The next step of this study is to use a CRISPR-Cas9 knock-in to demethylate cg23645476 and observe the relative change in expression of GSTM3 to determine if the relationship between this methylation site and expression of this gene is causal or purely correlational. This experiment will provide further insight into how DNA methylation contributes to disease phenotypes in African-Americans.



Josephine Chou

Faculty Advisors: Jingbo Dai and Yonyang Zhao

Role of DEPP1 in Regulating Lung Microvascular Endothelial Cell Autophagy Under Hypoxia

The vascular endothelium is a single layer of endothelial cells that line the interior surface of blood vessels. It regulates the circulation of substances into and out of a tissue. Endothelial dysfunction, or the loss of proper endothelial function, is a hallmark for many vascular diseases. Previous studies have found that a gene called DEPP Autophagy Regulator 1 (DEPP1) was upregulated in lung endothelial cells of pulmonary hypertension patients but the exact role of DEPP1 in the regulation of endothelial cell autophagy remains unclear. Small interfering RNA (siRNA) against DEPP1 was used to knockdown this gene in cultured human lung microvascular endothelial cells (hLMVEC) and the cells were treated with hypoxic (1% O₂) condition for 24 hours. Afterwards, the cells were collected for RNA and protein isolation and Quantitative reverse transcription PCR (RT-qPCR) were used to detect the efficiency of DEPP1 silencing. Western-blot analysis was performed to detect the expression of the cell autophagy marker P62. We found that silencing of DEPP1 markedly inhibited the gene expression under both normal and hypoxic conditions. Moreover, hypoxia treatment inhibited the P62 expression indicating the upregulation of cell autophagy. Silencing of DEPP1 reversed the hypoxia-induced P62 downregulation indicating that hypoxia induces hLMVEC autophagy in a DEPP1-dependent way. These results provide novel mechanism insights in the regulation of autophagy of lung endothelial cells under hypoxia which may provide therapeutic targets for diseases related to endothelial dysfunctions.



Chloe Chow

Faculty Advisor: Jennifer Weintritt

Touch Me and You'll Burn: Fire and Foresight in Statius' *Achilleid*

I examine how flame and fire metaphors in the 1st-century Roman author Statius' unfinished epic poem on the life of Achilles, the *Achilleid*, show young Achilles' burning intensity for love of both war and Deidamia. Though existing scholarship has examined many of the metaphors used by Statius in the *Achilleid* in detail, the repeated uses of fire references and imagery deserve more attention. Statius primarily employs two types of fire and flame metaphors: the brightness of Achilles when he engages in acts of violence and war and the warmth and lust he feels when seeing Deidamia. Drawing from Ovid's *Heroides*, a collection of elegies between Greek and Roman heroes, I then examine how these metaphors in the *Achilleid* pull together the Helen and Paris of the *Heroides* and Statius' Deidamia and Achilles as they suffer due to their male counterpart's inability to notice the destruction of metaphorical fire. Comparing textual themes, word choice, and scholarship surrounding the *Achilleid*, the *Heroides*, and female characters in epic, I argue that Statius' use of fire metaphors positions Deidamia as parallel to Helen, who both act with knowledge of the relative Homeric future of the *Iliad* beyond the events of the *Achilleid*. Deidamia acts with the knowledge of Achilles' fated tragic end while Achilles himself does not. This, in turn, demonstrates the unique capability and unique punishment

of women in the larger genre of epic: they may see the tragic conclusion to the hero's story but ultimately cannot prevent it.



Angela Davis

Faculty Advisor: Maia Jacobs

Evaluating Crowdfworkers' Ability to Identify Visual Triggers for Photosensitive Epilepsy in Media

Despite the prevalent nature of social media in modern society, many forms of online entertainment remain inaccessible for individuals with photosensitive epilepsy, a condition in which certain visual elements (e.g. a flash, a fast transition, patterns, etc.) may induce seizures and/or other adverse symptoms. Tools implementing machine algorithms to detect these visual elements (i.e. visual triggers) exist in the form of downloadable software and extensions, but they are computationally expensive and disruptive to the user experience. As a potential solution, this study aimed to determine how accurate the average person is in determining whether or not visual triggers are present in a piece of media and compare this accuracy with machine algorithms. I conducted a survey for 50 participants where 20 randomly selected GIFs would be shown. They would determine if a visual trigger had appeared or not, and if so, which visual trigger they had identified. The preliminary data indicates that while humans are worse than machines algorithms in determining visual triggers overall, their accuracy varies for each visual trigger. Further analysis of the data is necessary, but I predict that human identification accuracy for specific visual triggers will be comparable to existing online solutions, and thus be a viable alternative to the computationally expensive algorithms. These results are significant for developing tools to improve online accessibility for individuals with photosensitive epilepsy, as it provides valuable information for the strengths and weaknesses of human identification of visual triggers. ultimately cannot prevent it.



Jacob Geil

Faculty Advisor: Timothy Dobrer

The Impact of School Security on Student Wellbeing

Over the last decade, public schools have seen a dramatic rise in the use of visible school security measures, including metal detectors, security cameras, and security personnel. Although several studies have examined the impact of a school security presence on a student's academic outcomes, only a few studies have looked at how a security presence impacts school climate and student wellbeing, largely focusing on quantitative analyses. The lack of more qualitative approaches, offering in-depth descriptions of students' lived experiences, limits the scope of assessments examining school security presence. The present study seeks to fill these gaps by examining the relationship between school security and school climate, through the lens of student wellbeing. One hundred four Northwestern

first-year students completed a survey assessing their high school's climate with or without a school security presence. Afterward, 10 students were selected for follow up interviews. The semi structured interviews consisted of items related to dimensions of school climate and adolescent wellbeing, and all selected interviewees graduated from a high school with a security presence. Four themes emerged from both the survey and interview data: levels of school violence, type of security, student identity, and systems of support within the school. The emerging narratives and themes from this study could be used to better assess the role of school security and their extended consequences for school climate and student wellbeing, as well as to inform educators and administrators as they contemplate equity-based changes to their school security and school climate procedures.



Anika Gupta

Faculty Advisor: Michael C. Jewett

Converting Carbon Dioxide into a Universal Chemical Building Block using Cell-Free Biomanufacturing

Climate change, driven by high emission rates of CO₂, has become a pressing problem. It has the ability to change weather patterns and cause devastating humanitarian crises. A promising solution for reducing atmospheric CO₂ and slowing the progress of climate change is to use CO₂ as a primary ingredient for producing useful products. We are using a cell-free biomanufacturing system to build a pathway of reactions that assimilates CO₂ derived formate into the universal chemical building block, acetyl-coA, which is easily convertible into many chemicals of interest. CO₂ is efficiently converted into formate through electrochemical reduction. For the remainder of the pathway, we are utilizing enzymes, the biological tools for catalyzing reactions, to activate formate and convert it into acetylcoA. Naturally occurring enzymes do not efficiently catalyze most of the reactions in this pathway. We hypothesized that performing iterative site saturation mutagenesis (ISM) on enzymes of interest would improve their performance. In ISM, an amino acid at a chosen site within the enzyme of interest is replaced with other amino acids. Using cell-free protein synthesis, a system that is able to utilize given DNA and E. coli cell extract to produce proteins, we were able to generate libraries of mutated enzymes and then test their catalysis efficiencies using liquid chromatography and mass spectrometry (LC-MS). LC-MS results showed that ISM indeed improved the catalysis efficiencies of our enzymes of interest. Upon its completion, this pathway will provide a carbon-negative alternative for industrial chemical production and slow the progression of climate change.



Chelsea Guzman

Faculty Advisor: Myrna Garcia

Pervasive Citzenships: Cultural Citizenship, Transnationalism and Migrant Illegality in Angie Cruz's *Dominicana*

Recent scholarship dedicated to investigating exploratory forms of citizenships utilized by immigrants has provided the field with greater insight into how Latinx immigrants navigate their lives in the U.S. in relation to traditional conceptions of citizenship. This scholarship has produced forms of citizenship or theories related to citizenship such as cultural citizenship, transnationalism, and migrant illegality. Though these findings have been ultimately beneficial to the broader field of literature, this research often analyzes one form of citizenship in isolation from another, stopping short of examining how these forms of citizenship coexist within singular moments and lifetimes. This project investigates how cultural citizenship, transnationalism, and migrant illegality all engage with each other through the life of Ana Canción in Angie Cruz's book *Dominicana*. By doing so, this thesis hopes to reveal how various forms of citizenship can simultaneously impact the life of a Dominican immigrant living in New York City.



JoJo Holm

Faculty Advisor: Nathan Gianneschi

A Protein Mimic Towards a Novel Therapeutic for Incurable Neurodegenerative Disease

Dysregulation of protein-protein interactions (PPIs) is central to many pathophysiologies including neurodegenerative disease (ND). Targeting these PPIs has significant therapeutic potential but is challenging due to proteins' large and unique binding sites. In response, Gianneschi Lab has developed the protein-like-polymer (PLP) platform—proteomimetic polymers made through the polymerization of peptide chains along a hydrophobic backbone. These globular, multivalent polymers can successfully perturb specific PPIs such as the interaction between NF-E2-related factor 2 (Nrf2) and Kelch-like ECH associating protein (Keap1), which is central to ND. Nrf2 binds the Keap1 homodimer via the high (ETGE)- and low (DLG)-affinity domains acting as a latch and hinge at two Keap1 Kelch domains, wherein the more specific, DLG binding site stabilizes the binding between these proteins. Previous work has successfully shown inhibition of the Keap1/Nrf2 PPI using peptides from the ETGE domain. However, we hypothesize that PLPs incorporating both the high and low affinity Nrf2 domains, will yield a PLP that displaces native Nrf2 while being specific enough to avoid off target binding. We have successfully developed the synthetic methods and performed material characterization for DLG: ETGE copolymers of various ratios. Furthermore, the polymers will be characterized through *in vitro* binding assays to show Keap1/Nrf2 disruption, a reporter cell line to show Nrf2 pathway activation, and proteomics to assess off target effects across the polymer library. This project aims to build upon previous work to develop a more stable and specific PLP with therapeutic potential for ND.



Heather Humbert

Faculty Advisor: Christian Petersen

Quantification of *opsin+* Neurons Reveals the Dynamics of Head Regeneration in *Hofstenia miamia*

Regeneration is a complex biological phenomenon, whose elucidated mechanisms could inform development of new regenerative therapies. Our model system to understand these mechanisms is *Hofstenia miamia*, a saltwater acel worm capable of whole-body regeneration. *Hofstenia* possess a population of adult, pluripotent stem cells, which function under conserved mechanisms of regeneration across millions of years of evolution. Little is known of *Hofstenia*'s ability to use their stem cells to replace tissue of the correct proportionality and size. Some animals, such as planaria, can both generate new tissue through regeneration in a process called epimorphosis, and also undergo “de-growth” to re-proportion, which together allow for reversible control of organ size. In order to better understand the dynamics of tissue remodeling utilized across animal species, I have developed the acel brain as a model to study this aspect of regeneration. I constructed a riboprobe for the photoreceptor marker *opn4-2*, and used in situ hybridization to develop equations characterizing the brain: body ratio during regeneration. I discovered that epimorphosis occurs predictably in the growing brains of tail fragments, but there is no evidence of re-proportioning in the intact brains of head fragments. I developed the predictive scaling of epimorphosis as a tool to measure the success of head regeneration in RNA interference conditions, by knocking down novel genes potentially necessary for regeneration, and mapping them to my equations to determine regenerative success. My project seeks to further characterize known patterns of animal regeneration, and serve as a tool for future projects in the lab.



Stephanie Kim

Faculty Advisor: Marco Gallio

Genetic Mechanisms Underlying Temperature Preference Adaptation in *Drosophila melanogaster* from Africa and Europe

The common fruit fly, *Drosophila melanogaster*, originates in Southern Africa but has expanded to colonize nearly all temperate regions of the world following human migrations. The ability to adapt to and eventually prefer new thermal environments has been a key process in allowing this small poikilotherm to colonize new habitats. It is unknown how animal temperature preference evolves during the colonization of new environments. To address this question, we first tested several wild-derived fly strains collected in various locations along the “out of Africa” migration (from Zambia to France) and observed that, in rapid laboratory assays for thermal preference (2-choice tests), they display systematic differences in temperature preference, with strains from France and Zambia showing the most significant difference. Next, our goal has been to identify the genetic variation behind this shift in temperature preference. For this, we tested 308 unique recombinant inbred lines (RILs) obtained from crosses between a Zambian and a French parental population in the 2-choice

assay. Our preliminary results suggest a complex genetic architecture behind the evolution of temperature preference in these strains, but also point to key gene regions as a starting point for further experimental work that uses genetic manipulation, functional imaging and circuit studies in laboratory strains of *D. melanogaster*. Our hope is that this work will eventually lead to a better mechanistic understanding of the genetic processes that drive the evolution of thermal preference in *Drosophila*, and in general, contribute to our understanding of how behavior evolves under changing environmental conditions.



Emily Lam

Faculty Advisor: Namratha Kandula

Social Networks in South Asian Healthy Lifestyle Intervention

This qualitative study aimed to characterize the role of social networks in influencing cardiovascular health behaviors among South Asian American adults who participated in a culturally adapted, group lifestyle intervention. A random subset of participants (n=24) from the intervention arm of the South Asian Healthy Lifestyle Intervention (SAHELI) clinical trial were invited to participate in semi-structured interviews as part of a process evaluation. Participants were asked about connections between their personal social networks, social support, and lifestyle behavior changes. Interviews were transcribed, and the team used coding based on a theoretical model of social influence to identify themes. Three overarching themes emerged: 1) SAHELI participants and their family members provided bidirectional social support for behavior change; 2) SAHELI participants provided social support to one another in the group intervention setting; and 3) SAHELI participants encountered resistance to behavior change from network members. The behavioral changes initiated during the SAHELI intervention diffused beyond participants to their network members, and social support from network members helped sustain participants' behavior changes. Mechanisms varied based on participant gender, English language proficiency, and by type of social network member. Health professionals should draw on patients' social support networks to initiate and sustain beneficial behavior changes. Gender and cultural factors may also have implications for how social networks mechanisms affect behavior change.



Lucy London

Faculty Advisor: Tracy C. Davis

A Pipeline Flows Both Ways: Contradictions of an Activist Trajectory

Coming home after my fall quarter study abroad in Cuba, I was full of contradictions. I decided to use my honors thesis and capstone project to reflect on episodes of my own activist trajectory and the contradictions they entail. I use autoethnography to trace personal moments of feeling particularly aligned or misaligned with my values and, from there, to figure a path forward. Reflecting on

experiences of championing individual sustainability in high school to living in Indigenous-led resistance camps to the Line 3 tar sands pipeline to participating in a 5-day silent meditation retreat, I struggle through questions of how to discern my truth in a world of multiple truths, recognize my agency among waves of other people's theories of change, navigate the inherent and ever-present contradictions of changework, and acknowledge the interconnectedness and agency of all things. I find that changemaking is inherently dialectical: we must shape change while change simultaneously shapes us. For myself, it is necessary to hold the contradicting, multiple truths while aligning myself with the force of change. I hope that this research is useful to leftist organizers and changemakers to guide reflection on harmful tendencies present in movement spaces and help cultivate a positive relationship to change, not only on the systemic scale but in personal and relational scales as well. Instead of alienating one another for approaching change differently, I hope we can practice holding contradiction as a necessary discomfort and maintain a broader perspective while still creating critical change.



Claire Mason

Faculty Advisor: David Rapp

Examining the Utility of Refutation Replies to False Social Media Content

Concerns about the online spread and influence of false ideas are at the forefront of theoretical and everyday discussions. Understanding the factors that can reduce reliance on false information is critical in combating belief in and spread of misinformation. One strategy intended to respond to the spread of false information involves the presentation of refutations that negate false claims and provide correct information. In two experiments, we examined participants' reactions to false information designed to look like social media posts and the potential utility of different refutations for supporting accurate understandings. In both experiments, participants viewed Tweets containing true and false information and judged each Tweet for interest. After, participants answered open-ended questions related to the factual content of the Tweets they judged. In Experiment 1, false Tweets were followed by another Tweet containing a partial refutation, complete refutation, or no refutation. In Experiment 2, false Tweets were followed by another Tweet containing a refutation, socially aggressive refutation, or no refutation. Across both experiments, we find participants were more likely to rely on false information to answer questions if they had previously read false than true Tweets. However, participants were less likely to reproduce false information and more likely to provide correct responses after reading false Tweets that included refutations as compared to false Tweets that omitted refutations. We find no effect of aggression on the efficacy of refutation replies. These findings have practical implications for designing and navigating healthy information spaces, including but not limited to Twitter and other social media platforms.



Chantel McCrea

Faculty Advisor: Joshua Chambers-Letson

Love Letter to a Trick

Love, care, and intimacy are configured in the public imagination to be redemptive, universal affects. Phrases such as “all you need is love” and “love will set you free” indicate the reverence people have for these emotions and experiences. However, these concepts are seldom imagined outside of the committed heterosexual cisgender coupledness. Alternative forms of love, care, and intimacy explored and imagined by Queer and BIPOC scholars are then rendered unassimilable into conventional love discourse and become ostracized from the societal definition of love entirely. I challenge--through the use of a literature review, performance analyses, and interviews of Queer BIPOC kink practitioners and sex workers-- misconceptions around sex work and kink and disrupt the privileging of cis-heteronormative relational structures. By drawing parallels between marginalized and normative relational structures I destabilize what is normal and discover what new possibilities, frameworks, and formations become available to us when we dare to embrace the precise love we are afraid to name as such. These lenses hold space for the ambivalence of love, care, and intimacy and allow the development of a framework capable of accounting for the way our experiences with love, care, intimacy, and desire are often shaped equally by violence as well as redemption and positivity. This research differs from existing scholarship by centering Queer BIPOC folx and looking at sex work and kink expansively, addressing both survival and choice-based sex work and various kink dynamics as my analytic through which to destabilize normative conceptions of love, care, and intimacy.



José Medina

Faculty Advisor: Héctor Carillo

"Si No Te Gusta, Adiós": Mexican Temporal Assimilation in the Workplace

Current literature on Mexican assimilation explores how urban and rural destinations affect the assimilatory pathways available to immigrants. Researchers have also observed segmented, upward or downward, assimilation among Mexican immigrants dependent on the skill level of their jobs. Studies attempt to explain these differences by describing linearized and racialized pathways of assimilation. Studies on mobility find that second-generation Mexican immigrants utilize higher levels of human capital than their predecessors. The studies do not explore how the capital differences between generations manifest to create the differences in mobility observed. As such I ask what the differences in barriers experienced by first- and second-generation Mexican immigrants in the workplace are, and how are these barriers mediated through their social and cultural experiences? To answer these questions, I carried out 20 interviews with Mexican immigrants residing in Decatur, Illinois. Interviews uncovered the existence of a Hispanic social network within the factories of Decatur. Employers used this network to hire other Hispanics to meet labor demands, creating a Spanish-speaking enclave. Undocumented workers relied on hiring through this network to bypass the E-Verify system. The existence of this enclave paired with the lack of Spanish infrastructure created promotional opportunities for the second-generation workers as bilingual supervisors. The workers contended with

their exploitation and vulnerability by cultivating pride in their work which extended to other Hispanics. Overall, the interaction between the structural positions of the Mexican immigrants and the context of their workplaces influenced the mobility and agency they had working within the factories of Decatur.



Zidi Mu

Faculty Advisor: Benjamin Gorvine

The Role of Motive Disposition, Sense of Calling, and Parental Opinion in College Students' Career Decision-Making

College is an important time for initial career exploration and decision-making. While the associations between multiple internal and external factors and career decision-making have been established in the working population, few studies examined these factors among college students. The current study aims to investigate how motive disposition (i.e., to what extent individuals are motivated by power, achievement, and/or affiliation), sense of calling, and parental opinion influence college students' career choice, self-clarity, and commitment. Seventy-two Northwestern students who intended to go into business, healthcare, or education completed a 15-minute online questionnaire, and their responses were analyzed using independent samples t-test, one-way ANOVA, and correlation in SPSS. Results showed that there was a positive association between students' sense of calling and their clarity regarding future career, as well as a positive association between parental support and students' career commitment. There was no significant difference between power, achievement, or affiliation motivations among students who intended to go into three different fields. Exploratory analysis revealed that students' career decision-making experience differed significantly by race. For students of color, those who intended to go into healthcare or education had higher career self-clarity than their business counterpart, but this difference was not seen for white students. In addition, students of color experienced lower parental support and higher parental interference in the career decision-making process. These findings provide preliminary evidence on how internal and external factors influence college students' career decision-making and inspire future investigation into how this process may differ among people with different racial identities.



Shae Murphy

Faculty Advisor: Matias Alvarez-Saavedra

Standardization of Bioactive PA Injection Coordinates and Concentrations in the Mammalian Brain

Parkinson's disease (PD) is caused by the degeneration of dopamine-producing neurons (DNs) in a brain region called the substantia nigra (SN). Peptide amphiphiles (PAs) are peptide-based molecules that self-assemble into nanostructures. A PA (R14) that contains a bioactive sequence of the VGF

protein is being investigated as a scaffold for neuronal regeneration in a mouse model of PD. VGF is a nerve growth factor that stimulates neuronal survival pathways and induces oligodendrocyte (OL) proliferation to myelinate newly repaired neurons. This experiment determined an optimal PA concentration and standardized surgical injection coordinates targeting the SN. We performed surgeries to inject fluorescent R14. Brain tissue was collected 48 hours post-surgery and was frozen and immunostained with fluorescent antibodies to detect DNs and OLs. Fluorescent microscopy was used to quantitate the spread of R14 and visualize the overlap between the SN region and R14. I determined the three coordinates (anterior/posterior, medial/lateral, and dorsal/ventral) that should be used in future experiments to inject directly into the SN of a 6-week-old and 8-week-old mouse. The 5mM solution of PA was found to be ideal because it reduced brain damage and had the greatest lateral spread through the brain (1.3mm). The dilution also allowed cells to interact with the bioactive sequence and internalize R14 without weakening the signal. These experiments standardized experimental conditions for future experiments investigating the efficacy of the R14 bioactive signal in repairing DNs in the SN to alleviate symptoms of PD in the mammalian brain.



Malena Otero

Faculty Advisor: Claudia M. Haase

Affection, Friendship Quality, and Loneliness: A Dyadic Interaction Study

Affection is a positive emotion thought to be important for relationship functioning and well-being. While past research has focused on affection in romantic relationships, surprisingly little is known about affection in friendships. Further, previous research has explored affection predominantly as a behavior (e.g., showing affection), rather than an experience (e.g., feeling affection). We examined subjective experiences of affection during conflict and positive interactions and associations with friendship quality and loneliness among adolescent and young adult friends. The sample consisted of 108 friend pairs (216 individuals aged 15-26; 58.8% female, 38.4% male, 2.8% other) who engaged in two 10-minute naturalistic online conversations about a topic of disagreement (conflict conversation) and something they enjoyed doing together (positive conversation). After each conversation, friends reported on their emotional experiences, including affection, using established emotion checklists. Friendship quality and loneliness were measured by established questionnaires (UCLA loneliness scale; $\alpha = .95$; McGill Friendship Questionnaire; $\alpha = .94$). Controlling for age and gender, actor-partner interdependence modeling showed that youth who experienced greater affection in interaction with their friend in both the conflict ($\beta = .18, p = .007$) and the positive ($\beta = .18, p = .008$) conversation reported higher friendship quality. No partner effects (links between one friend's affection and the other friend's friendship quality) and no links with loneliness were found. These findings suggest that affection within a friendship is important for social connection with that friend, but perhaps less so for overall social connection.



Irena Petryk

Faculty Advisor: Lori Beaman

Measuring Risk-Sharing in a Developing Economy: A Study of Rural and Peri-Urban Thailand

Due to limited financial services in developing economies, the world's poor often form informal insurance agreements with relatives, neighbors, and moneylenders. Sparse records of these transactions make them difficult to track. As a result, economists studying developing economies may conclude that the level of financial risk-sharing is far lower than it actually is. This project seeks to accurately measure the level of risk-sharing in rural and peri-urban Thailand, determine whether moral hazard exists in informal agreements, and estimate the impact of access to informal insurance on maintaining consumption levels in the face of health shocks. Using household panel data from the Townsend Thai Project, I estimate two models to measure risk-sharing and search for evidence of moral hazard: one that analyzes year-to-year changes in consumption and income and another that focuses on fluctuations of the same variables around a long-term average. I also construct a triple-differences model that exploits variation in the timing of health shocks to explore the impact of access to informal insurance. The data reveal risk-sharing in both rural and peri-urban Thailand; however, the results do not provide evidence for the presence of moral hazard or the mitigation of consumption loss following illness. This project demonstrates that informal borrowing mechanisms allow households to engage in risk-sharing in Thailand even if formal institutions are limited, though their effectiveness in the face of health shocks remains unclear. This result has important implications for regional development efforts, particularly microfinance initiatives.



Samantha Powell

Faculty Advisors: Rebecca Ewert and Bruce Carruthers

Race, Place, and Disaster: Newspaper Narration of Displaced Populations After Hurricane Katrina and the California Camp Fire

This study analyzed portrayal of populations displaced by natural disasters – specifically Hurricane Katrina and the California Camp Fire – in local and national newspapers. Because displacement underscores vulnerability through a lack of financial or social ties for housing, the range of portrayal of displaced populations exposes compounded isolation and scrutiny. By looking to identify and understand the forces that drive this variation, I hope to better understand what causes stereotyping in American media. Through descriptive quantitative coding of relevant articles published within two months of each disaster in two national and one local paper per disaster, I identified three variations in coverage: construction of the victim-savior archetype, discussion of violence and chaos, and discussion of evacuee's post-evacuation planning. Then, through a qualitative discourse analysis of the rhetoric of specific articles, I grounded each variation in theory. This analysis found that 1) the demographic makeup of the affected populations, specifically race, played the most salient role in narrative construction, 2) the smaller the area covered by newspaper, the more nuanced and person-based their coverage, and 3) the specifics of the disaster, such as magnitude or type, affected what stories were told. These findings highlight sociocultural forces that drive portrayal which, in turn,

affects perception. By first understanding the roots of discriminatory media – such as the recent decrease in local media, understanding class as a grouping within race, and the reliance on stereotypes in times of social disorder – we can aim to remedy it and better understand its relationship to present discrimination.



Irene L Quan, Rishi Jain, Aru Singh, and Valentina Velasco

Faculty Advisor: Melissa Simon

Project MED (Medicine, Exposure, and Development): Promoting Access to Healthcare Education for Historically Underrepresented Groups Through Community Engagement, Sustainability, and Technology

Students from historically underrepresented groups (HUGs) often report barriers to entering the healthcare field, such as concerns about academic preparedness and difficulty accessing relevant experiences. Taken together, these pose major challenges to building a representative workforce and delivering equitable care. Project MED is an undergraduate-led pipeline program that aims to expose high schoolers from HUGs to the breadth of opportunities in the healthcare field and to prepare students for successful careers in healthcare. Partnerships have been established with four Chicagoland high schools, serving a total of 182 students. Through three main pillars—Learn, Lead, and Launch—Project MED has developed a robust repository of 20 workshops, recruited and trained 14 mentors, and curated a database of ≥ 100 opportunities in healthcare. Analysis of preliminary mixed-methods survey data from one school indicated a high degree of interest in healthcare careers (75%) following our program, based on ratings greater than four on a seven-point Likert scale. Among these students, many preferred presentation types including hands-on demonstrations (55.56%), STEM curricula and pre-professional preparation (33.33%), and speaker panels (11.11%). Qualitative responses further elucidated three main benefits of the program: bolstered self-efficacy, improved biomedical-specific knowledge, and increased understanding of pathways to healthcare careers. Project MED underlines the importance of depth over breadth, continued adjustments based on students' needs, and the implementation of sustainable and accessible technology in promoting interest in healthcare among HUGs—an essential step toward reducing educational disparities and achieving a workforce that can serve diverse populations.



William H. Schirmer

Faculty Advisor: Erica Hartmann

Reducing Biofilm Formation through CRISPRi Mediated Mutation of *Pseudomonas Aeruginosa* for Use in Novel Therapeutics

Antibiotic-resistant bacteria are an increasing global threat to public health. The emergence and spread of multi-drug resistant bacteria is an evolving issue that can be attributed to excessive use of antibiotics, lack of research and funding, and poor regulation. *Pseudomonas aeruginosa*, a common opportunistic

pathogen, can lead to infections in the blood, lungs and other parts of the body post-surgery and has shown resistance to a variety of antibiotics. Because antibiotic resistance in *P. aeruginosa* is so common, there is a need for novel therapeutics to treat these infections. One mechanism of resistance is the development of rigid biofilms. These surface-attached microbial communities form a layer of organic material that provides extra protection, can develop distinct phenotypic and biochemical properties, and can encourage horizontal gene transfer. Within *P. aeruginosa*, *algU*, *rpoN*, *recA*, and *lecB* have all been identified as contributors to biofilm formation. This study evaluated the potential suppression of these genes for eventual therapeutic development by generating mutants targeting the four specified genes using CRISPR-mediated modifications. The mutated *P. aeruginosa* strains were analyzed through a crystal violet assay to demonstrate the targeted gene's repression and effects on biofilm growth. In addition, optical coherence tomography imaging was performed to observe the variation in biofilm formation between strains. This study observed a decrease in biofilm growth when targeting genes *rpoN*, *lecB*, and *algU*. This decrease was also observed through the optical coherence tomography imaging. These findings suggest suppression of biofilm-related genes can be used as a strategy to restore antibiotic sensitivity.



Palak Shah

Faculty Advisor: Rosemary Braun

Modeling Individual Sleep Needs from Wearable-Device Data

An individual's natural sleep and wake cycle plays a critical role in nearly every aspect of their daily life. There are currently thought to be two processes that interact to regulate one's sleep-wake cycle: a sleep homeostat, which depends on the amount of time you have been awake or asleep; and the circadian rhythm, an internal 24-hour molecular clock present in nearly every cell of the body. Both processes differ between individuals, whether that's from a decision to pull an all-nighter one day or from a genetic inclination towards being an "early bird" or a "night owl". This project focuses on building a model that can predict how particular sleep disruptions impact an individual's sleep cycle, as well as their ability to recover from these disruptions. A "two-process" model with the capability to simulate a theoretical sleep-wake cycle with disruptions was built and is being tuned using actigraphy data. Actigraphy measures motion using a noninvasive accelerometer embedded into a wearable-device (e.g. Fitbit), allowing for the study of sleep activity patterns in a real-world setting. The actigraphy data was collected from approximately 20,000 individuals, who reside in 121 different countries. Our model has shown that recovery from sleep disruptions can be modeled mathematically, and the model is currently being trained using machine learning on synthetic data generated from the "two-process" model, and on actigraphy data. This model will be useful to anyone experiencing sleep disruptions due to health, work, or family, by providing information on how to get sufficient sleep regardless.



Peirong She

Faculty Advisor: Richard Zinbarg

Factor Analysis of Neuroticism

Neuroticism, one of the Big Five personality traits, disposes people to experience negative stimuli more intensely and make more negative interpretations of their experiences. Prospective studies have shown that neuroticism predicts the development of anxiety disorders and major depressive disorder during adolescence, as well as worse treatment outcomes (e.g., Zinbarg et al., 2016). Given the consequences of anxiety and depression, effective prevention targeting adolescents with high neuroticism is crucial. This study aids prevention by testing whether the NA-15 questionnaire, a neuroticism measure, as well as the model derived from it, effectively capture neuroticism. We performed confirmatory factor analysis (CFA) on NA-15 questionnaires completed by a demographically diverse sample consisting of 452 adolescents from public high schools in California, Tennessee, and Illinois. First, model comparisons of five different models indicated that the 2-factor hierarchical model provides an excellent fit (CFI = 0.97, RMSEA = 0.067, SRMR = 0.0310). This means that neuroticism was best captured by all 15 items as well as 2 group factors derived from them, namely anxiety and depression. Second, invariances analyses resulted in scalar invariance, indicating that the 2-factor hierarchical model effectively captures neuroticism across gender, race, and ethnicity. Finally, the omega coefficient was .83, showing that neuroticism accounts for a significant proportion of variability in the NA-15 scores. This study contributes to prevention efforts by providing a shorter but equally effective measure of neuroticism compared to existing metrics. These advantages can aid the dissemination and implementation of prevention programs for adolescents with high neuroticism.



Nikhil Sriram

Faculty Advisor: Anna Chorniy

Psychotropic Medications in Foster Care: Documenting Trends in Drug Use, Patient Characteristics and Outcomes Using Large Administrative Data

Mental health concerns are prevalent in the foster care population. This may be a result of trauma stemming from abuse, neglect, and family separation, which predisposes foster care children to mental health and behavioral challenges. Nonetheless, concerns are prevalent about prescriptions for psychotropic medications, including include antidepressants, anxiolytics (anti-anxiety), antipsychotics, mood stabilizers, and ADHD medications, being increasingly dispensed with a lack of data related to safety and efficacy present in youth populations. This study first reviewed research related to the incidence of psychotropic medications in foster care. Prior studies have generally shown that children in foster care use psychotropic medications at rates far higher than that of non foster care youth. Psychotropic polypharmacy, defined as concurrent use of 3 or more psychotropic medication classes for at least 30 days during the year, is also discussed. State and federal policies that are in place to regulate overprescribing of psychotropic medications in the population of children in foster care were assessed. Patterns and trends in policies are noted in policies, including oversight mechanisms and best practices for prescribing. Finally, existing evidence was compared to estimates obtained from a

national Medicaid claims database for 2000-2012 using Medicaid Analytic Extract (MAX) files (all foster care children are covered by Medicaid). Descriptive evidence was also produced on patient characteristics and outcomes, comparing those who take drugs and those who do not. This study highlighted a concerning trend within a vulnerable population, indicative of a need for continued research and more robust policy.



Stephanie Torello

Faculty Advisor: Katie Amato

Effects of Early Life Factors on the Infant Gut Microbiome

The development of communities of microorganisms that live in the human digestive tract, known as the gut microbiota, has shown to be an important contributor to the proper functioning of bodily systems throughout life. Many factors can influence the early composition of the gut microbiota, such as antibiotic exposure and breastfeeding; however, the breadth of research on the ways that these factors interact with each other is limited. Antibiotic use in early life is increasingly common, although it can be detrimental to the developing gut microbiota. In contrast, breastfeeding can promote the growth and development of the gut microbiota. This study examines how antibiotic use interacts with other variables, including breastfeeding practices and birth mode, to shape the infant gut microbiota. To do this, I utilize fecal samples taken at 2 timepoints from 44 infants in Cebu, Philippines. Analyzing this microbial data along with survey data about common practices, I identify variation in gut microbial diversity in response to early life factors as well as shifts in microbial diversity over time. Results show that birth mode, water treatment, breastfeeding duration, and location of delivery are the most significant predictors of gut microbiota diversity in the first 6 months of life. Understanding the relationships between different variables that influence the development of the gut microbiota can contribute to interventions and further research on how to mitigate long term adverse health implications.



Jillian Umstead

Faculty Advisor: Eli Finkel

Unstable, Unfaithful: Perception of Bisexual People in Relationships

Research has shown that there is a bias against bisexual people, specifically in dating. This study specifically sought to replicate a 1997 study to see if bisexual people are perceived differently now that there is more widespread acceptance of LGBTQ+ people. To examine this, participants were asked to read a description of a couple and evaluate them and their relationship on several factors, such as stability, satisfaction, and monogamy. Study 1 analyzed how 402 straight participants viewed relationships between a man and woman with at least one bisexual partner. Couples with a bisexual member were rated as less stable than couples with two straight people and were also rated as more

likely to end because of jealousy and cheating. Study 2 examined how gay people perceive bisexual people in relationships. It used the same design as Study 1, with the 553 gay participants (263 women and 290 men) reading about same-sex couples that matched their own gender. Preliminary analysis of this data found that although the same patterns of bias did not appear for gay participants, they rated the couples with bisexual people to have worse communication. Further analyses will consider how participants' gender and sexual orientation contribute to the perception of bisexual people in relationships. These studies add to the literature by suggesting that despite much progress being made regarding LGBTQ+ acceptance, there is still a bias against bisexual people specifically in the world of dating. However, this bias is not monolithic, and rather differs between populations.



Albert Wang

Faculty Advisor: Emre Besler

Exploring Climate Change Discourse on Social Media with Natural Language Processing

Climate change is a widely discussed subject on social media. Understanding the topics and attitudes in these conversations may inform better science communication and policymaking strategies. Previous studies have focused on either topics or sentiment and have largely been limited to analyzing either Twitter or Reddit, but not both. To provide a more comprehensive understanding, we conducted a comparative analysis of climate discourse on both platforms using topic modeling and sentiment analysis. Using machine learning and deep learning algorithms, we modeled both the topic distribution and level of optimism or pessimism of Reddit comments, Reddit posts, and tweets. Notably, we utilized BERT, a deep learning based tool, to yield high performance results. For topic modeling, we aimed to create a snapshot in time of the current landscape of climate discourse, limiting our data collection to a short window of time in March 2023. For sentiment analysis of tweets and Reddit comments, we aimed to examine the evolution of climate-related sentiment over time, collecting data over 15 years from 2008 to 2023. Preliminary topic modeling results showed that on Twitter, electric vehicles, forests, and denial were the most prevalent subjects of discussion, while pollution, water, and mining were hot topics on Reddit. The difference in subject prevalence across platforms indicates that they should be studied together in future research. Our ongoing sentiment analysis will provide further insights into the attitudes and emotions expressed on both platforms.



Isabella Wu

Faculty Advisor: Sidonia McKenzie

The Effect of Work from Home on City Structures and Inequality

Popularized by COVID-19 lockdowns, work from home has the ability to innovate the urban economics field. Although commonly accepted that workers live near a city center largely to commute to work, the ability to effectively perform the same tasks thousands of miles away from any office

building may uproot this conception entirely. As high-income individuals have historically fled the city center during the era of suburbanization, remote work opens these very same doors and potential for flight from the city center. In this study, individuals in 2023 were matched with individuals in 2019 to conduct a difference-in-differences regression analysis on income with work from home as the treatment. Results indicate that treated workers report higher income than untreated workers. Treated workers also show a preference for suburban residence as well a community of demographically similar individuals. This could indicate an increase in income inequality and upcoming gentrification. Further research is needed in order to quantify these specific effects and suggest solutions. Policy officials ought to take steps to limit an exodus from the city center and the potential ensuing damages from an increase in income inequality.



Rebecca C Wu

Faculty Advisor: Katherine Amato

Maternal Stress Associated with Infant Gut Microbiota in Cebu, Philippines

Early-life health outcomes are impacted by maternal health in the pre- and postnatal periods. Stress related to socioeconomic factors can contribute to variable maternal health. Both maternal and infant health are tied to the composition of the gut microbiota, the collection of microorganisms in the human gastrointestinal tract that has been shown to modulate stress through the functioning of the hypothalamus-pituitary-adrenal axis. Previous research has linked maternal stress to the infant gut microbiota and cognitive developmental issues - which often coexist with physical health problems - but associations between maternal stress, the infant microbiota, and infant physical health have not been directly explored. Using data from the Cebu Longitudinal Health and Nutrition Survey, connections between these three variables were investigated. Maternal stress was measured and indexed in 42 mothers using validated stress surveys totalling 26 variables. Infant gut microbiota composition was determined at 2 weeks and 6 months of age using 16S rRNA gene sequencing. Results from linear mixed effects models showed a negative correlation between indexed stress levels and the Shannon diversity index at 2 weeks ($p = 0.017$) but not 6 months ($p = 0.288$) of age. Certain microbial taxa were found to be differentially depleted or enriched in varying stress conditions. These results demonstrate that increased maternal psychosocial stress levels are correlated with decreased microbial diversity and altered composition in early life, providing evidence for intergenerational transmission of stress and pointing to the potential role of the immune system in these pathways.



Melinda Xu

Faculty Advisor: Lindsay Allen

The Impact of Telehealth on Health Equity in Opioid Use Disorder Treatment

The COVID-19 pandemic rapidly accelerated the use of telemedicine for opioid use disorder (OUD) treatment. Because it eliminates barriers to care such as transportation costs, telemedicine is seen as a promising avenue of improving OUD treatment access for low-income individuals. However, it is unclear whether telemedicine truly improves access for this marginalized group. Research on other disease states has shown that telemedicine may exacerbate disparities for low-income patients, who tend to have poorer internet connectivity, technological literacy, and access to devices with audio-visual capacity. My study examines the impact of telemedicine on access to OUD care between Medicaid (low-income) patients and privately insured patients. In particular, I focus on the initiation and use of buprenorphine, medication shown to significantly improve treatment outcomes. Using longitudinal individual-level data for patients with OUD from the Northwestern Medicine system, I examine the association between Medicaid status and number of in-person and virtual encounters, initial buprenorphine orders, and ongoing buprenorphine orders with a difference-in-differences approach. I further conduct moderation analyses to determine whether among Medicaid patients, those with poor broadband connectivity have worse outcomes. Although data analyses are ongoing, preliminary results indicate that disparities in access to OUD care worsened during the pandemic for those with Medicaid, compared to those with private insurance. Further, I observe additional deleterious effects for Medicaid enrollees with below-the-mean access to broadband. I take this as suggestive evidence that telehealth does not improve access across the board, and potentially undesirable effects on disparities should be considered when creating telehealth policy.

Poster Presentation Abstracts

Alphabetical by presenter's last name

Keyanna Adams and Ana de Souza

Faculty Advisor: Lisa Johnson

Understanding and Improving Memory Outcomes in Children with Epilepsy

Anterior temporal lobectomy (ATL) involves the surgical resection of left or right medial temporal lobe (MTL) structures to control seizures in 80% of patients with medication-resistant temporal lobe epilepsy (TLE). MTL supports the formation and retrieval of memories for past experiences, so the benefits associated with ATL must be balanced with the risks of memory decline. Currently, presurgical memory lateralization relies on an invasive procedure called the Wada test, which can be inaccurate, particularly in younger children or those with developmental delays. This project aims to improve memory outcomes in pediatric TLE patients by using fMRI to determine memory lateralization prior to left or right ATL. To achieve this, we designed two memory tasks to be performed in-scanner, one examining associative memory and one examining naturalistic event memory. In healthy participants, we hypothesize bilateral MTL activation during performance of both tasks. In patients with left or right TLE, we hypothesize greater activation lateralized to the non-epileptic MTL. Now, we are leading pilot testing of the memory tasks and subsequent data collection in healthy children and adolescents. Once we analyze the data, we plan to recommend one or both tasks to be paired with fMRI and employed in the presurgical evaluation of pediatric TLE patients. We further plan to pair the tasks with intracranial EEG during presurgical monitoring to examine the neurophysiological mechanisms underlying fMRI effects. We hope the findings of this project indicate that our clinical memory task method can replace the Wada test for patients being considered for ATL.



Kaylyn Ahn

Faculty Advisor: Alyssa Garcia

Moral Discourses, Regulated Bodies: Sex, the State, and Subjectivity in Cuba

In Dr. Alyssa Garcia's book *Moral Discourses, Regulated Bodies: Sex, the State, and Subjectivity in Cuba*, she explores the lives of AfroCuban women through testimonios, hip hop, and film. In Cuba, she collected testimonios of Black Cuban women and the oppression they face by the police. This study is important because communist member leaders of the Cuban government argued that because they eradicated capitalism through nationalizing industries and instituting socialist reforms, they eradicated the root of social evil and thus racism. There are little policy efforts or research on racism in Cuba because of the US Embargo against Cuba and because Cuba was not open to travel for Americans until 2009. As an Emerging Scholar, I conducted literature reviews, critically analyzed testimonios, and edited her manuscript. Police often criminalize Black women for walking in the street at night, accuse them of being a "jintera," or prostitute, and wrongly incarcerate them in facilities with unlivable conditions and rampant sexual violence. Through the testimonies of women of color in Cuba, race, sex, and gender are policed and criminalized by the state. This has many implications for the future of research in Cuba as the realities of Black women contradict the government's claim that racism is eradicated in Cuba. More research and policy work should be done to address the institutional racism of Black Cuban people and highlight their voices, stories, and truth.



Fatimah Al-Najaar

Faculty Advisor: Danielle Bell

Gender Equity Assessment with Gender IDEAL

As a research fellow at Gender IDEAL, I worked with Professor Danielle Bell, and Founder Flory Wilson, to promote their mission of contributing to the broader understanding of equity-focused management through developing an assessment that allows organizations to evaluate their gender equity status and suggest evidence-based recommendations. The assessment will ensure that genders of lower representation receive the support needed to allow for their excellence. A first version of the assessment has previously been launched and shared with participating organizations. Therefore, my role focused on developing the second version through researching best-practices using recent data from accredited sources that focus on women and LGBTQ+ members in the workplace. The important keywords were used to articulate questions and suggest changes. Each question was also rationalized by relevant resources. I then reached out to five experts on the topic to discuss feedback in scheduled Zoom meetings. The project was concluded with a finalized assessment of 130 questions divided into eight sections, as relevant. Although the first version of the assessment was thorough, an essential part of the second version focused on the organization's effort to address reproductive health services within the company, given the U.S. ban on abortion in 2022. This added a valuable piece of recommendations to ensure that child-bearing workers are properly assisted throughout the process.



Kethan Bajaj

Faculty Advisor: Ruchi S. Gupta

Determining Avenues to Improve Safety for College Students with Food Allergy

Food allergies (FA) and allergic reactions are common among college students, but there is currently little investigation into FA education and safety on college campuses. This study aimed to better identify areas for improved education and safety on college campuses. A cross-sectional, online survey was administered nationwide to college students with and without FA. Descriptive statistics were employed to characterize students' experiences with FA and determine the optimal methods to improve FA awareness and education on college campuses. Of 193 respondents from 65 universities, 74 reported having FA. Of those with FA, 28.2% reported experiencing an allergic reaction in a campus dining hall since starting college. Of all respondents, 37.8% were not confident in their ability to administer an epinephrine auto-injector. Significantly, 79.8% of respondents wished they knew more about how to assist someone having an allergic reaction, over half (58.6%) indicated they would attend an epinephrine auto-injector training course if given the opportunity, and 36.4% indicated they would be interested in being involved with an FA awareness organization on campus. Finally, 68.9% of respondents believe increased FA awareness training for college students will improve life with FA.

on campuses. Results demonstrate the need for increased epinephrine auto-injector training among the college population to improve safety for students with FA. Additionally, universities across the nation must take steps to improve food allergy awareness on campus, whether that be in the form of training courses, awareness organizations, or other means.



Sama Ben Amer

Faculty Advisor: Shayna Silverstein

Nostalgia and the Arab Diaspora: Rewriting the Past into the Present, for the Future

This summer, I set out to explore the ways in which dance—a central aspect of Arab culture and society—builds a sense of community and identity for those who perform it in the Chicagoland area. In the process of diving into this topic, I ended up looking more into the ways in which immigration status impacts one’s relationship and proximity to identity. In the context of Arab performance culture, this meant how nostalgia was central to the forming of community between first generation Arab Americans (immigrants) and second or third generation Arab Americans (diaspora). Over the summer, I conducted interviews with three Arab performers in the Chicagoland area, ranging from dancers to musicians to teachers, to understand the ways their identities impacted their art and approach to it. Additionally, I relied on a lot of observational practices and field notes to track the ways that community is built in social contexts where dance or music is performed. By the end of my research, I concluded that when it comes to intergenerational communities with ranging proximity to the Arab region and culture, nostalgia is the binding force that holds these groups together and creates a shared sense of unity. This maps with what is happening in the cultural zeitgeist at large, with many emerging artists building their platforms on an intentional blend of Western and Middle Eastern culture through language and imagery.



Alex Beres

Faculty Advisor: Joshua Leonard

PyFlowBAT: An Open-Source Software Package for Performing High-Throughput Batch Analysis of Flow Cytometry Data

Synthetic biologists frequently utilize flow cytometry to build and evaluate engineered biological designs due to the technique’s ability to measure hundreds of samples at a time. Although massive amounts of data can be collected using flow cytometry, analyzing said data often presents a barrier to high-throughput experiments. Currently, open-source and high-throughput flow cytometry analysis tools have not been extensively developed nor widely adopted. The field’s reliance on closed-source, expensive, and low-throughput tools presents a steep barrier to entry and limits the potential of synthetic biology. Hence, we present PyFlowBAT, an open-source Python package enabling the rapid, batch analysis of large amounts of flow cytometry data. PyFlowBAT is designed to dramatically

accelerate analysis workflows by performing vectorized batch operations on collections of flow samples instead of individually operating on each sample. PyFlowBAT provides features for conducting the entirety of the “processing, analysis, visualization” pipeline in one application. PyFlowBAT is both accessible to researchers with limited coding experience through its “plug-and-play” templates and appropriate for advanced programmers as a library to be used in more complex programs. We demonstrate PyFlowBAT’s effectiveness by analyzing inducible fluorescent protein expression data in mammalian cells and comparing the quantitative metrics produced by PyFlowBAT with those produced manually using a standard non-PyFlowBAT analysis workflow. PyFlowBAT adds crucial missing functionality to the growing corpus of open-source synthetic biology tools being developed in recent years. Furthermore, PyFlowBAT fills a largely ignored yet increasingly important niche within the synthetic biologist’s toolkit: software for rapid high-throughput flow cytometry analysis and visualization.



Annalise C Biesterfeld

Faculty Advisor: Mary J Weismantel

Big and Small Nature: An Ethnographic Case Study of Lawns in Evanston, Illinois

Suburban lawns are a cultural wealth and status symbol that have persisted since the emergence of suburbs, despite socio-cultural changes in the (sub)urban landscape. This ethnographic case study examines the relationship between suburbanites in Evanston, Illinois and their lawns. It aims to identify Evanston residents’ sentiments about their lawns and how they have been impacted by the cultural history of suburbanization and traditional lawn culture. The analysis of lawns in the post-industrial suburb of Evanston reveals political, class and sustainability influences in how suburbanites engage with the nature that is most proximate. This research represents nine months of archival research and ethnographic fieldwork including participant observation and semi-structured, long-form interviews with twelve interlocutors. This work examines the history of the American lawn and the suburbanization of Chicago, before examining Evanston’s lawn culture through four case studies on Evanston residents’ relationship to their lawns. In the politically progressive context of Evanston, traditional lawn culture is no longer the most prominent way to engage with nature. Instead, native planting, creative design and sustainability define the suburb’s aesthetic language. By engaging with their lawns intentionally, artfully and sustainably, Evanston sets new community standards for engagement with and love for nature. Despite the reality of individualism in lawn preferences, the community voice is strongly in favor of a new era of nature relationships. Lawns represent the integration of nature into post-industrial society, and Evanston’s unique engagement with them represents a future of human/nature partnership.



Bryan Cárcamo

Faculty Advisor: Tabitha Bonilla

The Anti-Critical Race Theory Movement

Local school boards across the United States have increasingly become sites of tension, especially for the advancement of anti-critical race theory agendas. In a multiracial democracy it is crucial to understand the policy implications of recent attempts to regulate how the issues of race and racism are discussed in K–12 schools. To address this dearth of research, I conducted a literature review on two key terms, “bathroom bill schools” and “transgender sports schools” as well as coded and analyzed data from the University of California, Los Angeles, School of Law’s, Critical Race Theory Forward Tracking Project. The results revealed that local school boards do not substantively reflect the major tenets of critical race theory, as conceptualized by academic and legal scholars in the field. Instead, anti-critical race theory legislation has sought to police trans and gender nonconforming students, creating inhospitable environments for such students in schools. Consequently, I argue that recent anti-critical race theory legislation has advanced an emerging wave of biopolitics and biopower as structures of government seek to police the biological lives of certain students. The movement has permeated across the country, including at the local, state, and national level. With dozens of states introducing or passing anti-critical race theory legislation, I argue that the anti-critical race theory movement has flourished at the local level in the shadows of state or national discourses. Further research should focus on the unique nature of the anti-critical race theory movement at the local level as well as the biopolitics and biopower of such policies.



Cristian Carpio

Faculty Advisor: Atique Ahmed

Spatiotemporal Dynamics of DNA Metabolism-related Genes in Therapy-Resistant Glioblastoma Multiforme (GBM)

Glioblastoma multiforme (GBM) is an extremely aggressive brain tumor with a median survival of 15 months and a nearly 100% recurrence rate. Identifying molecular mechanisms behind the therapeutic resistance of GBM is critical to enhancing current therapy and developing novel therapy. Temozolomide (TMZ) is the standard chemotherapy for GBM patients which works by interfering with cell growth and division via the alkylation of DNA followed by cell death. TMZ triggers DNA damage response (DDR) in cells and impairs DNA maintenance mechanisms. One key pathway of DNA damage response is ataxia telangiectasia mutated (ATM) which phosphorylates and activates Chk1 and Chk2 to cause downstream gene expression changes. One of these changes is in the upregulation of human ribonucleotide reductase complex subunit 2 (RRM2). RRM2 is a subunit of ribonucleotide reductase complex required for deoxyribonucleotide synthesis; a critical DNA repair mechanism and chemo-resistance pathway. Our group demonstrated that RRM2 knockdown increases TMZ sensitivity in GBM, but the mechanism which connects to the ATM-CHK1 pathways remains unclear. My project aids this investigation by immunofluorescence staining of RRM2 and ATM/ATR or Chk1/2 to reveal where these chemotherapeutic-resistance-related proteins reside. The

cells used were from patient-derived xenografts (cell lines established from tumors). Cell treatments include DMSO for vehicle control or varying doses of TMZ. The study focuses on when and where RRM2 interacts with ATM/ATR as well as CHK1/CHK2. Ultimately, localizing these key players can shed light on finding molecular mechanisms of TMZ-related therapeutic resistance in GBM. partnership.



Idaya Chambers

Faculty Advisor: Melissa Foster

An Overview of Contemporary Social Influence of Hip Hop, Rap, and R&B

Working with Melissa Foster, I assisted in a widened exploration of rap pedagogy, Hip Hop culture, and its social impact. Explained in Foster's upcoming book, Hip Hop has various influences on today's musical style and popular culture, inclusive not only of sound, but fashion, visual art, etc. Despite this, there is less academia available on Hip Hop when compared to other styles of performance like musical theater. To narrow the gaps in knowledge, Melissa sought to use her prior knowledge and research towards a resource for youth to learn about Hip Hop. I had the opportunity to interview contemporary Hip Hop & R&B artists. The processes for interviews consisted of compiling information on each artist, coming up with unique questions, and having a conversation with each artist and/or their managers and producers via zoom. Artists that I interviewed included KidKenn, Nezi Momodu, red veil, and TeaMarr. From each artist, I learned about their pedagogical styles, inspirations, goals, and audiences. KiddKenn, an openly queer rapper, seeks to empower people with uplifting and up-temp music that is nonetheless aligned with rap's rhythmic origins. Like other genres, Hip Hop is a diverse style. Yet typically, people are only aware of what's popular now and not aware of its mass influence. My work with Melissa has contributed to expanding academic knowledge related to hip hop and its massive, interdisciplinary influence in the arts.



Elana Charlson

Faculty Advisor: Onnie Rogers

White Students' (Dis)Engagement in Racial Identity and Allyship since Summer 2020

In the summer of 2020, the murder of George Floyd sparked nationwide protests against police brutality and racial injustice. This moment underscored the systemic racial inequities - in which whiteness is privileged and Blackness is disparaged - that characterize the sociopolitical context in the United States. While many white people participated in racial justice work immediately following George Floyd's murder, white Americans' support for the Black Lives Matter (BLM) movement has steadily declined. This trend of disengagement calls into question the extent to which the 2020 movement for racial justice, and white people's involvement in it, constitutes a fleeting moment of racial awareness versus a sustained racial reckoning. To understand white people's waning support for

BLM and racial justice efforts, I conducted 11 one-on-one interviews with white college students who self-identified as white allies, a group that demonstrated high levels of support for BLM in 2020. Our analysis of participants' reflections on their (dis)engagement in allyship resulted in three main patterns: the *'disengaged,'* the *'inconsistent engagers,'* and the *'sustained engagers.'* Participants in the disengaged group distanced themselves from whiteness and primarily conceptualized allyship through *listening and reflection,* whereas the more engaged students emphasized *responsibility* and *critical action* as essential to their racial identities and activism; this positioned them to proactively seek out and sustain opportunities for ongoing racial justice work. To enact social change, white allies must develop the capacity to locate and critique racial inequity in their own lives *and* take concrete action that challenges systemic oppression.



Hannah Christensen

Faculty Advisor: Sumitrajit Dhar

Your Ears Make Sounds! : Detecting Inner Ear Function Using the Sounds It Generates

According to the World Health Organization (WHO), 1.5 billion people in the world live with hearing loss. One promising method of early assessment of hearing health is by recording sounds generated from biological processes in the inner ear, known as Distortion Product Otoacoustic Emissions (DPOAEs). DPOAE measurements are made by introducing two tones of different frequencies in the ear. The interaction between the two tones causes our inner ear to produce the DPOAE that can be recorded using a sensitive microphone in the ear canal. Specific characteristics of DPOAE recordings can be characterized to indicate the state of an individual's hearing health, and they are sensitive to early signs of hearing loss. This project compares two different methods of recording DPOAE measurements—the first method (Fixed L_1) fixes the loudness of one stimulus tone while the other stimulus increases in 10dB steps, and the second method (Scissors) where the loudness of both tones are changed based on a mathematical function. Fifteen participants have participated in this study, in which their DPOAE recordings were measured and yielded a growth function for each method. Preliminary analyses have shown that the Fixed L_1 method tends to yield a steeper and more robust growth function than the Scissors method. From these data, the relationship between individual DPOAE generators and their impact on the DPOAE recorded are being examined. These findings inform the clinical practice of DPOAEs and allow further development of our understanding of the physiology of DPOAE generation and inner ear function.



Nicole Constante

Faculty Advisor: Joseph Contessa, Yale University

Effects of Oligosaccharyltransferase (OST) inhibitors on Osteosarcoma Cell Lines

The addition of sugar groups (glycosylation) to the amino acid Asparagine (N) is an essential modification that is needed for adequate functioning of the endoplasmic reticulum. Targeting glycosylation hasn't been a feasible cancer therapy due to its off-target effects on other proteins. NGI-1 is a small molecule inhibitor of oligosaccharyltransferase (OST) that can partially disrupt glycosylation and overcome therapeutic resistance. Due to low solubility of NGI-1, it's not a viable cancer treatment. By creating molecules similar to NGI-1, we can find an inhibitor that is better able to stop the addition of sugar groups to Asparagine. These molecules can then be used as cancer therapies. Here, we perform cell viability experiments on bone cancer cell lines that have shown more sensitivity to glycosylation inhibition, to determine the analog's effectiveness of inhibiting OST. Three analogs of NGI-1 were tested on three osteosarcoma cell lines. Experiments testing metabolic rate demonstrated that one of the molecules, HL-186 was successfully able to inhibit glycosylation and eventually cause cell death. A hallmark of cancer is the ability of a cell to produce a colony, or a tumor in a human. Clonogenic assays were used to measure the amount of cell colonies formed with the drugs. The inhibitors demonstrated a significant decrease in the amount of colonies formed, although some cell lines were more resistant than others. With these results, we were able to demonstrate the effectiveness of the OST inhibitors to stop (N)-linked glycosylation, to cause ER stress and result in cell death.



Jad Darwiche

Faculty Advisor: Teresa Horton

The Relationship between Mood and Engagement with Nature

The COVID-19 pandemic precipitated a decline in mental health, in part due to social distancing requirements that limited social interactions and physical activity. Recent literature suggests that nature has a positive impact on mental health from improving minor mood slumps to reducing the incidence of depression and anxiety. Unfortunately, psychological, social, and physical barriers prevent some people from accessing nature. We created and administered a national survey to explore barriers and opportunities that influence how and when people of diverse identities access nature ($n = 1621$). Preliminary analyses indicated that people who self-reported lower overall mood spent 10% less time in nature ($p < 0.001$). Although over 90% of people recognized that nature could improve their mood, only about 50% felt they could get outdoors when in a low mood. “Being unable to engage with nature when in a low mood” was selected more often than other barriers to accessing nature such as not having opportunities ($p < 0.001$) or enough time ($p < 0.001$). These results suggest that having a “low mood” may itself be a barrier to engaging with nature. Next steps are to use multivariate statistical models to explore relationships between additional factors (e.g., home environment, work-related factors, measures of mental health, identity, location) that may influence people’s perceived ability to

engage with nature when in a low mood. This work contributes to literature about how to support and educate people to make behavioral changes that can improve their mental health.



Aman Datta

Faculty Advisor: Dan McAdams

Parsing Mental and Physical Health Narratives

As discourse surrounding mental health intensifies, an integral aspect of the conversation is the link between mental and physical health. Here there is a gap in the literature: we do not have a clear comparative understanding of the way people conceptualise mental and physical health challenges in the context of their life narratives. In other words, how differently do people tell stories about mental vs. physical health challenges in their lives, and how do the qualities of their narration predict aspects of their well-being? I examined this link using narrative analysis. I analysed 266 narratives where participants told stories about physical and mental health challenges. I coded each narrative for themes and compared the coding results of physical vs. mental health narratives. Additionally, I correlated narrative themes with results from self-report questionnaires for psychological well-being to observe if people's narration styles had predictive power for well-being. People's articulation of mental and physical health experiences were remarkably similar. Mental health experiences yielded greater expression of self-growth, but outside of that there were no significant differences between the two kinds of narratives. In terms of the predictive power of the narratives, however, measures of well-being depended more on physical health outcomes. These results deepen the discourse: they suggest that the mental and physical health experiences are similarly conceptualised in a person's life, supporting the idea that they should be understood in similar ways, but that some of the effects of mental vs. physical health on well-being do vary, complicating the first assertion.



Georgia Assanuma Dutra

Faculty Advisor: Jeffrey Lewis

Employment Sensitivity to Business Cycles within the Restaurant Industry - The Post-Pandemic Shift

The restaurant industry has historically employed millions of Americans. Using pooled cross-sectional state-level data from 2003-2022, I measured the responsiveness of the employment rates of the industry, as well as the NAICS-designated sector it is part of to the overall business cycle. Although the results are inconclusive for the effect of state unemployment on the choice of whether to stay in the industry, there appears to be a positive correlation between business cycle and the choice to become a part-time worker within the Accommodation and Food Services Sector. For the more restricted restaurant industry, business cycle fluctuations negatively affect the number of hours worked

with significance, and the impact increased during the COVID-19 pandemic. Moreover, that significant correlation is not observed for other comparable industries during the pandemic period.



Julia Ellis

Faculty Advisor: Jolie Matthews

Undergraduate Students and Autoimmune Disease: Integrating Qualitative and Quantitative Methods

Autoimmune Diseases (ADs) are amongst the leading causes of disability and death for young adults, especially young women. Existing research on the psychological impacts of ADs is geared towards middle/older aged individuals even though receiving a diagnosis earlier on in adulthood is associated with decreased levels of psychological well-being and increased levels of emotional distress. This project utilized semi-structured interviews and quantitative scales to measure how ADs impact the undergraduate experience. 18 Northwestern University undergraduates participated in roughly 49-minute interviews and completed three scales using Qualtrics: Illness Intrusiveness Rating Scale (IIRS), Illness Identity Questionnaire (IIQ), and the Multidimensional Scale of Perceived Social Support (MSPSS). Preliminary data analysis revealed positive correlations between total IIRS and IIQ engulfment scores ($r=.84$), IIRS relationships/personality development subscale and IIQ engulfment scores ($r=.78$), IIRS instrumental subscale and IIQ engulfment scores ($r=.89$), IIQ acceptance and MSPSS significant other subscale scores ($r=.68$), IIQ acceptance and total MSPSS scores ($r=.56$). Negative correlations were observed between IIRS instrumental subscale and MSPSS family subscale ($r=-.57$) as well as IIQ engulfment and MSPSS family subscale ($r=-.53$). Preliminary qualitative analysis revealed three main themes: Role Conflict, Reliance on the “Safety Net”, and the Dilemma of Disclosure. Mixed methods analyses are still underway, but this project has implications in illustrating the difficulties managing ADs and the role social support can play in coping with them.



Bryan Enriquez and Ben Fredeen

Faculty Advisors: Amy S. Paller and Nihal Kaplan

Understanding Itch Using a Mouse Model of Recessive Epidermolysis Bullosa

Patients with recessive dystrophic epidermolysis bullosa (RDEB), a genetic blistering disorder due to a mutation in collagen-VII, experience itch refractory to conventional antipruritics. The pathophysiological mechanism is unknown, but inflammatory cells are believed to play a major role. Mice with a *Col7a1* mutation were utilized as a mouse model for RDEB (C7-hypomorphic). Tissue samples were collected from the paws and dorsal root ganglia (DRG). RNA was isolated and qRT-PCR was performed on select primers. Immunohistochemistry (IHC) staining with Ly-6G antibody and toluidine blue was used to identify neutrophils and mast cells, respectively. H&E staining was done for morphological assessment. H&E staining of the paws showed severe blistering and

inflammatory infiltration in C7-hypomorphic mice, with increased density of neutrophils and mast cells shown on IHC staining. Average gene expression levels of the front paws in C7-hypomorphic mice compared to wild-type mice revealed increases in *Il-4*, *Il-13*, *Il-31*, *Il-6*, *Mrgprb2*, *Trpv1*, *Tslp*, *Calcr1*, *Cnr1*, *Cnr2*, and *Piezo1*, with corresponding gene expression level increases in the DRGs for *Il4r*, *Il-13ra1*, *Il-13ra2*, *Il-31ra*, *Trpv1*, *Trpv4*, *Par2*, *Calca*, *Cnr1*, *Cnr2*, and *Piezo1*. C7-hypomorphic mice had substantial blistering with inflammation involved in the nociceptive and pruritic pathways. Interestingly, Th2 cytokines known to induce itch, such as Il-4 and Il-13, and their respective receptors were elevated. There were also increases in cannabinoid receptors, possibly as a compensatory response to pain - a common symptom in RDEB. These results give further insight into the pathophysiological mechanisms responsible for RDEB symptoms and potential therapeutic implications.



Rachel Epstein

Faculty Advisor: Susan Hespos

D[iff]f the Shoe Fits: When Can Children Recognize *Same* and *Different* Relations?

Relational reasoning – the ability to compare ideas or situations to discover common relations – is the cornerstone of higher-order cognition. This cognitive process allows individuals to construct and assess analogies and has been argued to be critical in STEM learning. Therefore, it is critical to understand when this ability develops in children. Relational reasoning has typically been evaluated through the Relational-Match-to-Sample task (RMTS). Children are presented with a card that has a pair of shapes depicting a *same* or *different* relation (*same*: two circles). They are shown two additional cards with new shapes depicting *same* (two squares) and *different* (triangle and hexagon) and asked which of these two cards is ‘more like’ the initial card. One study that only tested *same* found that 4.5-year-olds were able to succeed on the RMTS task without prior training or feedback. In contrast, a different study that tested both *same* and *different* relations found that children do not succeed until 5.5 years. To bridge the gap between these studies, our task tested both *same* and *different* relations, combined the good methods from the two studies, and removed all training and feedback to get a clean measure of success on this task. Preliminary data with twenty-two 4.5-year-olds suggests performance is above chance levels. If these results bear out with a complete sample, it will provide further insights about the factors that influence our relational reasoning abilities, helping foster more STEM learners in the future.



Amy Fan

Faculty Advisor: Alissa Chung

Are People “Real” on BeReal? Perception & Authenticity in Utilization of Social Media App

BeReal rapidly gained popularity in early to mid-2022. Created as a response to social media platforms where idealized images and higher usage is encouraged, BeReal takes a different approach. An app designed to value authenticity, BeReal asks users to post a daily front and back facing picture within a random 2-minute time slot and provides a short daily feed of BeReals from friends. Since there are no published studies on BeReal, looking into how people use the app could reveal unintended negative consequences or confirm that it does connect people in the positive manner intended. In an online survey, U.S. college students 18-23 years old were studied in two groups: BeReal users (n = 100) and non-BeReal users (n =100). Both groups completed questions on perception and usage of different social media platforms and anxiety, public self-consciousness, fear of missing out, and authenticity scales. BeReal users were asked additional questions to observe trends in how people use and perceive BeReal, determine the extent to which BeReal usage moderates the relationship between total time spent of social media and anxiety, and examine whether inauthentic BeReal behaviors are correlated with greater anxiety, FoMO, PSC, and general inauthenticity. Qualitative data shows that users see BeReal as a fun, low-stakes way to keep up with friends and record memories. Common drawbacks include increased feelings of self-consciousness and widespread lack of adherence to the 2-minute window due to intentional reasons like “being fake” and unintentional reasons like the notification coming at an inconvenient time.



Alexandra Feigin

Faculty Advisor: Sylvia Perry

An Investigation of the Intersection of Race and Mental Illness Stigma

Black people with mental illnesses are generally more stigmatized and discriminated against relative to their White counterparts in the United States. Schizophrenia is one disorder for which we see heightened discrimination, namely in the healthcare and law enforcement realms. This study investigated whether attitudes toward individuals with mental illness (schizophrenia or depression) varied depending on their race. In a single online study, we recruited 350 Americans to read a vignette which described either a White or Black individual in a grocery store who either had schizophrenia, depression, or no mental illness (control condition) and report their attitudes towards them. Participants were asked to report their levels of desire for social distance, violence, dangerousness, competence, dehumanization, and 11 emotions (e.g., anger, compassion) towards the target. There was no main effect of race such that perceptions of the individual did not vary across race. There was also no interaction between race and mental illness for any outcome measure. However, there was a consistent main effect of mental illness such that participants expressed stronger negative attitudes towards targets with schizophrenia, followed by those with depression, and the least negative attitudes towards the control condition targets. This experiment reaffirmed the extreme stereotyping and

stigmatization of individuals with schizophrenia and calls attention to the importance of effective stigma reduction.



Kayla Fortis

Faculty Advisor: Sandra Waxman

12-Month-Old Infants Look Longer at Surprising Outcomes in a Two-Dimensional Change Violation Task

Starting at 7 months, infants begin piecing together objects in their environment through visual and auditory cues, and they represent key features of objects based on how they are labeled (i.e., as an animal, a dog, or as Max). What remains unknown is whether these object representations are sufficiently robust to guide how infants reason and learn about the objects around them. To test infant reasoning, we used a change violation paradigm. Infants aged 11.5-12.5 months watched a video wherein a stuffed animal was presented, and a screen was lowered to obscure that animal. The screen was then lifted to reveal either the same animal (expected outcome) or a different animal (surprising outcome). Previous literature suggests that infants have early expectations about how objects should behave in the world and should be surprised by this violation. Hence, if babies detect this change violation, they should look longer at the surprising outcome versus the expected outcome. We first verified that babies could detect this change violation in a 2D video format since previous studies using this paradigm have only ever been done through live demonstrations. Although data collection is currently ongoing, preliminary data (N=7) suggests that infants are looking longer at the surprising (M=13.20s, SD = 4.16s) versus the expected outcome (M = 7.15s, SD = 3.63s). The results of this study will inform us of how infants make important predictions about the world around them and will enable us to further examine the effect of language on these expectations.



Serafina France Tribe

Faculty Advisor: Cecile Chazot

Quantifying the Softness of Wool via Structure/Property Relationships

State-of-the-art evaluation of textile touch sensation (e.g., scratchiness) follows broadly-adopted qualitative and time-intensive procedures that rely on consumer-based studies. This is due to the lack of understanding of how material properties and fiber morphology affect the mechanical interaction of the fabric with human skin. Wool, in particular, is an animal-derived fiber that can range from extremely soft to uncomfortably scratchy, due to the broad range of fiber morphology depending on the animal and breed producing it. Here, we investigate the microstructure of a variety of wool fibers that have already been qualitatively ranked in terms of scratchiness. We used scanning electron microscopy and developed an image analysis framework to assess the evolution of fiber morphology (e.g., diameter and surface roughness) across a large variety of animal sources. Our study of the

morphology of wool fibers is essential in establishing structure-property relationships and quantifying how microstructure affects relevant surface properties such as friction coefficient and water contact angle. This will in turn enable the development of standardized human-subject-free test methods for fiber scratchiness and will guide the design of new fibers and textiles for the apparel and medical industries.



Joy Fu

Faculty Advisor: Masaya Yoshida

Breaking Language Barriers: Surprising Similarities Between English and Mandarin Locative Constructions

How different are English and Mandarin? Upon first glance, they seem drastically different. Unlike English, Mandarin does not have tense-marking, and Wh-words are not at the beginning of a sentence. However, if we delve into the Locative Constructions (LC's), we can find surprising similarities between the two. LC's describe the movement of an object to a given location with respect to a subject. LC's involve the subject, the object that is moved (known as the *figure*), and the location where the *figure* is moved to (known as the *ground*). English has two ways to order these elements: [*Figure*]-[*Ground*] (I sprayed [the paint] [onto the wall]) and [*Ground*]-[*Figure*] (I sprayed [the wall] [with paint]). Given the drastic differences between the two languages, it would be unexpected to observe both structures in Mandarin, but preliminary interviews with Mandarin speakers indicated their possible presence. However, so far, no study has empirically confirmed such a phenomenon. By employing a survey that measures the “naturalness” of sentences for Mandarin speakers, this study fills the gap by investigating whether these two LC's are truly acceptable in Mandarin. Forty Mandarin speakers rated 144 Mandarin LC's on a scale of 1(unnatural) to 7(natural). The results suggest that both structures are prevalent in Mandarin, and that many Mandarin locative verbs function similarly to those in English. These findings demonstrate that English and Mandarin LC's show significant similarities that open up opportunities for further cross-comparative studies of the two languages.



Lillian Fu

Faculty Advisor: Claudia Haase

Sadness and Anger in Relationship Conflicts and Links with Empathic Accuracy

Sadness and anger are common emotions in relationship conflicts that may have different interpersonal consequences. While sadness predisposes people to seek comfort from others, anger makes people more self-focused. This raises the question of whether sadness and anger are differently associated with empathic accuracy (i.e., the ability to accurately perceive the emotions of one's partner) during conflicts. To investigate this, I used data from a laboratory-based study of 98 heterosexual married spouses from diverse socioeconomic backgrounds. Spouses engaged in a 10-minute conflict conversation and rated the intensity of their own and their spouses' emotions during the conversation.

Sadness and anger were taken from participants' self-rated emotions. Empathic accuracy was measured as the difference between participants' rating of their spouse's negative emotions and their spouse's self-rated negative emotions. I used actor partner interdependence modeling (a statistical modeling procedure that simultaneously models the emotions of husbands and wives) to examine how individuals' sadness and anger relate to their empathic accuracy for their spouse as well as their spouses' empathic accuracy for them. Results showed that experiencing more anger was not related to one's own empathic accuracy but was associated with receiving lower empathic accuracy from one's spouse. Sadness did not show any associations with empathic accuracy when statistically controlling for anger. An exploratory follow-up analysis showed that individuals who experienced more compassion showed greater empathic accuracy for their spouse. These findings provide insights into the role of emotions in empathy in close relationship conflicts.



Sydney Goldstein

Faculty Advisor: Renee Edwards

Motor Abnormality in Infancy and the Later Development of ADHD Symptoms

ADHD is a neurodevelopmental disorder commonly diagnosed in school-aged children, with promising research indicating that earlier identification may be possible. Identifying risk factors for ADHD can enable earlier intervention and mitigate adverse outcomes before they worsen. A growing body of research suggests that children who receive formal school-age ADHD diagnoses exhibit developmental deviations early in life, including atypical attainment of motor milestones. Thus, this study seeks to investigate whether motor abnormality in infancy predicts ADHD symptoms at preschool age. 189 children were recruited as part of the larger “When-to-Worry” Study and followed from 12 to 24 months of age. At 12 months, gross motor development (Mullen Scales of Early Learning) and attention regulation (Multidimensional Assessment Profiles – Attention Regulation Infant-Toddler Scale) were assessed. At 24 months, ADHD symptoms were measured using the Preschool Age Psychiatric Assessment. Using multivariate linear regression, a small but significant predictive relationship was found between gross motor and attention regulation at 12 months, predicting to number of ADHD symptoms at 24 months, $R^2 = .130$, $F(2, 147) = 10.988$, $p < .000$. Though this suggests that the variables are indeed related, it ultimately provides weak support for using early motor abnormalities as a predictor of ADHD symptoms from 12 to 24 months, as a great amount of unexplained variation exists. Future work should examine ADHD symptoms at later ages, when there is stronger evidence for the stability of ADHD symptoms, and gross motor delays at 24 months, when motor atypicalities may be more apparent.



Kiara Hill

Faculty Advisor: Aymar Jean Christian

Analyzing Black Representation in Media

Although America prides itself on being a melting pot, the media portrayed by the country does not reflect its population. White actors portray most characters in American media, and many storylines do not consider the complexities of race. As time has progressed, though, American media has attempted to bridge this diversity gap by bringing more people of color onto the screen. However, is this new wave of diversity authentic, or is it stereotypical, negative, and equally damaging? To investigate this question, specifically regarding the representation of black people in media, I conducted qualitative research alongside Professor A.J. Christian this previous summer. The specificities of this research included creating an Excel spreadsheet of eight streaming services and lists within those streaming services that promoted specific black media to the public. Once I created the spreadsheet, I went through each movie and television show within those lists, watched their trailers, and coded whether that movie or television show promoted black joy or trauma. Once I finished coding, I created graphs of each result and began drafting a report on my findings. The research showed that streaming platforms promote black trauma over black joy, which shows that media, no matter the subject, continues to be created for a white audience. This finding also shows that the portrayal of nuance within the black community continues to challenge the media industry. This research aims to further the argument of diversity and acknowledge that representation is more than tossing people of color onto the screen.



Seela Hinrichs

Faculty Advisor: Jilliana Enteen

The Effect of the COVID-19 Pandemic on the Thailand Transgender Surgery Industry

During the past thirty years, Thailand has become a popular destination for trans*-related medical procedures. Yet, in 2020, the medical tourism industry came to a halt due to the COVID-19 pandemic. My presentation explains the effect of the pandemic on the Thailand transgender surgery industry. I claim that due to the dramatic decrease in non-Thais entering Thailand during the pandemic for trans*-related surgeries, plastic surgery clinics in Thailand were forced to dramatically change their medical practice, shifting their appeal to locals. For this analysis, I utilize a database created by my advisor Dr. Enteen which has recorded all changes in the major transgender surgery clinic websites between the years 1997 and 2022. The different levels of advertising to western audiences can be seen through the website changes. My two-week research trip to Thailand supplements my investigation with physical documentation of the changes to the individual clinics in the form of photographs. Moreover, my interview with a Thai surgeon who works in both private and state Thai hospitals reveals how Thai doctors were forced to change their practices due to the COVID-19 global pandemic. I consider how medical practices in Thailand have changed as a result of the cessation in medical tourism and how these changes have further implications for both Thai citizens and non-Thai transgender individuals.



Ben Hirschboeck

Faculty Advisor: Dayne Swearer

Lighting the Way: Gold Nanoparticles for Sustainable Chemistry

Each year, an enormous amount of energy is used to drive chemical reactions through heat. The clothes we wear, the tools we use, and the food we eat are made possible by this thermochemistry, but these processes tend to be expensive and wasteful in terms of energy. Gold nanoparticles are capable of harnessing the sun's abundant visible light, and when combined with elements used in traditional chemistry, can drive crucial reactions with only light. From pollutant destruction to plastic recycling to fuel production, when it comes to applications, the sky is the limit – and the location of our most renewable energy source. The development and characterization of gold nanoparticles is thus an exciting opportunity to build elegant chemistry for a more sustainable world. In the Swearer Lab, I synthesized gold nanoparticles with readily available chemicals before decorating them with sites of palladium, platinum, iron and cobalt, metals capable of driving a wide variety of chemical reactions. I then assessed the size and composition of these nanoparticles through electron microscopy and various spectroscopic methods. Analysis confirmed that these nanoparticles were consistently sized, capable of absorbing visible light, and in the case of the palladium and platinum trials, hosted sites of the desired metal – making them exciting candidates for the aforementioned reactions. Synthesizing and characterizing nanoparticles such as these is a first step towards engineering useful and sustainable new chemical processes, and by engineering these catalysts, I have uncovered a set of tools in my field with the potential for great impact.



Elena Housteau

Faculty Advisor: Caterina Gratton, Florida State University

The Effects of Spatial Smoothing on Identifying Selective Regions of the Prefrontal Cortex

Functional magnetic resonance imaging (fMRI) is a useful imaging technique for studying the intrinsic functional connectivity of different areas of the brain. However, scans must undergo several steps of preprocessing to reduce the effects of scanner noise and participant motion before being analyzed. One such step is spatial smoothing, in which each vertex in the brain is averaged with its neighbors using a Gaussian kernel to increase the signal-to-noise ratio. However, too much smoothing can obscure small regions of interest within the brain. This analysis aimed to determine the ideal spatial smoothing kernel size to minimize scanner noise but preserve signal to identify distinctive network regions of the lateral prefrontal cortex (LPFC), an area of the brain central to many higher-level functions. For this analysis, a 6 FWHM Gaussian kernel was considered standard and five alternative kernels were tested on a single subject with >100 minutes of reliable resting-state data. A whole-brain surface map was created at each smoothing level to visualize the differences in network organization. High levels of smoothing obscured a small auditory region in the LPFC that is posited to be part of

an interdigitated sensory-biased belt. Additionally, decreasing the kernel size caused the salience network to lose its unique signal and be grouped with other networks. This finding needs further analysis but indicates that there are advantages and disadvantages to decreasing smoothing. This analysis emphasizes the importance of choosing a smoothing kernel size based on the objectives of a study rather than using a standard value.



Sophia Huang

Faculty Advisor: Gregory Phillips II

Analyzing Sexual Risk-taking among Asian American Youth

The model minority myth describes Asian Americans as intelligent and successful people, creating the assumption that they do not need social support. As a result, little research, especially regarding sexual health, has focused specifically on Asian individuals. Additionally, the discrimination lesbian, gay, and bisexual (LGB) people face increases their likelihood of engaging in adverse sexual health behaviors (e.g., substance use during sex). Thus, the intersecting minority identities of Asian sexual minority youth (SMY) combine to create a unique lived experience influenced by a multitude of stress risks. To understand the sexual health of Asian SMY, the results from the 2019 Youth Risk Behavior Survey, a nationwide survey that collects data on health-related behaviors, were analyzed. Utilizing SAS v9.4, associations between age at first sex, condom use, substance use during sex, and HIV testing were explored. Asian youth who reported sex with same sex partners or with both same and different sex partners were significantly less likely to report condom use than those with only different sex partners. Asian youth with both male and female sex partners were also more likely to report using alcohol or drugs at their last sexual encounter compared to those with only different sex partners. While the YRBS dataset does not distinguish between different Asian ethnicities, despite drastically different lived experiences, these findings highlight the fact that Asian SMY are more likely to report sexual risk-taking than their sexual majority peers, illustrating the need for further research.



Allison Kane

Faculty Advisor: Jones Parker

Differential Roles of D1- and D2-Spiny Projection Neurons in Behaviors Associated with the Different Classes of Schizophrenia Symptoms

Schizophrenia is a multi-faceted disorder with three symptom classes: positive (hallucinations and delusions), negative (decreased social engagement and emotion), and cognitive (worsened memory, attention, and executive function). Increased dopamine release from substantia nigra (SNc) dopamine neurons in the dorsal striatum brain region is associated with positive symptoms. Antipsychotic treatments alleviate positive symptoms by blocking D2Rs, a striatal subclass of dopamine receptors,

but are ineffective for negative and cognitive symptoms. The other subclass of dopamine receptors, D1Rs, are not targeted by existing antipsychotics, indicating involvement in negative and cognitive symptoms. We asked whether D1- and D2-dopamine receptor-expressing spiny-projection neurons (SPNs) differentially mediate the disruption of behaviors related to positive, negative, and cognitive symptoms by excess striatal dopamine release. We modeled excess dopamine release in the dorsal striatum by re-expressing the excitatory cation channel TRPV1 in SNc dopamine neurons of *Trpv1* knockout mice. This allowed selective nigrostriatal dopamine release by treating mice with TRPV1 agonist capsaicin. This dopamine release induced hyperlocomotion, reduced social interaction and impaired cognitive ability in the mice. To establish the causal roles of dopamine-driven changes in D1- and D2-SPN activity and negative and cognitive deficits, I have combined this TRPV1 approach with chemogenetic (DREADD) manipulation of D1- or D2-SPNs. We found that chemogenetically activating D2-SPNs in the dorsomedial striatum attenuates capsaicin-induced hyperlocomotion, partially normalizes working memory and has no effect on social interaction. Follow-up studies are underway to increase the number of mice and investigate the role of D1-SPNs in treatment-resistant symptoms, aiming to identify better therapeutic strategies.



Camille Kennedy

Faculty Advisor: Michael Santana, Grand Valley State University

Packing Edge-Colorings of Graphs

One exciting area of study in graph theory is exploring various colorings of graphs. A proper edge-coloring of a graph is a labeling of the edges so that any two edges receiving the same color cannot be incident to one another. A strong edge-coloring of a graph is a labeling of the edges so that any two edges receiving the same color cannot be incident to one another, nor can they be incident to a common edge. In this talk we explore a third type of edge-coloring, a $(1^j, 2^k)$ -packing edge-coloring. A $(1^j, 2^k)$ -packing edge-coloring of a graph G is an assignment of the colors $\{1_1, 1_2, \dots, 1_j\}$ and $\{2_1, 2_2, \dots, 2_k\}$ to the edges in G such that incident edges receive distinct colors and any two edges colored 2_i for the same $1 < i < k$ are not incident to a common edge. A $(1^j, 2^k)$ -packing edge-coloring of a graph can be used as a transition between proper and strong edge-colorings of graphs. We use packing edge-colorings of graphs to approach a conjecture posed by Erdős and Nešetřil about strong edge-colorings from a new direction. In this poster we will present our results on packing edge-colorings for graphs with maximum degree at most four.



Maddie Kerr

Faculty Advisor: Sarah Bartolome

“That’s Me on the iPad!”: Online Individual Music Instruction for Students with Disabilities in a Community Music Program

The COVID-19 pandemic dramatically altered educational settings and practices, presenting novel challenges alongside new technologies for instruction. This ethnographic study examined the impact of a virtual format on the culture of the Academy of Music and Art for Special Education (AMASE), a student organization at Northwestern University through which volunteers provide music lessons to young people with disabilities. The study specifically investigated how the virtual shift removed or imposed disabling environmental factors for AMASE students, applying the social-relational model of disability. As part of a research team, I analyzed semi-structured interviews with volunteers, parents, and students involved in AMASE, along with video recordings of individual and group lessons. The team used an inductive coding process, first coding independently and then consolidating our observations, to identify common themes and points of divergence across the dataset. Our analysis found nuanced impacts of online learning on the AMASE community; while parents and volunteers expressed a loss of connection within their respective groups, the virtual format spurred new partnerships between parents and volunteers and deepened relationships between volunteers and students. Moreover, many AMASE students strengthened their skills and identities as musicians. The virtual format imposed some disabling factors, including technological difficulties, environmental distractions, and communication barriers. However, the online space also facilitated flexibility and creative uses of technology, generating more accessible modes of learning and performance. While many educational programs have returned to in-person conditions, these findings highlight ways in which continuing to integrate virtual elements might contribute to the goal of universal accessibility.



Kevin Kim

Faculty Advisor: Omar Farha

Post-synthetic Modification of SIFSIX-3-Ni with n-Octylphosphonic Acid for Enhanced Hydrophobicity and Water Stability

Reducing the amount of CO₂ emissions from industrial point sources have been a critical challenge to mediate greenhouse effects. While carbon capture and storage (CCS) technology has been seen as a promising solution, there are a lack of adsorbents able to CO₂ emissions from dilute emissions. Metal-organic frameworks (MOFs) have shown excellent potential in carbon capture due to their high porosity, crystallinity, and ease of tunability. In previous studies, SIFSIX-3-Ni was shown to be an excellent MOF for CO₂ capture in low pressure environments with high selectivity at ambient temperature. Due to its small pore size, SIFSIX-3-Ni can sieve through larger molecules while allowing smaller molecules, such as CO₂, to pass into its pores. However, when in contact with H₂O, the framework of the MOF degrades due to strong hydrogen bonding dissociating the chemical interactions between the inorganic nodes and organic linkers. In this work, we have utilized the open metal sites on the surface of SIFSIX-3-Ni to chemically bond polar phosphates through post-synthetic

modification (PSM) methods with the aim to enhance the MOF's hydrophobicity and stability in humid environments. Through our studies we found that due to the small pores of SIFSIX-3-Ni, polar phosphonic acid can successfully adhere to the surface of the MOF with minimal to no defects. The MOF exhibited greater hydrophobicity and water stability compared to its unmodified form while retaining its porosity and CO₂ adsorption. With these results and future studies, we can come closer to making MOFs a viable adsorbent in industrial applications.



Lauren Kim

Faculty Advisor: Melissa-Ann Mackie

Cognitive Performance of Patients with WHO Grade III IDH Wild-Type Glioma vs Patients with WHO Grade III IDH Mutant Type Glioma

WHO grade III tumors are malignant and often recur as higher grade tumors, but mutations in the genes producing isocitrate dehydrogenase (IDH) can greatly affect prognosis. In glioblastomas, patients with the wild type mutation may have 15-18 months to live, but those with the mutant type may have double that time. This study aimed to compare the cognitive abilities of patients with grade III gliomas of different IDH mutation types to those with grade II (low grade) and IV (highest grade) gliomas. We examined 106 patients diagnosed with Grade II, III, and IV gliomas. The group of patients with grade III tumors were separated by their IDH mutation, wild type or mutant. All patients were assessed using the Repeatable Battery for Assessment of Neuropsychological Status (RBANS), and their index and total scaled scores were used for analysis. Though cognitive performance decreased as tumor grade increased, it was also found that within the tumor grade III group, those with IDH wild type mutation scored lower than those with IDH mutant type mutation. These findings suggest that in addition to longer survival, individuals with IDH-mutant tumors may also have a better cognitive prognosis, consistent with other studies. Consideration of the IDH mutation type can inform treatment planning and lifestyle changes. Furthermore, examination of the relationship between IDH mutation type and cognitive functioning may provide further support for considering IDH-mutant grade III gliomas to be lower-grade than the IDH-wild type variety.



Vibhusha Kolli

Faculty Advisor: Courtney Scherr

Understanding Endometriosis Pain Communication Through Provider Perspectives

Endometriosis is a prevalent gynecological condition, affecting roughly 10% of women of reproductive age. Despite its prevalence, receiving a diagnosis for endometriosis can take an average of 7-12 years, and healthcare providers have been identified as a barrier rather than as a facilitator to care. As pain is a subjective yet strong indicator of the condition, understanding how clinicians communicate about endometriosis-related pain is essential for identifying ways to improve patient

care. Therefore, this study employs semi-structured qualitative interviews to investigate how primary care providers (PCPs), the first line of endometriosis care, communicate with patients about the condition and associated pain. The study explored PCPs' methodology of assessment for endometriosis or suspected endometriosis, pain management communication, and self-efficacy in care delivery. Initial findings revealed that PCPs often employ a pain scale, such as rating pain from 1 to 10 and identifying specific descriptors, such as "stabbing" or "throbbing," to gain a better understanding of the patient's pain. In terms of pain management, providers provided clinical recommendations, ranging from over-the-counter medications to surgical interventions, based on their assessment patient pain levels. The interviews also revealed that PCPs desire more knowledge about the pathology of endometriosis to enhance their self-efficacy and deliver better care with confidence. These results highlight the need to understand the effectiveness of using pain scales and descriptors, as well as the importance of disseminating adequate medical information to PCPs. Further results will provide valuable insights into providers' perspectives on endometriosis pain communication and care delivery.



Sophie Konde

Faculty Advisor: David Schieber

How Evanston's Changing Alcohol Laws of the 1970's and 80's Uniquely Shaped the History of Northwestern University's Campus Drinking Culture

Evanston, Illinois houses more than just Northwestern University; it holds a history deeply tied to the Temperance and Prohibition movements. Evanston remained dry nearly half a century longer than the rest of the country, only beginning to legalize the sale of alcohol in 1972. Undergraduate students at the university were thus able to drink legally for only a decade, until the drinking age was increased to 21 in 1979 (Chicago), 1980 (Illinois), and 1984 (nationwide). To better understand how such dramatically shifting alcohol laws influenced and created campus drinking culture, 14 Northwestern alumni from 1972-1984 were interviewed about their experiences. In addition, archival research was conducted on the topic. It was found that the bubble surrounding campus caused by the dry laws isolated the student body and concentrated power among the most privileged. As alcohol was readily accessible, it was an easy and obvious arbiter of social life. Those in control of the alcohol were therefore in control of social life. This gave fraternities a great amount of power, as they were least policed, had the most resources, and maintained a high social status, allowing binge drinking and gender-based violence to thrive unregulated. The situation was exacerbated by anxieties regarding the political climate at the time. Although many institutions such as localities and universities seek to undercut this phenomenon through legislation and regulation, it is important to understand the ways in which such regulation can make the situation worse, as it did in Evanston in the 70s and 80s.



Annette Krol

Faculty Advisor: Robert Harmon

Restoration of Cellular Adhesions in Darier's Disease

A rare genetic skin disease known as Darier's Disease is characterized by a loss of cellular adhesion, which clinically appears as crusts and lesions on the skin. In particular, patients have half the amount of the SERCA2b protein, leading to calcium dysregulation in the cell. However, the mechanism by which abnormal calcium concentrations lead to the diminished ability for cells to stick together is unknown. Understanding these mechanisms is crucial for developing new treatment options. Because SERCA2 proteins have largely similar structures and functions in other tissues, we hypothesized that the same mechanism used to activate SERCA2 in other tissues is plausible in skin cells. Two drugs known to impact SERCA2 proteins in other tissues—Istaroxime, which is used to treat heart disease, and CDN1163, which has been studied in skeletal muscle—were tested. Using immunofluorescence microscopy, the quality of the adhesions in treated Darier's Disease cells was assessed in comparison to healthy age-matched donor cells. While Istaroxime was not found to restore cellular adhesions, treatment with CDN1163 showed improvement in adhesions at cellular boundaries. Overall, this suggests that some SERCA activators are capable of restoring SERCA protein activity, thereby promoting the formation of cellular adhesions. Although CDN1163 is not currently an FDA approved drug, the successful activation of SERCA2b *in vitro* shows therapeutic potential. Such treatments have implications not only for Darier's Disease patients but also for individuals with other conditions that arise from calcium dysregulation.



Angel Lee

Faculty Advisor: Stewart Shankman

The Progression of Stressful Expression: The Relationship Between Age, Stress, and Social Anxiety

Stress, the spice of life, is a well-documented phenomenon that is inextricably linked to many physical and mental factors. These factors include (but are not limited to) age and mental disorders like social anxiety. However, there is little research on how all these factors interact and relate to one another. The goal of my research was to examine the relationships between social anxiety, life stressors, and age. This study is important to examine because stress is experienced differently 1) across age groups (i.e., adolescents and adults) and 2) in socially anxious individuals. Adolescents are not only more impacted by stress than adults are, but they also tend to experience stressors unique to their age group. Additionally, social anxiety worsens the impact and longevity of stress. Moreover, these relationships are essential to understand in order to decrease stress and its negative impact on health. The present study extracts stress and social anxiety data from adolescents (N = 160, Mage = 16.5) and adults (N = 68, Mage = 25.1) from two separate studies. Preliminary findings suggest that social anxiety is linked to certain life stressors, and there are stressors linked to specific age groups. However, the association between age and social anxiety was not predictive of specific life stressors. As of this writing, this study implies that age does not affect which stressors socially anxious individuals are experiencing.



Joanne Li

Faculty Advisor: Dustin D. French

Social Determinants of Health in Community-Dwelling Dementia Patients Aged 65 and Over: Analysis of the 2019 National Health Interview Survey

Alzheimer's Disease and related dementias affect 3.4 million community-dwelling adults in the United States. Given the burden of disease, a greater understanding of modifiable risk factors is crucial for targeted public health strategies. Social determinants of health (SDOH) are factors that influence lifestyle choices, which in turn shape individual dementia risk. SDOH are categorized in five domains: economic stability, education access and quality, healthcare access and quality, neighborhood and built environment, and social and community context. Although individual SDOH have been linked with dementia risk, limited research exists on the interaction of SDOH across multiple domains in the context of dementia risk. Thus, the aim of this study was to evaluate the association between SDOH across all five domains and dementia among community-dwelling adults in the United States. A cross-sectional study utilizing a multivariable regression model was performed on community-dwelling adults aged ≥ 65 years from the 2019 National Health Interview Survey (NHIS). Respondents (N=9,278), of whom 303 (4%) reported positive dementia diagnosis, were predominantly female (55%), white (76%), and non-Hispanic (91%). Residing in a non-metropolitan area, having a usual place for healthcare, and receiving annual eye or dental exams were negatively associated with dementia. Minority compared to white status was not significantly associated with dementia. We present the first comprehensive national view of SDOH among community-dwelling dementia patients in the United States. This study indicates a key health disparity in the NHIS and highlights the necessity of targeted public health interventions to identify and treat dementia in vulnerable populations.



Ilona Lukina

Faculty Advisor: Seth Goldstein

Disparities in Incidence and Outcomes of Pediatric Esophageal Atresia and Tracheoesophageal Fistula

Esophageal atresia (EA) and tracheoesophageal fistula (TEF) are relatively common congenital abnormalities. Previous research has indicated that there are racial differences in the prevalence of EA/TEF and that thoracoscopic surgery may lead to better outcomes. We aim to analyze the incidence and outcomes of EA/TEF in infants of different backgrounds. We retrospectively queried the Pediatric Health Information System (PHIS) database for patients with EA/TEF from 2010 to 2021. We examined rates of EA/TEF in patients of various backgrounds and evaluated the association between race and surgical outcomes as well as the effect of surgical approach (open versus

thoracoscopic) on mortality rate, length of stay (LOS), and postoperative stricture rate at one-year. This yielded 1,207 neonates from 45 hospitals with a median age of 0 days [IQR 0-1], of which 57.0% of patients were male and 57.3% were non-Hispanic white. Within these patients, 88.1% had open surgery, 17.7% had postoperative stricture, and the median LOS was 26 days [IQR 16-50]. We found no significant difference in the rate of open versus thoracoscopic surgery ($p=0.334$), length of stay ($p = 0.750$), or rate of postoperative stricture ($p=0.181$). Black patients had a significantly higher mortality rate of 13.6% ($p=0.003$) compared to white (4.5%) and Hispanic patients (4.4%). These findings suggest that race may influence mortality in EA/TEF surgeries. This study provides valuable insights into the role of race and surgical approach in the management of EA/TEF and further research is needed to investigate the factors that contribute to these disparities.



Luke Malaisrie

Faculty Advisor: Fraser Stoddart

Crystalline Polyrotaxanes

A polyrotaxane (PR) is a mechanically interlocked molecule in the shape of a dumbbell with rings encircling the central rod. The application of artificial molecular pumps (AMP) for the construction of PRs has allowed precise control over the number of cyclobis(paraquat-p-phenylene) (CBPQT⁴⁺) rings threaded onto polymer chains. The upper limit of ring threading, however, has still not been verified for these systems. Furthermore, attempts at the crystallization have not been mentioned. The aims of this research project are to discover the upper limit of the number of CBPQT⁴⁺ rings that can be pumped onto polymer chains of known number average molecular weight and to investigate whether the resulting highly charge dense PRs can be crystallized. An oligomeric analog of the PR, constituted of a central oligoethylene glycol chain (6 units) flanked by two terminally located AMPs, has been synthesized. This molecule bears two rings synthesized by the use of bis(cyclopentadienyl)cobalt(II) as a reducing agent and nitrosonium hexafluorophosphate as an oxidizing agent within a N₂ environment. This oligorotaxane demonstrates the highest ring density on repeating units of ethylene glycol: one ring per three repeat units. The next steps of this project are to attempt ring pumping beyond 2 rings. The most ring-dense oligorotaxane will follow crystallization attempts through vapour diffusion with acetonitrile as solvent and di-isopropyl ether as a supersaturating agent. If successful, molecular pumping may allow crystallization of polymers never captured before; potentially introducing interesting electronic properties from such high-order crystals of PRs.



Shayan Malik

Faculty Advisor: Erica Hartmann

Assessing Limitations of Using Propidium Monoazide to Determine Viable Cells in Microbial Samples

Propidium monoazide (PMA) is a specialized dye that selectively binds to DNA in dead microbial cells with compromised membranes, hindering both the DNA extraction and amplification processes and thus aiding in identifying the number of viable cells in a sample. Despite widespread use of PMA, there is limited research on the appropriate treatment conditions. The aim of this project is to investigate the impact of different storage conditions, namely temperature and wait time before PMA treatment, on the degradation of extracted DNA. Ideally, samples should undergo PMA treatment immediately to most accurately represent the viable fraction. However, for practical reasons, this may not be possible. We are testing the impact of varying wait periods (1 hr, 2 hr, and 4 hr) prior to PMA treatment and storage at different temperatures through refrigeration or room temperature incubation. DNA extraction and qPCR will then be utilized to quantify the amount of viable bacteria in each sample, using *Pseudomonas aeruginosa* PA14 as a model organism. It is hypothesized that the wait period and temperature will impact the outcome of PMA treatment as these factors can affect the physiological state of bacterial cells, such as the growth phase and metabolic activity, impacting the DNA permeability and accessibility. Specifically, it is expected that higher temperature and wait, lead to fewer viable cells detected. This information will be important for interpreting results of microbiological studies that depend on understanding viability, such as measuring the load of viable pathogens on a surface for infection prevention efforts.



Anabel Marre

Faculty Advisor: Danielle Larson

Community-Academic Initiative to Measure and Improve Underrepresented Group Participation in Parkinson's Disease Research

To date, there is a lack of racial and ethnic diversity in Parkinson's Disease (PD) clinical trials, and participants are disproportionately non-Hispanic Caucasian, creating limited generalizability of research findings. It is unclear why there are incommensurate rates of underrepresented group (URG) research participation; lower health literacy and lack of trust have been suggested as contributors. To study this issue, four educational workshops with a total of 92 participants were held at community centers in URG-predominant Chicago neighborhoods. Pre- and post-workshop surveys assessed participants' knowledge of PD symptoms and signs, trust in medical researchers, and willingness to participate in clinical trials. Most participants identified as either African American (35.9%) or Asian (37%), and survey results indicated that overall, community members were trustful of clinical researchers and had positive feelings towards research and researchers' intentions. Participants were most likely to participate in studies that could be done within their homes or offered financial compensation, and they were least likely to participate in studies that involved obtaining biological samples. Notably, very few respondents had ever been asked to participate in a PD clinical trial before

(8.1%). Respondents had a basic baseline understanding of PD, and tremor was the symptom most frequently identified as an early sign of PD (32.6%). These results indicate that URG individuals are more open to participating in PD studies than previously assumed by researchers; community engagement incorporating education on PD and associated studies has the potential to improve awareness of research and increase participation rates.



Kathyayini Mendu

Faculty Advisor: Almaz Mesghina

Efficacy of Emotional Regulation Strategies in the Classroom

The project attempted to understand how helpful different types of emotional regulation strategies were in alleviating stress, maintaining focus, improving motivation, and overall efficacy. The emotional strategies tested were reappraisal and mindfulness. Reappraisal is a strategy where negative events are reframed to be seen in a more positive light. Mindfulness is a strategy where the goal is to observe your thoughts and emotions and let them pass instead of trying to control them. This study is important as it can potentially provide effective strategies for students to mitigate their stress or negative emotions while studying. Furthermore, this study was conducted during the pandemic, which is a unique environment. In the study, a survey was provided to students in a Midwestern University. The survey taught one-third of the participants about reappraisal, one-third about mindfulness, and left one-third as a control. The participants then watched a video and rated the efficacy of the strategies. Their responses were then qualitatively coded and analyzed, and literature was also read to gain a better understanding of the effectiveness of emotional regulation strategies in different contexts. Our results provided mixed findings; some people did not find the strategies effective while others did. Those who did find reappraisal helpful in reducing or reframing stress, and found mindfulness an effective way to reduce distraction. Since this study focused specifically on students in the pandemic, it adds to the current research about students, and studies the unique intersection of the stress of students in a global pandemic. The implications of this study show that emotional regulation strategies may not benefit everyone, but they can be an effective tool in maintaining or improving focus or reducing stress.



Karan Nayak

Faculty Advisor: Netta Gurari

Assessments for Identifying Tactile Deficits at the Upper Extremity of Individuals with Stroke: Preliminary Results of a Scoping Review

Accurate perception of tactile/touch stimuli is essential to perform physical tasks. Upwards of 80% of individuals with stroke have tactile deficits. However, there is currently poor knowledge regarding tactile deficits post-stroke due to minimal focus on sensory deficits and limitations of existing

examinations. For example, approaches for quantifying tactile perception in the human stroke population include behavioral assessments, which require an individual to respond whether a tactile stimulus is felt, and brain recordings/neuroimaging, which indicate whether a tactile stimulus delivered at the finger reaches an individual's brain. Behavioral assessments make it possible to determine whether a tactile stimulus is cognitively perceived. Even so, behavioral assessments have limitations, including that information regarding the processes occurring within the nervous system are not directly made clear. This scoping review summarizes strengths and limitations of existing tactile examinations at individuals' arm post-stroke. Of the 23 articles included, 22 examined tactile perception while the individual's tested arm was passive and 1 while the arm was actively moved by the individual. 17 of the 23 articles were behavioral and 6 were neuroimaging assessments. A potential limitation of currently available tactile assessments is that perception is primarily determined when the tested arm is at rest, and not active, since daily functional activities require perception during volitional movement. In summary, these preliminary findings suggest a need for tactile examinations that more clearly examine stroke-related deficits along the nervous system and accurately represent conditions that an individual with stroke may experience on a regular basis.



Aidan Ocampo and Suhanee Giroti

Faculty Advisor: Shelby Hatch

Environmental (In)Justice: Racial and Socioeconomic Disparities of Heavy Metal Contamination in Chicago

Heavy metal contamination, resulting from immense industrialization over the past four decades, continues to threaten the health of Chicago's residents. More disturbingly, this contamination poses an unequal threat to communities based on race and socioeconomic status. The city's history of discriminatory practices such as redlining and zoning laws result in people of color and lower SES Chicagoans living in areas with a potentially higher rate of contamination. Evidence of these disparities can be visible through the chemical analysis of surface and subsurface soil and water from across the city's diverse neighborhoods. In the current study, we investigated the correlation between the extent of heavy metal contamination, current and historical industries, and the demographics of neighborhoods in the City of Chicago. Our research involved collecting environmental samples, analyzing them for heavy metal content, then using Geographic Information Systems (GIS) software to depict the resulting data in connection with U.S. Census tract data. Analysis of samples collected through previous research by Dr. Shelby Hatch also indicated an already concerning pattern of contamination. The continuation of this research was done through the collection of soil and water samples from 5 identified neighborhoods with contrasting racial demographics and industrial histories. The analysis of the environmental samples was done through the inductively-coupled plasma optical emission spectrometry (ICP-OES) which identifies which heavy metals are present and their concentrations. Our preliminary results indicate a correlation between heavy metal contamination and the percentage of people of color and lower SES.



Atrik Patel

Faculty Advisor: Robin Nusslock

Low Reward-Related Brain Function is Uniquely Associated with the Construct of Narrow Depression

Depression is related with reduced ventral striatum and heightened ventromedial prefrontal cortex activation during reward processing. A growing literature extends these findings to dimensional depression symptoms, which may provide heightened precision to understand how specific symptoms may relate to changes in the brain. Here, we relate the tri-level model of mood and anxiety symptoms to reward-related brain function in individuals at heightened risk for mood and anxiety disorders. Adolescents (N=220, 18-19 years old) completed the monetary incentive delay task during fMRI scanning and questionnaires assessing tri-level symptoms. We regressed comorbid symptoms (general distress), domain specific symptoms (anhedonia-apprehension, fears), and specific depression symptoms (narrow depression) onto brain activation during reward processing (p 's<0.001, $k=10$ cluster size). During reward anticipation, general distress was associated with heightened activation in the ventromedial prefrontal cortex. Anhedonia-apprehension was not associated with wholebrain clusters. Narrow depression was associated with reduced ventral striatum activation. During reward outcome, broad and narrow depression symptoms were associated with altered activation in regions in the frontoparietal and default mode networks. The findings suggest that symptoms common to depression and anxiety may be uniquely related with altered reward activation in the cortex, while narrow depression symptoms may be specifically related with subcortical changes. These results may help future work identify unique changes in the brain that characterize subgroups of depression and anxiety-related diagnoses.



Keely Pickett

Faculty Advisor: Sumit Dhar

How Perception of Hearing Difficulties Changes with Age

Hearing loss in the United States is the third most prevalent chronic condition in adults and grows increasingly common with age, occurring in 1 in 3 individuals over the age of 65. However, the number of people who utilize hearing healthcare is limited. Self-perception of hearing difficulties is the most influential among many factors that influence the low uptake, use, and satisfaction. Therefore, easily accessible self-assessment tools that accurately document hearing changes could be beneficial to increase uptake and usage of treatment. However, limited work exists on how responses to subjective assessments change within individuals over time. Thus, this study attempts to understand if self-assessment questionnaires can capture shifts in hearing abilities over time. Using participants from the Hearing Assessment Reformulation Project (HARP) who had normal-hearing ~10 years ago, this study followed-up with participants in one of two target age-groups (30-40, 50-60 years old) at the time of the first test. Participants completed a case history questionnaire containing the Hearing Handicap Inventory for Adults/Elderly and questions related to hearing status. Results are expected to demonstrate a shift in self-perceived hearing abilities, with greater impacts in the older age group.

The relationship between expected threshold declines and changes in perceived difficulties will be evaluated. This work will add to existing longitudinal research studying objective measurements, as well as provide insight into the trajectory of hearing abilities with increasing age. The results may open discussions regarding when it is best to recommend hearing aids based on perceived hearing abilities or audiometric thresholds.



Andres Polanco Molina

Faculty Advisor: Merida Rua

Gentrification and Gente-Displacement: Community Changes in Small Cities

Current gentrification debates have centered more on the physical displacement of marginalized groups than the sentiment of change these groups have experienced (Davidson 2009, 226). Contemporary comprising these debates focus on big cities, with little attention to how gentrification affects residents in medium or small-sized cities or towns (Nevarez & Simons 2020, 16-17). Through a review of existing literature, this research focuses on gentrification's impact on marginalized people within small cities in the United States, specifically Ecuadorians of Sleepy Hollow, located in the Hudson Valley of New York. While Latines in the United States constitute the largest minority group, they are not a homogeneous one—belonging to many different nationalities, regions, races, and histories. As such, concerted effort must be made to examine how gentrification transforms the neighborhoods in which underrepresented and heterogenous Latine subgroups live. The small, albeit growing, literature reveals emerging themes of how these groups rely on their strong social ties cultivated over time and symbolic nationalism to create community in their *barrios*; however, this is more difficult as gentrification changes the feeling of place in these neighborhoods. These themes frame gentrification as violently hindering future Latine community building, especially within underrepresented groups.



Emma Rens

Faculty Advisor: Stacy Benjamin and John Anderson

Promoting Operating Room Sustainability Through a Novel Seal Design For Laproscopic Trocars

The healthcare industry, specifically operating rooms, have an immense impact on the climate crisis, with the waste generated accounting for 10% of all US greenhouse gas emissions. While it is important to prioritize patient outcomes, this waste is contributing to a catastrophic public health crisis. Laparoscopic surgery is a minimally invasive surgical technique that employs ports, known as trocars, through which surgeons manipulate instruments. Trocars are responsible for maintaining the required inflated gas pressure of laparoscopic surgery and surgeons must match trocar size to the surgical instrument to maintain the pressure. With many different sized instruments being used, often trocars

are replaced multiple times during a procedure to fit the new instrument. With approximately 15 million laparoscopic surgeries taking place in the US each year and at least 3 trocars being used per surgery, there is an incredible amount of waste generated from using single-use trocars. While reusable trocars exist, surgeons are hesitant to switch due to required sterilization and precedence. This project aimed to design a seal accessory to fit on the head of reusable trocars to increase their versatility with differently sized surgical instruments while maintaining sufficient gas pressure and minimizing friction. The seal cap is a flexible, reusable, surgical grade nitrile cap designed to be placed over the top of existing reusable trocar heads incentivizing surgeons to forego operating time wasted switching out trocar sizes while simultaneously promoting adoption of reusable trocars and sustainable practices. The seal cap geometry, thickness, leaflet number and leaflet size were all selected using friction and leakage testing models.



Jade Ross

Faculty Advisor: Onnie Rogers

Race Conversations: Exploring Whether and How Black and White Parents Talk with Their Children about George Floyd

Previous research has found differences in the content of race-related conversations led by Black and white parents (e.g., Rogers et al., 2021; Sullivan et al., 2021). With increased emphasis placed on the importance of race and racism related conversations following the murder of George Floyd and subsequent racial protests in the summer of 2020, we investigated whether and how Black (n=343) and white (n=371) parents spoke to their 8–11-year-old children about George Floyd in the months following his murder. Our primary research questions were: Did Black and white parents talk with their children about George Floyd? What reasons did Black and white parents give for choosing to talk/not talk with their children about George Floyd? Overall, 77.45% of parents (n=553) reported having conversations about George Floyd. While there wasn't a significant difference between Black (n=275) and white (n=278) parents who had these discussions, there were considerably more white (n=96) than Black (n=65) parents who chose not to speak about George Floyd with their children. The most common reasons parents gave for avoiding conversations about George Floyd with their children were: *not appropriate*— where parents felt the subject matter was inappropriate for children, *emotional distress*— where parents believed their children were too emotionally/mentally fragile to have the discussion, *age*— where parents decided their children were too young to talk about George Floyd, and *lacks initiative*— where parents mentioned that their children didn't take the initiative to ask about George Floyd.



Christopher Sollenberger

Faculty Advisor: Samuel Stupp

Evaluating Chondrogenic Potential of Chondroitin Sulfate Mimetic Peptide Amphiphiles

Articular cartilage degeneration is one of the leading causes of pain and disability for people over the age of 65 in the developed world. One of the most common treatments for articular cartilage degeneration is autologous chondrocyte transplantation, a treatment plagued with problems—such as long recovery times—that negatively affect clinical outcomes. Chondroitin sulfate (CS), as an important glycosaminoglycan component in extracellular matrix, plays a protective role by interacting with growth factors such as TGF- β 1. Here we synthesized a class of self-assembling molecules that are functionalized to mimic the chemical structure of CS and applied as biomaterials to potentially improve the outcome of chondrocyte transplantation. Three differentially sulfated *N*-acetyl galactosamine (GalNAc) peptide amphiphiles (PAs) were used to decorate the surface of human chondrocytes to enhance the interactions with growth factors. To examine whether these PA cell coatings enhance functionality of chondrocytes, western blots were performed to characterize the expression of various chondrogenic factors including CD44, Sox-9, Collagen II, and Aggrecan. Moreover, confocal imaging was used to confirm the presence and efficiency of the PA cell coating. Initial results confirm the presence of PA coating after four days. Furthermore, preliminary examination of PA treatment in solution demonstrates that the PA treatment enhances chondrogenic activity of treated chondrocytes after three days. More *in vitro* evaluation of the biological efficacy of PA coating in stimulating chondrogenesis is ongoing. This work will motivate future *in vivo* studies to evaluate the use of PA cell coatings for clinical use in autologous chondrocyte transplantation.



Eden Stargardt

Faculty Advisor: Isabel von Holt

The Lasting Legacy of a Divided City: *die Berliner Orchester als Mikrokosmos für Deutschland in der Wendezeit*

For my thesis and independent research project, I am studying the impact of the Berlin Wall and divided Germany on the orchestras within the city. When the Berlin Wall fell on November 9th, 1989, a formerly-divided city was suddenly reunited – however, a distinct separation remained between who and what belonged to the former East and the West. There was a visible, public unification that was displayed through public celebrations, concerts, and performances: there were many performances publicly representing a unified Germany. However, my research investigates the more subtle aspects of reunification that were not on display. Almost all pre-existing music research surrounding the impact of the German Democratic Republic (GDR) has been related to popular or rock music. I am most interested in the impact of the fall of the Wall, focusing specifically on the period of transition from 1988 to 1991. This was a time of great change within German society, and I am working to see how exactly the performance of classical music within the city was impacted. My research contributes to bridging the gap in knowledge, as most of the archival materials on this subject are only available

in Germany and are written in German. My project contributes to making this topic more accessible to non-German speakers and will hopefully extend the scope of research on this topic.



Skyler Stone

Faculty Advisor: Erik Andersen

Genetic Benzimidazole Resistance in *C. elegans*

Parasitic nematodes pose a huge burden on the health of both humans and livestock, ultimately impacting billions of people each year. To treat these infections, anthelmintic drugs are often used, with the primary treatment being benzimidazoles (BZs). Resistance to the two most prescribed BZs, albendazole and fenbendazole, is rapidly evolving in parasitic nematodes. It is imperative to investigate the genetics behind this drug resistance. Benzimidazoles work by targeting and binding to beta-tubulin in microtubules, a vital part of the cytoskeleton, restricting the lengthening of the microtubule called polymerization. Beta-tubulin is partially encoded by *ben-1*, which has been previously correlated with resistance to BZ. There are five other genes that are involved in encoding beta-tubulin: *tbb-1*, *tbb-2*, *tbb-4*, *tbb-6*, and *mec-7*. In this study, the model organism *C. elegans* was mutated using CRISPR-Cas9 with a knockout of each of the genes identified above in either a wild-type laboratory strain (N2) or in a strain already lacking *ben-1* (ECA882) for a total of 12 mutant strains. These mutant strains will be exposed to various concentrations of BZs. It is predicted that mutants with a *ben-1* deletion will be more resistant to BZs than mutants with the N2 background. Within the N2 background, *tbb-4*, *mec-7*, and *tbb-6* are unlikely to influence resistance because *tbb-4* and *mec-7* are expressed in only neuronal cells that are involved in chemo- and mechanosensation and *tbb-6* is likely to be a stress-resistant tubulin. This study will further drug development for parasitic nematode infections by helping to identify how anthelmintic drugs can be most efficient against spreading resistance.



E-D Tadese

Faculty Advisor: Sylvia Perry

Identifying Factors that Impact the Retention of Racial Minorities in Pre-Medicine

Black, Hispanic, and Indigenous physicians are largely underrepresented in healthcare. Prior research has found that patients who are racial minorities received more effective care when they had a doctor of the same race. Thus, it is important to understand the factors that contribute to these racial disparities. In the current study, we examined which factors predicted Black, Hispanic, and Indigenous pre-medical students' intentions to attend medical school. We specifically focused on PWIs because they make up the vast majority of U.S. institutions, however, racial minority students may also face decreased belonging and discrimination at these institutions. We examined the impact of four factors: lack of belonging, premedical course difficulty, life demand of courses, and racial microaggressions on 42 undergraduate Black, Hispanic, and Indigenous premedical students attending PWIs. In

correlational analyses, we found that course track difficulty and racial microaggressions were negatively correlated with plans to attend medical school, such that URM students who found courses to be more challenging and experienced greater racial microaggressions at school had lower intentions to pursue medical school. There were no significant associations between lack of belonging and life demand on students' intentions. These results reveal the need for primarily white institutions to provide more inclusive and supportive learning environments to help URM pre-medical students thrive and succeed. Future studies should aim to implement such interventions.



Joanna Tasch

Faculty Advisor: Lilah Shapiro

The Holocaust as an Interpretive Framework: American Jewish Interactions with Contemporary Social Injustice

The Holocaust remains a meaningful part of contemporary Jewish identity throughout the United States, shaping how many American Jews understand themselves and their place in a modern world that remains plagued by injustice. This project aims to understand how the American Jewish community interacts with the use of the Holocaust as an interpretive framework through examining how the American Jewish community invokes or rejects comparisons between the Holocaust and contemporary political issues. This study used the grounded-theory method of qualitative research to analyze online newspaper articles, website pages, speeches, and online public statements from American Jewish individuals, organizations, and museums which invoke or reject comparisons between the Holocaust and contemporary social injustice. The project focuses on five case studies where the Holocaust framework was invoked or rejected: Arizona's use of cyanide gas for death penalty executions, discussions surrounding ICE detention centers, the Israeli-Palestinian conflict, the pro-life movement, and protests surrounding COVID-19 regulations. Findings reveal that those invoking the framework believe using Holocaust comparisons brings visibility to the injustice, inspires activism, helps embody principles of "never again," and helps us learn from the lessons of Holocaust history. Those that reject the framework find that Holocaust comparisons are offensive, antisemitic, uneducated, take focus away from fixing the injustice, and are a form of Holocaust distortion/denial. This study suggests that interacting with the Holocaust as an interpretive framework gives the American Jewish community a personal stake in political activism, and that perceptions of the framework depend on political opinions toward the contemporary injustice.



Desta Tewabe

Faculty Advisor: Michelle Driscoll

Colloidal Synthesis and Ferrofluids

To address targeted applications, such as drug delivery and customized inks, we must create materials with a controlled shape and accuation method. An ongoing project in the Driscoll lab is to design a multistage mix-and-melt reaction that synthesizes magnetic particles in such a way as to control their shape and the relative orientation of their dipoles. My research focuses on synthesizing the colloidal components of these particles. I have synthesized hematite cubes of various sizes, and both negatively- and positively-charged polystyrene using the initiators potassium persulfate (KPS) and AIBA, respectively. I have determined how experimental parameters such as mixing time and revolutions per minute (rpm), styrene monomer concentration, and initiator concentration effect the size distribution the polystyrene particle spheres. I have also fabricated anisotropic by dispersing negatively-charged polystyrene colloids into a polyvinyl alcohol (PVA) gel, and then stretching it, allowing me to make particles with a controlled aspect ratio. In order to characterize these particles and how various parameters influence particle size distribution, I analyze the size distribution of both the unstretched and stretched polystyrene particles by constructing a histogram using the data gathered from the SEM images.



Teresa Truong

Faculty Advisor: Megan Morris, Lawrence Livermore National Laboratory

Parasitic Bacteria and Their Effect on Carbon Capture by Biofuel-Relevant Microalgae

Improving algal cultivation practices is important for the expansion of biofuels as a renewable energy source. One biotic threat that limits algal growth is parasitic bacteria that can cause algal death and crash entire cultivation ponds. My research project questions whether certain bacteria can influence parasite activity, specifically whether the addition of mutualistic bacteria can dampen the algicidal effects of a parasitic bacterium. To accomplish this, I grew algae with a bacterial community containing a *Rickettsiales* bacterial parasite that kills algae through cell attachment and lysis, and co-cultured that with or without a mutualist bacterial community. I tracked general algal growth over seven days through fluorescence readings; while all cultures crashed by day 7, one bacterial community delayed the parasite's algicidal effect compared to the control group. DNA sequencing revealed the bacterial taxonomic composition in each co-culture, and the order *Chitinophagales* was overabundant in the delayed community but absent in the algae-parasite co-culture. Our previous work has established *Chitinophagales* as a mutualist of algae, and microscopy revealed that its filamentous resembles a bridge between algal cells, which we hypothesize may provide a physical or chemical barrier protecting algal cells from parasite invasion. Future work will investigate the mechanisms underlying these observed results. Overall, this work demonstrates that system dynamics can affect host-parasite interactions, better characterizing species interactions in an ecological context. Through our enhanced understanding of biotic interactions, we hope to improve current algal cultivation practices to produce economically viable algal biomass as a renewable bioenergy source.



Elizabeth Vazquez

Faculty Advisor: Kelly Wisecup

William Jones: A Narrative History

William Jones (Meskwaki), the first Indigenous person in the United States to receive a PhD in Anthropology, has often been relegated to the background of the anthropological institutions that he contributed to, such as the Field Museum. In academic discourse, most conversations about non-white people contributing to the Field focus on their labor during 1893 Columbian Exhibition. What of the people who remained within these institutions during the Museum's early years, like Jones? He exists in scholarship mainly in discussions of his field work, leaving questions about his time physically at the Field Museum. This research project, funded by the Summer Undergraduate Research Grant in Native and Indigenous Studies, aims to build off existing work by scholars such as Kiara Vigil by simultaneously recontextualizing Jones' story and grounding him in the physical space of Chicago. By combining critical readings of works about Jones, such as biographies, with his few remaining personal writings, one can get closer to Jones' story on his own terms. My work resulted in a public facing essay within Northwestern's Archive Chicago, a place-based digital project aiming to treat the city itself as a historical archive, alongside annotations of a 1909 map of Chicago that includes Jones' home address. Further independent research will contend with other narratives of marginalized intellectuals who worked within early twentieth century museums and anthropological institutions, creating a sound legacy for young professionals of color who seek to enter and better the world of museums and public history.



Anastasia Wei

Faculty Advisor: Adam Miller

Building Unprecedentedly-Sized Sample of Type Ia Supernovae Discovered by Zwicky Transient Facility (ZTF)

The super-luminous explosive death of a star known as a supernova is one of the most exciting and dramatic events in the universe. Type Ia supernovae (SN Ia), a particular type of them, are especially valuable in the precise measurement of the universe's expansion due to their consistent evolution of their brightness over time. Despite their significance, their exact formation methods remains a mystery. One promising method for discerning their formation methods involves analyzing early observations of these events. My project aims define a sample of SNe Ia discovered by the Zwicky Transient Facility that has observations within a few days after explosions. Through model fitting and subsequently perform a series of analyses on this sample, we hope to investigate the progenitor systems of SNe Ia. The largest existing sample of SNe Ia with early observations consists of 127 SNe Ia reported in 2019. My project will update and complement this sample to build the largest sample

ever with additional data collected between 2019 to 2020 from ZTF to form a uniform sample of high-quality light curves (plots of brightness over time) of young SNe Ia. We identified 932 young SNe Ia and confirmed crucial role that early observations play in distinguishing between potential formation channels for SNe Ia using light curve simulations. Further calibration are currently being conducted on the this sample in preparation for the upcoming data release.



Kennedy Williams

Faculty Advisor: Sumitrajit Dhar

Using Sounds Generated by the Ear to Diagnose Ear Problems

Otoacoustic emissions (OAEs) are miniscule vibrations that originate after the onset of an auditory stimulus from the cochlea and travel out to the ear canal. These OAEs can be recorded using a sensitive microphone, where they're used in research to understand the physiology and in clinics to determine the health of the inner ear. Distortion product otoacoustic emissions (DPOAEs), evoked by presenting two tones of different but intentionally related frequencies, have many clinical applications such as in universal newborn screening for hearing loss. However, the clinical utility of DPOAEs remains restricted. Only a fraction of the human hearing frequency range is evaluated in current clinical protocols, primarily because the systematically changing mechanical properties of the cochlea have not been considered in designing the clinical protocol. This project seeks to expand considerably the power of DPOAEs as a diagnostic tool by evoking the DPOAE response across the entire cochlear length. More specifically, the project seeks to maximize the DPOAE response from individuals with normal hearing while simultaneously remaining sensitive to even mild hearing loss. Our laboratory has recently designed a test protocol where the frequency ratio between the two stimulus tones is altered to match the varied mechanical properties of the cochlea. Our goal is to evaluate the clinical accuracy of this new protocol by comparing test results between ears with normal and abnormal function. Analytic methods utilizing a confusion matrix and receiver operating characteristic curves will be utilized to compare the performance of the new protocol against the current standard.



Morgan Willison

Faculty Advisor: Eli Kean

How Do Transgender and Non-Binary College Students Define “Having Sex”?

Existing scholarship studying personal definitions of ‘having sex’ overwhelmingly relies on a strict gender binary and the conformity of bodies to cisgender norms. The current study aims to expand upon existing scholarship by asking transgender and non-binary college students how they define ‘having sex’, and what factors influence their definition. The researchers conducted individual interviews, asking open-ended questions, and used qualitative analysis to identify insights and common

themes. Findings illuminate how participants' gender identities impact their sexual experiences. Notably, participants based their definitions on the type of relationship or connection between them and their partner(s), while others used the actions performed, goals achieved, or simply the experience of sexual pleasure. The current study has implications for sex education curriculum, medical inquiry into sexual behavior, and improving how colleges support students' sexual well-being.



Yao Xiao

Faculty Advisor: Mark Beeman

The Role of Insight in Mathematical Problem-Solving

People sometimes gain a sudden idea through insight after being stuck on a problem. Researchers have been studying insight as a crucial component of creative problem-solving in the past decades. However, the role of insight in mathematical problem-solving remains unclear, while mathematics is essential in scientific development and ubiquitous in everyday life. In the current study, 46 Northwestern undergraduates used a note-taking application on an electronic tablet to solve mathematical problems. To understand how the solving process unfolds, we adapted the “experience sampling” procedure. The experimenter instructed the participants to report their experience of insights by drawing exclamation marks along their writings. If they found an answer to the problem, they reported how confident they thought their answer was correct. The materials used were from real-life mathematical educational resources with high solving rates and low familiarity to college students, selected based on a preliminary study (N=20). We predicted that 1) insights occur when people solve mathematical problems, possibly more than once within a single problem; 2) insights are positively associated with (correctly) solving rates and confidence levels in the correctness of the solutions. The results support these two predictions, and the association between positive outcomes (solving rates and confidence in the solutions) and insight aligns with previous literature on classical insight problems. This study does not only contribute to our understanding of the mental processes underlying mathematical thinking but also sheds light on how insight plays a role in one important type of real-life problem-solving.



Jason Yang

Faculty Advisor: Netta Gurari

Development of an MR-Compatible System to Assess Force-Dependent Neural Activity

The sense of touch is critical for humans, as effective object manipulation requires accurate tactile perception. To better understand the associated neural processes, functional magnetic resonance imaging (fMRI) during tactical stimulation can identify how tactile signals travel within the central nervous system. While magnetic resonance (MR)-compatible stimulators exist, most deliver electrical, vibrotactile, or air puff stimulation. There is a lack of stimulators that provide constant forces

resembling the natural grip forces used in object manipulation. Thus, we developed an MR-compatible system to deliver accurate, localized, repeatable, and automated constant-force stimulation to the fingertip. Our custom device is pneumatically actuated and interfaces with the palmar aspect of the right index finger. Forces were delivered at three perceptually distinct levels (Low, Medium, High), and we identified the resulting neural activity in five participants using fMRI. The mean \pm standard deviation of the force magnitudes for Low, Medium, and High were 1.572 ± 0.737 N, 5.148 ± 0.308 N, and 11.597 ± 0.270 N, respectively. When applying the forces to the fingertip during fMRI, activity was observed in the contralateral primary somatosensory cortex, bilateral secondary somatosensory cortices, and ipsilateral premotor cortex. This study demonstrates the efficacy of our MR-compatible system to deliver discrete magnitudes of force and elicit activity in brain regions previously identified in relevant literature. Future work can use this system to better understand the neural response to force stimulation in various populations, such as individuals with stroke.



Grace Yu

Faculty Advisor: Shelby Hatch

Environmental (In)justice in Chicago: Racial and Socioeconomic Disparities of Heavy Metal Contamination in Chicago

Environmental injustice occurs when pollutants become disproportionately concentrated in low income and marginalized communities due to health inequities and discriminatory policies. Higher levels of heavy metals can lead to increased risk for cancer, respiratory illnesses, and metal poisoning. In Chicago, redlining and discriminatory zoning ordinances have led to increased industrial use and higher density zoning in minority communities, resulting in heavy metal contamination that negatively impacts the health of Chicago's marginalized residents. Environmental disparities can be observed by analyzing the surface and subsurface soil of Chicago's neighborhoods. Geographic Information Systems (GIS) has great potential in terms of mapping the environmental injustices in Chicago's marginalized neighborhoods. The goal of this study was to investigate a correlation between heavy metal contamination and racial, socioeconomic disparities across Chicago. Our research involves collecting soil samples, chemically analyzing samples to determine the level of contamination, and then using GIS software to map the data in conjunction with racial, socioeconomic, and other demographic data. Building on previous research done by Dr. Shelby Hatch and former research assistants, soil samples were collected from neighborhoods in Chicago that lacked environmental data, including areas from the South Side and the Northwest regions of Chicago. The samples were analyzed using inductively-coupled plasma optical emission spectrometry (ICP-OES), which identifies any heavy metals present as well as the concentrations of the metals. Current results indicate a correlation between heavy metal contamination and the percentage of people of color and socioeconomically disadvantaged individuals in Chicago's neighborhoods.



Roy Zhu

Faculty Advisor: Michael Rodríguez-Muñiz, University of California Berkeley

Towards Digitization: Humboldt Park and the PRCC's Community Archive

The work of community archivists to reclaim the archive from its colonial underpinnings has led to the development of accessible and sustainable methods for stewarding community records. In Humboldt Park, the Puerto Rican Cultural Center (PRCC) has begun digitizing its many records, which chronicle the political and social life of the PRCC and Chicago's Puerto Rican community over 50 years. This work is vital to preserving community legacy amid gentrification. Last summer, I worked with the PRCC to lay the groundwork for a digitized community archive. I wrote an annotated bibliography that indexed existing literature on digitization of community archives, created a spreadsheet documenting community archives in Chicago, wrote a report on effective web design strategies for community archives, created an incomplete timeline of previous efforts to archive the PRCC's materials, and helped sort and move records prior to digitization. Creating the bibliography and spreadsheet helped establish valuable context for the PRCC's work, providing a theoretical framework for digitization as a mode of communal custody while also establishing knowledge of other local archival projects. I created a framework for evaluating digitized archives based on content and user experience and outlined five main areas of focus for archival web design. Efforts to create a timeline of PRCC's archival efforts highlighted a need for greater input from community members and more innovative ways to honor community historians and storytellers. Looking forwards, we hope to address how the structure of a website can embody community frameworks for sustainable access and care of history.



∞ Creative Arts Festival

∞ 12th Annual Creative Arts Festival

Eli Civetta and Christina Warner – *Emcees*

PERFORMANCES:

Megumi Oishi – *Confidentiality Antonym* (Poetry)

Safin Hasan – *Wingman* (Short Film)

Isabella Brown – *Behind this Flesh (Excerpts)* (Poetry)

Ginny Lee – *Inkling* (Short Film)

Lalla-Aicha Adouim – *Industry* (Poetry)

Jesse Vela – *Imago Nana* (Short Film)

Abdullah Imran – *Partlence* (Documentary)

Noah Rabinovitch – *Florida Man* (Creative Writing)

Ysa Quiballo – *an arm's reach* (Video Essay)

Nick Leahy – *Ciel's "PHARAONIC WOES"* (Music Video)



Professional Jury

AJ Links, Paskal-Rudnicke Casting

Maris O'Tierney, Poet-Musician

Mickie Paskal, Paskal-Rudnicke Casting

Joey Slotnick, Actor



Stage Manager

Gemma DeCetra

Megumi Oishi

Faculty Advisor: Brent Huffman

Confidentiality Antonym (Poetry)

Confidentiality Antonym is a poetry collection about things that I would love to say aloud, but can only write, for fear of any consequences that may come from it (disapproval, rejection, etc.) Hence, the title — this collection is the opposite of confidentiality, but only in the written form. I have pulled two of my favorite pieces from the collection to share.

Racehorse is a poem about the experience of being an athlete under poor sports management/coaching. It aims to detail the toxic culture of mistreatment, rejection, and isolation in the wake of an athlete's downfall through the metaphor of a racehorse being euthanized for an injury.

Daphne on the Wreath is a story about sexual assault, alluding to the Greek myth of the nymph Daphne and the god Apollo. Daphne is turned into a laurel tree by her father, Peneus, as she tries to escape Apollo's advances. Apollo then takes the laurel leaves and makes it his emblem, which to this day is used as a symbol of victory in Olympic ceremonies. This irony symbolizes how sexual assault usually goes unpunished and how only the victim is left to suffer the consequences.

The sentiments of both pieces have never been vocalized aloud to the people that the pieces are about. These pieces symbolize things that can never actually be said in person, but the courage that is found to write it out and present it.

Safin Hasan

Faculty Advisor: João Queiroga

***Wingman* (Short Film)**

“Wingman” is a short film that illustrates the dynamics of various everyday emotions experienced by young adults exploring the complexities of relationships, emotions, and the human psyche. As the story unfolds, the protagonist, finds himself feeling increasingly isolated and betrayed by his friend, who starts to show interest in the girl that he likes. Protagonist struggles to reconnect with his friend and their mutual love interest, all while slipping into multiple realities that blur the lines between fantasy and reality. I played with the concept of parallel storytelling, often used in thriller films to show his gradual disconnect with reality. Drawing inspiration from non-linear storytelling in thriller films and the limerence of romantic comedies, I tried to experiment by combining them to create an immersive experience of distorted reality for the audience, the exact same emotion the protagonist is also experiencing. Introducing the non-linear narrative towards the middle of the film, establishing the stark contrast in protagonist's imagination and reality, and ending the film without confirmation on the true reality is how I tried to introduce reality distortion in my film.

Isabella Brown

Behind This Flesh (Excerpts) (Poetry)

Behind This Flesh is a reflection on our culture of violence, both in life and in media, especially related to women. In exploring how true crime is delivered to audiences, I express how victims are reduced to less than human in many ways: into statistics, examples, or objects. I speak to the lives they had before they became spectacles, and how the spectacles cause even more fear for the women seeing them. Additionally, I navigate living in this same world as a woman, constantly afraid of violence, as well as in Latin American countries, where governments ignore and invalidate their women's pleas for protection against disproportionately violent, personal, and frequent attacks and killings. How are we meant to feel free in a world where we can be hurt at any moment, where we're constantly reminded of this reality by both media and personal experience, and where, if the worst happens, we'll be remembered only as that worst moment? These are some of the biggest questions this piece asks. There is rage and despair here, but there is also strength and resolve.

I am very familiar with true crime media as a whole, so I began with that foundation. My research started with the history of the true crime genre, then shifted to critiques on consumption and production of sensationalized materials about violence. Another large part of my research covered the increasing femicides and violence against women in Latin American countries, and that was supplemented with research on familial origins of violence and the human nature of violence. Early on in the writing process, my boyfriend was randomly attacked at a CTA station. Despite one draft resulting from my reaction to this event, I believe this incident scared me enough that writing about how violence in the world affects me personally became challenging. I didn't effectively broach the topic again until my advisor and I felt the project was lacking in my presence. I finally approached my feelings about this head-on and wrote many important parts of my piece, including the closing poem. Additionally, I must mention two books I took specific artistic inspiration from, as I'm so grateful for the influence they had on my piece: Maggie Nelson's *Jane: A Murder* and Zining Mok's *Orchid Folios*. Overall, with this project I seek to increase awareness of victim erasure, bring attention to systemic violence and the fear that permeates our lives because of it, and inspire effort to respect women's experiences and end patterns of violence.

Ginny Lee

Inkling (Short Film)

Grace goes to visit her old friend Gemma, a successful up-and-coming artist, after hearing that she has suddenly announced an early retirement from her art career. Grace, a fellow artist who has lived in mediocrity for quite some time, is baffled by the news. Gemma is reluctant to let Grace in, but as she pries, Gemma gives in. During their encounter, Grace tries to figure out what makes Gemma's art so successful but notices Gemma's nervous and withdrawn behavior, which becomes increasingly evident when she refuses to let Grace go upstairs to her studio. There, she is met with a giant canvas covered in a sheet stained with a dark liquid. The canvas is uncovered to reveal a disturbing painting that is dripping with the liquid. Grace realizes that Gemma is afraid of this room because this ink-like substance has consumed both her and her art. Believing that this pain is what fuels Gemma's creativity, Grace locks her in the room as Gemma begs to be let out.

This film was created with the intent of deconstructing the Tortured Artist trope, exploring this from the perspective of an artist and an observer. Many films featuring this trope show the tortured artist character giving into their suffering, and their demise is seemingly self-inflicted as they lean into it, actively chasing after it for the sake of their art. This suffering is something they strive for, proving to be fruitful for their artistry in the end. However, there are few questions about what the consequences of long-term suffering might be. As long as an artist can produce a commendable work of art, the person can easily be discarded, left to be devoured by their own creation.

I wanted to tell a story about the barriers that can result from attempting to escape this perception. How do we knowingly or even *unknowingly* contribute to upholding this?

Inkling portrays the main character, Gemma, as an artist who is trying to break out of this tortured artist mold. Ultimately, it is Grace that tries to force Gemma back into a dark place to continue her art. The character of Grace reflects the societal role of enforcing the glorification and romanticization of mental illness in the context of art and creative pursuits.

I hope to convey that perhaps there comes a moment when one realizes that the best choice is to heal. To wonder if beauty in creation can develop even further following a period of healing, rather than from suffering.

Lalla-Aicha Adouim

Industry (Poetry)

This poem explores a twisted, dark version of Hollywood in the 1930s, where actors were rising as gods and nights were spent partying. Inspired by the movie *Babylon*, the story is told from the perspective of a once innocent admirer, who was sucked into the alluring world of gods and glamour. It's not an easy hold to break, because we naturally love beautiful things, we are oddly gravitated towards what's toxic and poisonous. This poem is an exploration of that ideal, and why human nature may crave that allure.

Jesse Vela

***Imago Nana* (Short Film)**

This medley of music videos is the punching bag for my sore fist, when I feel like a raging bull in the ring. Whatever its due from, wherever it comes from, whether real or not, it is all recorded and written for some semblance of tangibility. A tangibility besides myself.

Abdullah Imran

Faculty Advisor: Marco Williams

Partlence (Documentary)

Partlence is an archival documentary highlighting the 1947 Partition of Pakistan and India. Almost 15 million people were displaced during this migration, and many were murdered while crossing the border. The film uses oral accounts of survivors of the Partition with personal and archival footage to tell the story of one of the most horrifying partitions. This film uses survivors of the Partition and uses their voices as the story of the violence and trauma they faced. The film's approach emphasizes the emotional toll of the event, documenting how the Partition affected the lives of millions of people and the subsequent breakdown of communal harmony. The film concludes by reflecting on the pre-Partition society, where people of different religions lived together peacefully without any hatred, and how the Partition changed everything. Partlence uses abstract and archival footage to intensify the oral accounts and add a unique perspective to the existing knowledge of the 1947 Partition. By telling the story through the eyes of survivors, the documentary provides a deeper understanding of the human cost of forced migration and communal conflict.

Noah Rabinovitch

Florida Man (Creative Writing)

This reading is a few poems from my undergraduate thesis in creative writing, titled “Florida Man.” Florida Man is a meme, or monolithic internet celebrity widely circulated in early 2000’s clickbait journalism. After a series of headlines listed an anonymous “Florida Man” committing a variety of chaotic and often humorous crimes throughout South Florida, his identity began to blur together. Left out of these articles though is the very real history of gun violence, sex trafficking, and racial injustice in Florida’s pleasure driven tourist economy. The larger collection seeks to complicate the idea of who a Florida Man is, a nameless person likely without access to education, fresh food, or healthcare; and re-center the Men in Florida who cause actual harm to actual communities.

The poems selected for this exhibit have to do with Florida Man’s relationship to storytelling, and literature in general. As a character conjured up by clickbait journalism, his wider narrative has deflated the journalistic integrity of stories of loss, violence, and advocacy in Florida. Storytelling can be silly, weird, and random while still having a very real impact on the identities and communities it mentions. Those same narratives can have just as serious implications on the people and places they exclude. By weaving his narrative into the works of more canonical figures in English literature and global journalism, I hope to reposition the integrity of digital media.

Ysa Quiballo

an arm's reach (Video Essay)

Emotionally, the appeal of the word “home” draws from people’s personal utopias of nostalgia, but as the definition goes, it is simply what we return to at the end of the day. It’s the things we believe to be true or untrue about ourselves, the way we live or don’t live inside our bodies, and the compassion or lack thereof that we offer ourselves. The connotations of returning home are packed with themes of victory, rest, and self-discovery, but if one has grown accustomed to abstraction, disembodiment, and self-hatred, returning home then carries a distorted version of comfort as it is found in danger instead of safety.

In this video essay, I explore the ways in which I return to and leave the homes I have belonged to in the context of how I engage and disengage with my body. Concepts include academic efforts as a form of self-imposed work abuse, others’ perceptions as a form of self-abstraction, pride as a form of self-harm, clothing as a form of disembodiment, eating disorders as a toxic attempt at relational nourishment, and intangible faith as a form of tangible grounding. These are the homes I’ve grown up in, departed from, and returned to.

Nick Leahy

Ciel's "PHARAONIC WOES" (Music Video)

"PHARAONIC WOES" delves into themes of identity, self-discovery, and the pursuit of one's true passion, even when faced with adversity. The video opens with Ciel having orchestrated an elaborate ruse: pretending to have died and luring his so-called friends to his funeral to uncover their genuine thoughts about him and his dreams. The sad scene, filled with friends dressed in black, is abruptly juxtaposed by the shallow behavior of the attendees, who gossip and laugh in the funeral's reception area, displaying no genuine concern for Ciel or his aspirations. However, Ciel, consumed by rage at his friends' insincerity, decides to reveal his presence and scares everyone out of the building in a whirlwind of chaos and emotion. Now alone, Ciel steps out of the building and discovers a serene, snow-covered garden, offering a stark contrast to the funeral setting. In this oasis, he stumbles upon a microphone booth and a notepad placed dead center in the garden. As Ciel pens heartfelt lyrics on the notepad, we are left to ponder the boundless potential of his future as an artist.

The message of "PHARAONIC WOES" is that you should never let others determine your path in life. As the director, my vision behind the music video stemmed from a desire to create a visual representation of the song's powerful message and to craft a narrative that would inspire viewers to stay true to themselves, never allowing others to dictate their path in life. As such, I decided to set the video in a funeral-like environment to emphasize the metaphorical death of one's former self that was dependent on others for validation, and the rebirth that comes from embracing one's identity. The twist of Ciel faking his death serves as this symbolic act of defiance against societal expectations and the judgment of others. Additionally, by juxtaposing the solemn funeral setting with the superficial behavior of Ciel's friends, I wanted to highlight the importance of self-awareness and the realization that those who do not genuinely support us can be detrimental to our growth. Therefore, the discovery of the microphone booth and notepad in the snow-covered garden symbolizes Ciel's calling to pursue his passion for music and the idea that our true purpose is often waiting to be uncovered. The video ends on an uncertain but hopeful note as Ciel embraces his newfound identity and potential as a musical artist. Overall, my hope with the "PHARAONIC WOES" music video is that it resonates with viewers and inspires them to follow their unique path, regardless of the judgments and expectations of others.