

Assumption University's Undergraduate Research Symposium 2023



Annual
Undergraduate
Symposium

Tuesday, April 18th

Session A:
8:30 AM - 1:45 PM
TFAC Ballroom A

Wednesday, April 19th

Session B: 9:00 AM - 10:30 AM TFAC Ballroom A
Session C: 9:30 AM - 12:30 PM TFAC Ballroom B
Session D: 11:30 AM - 1:20 PM TFAC Ballroom A
Session E: 12:45 PM - 2:45 PM TFAC Ballroom B

Poster Session & Reception:
3:00 PM - 4:30 PM TFAC Ballrooms



Assumption University

Office of the Provost and
Academic Vice President

Welcome to the 29th *Annual Undergraduate Symposium*. The *Symposium* highlights the research and scholarly achievements of Assumption students working in collaboration with dedicated faculty mentors. These collaborations represent a model for integrating teaching, original research, and the beneficial effects of peer review in promoting intellectual development and professional growth. The *Symposium* provides the campus community with the opportunity to gain a greater appreciation of the individual and collective accomplishments of our faculty and students, as well as to applaud those achievements.

I hope that you enjoy and profit from viewing the posters, hearing the papers, and speaking with the authors of these impressive works.

Sincerely,

A handwritten signature in cursive script that reads "Paul N. Douillard".

Paul Douillard, Ph.D.
Interim Provost and Vice President for Academic Affairs



TUESDAY APRIL 18

Session A: 8:30a – 1:45p

TFAC Ballroom A

Moderator and Mentor: Dr. Francis Prior

Panel 1: Law Enforcement and Crime Prevention

	<i>Presenter</i>	<i>Title</i>
8:30-8:45	Adam Briffett	Stress Among Police Officers
8:45-9:00	Madison Lucontoni	What Do Police Officers Think and Feel About Body Worn Cameras?
9:00-9:15	Patrick May	Police Officers Feelings Towards Arresting Civilians
9:15-9:30	James Olaes	Stress Impact of BSA Analysts
9:30-9:45	Matthew Szydlak	Law Enforcement's Perception of Their Role in Society
9:45-10:00	Stephen Xiarhos	How Police Officers Deal With Work Related Stress

Coffee Break

Panel 2: Courts and Corrections

	<i>Presenter</i>	<i>Title</i>
10:15-10:30	Melissa Contreras Lopez	The Daily Impact of Cases on Victim Advocates
10:30-10:45	Rebecca Franceschini	Victim Participation Through the eyes of the Parole Board
10:45-11:00	Sydney Keyes	Parental Involvement in the Juvenile Courts
11:00-11:15	Olivia McCluskey	Pretrial Diversion and Pretrial Probation; A Prosecutor's Thoughts and Feelings Towards These Dispositions
11:15-11:30	Kali Scirocco	How Attorney's Think and Feel About Working With Victims of Domestic Violence
11:30-11:45	Caroline Shea	Attorney's Thoughts and Feelings about Juvenile Diversion Programs

Lunch Break

Panel 3: Social Services and Education

	<i>Presenter</i>	<i>Title</i>
12:15-12:30	Thomas MacDonald	Issues with Reentry: Thoughts and Feelings of Post Release Counselors
12:30-12:45	Varun Nathan	The Role and Struggles of Hispanic Community Organizations in Addressing Food Insecurity in the Age of COVID-19
12:45-1:00	Deici Perez	Worcester Court Service Litigants and their feelings About Custody Issues
1:00-1:15	Sean Simmons	Court Service Center Research Project
1:15-1:30	Andrew Sneeringer	Exploring Effective Approaches for College Alcohol Policy Violations: Insights from Community Standards Department Members
1:30-1:45	Faith Somody	Discipline and Responsibility: How Educators Feel about Sanctions in their Line of Work

WEDNESDAY APRIL 19

Session B: 9:00a – 10:30a

TFAC Ballroom A

Moderator: Dr. John Bell

	<i>Presenter</i>	<i>Title</i>
9:00-9:15	Julia Tardugno	What You Need to Know About: Vigilance Committees
9:15-9:30	Maria Lepak	National vs. Auxiliary: Mutual Aid Attempts Within the American Colonization Society
9:30-9:45	Joseph Vanacore	On Mutual Aid and Law in Abolition
9:45-10:00	Claudio Rocha	Srebrenica: Massacre or Military Action?
10:00-10:15	Julia Tardugno	Curating the Slavery Adverts 250 Project: Chronicling Newspaper Advertisements About Enslaved People from the Era of the American Revolution
10:15-10:30	Joseph Vanacore	Defensio Reipublicae

Session C: 9:45a– 12:30p

TFAC Ballroom B

Moderator: Dr. Leamarie Gordon

	<i>Presenter</i>	<i>Title</i>
9:45-10:00	Tim Cannon	App-Based Learning in Athletics
10:00-10:15	Jill Finn	Causes and Ramifications of the Lack of Women in the STEM (Science, Technology, Engineering, Mathematics) Fields
10:15-10:30	Taygan Kosky	Are your Desires Devastating your Ability to Achieve Happiness?
10:30-10:45	Kelly Knutelski	Elevating our Voices: An Exploration and Demonstration of Modern Feminist Poetry

Coffee Break Ballroom A

11:15-11:30	Taylor Cirone	A Push for Historical Thinking in Elementary History Instruction
11:30-11:45	Christopher McCrone	The Utility of Roman Numerals
11:45-12:00	Dante Bachini	Changes to the Primary Care Interviewing Model: Redefining Best Interviewing Practices for Chronic Disease Management and Support
12:00-12:15	Emily Drummey	Teaching Mands: Why

WEDNESDAY APRIL 19

Session D: 11:30a-1:20p

TFAC Ballroom A

Moderator and Mentor: Raymond Albert

Cybersecurity Panel

	<i>Presenter</i>	<i>Title</i>
11:30-11:38	Matthew McNaughton	The Role of Data Protection in Cybersecurity
11:38-11:46	Evan Gray	Securing The Email Gateway
11:46-11:54	Connor Flanagan	The State of Surveillance and Biometrics
11:54-12:02	Tyler Lappe	Security of Apple Device Tracking
12:02-12:10	Andrew Ellis	The Importance of IoT Security
12:10-12:18	Jacob Milton	Structure of a Company's Network and Employees in Relation To Network Security And Cybersecurity

Coffee Break

12:32-12:40	Josh Wood	Standards in Cybersecurity
12:40-12:48	Christian Buckley	Cybersecurity in Secondary Schools
12:48-12:56	Cameron Carpenter	Privacy of Personally Identifiable Information
12:56-1:04	Alex Hall	A Comparison of Cybersecurity Role Titles
1:04-1:12	Tyler Reid	The Impact of AI in Cybersecurity
1:12-1:20	Daniel Forster	Digital Forensics in Cybersecurity

Session E: 12:30p – 2:45p

Location: TFAC Ballroom B

Moderator: Dr. Benjamin Knurr

	<i>Presenter</i>	<i>Title</i>
12:30-1:45	Courtney Deslauriers	Modeling the Particle-on-a-Ring Theory in an Undergraduate Laboratory
12:45-1:00	Julie Dwyer	Womanhood in Light of the Theology of the Body
1:00-1:15	Sydney Keyes	Debt Peonage: How Formerly Incarcerated Fathers Experience Child Support and Criminal Justice Debt
1:15-1:30	Wandzia Prytko	Marketing Through Microcultures on Social Media: An Examination of BookTok and Independent Bookstores

Break

1:45-2:00	Andrew Brooks	The R.I.C.O. Act: America's Approach Against the Mafia and Corporate Crime
2:00-2:15	Abbigail Sullivan	Remedying Unfair Fair Use Judgments in the Music Industry: A Call for Greater Consistency in Application of the Four Factors and Transformation Determinations in Copyright Legislation
2:15-2:30	Victoria Gauthier	An American Universal Basic Income: A Remedy for Inequality
2:30-2:45	Teresa Guerra	Nietzsche's Influence on Kandinsky's Expressionism

WEDNESDAY APRIL 19

Poster Session and Reception: 3:00p-4:30p

Refreshments Served

Location: TFAC Ballrooms

3:30

Presentation of Symposium Logo Contest Award: Winner - Elizabeth Cormier

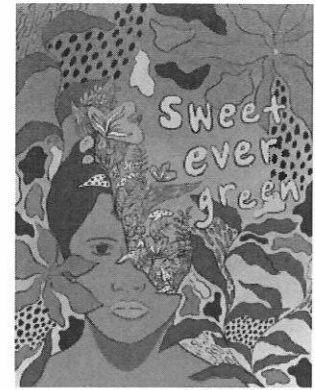
Presenters

Kyra Belden
Rebecca Benjamin
Lali Berelashvili, WPI
Nathan Boudreau
Matthew Brouillet
Mark Buono, WPI
Kathryn Cannistraro
Abbey Cashman
Lauren Cavanaugh
Michaela Champagne, WPI
Angelina Davis
Vincenzo DiCarlo
Dhimitri Disho
Maria Gaughan
Rachelle Gonzales, WPI
Jack Grafton
Jada Hind-Williams, WPI
Sarah Iacoviello
Austin Jandrucko, WPI
Josie Kim, WPI
Emily LaFond
Aine LaPalme
LiLi MacQuarrie
Hailey McKillop
Morgan Miller
Avery Morin
Patrick Otto
Brady Ryan
Julie Sutherland
Christina Tsillas, WPI
Deyana Underwood
Gabrielle Willett

Senior Seminar in Graphic Design

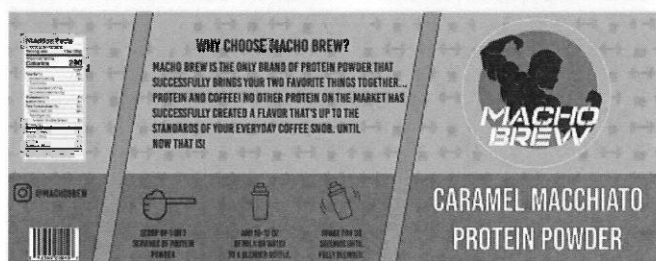
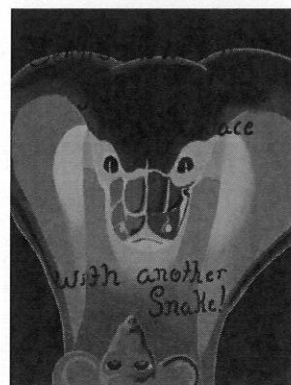
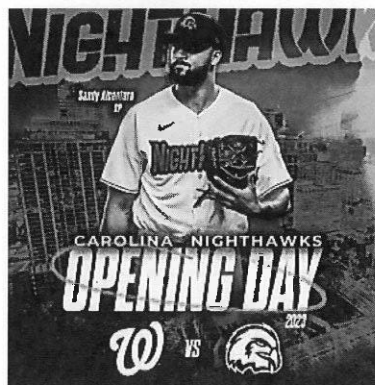
The seminar is devoted to an advanced project in Graphic Design as a culmination of a program of study for the major in Graphic Design. The seminar is completed by an exhibition of student work.

ART & DESIGN SHOW April 11th - April 27th Emmanuel d'Alzon Library



Ashley Carpenter
Britney Colome
Brenda Delgado
Gabriella Dreyfus
Victoria Freitas
Connor Howells
Madison Kapulka
Riley Kindred
Julia Massicotte
Shaye Nickerson
Nolan Sheehan
Shane Sullivan
Caitlin Sze
Brady Weldon
Makenzie Wilson

Faculty Mentor:
Professor Scott Glushien



These are just a few of the works on display.

Abstracts

Presentation Session A Panel 1

Tuesday, April 18, 2023

Stress Among Police Officers

Adam Briffett '23

Criminology & Sociology

Police officers are known to have stressful conditions of work, which include long hours, dealing with the public, and having to be in life-threatening situations where violence is involved. To study the work-related stressors police officers face every day I will be conducting qualitative interviews. The purpose is to find out what the leading stressor is for police officers and ways to help or prevent stress when present. I expect that I will find results that show the leading stressors are dangerous situations or threats of violence on the job. What I expect to find from the results is that police officers tend to have the highest levels of stress while encountering life threatening or altering situations/scenarios on duty.

Faculty Mentor: Dr. Francis Prior

Understanding the Perceptions and Feelings Police Officers Have on the Implementation of Body Cameras

Madison Lucontoni '23

Psychology and Criminology

Recently, law enforcement has been criticized heavily for the illegitimate use of force. Consequently, this controversy has resulted in the implementation of body worn cameras. But how do police officers' think and feel about this approach to surveillance? To investigate this question, I plan to conduct and transcribe interviews with five different police officers from various ranks to get their opinions on how they feel about body worn cameras and the extent to which they affect the way in which they do their job. Contrary to the previous research, I suspect that body worn cameras will be seen as an effective form of surveillance for the officers. Consequently, these results reflect the opinions of a small population of police officers.

Faculty Mentor: Dr. Francis Prior

Police Officers Feelings Towards Arrest

Patrick May '23

Criminology & Sociology

Arrests are one of the major sanctions that they have at their disposal. There is insufficient qualitative research on how officers feel about how they are using this sanction. I plan to conduct a qualitative study that will provide a greater understanding as to how officers feel when they arrest individuals. Volunteers for the study will be interviewed regarding their experiences as a police officer and how they handled and felt towards certain arrest situations. I expect I will find that small town officers are more lenient towards smaller offenses and the more intense the offense the less the officer cares about having to arrest someone. These findings would confirm that depending on the officer's department and the offense committed, the way they handle and feel about each arrest will vary.

Faculty Mentor: Dr. Francis Prior

±Honors Thesis

Stress on the BSA Analysts

James Olaes '23

Criminology

Banks and other financial institutions are required by the federal government to employ a Bank Secrecy Act Team to monitor and report financial crimes. Over the previous decades, there have been many advances in banking, including the development of mobile banking from a personal device. The increase in accessibility for the customer has also led to the increase in the potential for criminal activity with new financial crimes being committed that were previously unknown. BSA Analysts currently experience a larger workload than in previous decades as they monitor new avenues used by criminals to obtain financial information and monetary gains. To study the effect of this increase, multiple interviews will be conducted to determine the level of stress and its effect on the work performed by the BSA Analyst. Due to the increase in the workload, there should be an increase in stress that affects the BSA Analysts.

Faculty Mentor: Dr. Francis Prior

Law Enforcement's Perception of Their Role in Society

Matthew M. Szydlak '23

Criminology & Sociology

In the past 10 years, law enforcement has been increasingly scrutinized by the public. With the rise in use of social media, it has never been easier for activities performed by law enforcement to reach every person with internet or television access. Many people have taken a stance on how they feel about law enforcement based upon critical media coverage of police violence. How do members of law enforcement view themselves and their role in society in light of this public criticism? I wish to gain a better understanding of how law enforcement perceives themselves within the scope of society with the rise in social media. I expect officers to express feelings of societal pressure to perform their duties perfectly, but still hold a relatively positive outlook on their occupation and position in society. The research I'll conduct will generate a positive step towards fixing any problems that have arisen with law enforcement in this media-controlled age.

Faculty Mentor: Dr. Francis Prior

How Police Officers Deal with Work Related Stress

Stephen Xiarhos '23

Criminology & Sociology

While officers need to execute their duty, they need to be able to do so while handling stress. Using an interview method, I will be asking questions to current police officers of how they deal with stress and their job on a daily basis. The main questions and the reason for my research is: How do police officers think and feel about the effects of work-related stress and how it affects them executing their job? I think that most of these police officers will say that they deal with some kind of stress throughout their workday. Implications of this is that when there are officers put in high stress situations, they have to be able to handle it in the safest way possible. This research will help us figure out how we can help officers around the United States who are put in high stress situations on a daily basis.

Faculty Mentor: Dr. Francis Prior

Presentation Session A Panel 2

Tuesday, April 18, 2023

The Daily Impact of Cases on Victim Advocates

Melissa Contreras Lopez '23
Criminology & Management

Victim advocates are an important part of the victim journey when dealing with the court process. Victim advocates can at times be undervalued or overlooked with the number of cases they deal with and the people they help. This study is designed to focus on how victim advocates are impacted in their daily/personal lives by the cases they deal with. I plan on interviewing victim advocates at a local DA's office to answer questions about their job and how it potentially affects their personal lives. I expect to find that victim advocates are stressed out from their jobs and overload of cases. The results will hopefully show how victim advocates can be supported through their jobs and shine a light on the work they deal with.

Faculty Mentor: Dr. Francis Prior

Victim Participation Through the Eyes of the Parole Board

Becca Franceschini '23
Criminology & Sociology

For years The United States has used parole to help offenders transition out of the prison system and adjust back into the community under supervision of the state. During the parole process, victims or their family have the right to provide input. By looking into the views of the parole board members and gaining a better understanding of how they feel and what they see could better explain their decision making when victims participate vs when they do not. In this study I will use interview methods to focus on the parole boards individual views and how they make their decisions. With taking victim impact statements into consideration the results to this study will likely lean towards the parole board members not granting parole to the offender.

Faculty Mentor: Dr. Francis Prior

Parental Involvement in the Juvenile Courts

Sydney Keyes '23
Criminology & Sociology

Parental involvement and family intervention techniques can be incredibly beneficial to juveniles involved in the juvenile justice system. But how do the juvenile court employees feel about parental involvement? To answer this research question, I will be conducting numerous qualitative interviews with different court employees such as Clerk Magistrates and Probation Officers at the Framingham Juvenile Courts. I expect that results will indicate that these court employees will feel that parental and family involvement in the juvenile courts is an important aspect of the court processes when looking at the best interest of the juvenile. I also anticipate these employees feeling that there is more that can be done in the juvenile court system to have more parental and familial involvement. Future research could consist of interviewing the juveniles and their parents or family members on this issue. This research will help to

create more ways to integrate parents and families into the juvenile court proceedings which could produce more positive outcomes for juveniles.

Faculty Mentor: Dr. Francis Prior

Pretrial Diversion and Pretrial Probation; A Prosecutor's Thoughts and Feelings Towards These Dispositions

Olivia McCluskey '23
Criminology & Sociology

Dispositions such as pretrial diversion and pretrial probation allow for a decrease in high volumes of guilty pleas. Having a conviction on your criminal record comes with many consequences; therefore, using these dispositions could ultimately reduce the number of issues offenders may face. While pretrial diversion and probation are great alternatives for some offenders, it puts the public general safety at risk. To study how prosecutors feel towards pretrial diversion and pretrial probation. I conducted interviews through the District Attorney's Office in Worcester Massachusetts. Understanding how Assistant District Attorney feel and think will benefit the court system as a whole. I hypothesize that prosecutors will feel more reluctant to offer these alternative dispositions when dealing with individuals who continuously re-offend.

Faculty Mentor: Dr. Francis Prior

How District Attorneys Think and Feel About Working with Victims of Domestic Violence

Kali Scirocco '23
Criminology & Sociology

Domestic violence and trauma have developed into an intense area of research over the past 40 years and have been seen as an ongoing problem. My research will be focused on how attorneys think and feel about working with victims of domestic violence. I will conduct interviews within the District Attorney's office in Worcester Massachusetts to study how attorneys work with victims. Through my interviews, I believe I will find that when attorneys work with victims of domestic violence, they feel rewarded to help individuals. Through the attorneys conducting these interviews with victims, attorneys are given the chance to develop relationships, hear their side of the story, and help create a better life for those who experienced domestic violence.

Faculty Mentor: Dr. Francis Prior

Attorney's Thoughts and Feelings about Juvenile Diversion Programs

Caroline Shea '23
Criminology & Sociology

Juvenile crime has increased over the years, but the goal of juvenile courts is to divert cases meaning that juveniles do not end up in prisons. However, there are some situations where juveniles cannot or are not diverted and are placed in the Department of Youth Services. The goal of this study is to determine attorneys' thoughts and feelings about diversion programs and sending juveniles to prison. I plan to conduct this research through interviewing attorneys about their thoughts about juvenile diversion programs. Through this research I expect attorneys will think it is important to not send juveniles to jail and the importance of sending them to diversion programs, so they do not have a criminal record.

Faculty Mentor: Dr. Francis Prior

Presentation Session A Panel 3 Tuesday, April 18, 2023

Issues with Reentry: Thoughts and Feelings of Post Release Counselors

Thomas MacDonald '23

Criminology

Over recent decades, reentry services have grown in popularity and necessity. The thoughts and feelings of post release counselors are important to understand in order to expand and improve reentry services. This brought me to the question, what do Post Release Counselors think and feel about reentry services? To study this, I will conduct interviews with Post Release Counselors. I will ask questions about the most prominent services offered by Post Release Counselors and what the Counselors think about them. These included education, housing, sober living, general reentry services, and more. I assume that there are many changes that can be made to current reentry services and the thoughts and feelings of the Post Release Counselors will support this claim.

Faculty Mentor: Dr. Francis Prior

The Role and Struggles of Hispanic Community Organizations in Addressing Food Insecurity in the Age of COVID-19

Nathan Varun '23

Criminology & Sociology

As the United States saw a decrease in overall food insecurity since the days of the 2009 recession, the issue of not having enough food has reemerged as socially relevant due to the implications of the COVID-19 pandemic. While many groups in our society today have become socioeconomically vulnerable due to the pandemic, there is one group whose complications with COVID have further worsened the state of food security in their communities: Hispanic-Americans. In order to help analyze how Hispanic-Americans have coped with intensified food insecurity during the pandemic, I plan to interview workers from various community level organizations across Worcester focused on addressing this issue, predominantly soup kitchens which serve these communities to answer the following research question: How have Hispanic-based food service organizations coped with the struggles of obtaining and serving adequate food since the unstable days of the COVID-19 pandemic? I expect to find that these locations have experienced more trouble obtaining adequate resources.

Faculty Mentor: Dr. Francis Prior

Worcester Court Service Litigants and their feelings About Custody Issues

Deici Perez '23

Criminology & Sociology

Opening up about custody issues can be very overwhelming for a parent, as we know all families handle tough situations differently. Some families seem to be able to handle difference personally while others seem to need the help of professionals. To study the feelings of litigants, I will conduct interviews

to gain the perspective of parents who are battling or have battled custody issues. The results will likely demonstrate that parents who have strenuous issues concerning the custody of their children tend to have poor mental health. Parents tend to become more aware of ongoing feelings that might have been suppressed before the study. The results of the study leave room for further research on how to help those parents that have been severely affected by their home environments.

Faculty Mentor: Dr. Francis Prior

Court Service Center Research Project

Sean Simmons '23

Criminology & Sociology

Access to legal aid is vital to our legal system and those under its jurisdiction. The rates at which people receive legal aid have many factors that are involved, but one of the most noticeable changes in recent history in regard to legal aid is the effect that COVID-19 had on it and how COVID-19 affected access to legal aid. The legal system was impacted greatly by COVID-19, and legal aid specifically, which is a contact-heavy job. I will be conducting a survey that I will administer to workers in surrounding Court Service Centers to examine the effects of legal aid and its effectiveness pre-COVID-19 and post-COVID-19. I expect that this research will further show the effects of legal aid and how effective we can make legal aid and our access to legal aid in the future.

Faculty Mentor: Dr. Francis Prior

Discipline and Responsibility: How Educators Feel about Sanctions in their Line of Work

Faith Somody '23

Criminology & Sociology

Teachers are an influential aspect in the classroom when it comes to assessing and improving upon a student's academic progress, they can be seen as indispensable sources of information and influence concerning their behavior. Participants in this study will participate in an interview that will ask them questions that would go on to answer the query of how teachers/educators think/feel about the responsibility of using discipline and sanctions in the course of their work. I hypothesize that the teachers that are interviewed will report back that they feel that more sanctions and disciplinary actions should be taken, however they should not be the one to handle that burden.

Faculty Mentor: Dr. Francis Prior

Presentation Session B

Wednesday, April 19, 2023

What You Need to Know About: Vigilance Committees

Julia Tardugno '24

History

Our country was founded on the ideals of equality and freedom, yet for so many, this was not a reality. Many African Americans were trapped in the endless cycle of slavery, so it was up to free African Americans in local communities to aid those searching for self-emancipation. To begin answering this

question, one must do extensive research to understand how citizens gained the ability to contribute to one of the largest forms of mutual aid in our society. Vigilance committees fostered this idea of citizens helping and protecting one another from harms directly associated with their own political system. I created a zine to educate people on the emergence of vigilance committees, the key figures who established them, and highlight their significant work efforts in providing mutual aid to the brave African Americans taking the steps to secure their own freedom. A zine is a pamphlet-style form of getting out information, particularly for those whose voices are less often heard. The zine not only provides a background on vigilance committees but draws connections to the present and how we can use our knowledge of vigilance committees to assist marginalized groups of people who continue to find oppression in varied forms. Based on the research of heroic vigilance committees nationwide, it can be determined that people must continue to provide mutual aid in its highest form and fight endlessly to ensure that all people gain the right to life, liberty, and equality.

Faculty Mentor: Dr. John Bell

National vs. Auxiliary: Mutual Aid Attempts Within the American Colonization Society

Maria Lepak '24

History

When studying the history of mutual aid, it is necessary to analyze the failures and malicious motivations of certain groups that framed themselves as mutual aid organizations. This project attempts to refine the idea of what mutual aid is and what it is not by comparing the auxiliary and national branches of the American Colonization Society. While acknowledging the American Colonization Society's racism, this project also calls attention to the Black Americans who chose to leave the United States on their own accord and the support they were given upon making that decision. To present my findings, I created an informative "Zine" that graphically represents the findings described in my paper.

Faculty Mentor: Dr. John Bell

On Mutual Aid and Law in Abolition[±]

Joseph Vanacore '23

History

As last semester's American Antiquarian Society Seminar focused on Mutual Aid throughout American history, I took a closer dive into the specifics of law, as utilized by abolitionist mutual aid societies, and the importance that law holds in these communities. Mutual Aid is a system and process of shared care and support between individuals with common interests, goals, and needs. Mutual aid has historically served as a means of improving the circumstances of one's life, as well as the circumstances of the wider shared community. A semester of valuable research at the American Antiquarian Society has led to my specific interest within mutual aid, of law with the context of abolition. Careful research and personal interest have guided me and culminated in the creation of my Zine project, which will be archived into the American Antiquarian Society's holdings. Law within abolition and mutual aid is a complex topic, with many possibilities and applications. In terms of mutual aid and mutual aid societies, law was essential in representing individuals who needed it, fugitive slave trials, combatting unfair congressional legislation, and providing a voice for discriminated groups who would otherwise be left out of this discourse, among countless other uses.

Faculty Mentor: Dr. John Bell

Srebrenica: Massacre or Military Action?

Claudio Rocha '23

History

On July 11th, 2023, Bosnia-Herzegovina will mark the eighteenth anniversary of the 7,000-8,000 Bosnian-Muslim men massacred in the town of Srebrenica by Bosnian-Serb forces led by Serbian General Ratko Mladic. While Yugoslavian dictator Joseph Tito's leadership style and policies were meant to provide stability for Yugoslavia, the facts proved the opposite. When Tito established weak political institutions, he had created them to prevent challenges to his dictatorship, yet his death led to nationalist politicians defying weak institutions with their will to power. Consequently, these politicians carved up nation-states based on their ethnic populations. The most destructive violence brought about by the politicians' will to power crystallized in the ethnically diverse city of Srebrenica on July 11th, 1995. As a result of my research, I will showcase how the actions found on July 11th, 1995, match the criteria of someone committing Ethnic Cleansing or Crimes against Humanity and not the legal definition of genocide adopted in the 1948 United Nations Genocide Charter. I will back up my argument by using the oral histories of the survivors and perpetrators of the Srebrenica massacre, the stories of United Nations Dutch soldiers and commanding officers stationed in Srebrenica, and the framework laid out by the Senior Genocide Prevention Advisor Katherine G. South Wick in her article "Srebrenica as Genocide(?)." While we can acknowledge the events at Srebrenica as a tragedy, we must remain firm when applying one of the most powerful words in international law to an individual(s) or nation(s).

Faculty Mentor: Dr. Irina Mukhina

Curating the Slavery Adverts 250 Project: Chronicling Newspaper Advertisements about Enslaved People from the Era of the American Revolution

Julia Tardugno '24

History

I made significant contributions to the *Slavery Adverts 250 Project*, a digital humanities project that does not shy away from the uncomfortable topic of slavery. Instead, it pays tribute to those harmed in its perpetuation and recovers the stories of enslaved people. I used digital databases to collect newspapers from the era of the American Revolution. In those newspapers, I identified hundreds of advertisements regarding enslaved people from throughout the colonies, from New England to South Carolina. I compiled daily digests of slavery advertisements, including images, and posted them on the *Adverts 250 Project* website. To reach a larger audience, I posted these advertisements and stories of enslaved people on the project's Twitter feed, including captions, images, and citations. The history of slavery, an essential perspective of the era of the American Revolution, has an outlet through the *Slavery Adverts 250 Project*. This allows scholars, students, and the general public to learn a more complete history of the founding of the nation. This presentation summarizes collaborative research conducted with a faculty member made possible by Summer Scholars Program sponsored by the D'Amour College of Liberal Arts and Sciences.

Faculty Mentor: Dr. Carl Keyes

Defensio Reipublicae

Joseph Vanacore '23

Political Science

In my thesis idea of *Defensio Reipublicae* I intend to analyze the founding of the American republic, while also briefly touching upon the history of republicanism in the Roman republic, in order to formulate a defense in support of republicanism. By looking at sources of the foundation of the United States, as well as political philosophy, I plan to lay out why republicanism—as a form of governance—is a prime choice for governing human societies. Sources such as the Federalist Papers, scholarly articles, political philosophers, and the expertise of my advisor, President Weiner, will be very useful in the application and presentation of my thesis. *Defensio Reipublicae* is intended to show that—although imperfect, as all manmade creations are—republicanism is a great form of government for humanity in the past as well as the modern world, allowing the body politic to effectively and peacefully govern itself without the overbearing control of an autocrat, despot, or monarch. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: President Gregory S. Weiner, Ph.D.

Presentation Session C

Wednesday, April 19, 2023

App-Based Learning in Athletics

Tim Cannon '23

Psychology

Cognitive science research suggests that spacing, interleaving, and retrieval practice are three highly effective learning strategies. The Blank Slate app is designed to take advantage of these strategies to help individuals learn selected content. The app introduces content to users via questions which they are prompted to answer via push notifications every few days. The app adapts to each user by tracking performance and predicting which questions are at highest risk of being forgotten. Having users focus on the most crucial questions allows them to remember a lot of information while only needing to commit minutes a week to using the app. This presentation will give an overview of an ongoing research study that is helping to validate the app. Further, I will explain how this app could be useful in other contexts, specifically within an athletic department or setting.

Faculty Mentor: Dr. Leamarie Gordon

Causes and Ramifications of the Lack of Women in the STEM (Science, Technology, Engineering, Mathematics) Fields[±]

Jill Finn '23

Education

Women consist of only 27% of workers within the STEM fields while men make up the remaining 73%. Several causes contribute to this drastic difference, with one of the main reasons being the lack of confidence that women have in these subject areas. Their lack of confidence often begins in the elementary and middle school grades as a result of teacher bias, fixed mindsets, and a lack of role models,

causing young girls to shy away from STEM and turn towards other interests. However, there are ways to fix this problem and if teachers are willing to put more energy into it, the classroom can become a place that encourages young girls to pursue STEM careers later in life, rather than discourages them. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Kathleen Scibelli

Are Your Desires Devastating Your Ability to Achieve Happiness?

Taygan Kosky '25

Philosophy

Pleasure and the desire to succumb to it is ruining many individuals' ability to achieve happiness. Many theological ideas reference varying pleasures as the root of suffering, yet few fail to explain what that entails, or how to live a life free of desire. I believe humans are innately creatures that fall to *désir*, or unrequited desire. Jacques Lacan has put forth the idea of desire being an endless matter, impossible to satisfy. Marquis de Sade believes that desire should be what humans follow upmost, even if it results in crimes such as murder. The discussion of desire to achieve pleasure in relation to happiness will be explored through the perspectives Biblical and Buddhist means, as well as varying philosophers in an attempt to answer the question of if one's desires are harming their ability to achieve happiness. Although I am a firm believer that many philosophical questions relate to an individual's own nature, I believe that succumbing to desires of pleasure is, in fact, harmful, and instead we should find other means to achieve high-mindedness through.

Faculty Mentor: Dr. Thomas Miles

Elevating Our Voices: An Exploration and Demonstration of Modern Feminist Poetry[±]

Kelly Knutelski '23

English

Modern feminist poetry came onto the literature scene in the 1960s, starting with the founding mothers of this movement such as Maya Angelou, Audre Lorde, and Mary Oliver. As women's rights have progressed, new styles and themes have emerged in the world of feminist poetry with poets like Rupi Kaur and Kim Addonizio. Background research on the unique forms of confessional poetry and the themes of love, violence, mental health, and body image used by Kaur and Addonizio will be explored to create a summary of their work and impact on the modern female and feminist community. These findings, as well as an exploration of the work of these poets, inspire this thesis' main focus, a creative project of a poetry portfolio focusing on the themes and styles discovered. A balance of Kaur's and Addonizio's poetic traits will be adapted into the writer's work. The portfolio concludes with a set of unique poems that come from the writer's own personal style and voice. The entirety of the portfolio provides a story of the writer's highs and lows in a journey of female empowerment, touching upon the themes of relationships, mental health, and body image. The goal of this project is to make a valuable contribution to the ongoing canon of modern feminist poetry. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Prof. John Hodgen

A Push for Historical Thinking in Elementary History Instruction[‡]

Taylor Cirone '24

Education

Developing historical thinking is an essential, yet often overlooked, skill in the elementary history classroom. Children must be given the opportunity to develop skills as historians who read and evaluate sources from multiple perspectives. An interactive, inquiry-based, mini-unit on evaluating perspective during westward expansion was taught to a fourth-grade class. In the final two lessons, students were asked to “weigh the evidence” using original historical documents adapted for elementary learners. Some historical documents considered the voices white settlers; other sources considered the voices of Native People who are historically marginalized and lack a voice in westward expansion history. Considering both perspectives, students were challenged to make claims using evidence to reach conclusions. The results of their claims varied in clarity and depth depending on the source and the student’s interpretation. Some sources resulted in clear demonstrations of historical thinking by the students. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Lisa D’Souza

The Utility of Roman Numerals

Christopher McCrone '26

Engineering

Roman numerals were used for the math with which the empire was built. However, the historical use (which itself varies over time and location) need not be strictly followed. The strength of Roman Numerals are their practicality, simplicity, and flexibility. There are only 7 core numerals (their form varied slightly over history) with three primary relationships there between. Every core numeral, with the exception of I, is a multiple of 5 or 10, and can go into others either two, five, or ten times, or a multiple thereof. Roman Numerals are not encumbered by place value, and, when used in purely additive form, the order of operations becomes far less important. For example, in purely additive form addition becomes mere simplification, and with a modification to the notation, using ‘N’ to signify that all associated numerals form an absent number, subtraction becomes mere cancellation, regardless of how large or many the numbers are that are being subtracted. This seems to allow for greater liberty of organization and modifications to notion. Roman numerals can be used for any math that does not require place value. This simplicity and flexibility might help people in general to learn and work with Roman Numerals, perhaps even more so those who struggle with math.

Independent Work

Changes to the Primary Care Interviewing Model: Redefining Best Interviewing Practices for Chronic Disease Management and Support

Dante Bachini '23

Health Sciences & Human Services and Rehabilitation

Building the rapport between provider and patient is a key determinant of successful health outcomes in healthcare. In chronic disease management, many are disenfranchised at the time of care due to the extended duration, and stress chronic illness creates. The communication that is essential in chronic disease management is lost, creating confusion, distrust, and anguish for both patient and provider. Addressing the complex nature of chronic disease management requires changes in how primary care interviewing is conducted. A literature review of the current primary care interviewing methods was

conducted. It was identified that the current interviewing practices create a barrier between patient and provider. Primary care interviewing strategies fail to account for all aspects of the patient including mental health, functional and social. The current techniques for primary care interviews were then compared to the novel, patient-focused interviewing strategies. Motivational, collaborative, self-management, and patient-as-experts were identified as superior interviewing methods to maintain patient autonomy and wellness. These interviewing strategies were associated with more adaptable patient care plans, improved health management, and functional-chronic disease outcomes. The identified techniques were less associated with the pathology of a disorder, rather focusing on advocacy and maintenance of the complete individual, creating empowerment. The strength-based conversations that were cultivated improved patient adherence and coping strategy utilization.

Faculty Advisor: Dr. Cinzia Pica-Smith

Teaching Mands: Why

Emily Drummey '23

Psychology

The current study expands upon previous research on mands for information (MFI). MFI are when an individual requests specific information from another person. For example, a child may ask "Why can't I have ice cream before dinner?" and a parent may respond, "It will spoil your dinner." This type of information-seeking behavior is crucial to child development. MFIs are vital to language development and the acquisition of information about an individual's environment; however, children with autism spectrum disorder (ASD) tend to not acquire MFI without direct teaching. The present study extends research conducted by Valentino et al. (2019) to teach children to specifically request for information using "Why?" Previous research investigated procedures to teach the MFI "Why?" as effective procedures for all other "Wh" questions had already been demonstrated. In Valentino et al. (2019) the MFI "Why?" was taught when there was value in the answer thus motivating the child to emit the MFI. Results showed effective acquisition of the MFI "Why?" for their participants. In the current study, the MFI "Why?" was examined under the same conditions, however we extended their procedures to teach empathetic statements in children with ASD. Data supports the procedures in Valentino et al. (2019) were effective in teaching the MFI "Why?"

Faculty Mentor: Dr. Nicole Pantano

Presentation Session D

Wednesday, April 19, 2023

The Role of Data Protection in Cybersecurity

Matthew McNaughton '23

Cybersecurity

This paper will identify the role of Data Protection in Cybersecurity. The paper will provide a background of Data Protection, detail on the importance of Data Protection, touch on current attacks and countermeasures as well as standards and laws. It will also go in depth on the data protection of

mobile devices, networks, and the cloud. Moreover, it will also address cryptographic techniques, the use of AI (Artificial Intelligence) in Data Protection, and the overall correlation between Data Protection and Cybersecurity.

Faculty Mentor: Dr. Raymond Albert

Securing The Email Gateway

Evan Gray '23

Cybersecurity

Despite the advancement of technology in today's world, email still remains as the most common form of communication for businesses and enterprises. It's a necessary and essential communication tool for organizations worldwide. Email, therefore, is a popular attack point for adversaries looking to break into - and exploit an organization. Humans have proved to be the weakest link and many threat actors have demonstrated the effectiveness of social engineering attacks. This paper will discuss the importance of email security and how vital cryptography, industry standards, and artificial intelligence are to defending against modern cyber-attacks. The paper will conclude with an overview of email security best practices.

Faculty Mentor: Dr. Raymond Albert

Biometrics Surveillance

Connor Flanagan '23

Cybersecurity

Governments around the world are bolstering their protections against the cyber threat landscape by collecting and deliberately applying biometric surveillance technologies for security, data collection and law enforcement purposes. This paper argues that while biometric surveillance technologies can do plenty of good, they must be implemented with appropriate safeguards and oversight to protect individual rights and freedoms. There will be a focus on the local and global relationship between freedom and security, the private and public sector collection and use of individual's information, and the implementation of surveillance and identification technologies that are being implemented into everyday life. Several industries and governments will be examined, and their practices will be documented producing a conclusion about the underlying mechanisms that documents society and everyone in it. The paper concludes with recommendations for policymakers and security professionals on how to balance the benefits and risks of identity technologies and surveillance states.

Faculty Mentor: Dr. Raymond Albert

The Security of Apple Device Tracking

Tyler Lappe '23

Cybersecurity

This project explores the security of Apple device tracking and evaluates the effectiveness of cybersecurity standards and cryptographic techniques used to protect this feature. Additionally, the project examines the potential impact of artificial intelligence (AI) on the security of device tracking. The research highlights the importance of maintaining high-security standards for device tracking, especially with the increasing amount of personal information stored on these devices.

Faculty Mentor: Dr. Raymond Albert

The Importance of IoT Security

Andrew Ellis '23

Cybersecurity

The modern world is becoming more reliant on the use of embedded computing devices connected over the internet, known as “the internet of things” (IoT). However, many do not consider the security implications that come from such devices. Security breaches can happen regardless of the size of an organization or industry. This is no different when it comes to the utilization of IoT devices. IoT security is a fairly new discipline that aims to resolve business related issues as well as allow for operational and cost benefits in various industries such as healthcare, utilities, financial services, retail, manufacturing and transportation. This paper discusses the pros and cons of IoT devices, the ways attackers target said devices, as well as how companies can utilize proper IoT security measures to keep these devices secure.

Faculty Mentor: Dr. Raymond Albert

Structure of a Company's Network and Employees in Relation to Network Security and Cybersecurity

Jacob Milton '24

Cybersecurity

As technology advances, the need for an increased variety in security types becomes more pronounced for any company to function without undue risks to their continued well-being. The increased risk associated with hackers and other cyber attack vectors such as viruses and malware require attention be focused on the network security side of the topic, but it also demands attention isn't taken off of proper security in the physical, peer-to-peer sense either. As users often fall victim to basic social engineering attacks, it is important to have the right amount of focus on each side of the problem. This paper covers these topics in the context of cybersecurity standards, cryptographic principles, and the application of artificial intelligence and the need for continuous evolving user training.

Faculty Mentor: Dr. Raymond Albert

Standards in Cybersecurity

Joshua Wood '23

Cybersecurity

Cybersecurity is such a broad field that affects every aspect of our lives. From shopping, to banking, to education, even socializing with peers and colleagues, more and more of our daily lives are moving to a digital environment. With an ever-expanding skills gap and need for cybersecurity professionals protecting data and networks, governments and enterprises have adopted several standards to address these needs. This paper examines the various standards these entities have advanced such as certifications, laws, and national frameworks while providing an overview of the influence of cryptographic principles and AI on such standards.

Faculty Mentor: Dr. Raymond Albert

Cybersecurity within Secondary Schools

Christian Buckley '23

Cybersecurity

Cybersecurity within school districts is more crucial today than ever, the number and complexity of cyber threats to a district pose a very large problem for faculty and students. As an intern serving in a local school district, I have seen first-hand how cybersecurity plays a role within a district. Use of cryptography within schools allows student, faculty, and administrative data to be encrypted and remain confidential. Artificial intelligence components designed into software is used to monitor network traffic, access points, and user behavior. Lastly, cybersecurity standards serve to guide development of district policies. This paper covers the use of cryptography, cybersecurity standards, and artificial intelligence within Secondary School districts and reflect of my internship experience.

Faculty Mentor: Dr. Raymond Albert

Privacy of Personally Identifiable Information

Cameron Carpenter '23

Cybersecurity

This research paper investigates the privacy of personally identifiable information (PII), which is a growing fear as technology is used more often in our daily lives. PII is any information that can be used to identify an individual, including their name, address, social security number, or email address. As individuals increasingly share PII online, security becomes a concern and questions arise. This paper explores various approaches to protecting the privacy of PII, including legal frameworks, best practices for individuals and organizations, as well as technological solutions. This paper also examines the challenges and limitations of these approaches, due to the difficulty of finding a balance of privacy and security. Ultimately, the paper argues that protecting the privacy of PII requires a multifaceted system that balances an individual's rights, corporate responsibility, and the desire to keep the private data of an individual private.

Faculty Mentor: Dr. Raymond Albert

A Comparison of Cybersecurity Role Titles

Alex Hall '23

Cybersecurity

The words penetration tester, vulnerability assessor, and ethical hacker are often confused by many even though the terms have different meanings. Confusion exists due in large part to the relationships that exist among these terms. This paper will provide the definition of these three terms as given by cybersecurity experts and in the context of standards, cryptographic principles, and artificial intelligence. It will distinguish the three terms and identify their similarities.

Faculty Mentor: Dr. Raymond Albert

The Impact of Artificial Intelligence on Cybersecurity

Tyler Reid '24

Cybersecurity

Artificial Intelligence (AI) has taken the world by storm. Today, AI has proven to be extremely efficient in completing certain prescribed tasks and has also proven to be extremely beneficial when

applied to cybersecurity challenges. Some forms of AI are proving to be particularly effective in detecting network traffic anomalies, ultimately helping to improve network security and stop potential threats before it is too late. The use of AI in cybersecurity holds much promise, but its application can sometimes pose drawbacks. This paper explores this topic in a greater context, including cryptographic principles and standards.

Faculty Mentor: Dr. Raymond Albert

The Challenges of Digital Forensics in Law Enforcement

Daniel Forster '23

Cybersecurity

This paper goes into detail of the growing challenges faced by law enforcement agencies in today's age of technology, including encryption, AI, standards, and mental health concerns. Mental health is critical for law enforcement officers due to the graphic exposures of criminal evidence, leading to depression, anxiety, and PTSD. This paper discusses the challenges of providing support and resources to lessen these issues. The introduction of artificial intelligence poses both benefits and challenges for law enforcement agencies. This paper examines the complications involved with AI. Standards are essential for law enforcement agencies to operate effectively and efficiently, but developing and implementing standards in law enforcement is also a standing challenge. Encryption is another significant challenge, with legal and technical implications when dealing with encrypted data in criminal investigations. Finally, digital forensics poses significant challenges for law enforcement agencies, including the need for specialized training and high costs of equipment. Addressing these challenges requires a united effort by law enforcement agencies, government entities, and society as a whole to support law enforcement agencies effectively.

Faculty Mentor: Dr. Raymond Albert

Modeling the Particle-on-a-Ring Theory in an Undergraduate Laboratory[±]

Courtney Deslauriers '23

Chemistry

In early chemistry education, students are often taught to think about electrons as small, negatively charged particles existing in planetary orbits around the nucleus of an atom. In reality, electrons exist in a cloud, exhibit wave-particle duality, and are best described by wave functions. This idea that electrons travel as waves and are moving around the nucleus so quickly that it is impossible to know the speed or location of an electron at any given moment is extremely abstract, but is essential to the theory of quantum mechanics, and therefore to undergraduate physical chemistry courses. To assist students in gaining a better understanding of these concepts, this project proposes an undergraduate laboratory experiment, focusing on the particle-on-a-ring theory. Several porphyrin molecules with different *meso*-substitutions were synthesized and analyzed using UV/Vis spectroscopy and the particle-on-a-ring model to calculate experimental carbon-carbon bond lengths. The calculated bond lengths differed from the literature value by varying degrees. The differences in values are due primarily to the presence of additional orbitals of appropriate orientation, allowing the porphyrin π -system to delocalize into them, thus expanding the ring. These additional orbitals are likely affected by the presence of an additional π system, the electronegativity of the atoms in the substituent groups, and/or the possibility of hyperconjugation of the substituent molecular orbitals. Synthesizing their own porphyrin molecules for analysis gives students a sense of ownership over their experiment and the analysis itself gives students the opportunity to explore the model on a deeper level. Asking students to explain how the model works

and at what point it breaks allows them to gain a better understanding of the particle-on-a-ring system, and therefore, basic quantum mechanics. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Benjamin Knurr

Womanhood in Light of the Theology of the Body[±]

Julie Dwyer '23

Theology

As Pope St. John Paul II explicitly articulates in his Theology of the Body, the Catholic Church sees the body as integral to the person. The book of Genesis reveals that human beings are made in the image and likeness of God, which means that the body, as constitutive of the person, reveals not only realities about the person, but about God. The sexed body communicates the transcendent realities of masculinity and femininity, and human masculinity and femininity, individually and in their union, provide an icon of the Divine nature. While the complexity of each human heart cannot and should not be reduced to a stereotype, there are typical qualities of both masculinity and femininity that one can better understand when considering the constitution of male and female bodies. Through this thesis, which focuses on women, I show that women, through their bodies, bear the privileged sign of the human "capacity for the other," which is necessary in order to be in union with God and neighbor. This capacity speaks to the receptivity of God within the Trinity and toward humanity. The Blessed Mother, who reveals the fullness of femininity, is the archetype of this quality, which ultimately results in the salvation of the world. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Christopher Klofft

Debt Peonage: How Formerly Incarcerated Fathers Experience Child Support and Criminal Justice Debt

Sydney Keyes '23

Criminology

Incarceration is a dramatic life event that can separate parents from their children. Formerly incarcerated fathers are generally seen as failing their partners and children because they often struggle to stabilize themselves economically and reintegrate socially. But how do formerly incarcerated fathers view themselves when it comes to their fatherhood roles? To answer this question, we conducted a total of 48 quantitative in-depth, semi-structured sociological interviews. The following study focuses on a sub-sample of 5 interviews. The results of this study suggest that formerly incarcerated fathers perceive themselves as having a "being there" role and/or a provider role in terms of fatherhood.

Faculty Mentor: Dr. Francis Prior

Marketing Through Microcultures on Social Media: an Examination of BookTok and Independent Bookstores[±]

Wandzia Prytko '23

Marketing

Two of the primary uses of social media are sharing and communication. Book lovers use social media to share their love of reading and bookstores use it to promote their businesses. This side of TikTok

is commonly referred to as “BookTok,” and this community of book lovers has greatly impacted the publishing industry, with books that are popular on BookTok appearing on bestsellers lists and showcased in many bookstores (Dalrymple, 2022). This research explores the role of microcultures in social media marketing, by focusing on the BookTok microculture and its significant role in the marketing strategies of independent bookstores. The research includes an examination of microcultures and their impact on businesses, the effectiveness of the key social media marketing tactics used on TikTok, what BookTok is, how independent bookstores engage with BookTok, and an interview with an independent bookstore on their uses of BookTok. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Bridget Leonard

The R.I.C.O. Act: America’s Approach Against the Mafia and Corporate Crime[±]

Andrew Brooks ‘23

Accounting

Identify the main points of the R.I.C.O. (Racketeer Influence and Corrupt Organizations) Act of 1970: (1) the definition of racketeering; (2) racketeering engagements and how the government identifies it; (3) the punishments defined in the by the law; and (4) the civil and criminal processes with which the prosecutor and defendant must follow. There is a comparison between three examples of how the R.I.C.O. Act was used against the Italian Mafia in the 1980s and 1990s, and three examples of how the law was used against corporations committing acts of racketeering. There is a noticeable difference in the effectiveness between how the law is used between the two forms of enterprises. This difference is identified by the fact that the “cutting off the head of the snake” tactic used by prosecutors against the Mafia (by targeting the Mafia bosses) is not the same tactic used for corporate crime. The ineffectiveness of the law when it comes to corporate crimes of racketeering begs the question as to whether or not corporate crime should continue to be applied to this law. If the law should sustain its stake in corporate racketeering, then prosecutors should work to approach the methodology of “cutting off the head of the snake” in the direction of top-level management and potentially board directors to be charged with crimes committed and not hide under the guise of the corporate entity in court. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Philip Benvenuti

Remedying Unfair Fair Use Judgments in the Music Industry: A Call for Greater Consistency in the Application of the Four Factors and Transformation Determinations in Copyright Legislation[±]

Abbigail Sullivan ‘23

Business Management and Political Science

In this thesis, I will focus on the Copyright Act of 1976 and how the copyright clause has affected the music industry: “to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries” (U.S. Const. Art. 1, Sec 8. C. 8) The music industry has seen a process of evolution and change over the past few decades. With the ease of accessing new technology, there has been a tremendous increase in the number of people who create music and other works. However, there is a lack of understanding of how to apply four legislative considerations or the four factors (the purpose and character of the use, the nature of the

copyrighted work, the amount and sustainability of the portion taken from copyrighted work, and the effect the use has on the potential market) which assist in determining fair use and identifying the transformative nature in fair use within a copyright case. I will also discuss the two problems that I have identified with the Copyright Clause, and more specifically, the lack of a consistent understanding of the cohesive thought process in which to apply these four factors within cases. Ultimately, I propose that Congress revise Section 107 to help create a more consistent understanding of applying the four legislative considerations that have been used in copyright cases. This will allow for better protection of artists' rights within the industry when they create music.

Faculty Mentor: Prof. Michael T. Matraia, J.D., M.S., C.P.A

An American Universal Basic Income: A Remedy for Inequality

Victoria Gauthier '23

Economics

A Universal Basic Income (UBI) is a policy measure that provides an income floor to all citizens. Recently, UBI has gained much popularity as a possible solution for rising poverty rates and inequality. There is a growing body of research that shows a UBI is successful in reducing poverty and increasing quality of life. Additionally, poverty rates are not rising, but inequality is. This raises the question, could a UBI address the current income inequality problem in the United States? However, there are fewer studies linking a UBI to inequality. Building on the research on UBI and poverty, this paper provides insight into how a UBI could help the issue of income inequality.

Faculty Mentor: Dr. Smriti Rao

Friedrich Nietzsche's Influence on Kandinsky's Expressionism

Teresa Guerra '23

Art History

In his influential masterpiece *Thus Spoke Zarathustra: a book for None and All*, the late-modern philosopher Friedrich Nietzsche developed his concept of self-overcoming, that is transcending one's perceived, given limitations and forging ever-more sophisticated and creative modes of action and expression. Nietzsche presents his Zarathustra as the perfect embodiment of the expressive, creative, and meaning-giving life of self-overcoming. This Nietzschean philosophical teaching discernibly influenced the character, ideals, and purposes of German Expressionism. Specifically, Nietzsche's teaching on self-overcoming had a particularly strong influence on the artist Wassily Kandinsky. Like Nietzsche, Kandinsky believed that artistic creation – in his case, non-objective, abstract painting – was the greatest expression of one's will. Kandinsky presents himself as a prophet and creator of a new wave of expressionist art. This paper examines Nietzsche's account in *Thus Spoke Zarathustra* of the awesome creativity of the powerful will possessed by the highest human type and traces his influence on Kandinsky's development as an artist in the early 20th century.

Faculty Mentor: Dr. Toby Norris

Poster Session Wednesday, April 19, 2023

Trait Mindfulness and Memory Performance[±]

Kyra Belden '23

Psychology

Previous research has suggested a link between self-reported states of mindfulness and performance on tasks designed to examine eyewitness suggestibility. In this study, I examined whether measures of trait mindfulness would similarly predict how susceptible people's memories are to external suggestion. Participants studied six common household scenes, and then were asked to rate the pleasantness of items they believed to be recalled by another participant. These items included six suggested items not present in the scenes. Following a two-part memory test involving a recall task and a recognition task, participants completed a mindfulness questionnaire to measure levels of trait mindfulness. I found that participants demonstrated false memory for the suggested items, and mindfulness scores predicted memory accuracy on the recognition test.

Faculty Mentor: Dr. Leamarie Gordon

Observation and Classification of Microbial Growth on Towels from Different Environments

Rebecca Benjamin '24 and Avery Morin '25

Biology

Shared objects, such as towels, can be vehicles for the spread of infectious diseases due to present bacteria. The study sought to determine if bacteria were present on a used kitchen or bathroom towel and to presumptively classify them using selective and differential media. A used bathroom towel, used kitchen towel, and an unused towel (control), were swabbed and inoculated into nutrient broth tubes that were incubated overnight at 37°C. Aliquots from each tube were spread-plated to create a lawn of bacteria on nutrient agar to confirm growth, EMB agar indicating Gram-negative bacteria and lactose fermentation, and mannitol salt plates indicating Gram-positive bacteria tolerant to high salt concentrations and mannitol fermentation. The dirty kitchen towel produced growth on the EMB plate, indicating the presence of Gram-negative bacteria and weak lactose fermenters (pink color change), as well as on the mannitol salt plate reflecting the presence of Gram-positive salt-tolerant bacteria that ferment mannitol (yellow color change). The dirty bathroom towel also had mannitol-fermenting, salt tolerant bacteria on mannitol salt agar, as well as on EMB agar, where dark purple and green color changes were present, indicating strong lactose fermenters. Green colonies on EMB agar are considered presumptive for *E. coli*. Interestingly, the unused towel also produced some growth on all three plates. The results signify the diversity of microbes present in home environments. The presence of *E. coli* on a shared towel is concerning as some strains are pathogenic. More tests should be performed to confirm its identification.

Faculty Mentor: Dr. Soraya Betancourt-Calle

Trafficking of the Dopamine Transporter

Lali Berelashvili '23

Psychology & Biochemistry

Dysregulating of dopamine is indicated in multiple neurological disorders, including ADHD, autism spectrum disorder, addiction, and schizophrenia. The dopamine transporter (DAT) is one of the most important components of regulating extracellular dopamine levels. Typically, DAT is trafficked at a steady state. However, mutants are less stable on the surface and may facilitate dysregulated reuptake of dopamine into the presynaptic neuron. This dysfunction of DAT may be a critical factor in abnormal dopamine levels. In fact, specific coding variants for DAT have been identified in people with neurological disorders, such as DAT R615C in people with ADHD. To determine how DAT trafficking occurs in mutants, human embryonic kidney cells were cultivated with wild-type DAT and DAT R615C. Expression of the dopamine transporter, along with its trafficking, was analyzed through molecular biology techniques. It was found that DAT R615C expresses 45% as much as wild-type DAT. Further, a 50% decrease in surface DAT was observed in DAT R615C compared to the wild type ($p=0.02$). This suggests that DAT R615C is an unstable mutant of the dopamine transporter and likely affects dopamine dependent behaviors.

Faculty Mentor: Dr. Jeanine Skorinko

Overview of the General Structural Causes of Water Scarcity Worldwide and the Specific Structural Causes of Water Scarcity in Jordan and USAID's Role in Addressing Them

Nathan Boudreau '23

Global Studies

Water scarcity is a global problem, with at least four billion people throughout the world living under conditions of water scarcity for at least one month of the year. Jordan is the second most water scarce country in the world, the most water scarce country in the world is Saudi Arabia. However Saudi Arabia has enough money to build the economic infrastructure to satisfy its water needs whereas Jordan does not have the funds to do so.

Faculty Mentor: Dr. Kevin Hickey

Complexity Size Scaling Relations in Complex Networks

Matthew Brouillet '25

Physics

Complex systems can be represented by flow networks for energy and matter such as Rayleigh-Benard convection, river basins, lightning, circulatory systems of different kinds, etc. Agents along those networks form flows avoiding obstacles and searching for path of least action, with a curvature described by the metric tensor. The action efficiency can be used as a numerical measure for its level of organization. The constraints for motion curve the space and they push the agents away from them, they can be modeled with a repulsive potential, and the nodes such as the source and sink can be modeled with an attractive potential. The flows do work on the constraints to motion reducing them and thus reducing the curvature. This process obeys the Gauss Principle of Least Constraint, the Hertz's Principle of Least Curvature, and ultimately the Principle of Least Action. The more organized the system, the shorter are the paths, the higher is its degree of organization i.e. complexity. The decrease in internal entropy of the system corresponds to increase of the external entropy production by faster transmission of matter and energy across its boundaries. In our Agent Based Model simulations of flow networks the average path

length measured, which depends on the size of the system, measured by the number of agents. The curvature of the paths of agents between the source and the sink decreases with self-organization time, but, also with increasing number of agents.

Faculty Mentor: Dr. Georgi Georgiev

Analysis of Stigma Towards the Mental Health Discussion via Social Media

Jada Hinds-Williams, Psychological Science

Josephine Kim, Management Engineering- Data Science concentration

Mark Buono, Data Science

Rachelle Gonzales, Psychological Science, Management Engineering-Operations concentration

As social media platforms continue to expand their reach, these platforms have the capability to facilitate public health discussions, such as mental health discussions, to a widespread group of individuals. However, the stigma associated with discussing mental health on social media poses one of the largest barriers to mental health conversations and awareness. Our two-part study explored whether the stigma and negative attitudes surrounding the mental health discussion on social media has dissipated in recent years. From data collection through Twitter, we used analyses including both sentiment analysis and topic modeling as well as applying many defining queries to determine changes of engagement in the mental health discussion over three different time periods, a decade ago, pre COVID-19, and post COVID-19. Our survey participants viewed and rated their engagement tactics towards four real tweets gathered from twitter and rated their agreement towards two different scales with one scale geared towards the stigma of posting about an individual's mental health on social media and one scale geared towards the stigma of individuals who struggle with mental health in general. We were able to draw conclusions among many different aspects of our data collection and compare between two different populations, one being students from Worcester Polytechnic Institute and the general public who completed the survey through a CloudResearch portal.

Faculty Mentors: Dr. Adrienne Hall-Phillips (WPI), Dr. Jeanine Skorinko (WPI), and Dr. Nima Kordzadeh (WPI)

The Gender Gap in Mental Health

Kathryn Cannistraro '24

Human Services and Rehabilitation Studies

Socially constructed differences in gender roles have been passed down throughout generations, providing a strict framework for viewing masculinity and femininity. Research shows that enforcing such normative expectations for gender-specific behavior has very real consequences. In a society that views mental illness as a weakness, and deems men being weak as socially unacceptable, data presented on human behavior represents only a product of social conditioning, reinforcing a false truth and further contributing to a cycle of stigma and marginalization. Increasing understanding and giving visibility to this issue is vital in order to bridge the gender gap in mental health.

Faculty Mentor: Dr. Christian Williams

Anxiety In the Arts: Anxiety Displayed Through Mixed Media[±]

Abbey Cashman '23

Art

It is hard to ignore the flood of media concerning the arising crisis of anxiety. There are so many works in the media and yet I could not connect with any of them. Anxiety is chaotic and multilayered, and I felt as though it needed to be portrayed in that manner. That being said, I turned to mixed media to present my reality of anxiety. Each piece is done on canvas and utilizes an array of materials meant to represent my feelings.

Faculty Mentors: Professor Simmons and Professor Glushien

A Content Analysis Examining the NFL's Social Media Communications in a Global Market[±]

Lauren Cavanaugh '23

International Business

To better connect with the potential fan base in the United Kingdom, the NFL created another Instagram account, separate from their main "NFL" account, with the username "NFLUK". In this thesis, I conducted a content analysis comparing a selection of posts made during the 2021 NFL season for each account, "NFL" and "NFLUK" to examine how the NFL modified their posts and communication for their new target audience. The posts were examined through the perspective of two different communication theories: The Elaboration Likelihood Model of Persuasion and the Adaptation versus Standardization Model of International Marketing. The goal was to determine if the UK social media posts used more peripheral cues than the US posts, and if the U.K., given its cultural differences with the U.S., used more calmer tones and less excitement than the US posts. It was found that the UK account did use more peripheral cues and that some of the posts were adapted to meet the standards of the UK market. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Bridget Leonard

Leadership and Performance: Flight Simulator

Michaela Champagne '23

Psychological and Cognitive Science

Leaders and subordinates share a complex and complicated relationship, and leaders can directly influence the mental state and subsequent physical performance of their subordinates. System Dynamics is an important aspect of modeling these relationships and the variables that interact with each other in a dynamic fashion. Participants interacted with the Leadership and Performance Model (LPM) after being briefed on their given subordinate. Some players knew the personality data of their subordinates ahead of time, while some did not. Players had to make behavioral choices that influenced their simulated subordinates' Army Combat Fitness Test (ACFT) scores, motivation levels, and energy levels. The average Overall Simulation Score (OSS) of each group provided insight on whether or not knowing a subordinate's personality is integral to improvement of their performance.

Faculty Mentors: Dr. Jeanine Skorinko (WPI), Dr. Jim Doyle (WPI) and, Dr. Michael Radzicki (WPI)

Quality of School-Based Mental Health Services and Student Well-Being[±]

Angelina Davis '23

Psychology

Schools are essential in providing both students who struggle with mental health problems as well as the overall student population with services that improve well-being. Previous research has shown that, among other factors, the involvement of caregivers is important for the effectiveness of such programs, thus improving their quality. However, there is little evidence about the relationship between the quality of these mental health services and student well-being. This study aimed to fill this gap in literature. Participants included 19 caregivers, 5 middle school students, and 5 mental health professionals. Participants completed questionnaires that assessed the study variables. The correlations between quality of mental health services and student outcomes were not statistically significant, however, were all in the expected direction. The correlation between caregiver involvement and psychopathology was also in the right direction, but parental involvement seemed to increase negative affect and decrease life satisfaction. However, none were statistically significant. The trends in the current findings point to the need to evaluate the quality of school services, encourage caregiver involvement, educate caregivers and students about common problems and mental health illnesses, and provide ongoing training to school mental health professionals. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Maria Kalpidou

Family Dynamics Predict Language Skills at 12 Months of Age[±]

Angelina Davis '23

Psychology

The purpose of this study was to explore associations of parental language during triadic interactions, parental depression at 3 and 12 months, and the environmental climate of parental-child interactions with language skills of infants at 12 months. Participants included 42 infants and their parents. Standardized measures of communication skills in infants are associated with parental language use, emotional climate, and parental depression. There was a lack of association between parental depressive symptoms and language production in children. The emotional tone of interactions and the social energy of the infant seem to be the best predictor of infant language skills.

Faculty Mentor: Dr. Maria Kalpidou

Mating in Sexually Mature Zebrafish Suppresses the Alarm Response Elicited by Glycosaminoglycan Chondroitin

Vincenzo DiCarlo 22'

Biology

Specific behavioral repertoires in a given species can provide contextual evidence as to why some animals behave differently than others. In the case of zebrafish, it has been shown that they have an evolutionary predisposition to ignore potentially harmful stimuli when partaking in copulation. Typically, these animals will elicit many alarming behaviors such as erratic movement, freezing, and bottom-dwelling when responding to an alarm substance released by the injured skin of a neighboring fish. Using both sexually mature and sexually immature zebrafish these behaviors were observed for when in the presence of a synthetic alarm substance constructed from a shark cartilage supplement with trace

amounts of glycosaminoglycan (GAG) chondroitin. The first experiment was utilized to observe the conventional alarm response these zebrafish are known to display when in the presence of such a substance. A significant difference was found for each behavior between the control and experimental groups suggesting that the experimental group displayed a higher frequency of alarming behaviors than the control. The second experiment was utilized to test whether mating could repress this conventional alarm response observed in the previous experiment. For every behavior observed in the second experiment, none were found to be significantly different between the control and experimental groups. This suggests that the alarm response was repressed when the animals were allowed to mate. However, it was found that in the last two trials where sexually immature fish were used, the alarm response was not able to be repressed. Thus, there was evidence found that suggests the original hypothesis proposed by Diaz-Verdugo et al. (2019) was correct when pertaining to sexually mature zebrafish.

Faculty Mentor: Dr. Stuart Cromarty

Nation-Building with a Focus on South Korea[±]

Dhimitri Disho '23

Political Science

Nation-building is a practice that the United States has been dealing in since the end of WWII. It is what the United States has attempted to do recently in the Middle East in respect to Iraq and Afghanistan. This thesis explored the history of nation-building from the 1950s up to now with a focus on South Korea to see if there was anything from the South Korean effort to help understand what a successful nation-building project would look like. The examination of South Korea led to several conclusions on nation-building; it requires sustained support that may last decades, a slow transition to a democratic style government, and a bubble around the country. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Bernard J. Dobski

Broad and Narrow Spectrum Phototactic Responses of Branchiopod Crustaceans: Red-Tail

Fairy Shrimp and Tadpole Shrimp[±]

Maria Gaughan '23

Biology

Fairy and tadpole shrimp have more spectral photoreceptor classes than expected given their reduced nervous systems for processing visual information. Both shrimp are branchiopods, a group of crustaceans that are often found in temporary pond habitats, and they are thought to use light cues for orienting behavior. Other organisms with many spectral photoreceptor classes, such as birds, butterflies, and fish, tend to have more complex sensory systems which process spectral information as color vision. It is possible that branchiopods have maintained multiple spectral photoreceptor classes for luminance vision in dim, spectrally variable habitats. We tested how fairy and tadpole shrimp respond behaviorally to broad and narrow spectrum light for phototactic behavior. These assays may indicate if color vision is being used. Fairy and tadpole shrimp behavioral responses were photonegative at higher intensities, such as those in late morning or early afternoon sunlight in a terrestrial habitat. Responses at intensities lower than starlight in a terrestrial habitat suggest tadpole shrimp are more sensitive to dim light than fairy shrimp, and neither shrimp uses color vision at these intensities. Male fairy shrimp become positively phototactic to broad spectrum light at low intensity. Broad and narrow spectrum behavioral results were similar, suggesting color vision is unlikely at low intensities. It remains to be seen whether responses at high intensities use color vision.

Faculty Mentor: Dr. Nicolas Lessios-Damerow

Essentially Doomed: How the COVID-19 Pandemic Has Impacted the American Restaurant Industry[±]

Jack Grafton '23

Marketing & Management

COVID-19 appeared unpredictably in late 2019 and developed into the most catastrophic global health emergency of the last century over the course of the next three years. The highly contagious virus infected hundreds of millions of people worldwide and was responsible for the death of millions. Beyond the devastating health impact the virus had on the world, pandemic related shutdowns resulted in massive economic consequences. Social distancing measures resulted in months long shutdowns and restrictions on businesses throughout the United States, creating massive revenue and employment losses. Of specific industries heavily impacted by the pandemic in the United States, the American restaurant industry was devastated by the pandemic and its shutdowns. While other industries discovered the benefits of remote work, restaurants were unable to utilize this luxury. Despite being among America's largest industries by employment and accounting for 4% of America's GDP in 2019, three years later the restaurant industry is still fighting to recover. This paper answers the questions of what the impact of the COVID-19 pandemic was on the American restaurant industry and what the future holds for the fractured industry. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Zachary Daniels

Investigation of Drug-Drug Interactions Involving the CYP3A4 Liver Enzyme[±]

Sarah Iacoviello '23

Chemistry

Understanding the metabolic pathway of a drug is an integral part of pharmaceutical development. Microsomal techniques are often used as industry standards to model the metabolism of the drug by the liver. Our studies employ carbamazepine (CBZ) as a CYP3A4 substrate to develop a method to investigate potential drug-drug interactions involving this enzyme. Toward this end, the metabolite of CBZ, carbamazepine-9,10-epoxide (CBZ-E), was synthesized for use as a standard. The purity of the synthesized CBZ-E was 95.2%, and the percent yield was 76.16%. The use of human liver microsomes is a common incubation method used to model drug metabolism in an *in vitro* setting. We have studied the metabolism of CBZ and analyzed the results using HPLC methods. The final results will be presented at the time of the symposium.

Faculty Mentor: Dr. Edward Dix

Personality, Temperament, & Self Deception

Austin John Jandrucko '23

Psychology

It's been long established that the living experience is one marked by perceptual limitations of a subjective experience. The study is seeking to explore how these limitations affect not just our view of the world, but more importantly our views on ourselves. Participants completed an online survey that assessed their presentation of personality in accordance with The Big 5 model for core personality traits. As well as assessed their own self perceived personality according to the same 5 factor model of the Big

5. Then a participants personality disparity was measured through the difference between their psychologically assessed personality and their self-assessed personality of The Big 5 personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism. Although a large span of variety appeared in the measured disparity between the two self-images, no significant relationships were found between any degree of prevalence of Big 5 personality traits and the prevalence of personality disparity.

Faculty Mentors: Dr. Jeanine Skorinko (WPI) and Dr. Jim Doyle (WPI)

Recovery Experiences During COVID-19[±]

Emily LaFond '23

Human Services and Rehabilitation Studies

People with substance use disorder are a particularly at-risk population who experienced greater hardships during the coronavirus (COVID-19) pandemic, as previous literature revealed. The present study aims to explore the experiences of individuals with substance use disorder accessing recovery support services during the COVID-19 pandemic. Self-report survey data was collected from 144 participants who self-identified as having substance use disorder and engaged in recovery support services since COVID-19 began. Thematic analysis was used to analyze survey data and 4 main themes were identified: (1) Shifting terrains in recovery, (2) Connecting through a screen, (3) Heightened hardships, and (4) Grow through what you go through. Participants experienced greater challenges during the pandemic related to accessing virtual substance use support services, exacerbated mental health symptoms, and loss of relationships, which often led to decreased motivation for recovery. In the face of adversity, however, a number of participants expressed cultivating resilience and healthy coping strategies, leading some to derive a newfound sense of purpose in recovery. Future research should explore the present role of virtual services in recovery treatment and mental health conditions following the pandemic. This presentation summarizes collaborative research conducted with a faculty member made possible by an Honors Summer Fellowship.

Faculty Mentor: Dr. Christian Williams

Effects of Serotonin on Male Crayfish Aggression

Aine LaPalme '23

Biology

The goal of this study was to determine to effects of serotonin on male crayfish aggression. Serotonin is a neurotransmitter and hormone responsible for regulating emotion and behavior in humans, as well as animals. Crayfish are commonly studied for their behavior, as they have distinguishable and recognizable behavioral patterns and responses related to aggression. Six pairs of male crayfish were assigned via similarity in size and set as a control group, in which one member of each pair was injected with crayfish saline solution. The same was done for the experimental group, however, serotonin was injected in place of crayfish saline solution in one member of each pair. The pairs of crayfish were allowed to interact and were observed for a fifteen-minute period, and behaviors were recorded for each individual every ten seconds. The data was statistically analyzed using paired T-Tests. Crayfish injected with serotonin increased their approach and walking forward behaviors. Additionally, it was also seen that submissive behaviors such as walking backwards, escape response, and wall behavior increased in the non-injected experimental partner indicating that these individuals recognized increased aggression in the serotonin- injected partner. Lastly, non-injected individuals interacting with a serotonin-injected individual were more likely to engage in aggressive behaviors compared to non-injected individuals who

interacted with a saline-injected individual indicating that overall aggression and activity was increased in these pairs and these non-injected animals need to defend themselves.

Faculty Mentor: Dr. Stuart Cromarty

Breakfast is the Most Important Meal of the Day: An Investigation of the Levels of Cadmium in Breakfast Cereal[±]

LiLi MacQuarrie '23'

Chemistry

Cadmium (Cd) is a transition metal that offers no nutritional value to human beings. Humans' main exposure to Cd is through consumption. Cd is extremely soluble, leading to plants readily absorbing it through contaminated water. Plants containing the absorbed Cd are consumed, and the metal accumulates in the body and is toxic. Effects of Cd in the body include renal tubular damage, pulmonary emphysema, epigenetic changes, and carcinogenesis. Previous studies have looked at Cd in cereal-based products, and their results revealed low, varied amounts of Cd in the samples. However, most of these studies were performed in Asian countries. This leaves a gap in data for foods in the United States. This study looks at three different rice cereal brands from grocery stores in the Worcester, MA area. In a 2 g sample, the results ranged from $0.04 \pm 0.03 \mu\text{g}$ in Rice Chex (General Mills), $0.06 \pm 0.04 \mu\text{g}$ in Signature Select's Rice Pockets (Shaws), and $0.09 \pm 0.06 \mu\text{g}$ in Food Club's Rice Squares (Big Y). These results were all above the LOD of $0.015 \mu\text{g}$. The amounts of Cd found were comparable with the amounts found in previous literature. Since the levels of Cd were below the TWI of $2.5 \mu\text{g}/\text{kg}$ body weight, it can be concluded that the amount of Cd in these brands do not pose a health risk. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Brian Niece

Effects of Muta28ons on C. elegans Neuromuscular Func28on

Hailey McKillop '24

Neuroscience

Neurons communicate at synapses, which include a signal sending compartment, called an axon, and a signal receiving compartment, called a dendrite. To be28er understand the molecules necessary for the forma28on of dendrites, the Francis lab at UMass Chan Medical School carried out a forward gene28c screen and found a novel mutant strain of unc-63 in Caenorhabdi28s elegans. This mutant has a missense muta28on that causes a failure in acetylcholine receptor (AChR) assembly on dendrites of GABAergic neurons but did not affect dendrite structure. I further characterized this mutant with pharmacological and behavioral assays. UNC-63 is an α subunit of nico28nic acetylcholine receptor (nAChR), found in the body wall muscle of C. elegans. Levamisole is a pharmacological agonist that binds to nAChR and causes persistent contrac28on of body wall muscles in C. elegans, eventually leading to paralysis. Analysis of levamisole assays reveal unc-63 mutants are resistant to levamisole, as are unc-63 null mutants, sugges28ng a disrup28on in nAChR forma28on. When we performed a muscle specific rescue of unc-63, the animals showed par28al levamisole resistance. Considering these differences at the neuromuscular synapse, it is surprising that behavioral analysis reveals the motor movement of unc-63 mutants is not different than wildtype animals, whereas unc-63 null animals move poorly. Our data suggests our unc-63 muta28on is sufficient to disrupt AChR but not sufficient to impact motor movement. To further explore this unc-63 muta28on, I am building strains carrying muscle GCaMP6, the calcium indicator, in the mutant background to perform calcium imaging and optogene28c analysis.

Faculty Mentor: Dr. Michele Lemons

The Importance of Downstream Processing for Peptide Manufacturing

Morgan Miller '23

Biology

Peptides are small proteins that are manufactured for research and development purposes that are made of a combination of amino acids. Peptides are manufactured using a hybrid synthesis using solid and solution phase synthesis. High-performance liquid Chromatography is part of this downstream process which ensures quality control and is essential for detection of product-related impurities. This relies on ligand binding via a column for large molecule separation to isolate and purify these peptides. Downstream processing such as purification is significant in producing highly purified active peptides for pharmaceutical ingredient use. Manufacturing these peptides are used in developmental trials for new enzymes, pharmaceutical, and vaccine research. Hundreds of drugs use peptides to treat conditions such as diabetes, multiple sclerosis, and high blood pressure. The synthetic process begins with solid phase synthesis of amino acids using resin to attach polymer beads suspended in solution (the deprotection step). Coupling of the amino acid chain then occurs after the activation of the amino acid sequence. Peptide bond formation occurs through a nucleophilic substitution reaction to form amide bonds. Then cleavage will take place using a cleavage cocktail (dissociation step). The peptide is then purified using HPLC and then further analyzed to ensure good manufacturing processes used. This also qualifies that the product is up to the standards for customer use in their research efforts.

Faculty Mentor: Dr. Edward Dix

The Effect of Gratitude and Compassion on Persuasion Processing[±]

Patrick Otto '23

Psychology

This study explored whether gratitude and compassion, separately, increase or decrease persuasion. Participants were induced to feel gratitude or compassion and rate how persuaded they were by arguments. Based on previous literature, we hypothesized gratitude would increase, while compassion would decrease, persuasion. Although results were not significant, means were in the opposite of the predicted direction. The compassion group was more persuaded than the gratitude group. This research highlights the importance of understanding positive emotions. This presentation summarizes an original capstone project that fulfills the final requirement of the Honors Program.

Faculty Mentor: Dr. Maria Parmley

The Formation and Fate of Microplastics

Brady Ryan '23

Environmental Science

Although the definition is under debate, microplastics are widely accepted as plastic particles that are 5 millimeters in diameter or smaller. Microplastics can come about in two ways: they can be formed as a result of the breakdown of larger plastics (secondary production), or they can be deliberately produced (primary production), and they are very difficult to get rid of. Although mass production of plastic only began about 70 years ago, plastic pollution and the ensuing microplastics have already proven to be a major problem. In humans, microplastics can be found in blood, lung tissue, and stool, and have already been linked to infertility, obesity, altered chromosomes, gut inflammation, immune system complications, and cancer. Moreover, in zebrafish, the presence of microplastics corresponds with

inflammation and lipid accumulation, and in mice, microplastic presence has been linked with altered metabolism, increased appetite, lesions, and decreased liver weight. To mitigate the effects of microplastics, minimizing their production is paramount. Ways this can be accomplished include putting an end to primary production of microplastics and recycling old plastic instead of producing new plastic. More possible solutions include searching for organisms or substances that degrade microplastics, as well as launching a microplastics safety consortium.

Faculty Mentor: Dr. Benjamin Knurr

ABA Staff Training Using Train to Code

Julie Sutherland '23

Psychology

Providing effective interventions for children with autism presents a challenge to staff because children vary widely in the type, number, or severity of language and socialization deficits and behavior challenges. We investigated the use of a computer program to teach staff how to deliver a behavior intervention program and assessed their ability to correctly implement the program. Participants learned prompt types used in discrete trial teaching (DTT), which is a common teaching procedure used to teach children with autism. The participants were asked to code the order of events in a trial, written descriptions of a trial, and video depictions of DTT. Coding involved identifying correct/incorrect examples and identification of error types. Pre-test/posttest results indicate an increase in participants' ability to correctly implement DTT programs. This training program may be an effective staff training tool in settings based in applied behavior analysis interventions.

Faculty Mentor: Dr. Karen Lionello-Denolf

Investigating an In Vivo Murine Model of Microglial Senescence

Christina M. Tsillas '23

Biochemistry and Psychological Sciences

Senescence in CNS resident macrophages known as microglia, have been suspected to play key causational roles in neurodegenerative disease. This project aims to learn more about the potential causation and mechanisms that underlie senescent microglia's role in diseased aging. To accomplish this goal, this research studied potential models of senescence in microglia. This investigation explores four different potential *in vivo* models of senescence in microglia in mice using pharmacological and genetic tools including Busulfan, *p21* overexpression, *Smurf2* overexpression, and transgenic Alzheimer's Disease model mice.

Faculty Mentors: Dr. Dorothy Schafer (WPI), Dr. Jeanine Skorinko (WPI), Dr. Angela Incollingo Rodriguez (WPI), and Dr. Robert Dempski (WPI)

Testing Regulatory Neurotransmitters for Behavioral States in C. elegans in Response to Stress

Deyana Underwood '23

Biology

Serotonin, tyramine, and dopamine are neurotransmitters that have been shown in previous literature to regulate behavioral states in *C. elegans*. In a non-threatening environment, *C. elegans* remain in areas with an abundance of food. With the introduction of an aversive stimuli, such as a tap vibration, these nematodes are startled and leave the food rich environment. The goal of this study is to elucidate

neurotransmitter signaling underlying *C. elegans* behavior after an aversive tap stimulus. 28 wildtype (N2) *C. elegans* were transferred from their home plate to a medium-sized agar plate with four 5 μ L spots of OP50 spotted into a square pattern. Behavioral data was collected using the MultiWorm Tracker for a 30-minute experiment, with an aversive tap delivered at minute 15. This was repeated with *tph-1*, *tdc-1*, *cat-2*, and N2 worms starved for 1 hour. Leaving events were scored in the 30-minute trial and are defined as *C. elegans* that move at least 2 body lengths away from the food patch. Preliminary results suggest food deprived N2 animals tend not to leave the food patch, even after the presentation of the aversive tap. In contrast wildtype animals leave the food patch more readily after the tap presentation. Further experiments are being conducted to determine the rate of leaving events in the *tph-1*, *tdc-1*, and *cat-2* mutants that are deficient in serotonin, tyramine, and dopamine, respectively.

Faculty Mentor: Dr. Michele Lemons

Predictors of Dissociative Experiences

Gabrielle Willett '23

Psychology

This study investigated whether childhood trauma or fantasy proneness is a better predictor of dissociation in a nonclinical sample, using archival data. Fantasy proneness was a stronger predictor of dissociation among people with no childhood adversity, but childhood adversity was a stronger predictor among those with adversities. Dissociation may be an outlet for those with an imaginative and inquisitive mind, and a coping strategy when dealing with adversity. These findings normalize dissociative experiences in a nonclinical population.

Faculty Mentor: Dr. Maria Kalpidou

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