FORDHAM COLLEGE AT ROSE HILL 14TH ANNUAL UNDERGRADUATE RESEARCH SYMPOSIUM

Wednesday, May 5, 2021

AN INTERDISCIPLINARY CELEBRATION OF OUR STUDENTS AND MENTORS
Welcome to the Fourteenth Annual FCRH Research Symposium, for the first time in a hybrid format! The accomplishments of our students and mentors during the pandemic have been extraordinary and we are overjoyed to celebrate them today. From our beautiful campus, to their homes throughout the country and beyond, our undergraduate research community was always open for new discoveries. We are delighted to share 120 abstracts from over 200 students who pursued their projects during such challenging times. Their work, dedication, and determination to be a part of today’s event is inspiring and what FCRH undergraduate research is all about. We are in this together to urge each other on and findings shared today may well change the world. We are also proud to announce that the 11th volume of the *Fordham Undergraduate Research Journal* has been published. The FURJ team took on an enormous undertaking of running their operation in hybrid format, with a record number of submissions, and as always, they have dazzled us with the quality of their efforts.

Undergraduate research has become a part of who we are at FCRH. Because of this, our program, against all odds in the past year, continues to grow, expanding across disciplines and accessible to all students in a number of ways. Students are creating new knowledge in our labs, independently with the guidance of their mentors, as part of innovative class projects, and even to support their activism. Thanks to generous support from donors, FCRH has provided over $1.5 million in funding for students and faculty over the past ten years, giving more students the opportunity to deeply engage and participate in or spearhead impactful projects. For the third year, FCRH offered a “Foundations in Research Engagement” seminar; students enrolled in this course developed six fascinating projects utilizing a range of research methods and they did so within hybrid groups. As you will see, our students across disciplines have initiated cutting edge research on COVID-19. They continue to present at national conferences and they are publishing their timely work too. We are profoundly grateful for the way our students and mentors strive to find ways to better understanding and even lives while buoying our program.

Our programming would not be possible without the dedication of so many people. We are so thankful to our generous alumni donors and to the Fordham College Alumni Association for ongoing financial support for research at FCRH. We would like to extend our tremendous appreciation to our beloved students and their cherished faculty mentors, as well as supporters from our faculty and staff, family, friends, and alumni. Special thanks are due to our behind the scenes’ team who work tirelessly in support of undergraduate research: Jillian Minahan, Susan Legnini, Grace Little and Eric Riklin from the FCRH Dean’s Office; our FCRH Undergraduate Research Grant reviewers, which includes fifty faculty members and two alumni; and all who give themselves each and every day to making this community a place that continued to shine so much light during the past year.

Dr. Maura B. Mast
Dean
Fordham College at Rose Hill

Dr. Rachel Annunziato
Associate Dean for Strategic Initiatives
Fordham College at Rose Hill
WITH GRATITUDE TO OUR ALUMNI DONORS WHOSE SUPPORT FUNDS UNDERGRADUATE RESEARCH AND FELLOWSHIPS WITHIN FORDHAM COLLEGE AT ROSE HILL

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The Fourteenth Annual Fordham College at Rose Hill
Undergraduate Research Symposium
May 5, 2021 | Rose Hill Campus | Zoom

Schedule of Events

12:00  Opening Remarks & Musical Performance
       (Butler Commons)

       The Reverend Joseph M. McShane, S.J.
       President of Fordham University

       Miguel Sutedjo
       FCRH ’23, mentored by Dr. Nathan Lincoln- DeCusatis

12:00-5:00  Virtual Poster Session

1:00-3:00  Oral Presentations

3:00  Celebratory Remarks & Presentation of FCRH Faculty Mentor Awards (Keating 1st)

       Maura Mast, Ph.D.
       Dean, Fordham College at Rose Hill

       Dennis Jacobs, Ph.D.
       Provost, Fordham University

       Rachel Annunziato, Ph.D.
       Associate Dean, Fordham College at Rose Hill

3:30  Outdoor Celebration (Keating Terrace)
FCRH 14th ANNUAL UNDERGRADUATE RESEARCH SYMPOSIUM

Schedule of Presentations

Opening Remarks & Musical Performance, 12pm-1pm

Butler Commons, Duane

The Reverend Joseph M. McShane, S.J.
President of Fordham University

Asian/Asian-American Jazz: A Musical Analysis

Miguel Sutedjo

Please contact Dean Annunziato (annunziato@fordham.edu) if you would like to attend any of our in-person talks. They will be recorded as well.
Oral Presentations, 1:00pm-2:00pm

Panel 1
Healing & Wellbeing
Keating 204, Moderator: Bianca Campagna

Use of Ecological Momentary Assessment in Studying Emotion Regulation in Individuals with Depression and Thoughts of Suicide, Sophia Idso

Demographic Factors Affecting Suicide Ideation, Alexis Cosenzo

Suicidality in College Students Predicts Lower Sense of Belonging and Reduced College Persistence, Roscoe Garner, IV

Stress, Depression, Anxiety, and Coping Among Working Mothers During COVID-19, Maria Zarcone

Implications of the COVID-19 Pandemic on Higher Education Faculty Members' Perceived Stress Levels, Umar Mian & Nicole St. Jacques

Panel 2
Implications for Community & Environmental Health
Keating 206, Moderator: Jillian Minahan Zucchetto

Fitness costs and benefits of gene expression plasticity in rice under drought, Colleen Cochran

Plasticity responses to competition in Brassica rapa, Rachel Konshok

Nutrient Drivers of Toxic Cyanobacteria Blooms in the Lake in Central Park, Paige Wallner

Ecological Momentary Assessment of Distress Tolerance as a Dynamic Predictor of Suicidal Thoughts and Behaviors among Bronx Residents, Grace Denomme

Transitioning to Adulthood during the Coronavirus Pandemic: Young Adult Patterns in Moving Out of the Family Home, Valeria Venturini

Panel 3
Global Perspectives
Keating 208, Moderator: Sarah Duncan-Park

Media Dissemination in Myanmar's Spring Revolution, Rebecca Pfeiffer

The Prospect of Economic Development through Financial Inclusion as a Conduit to Capital Accumulation, Zachary Brower

Migrant Workers and Migradollars: How Recessions in the United States Influence Remittance Flows to Mexico, Carsyn Fisher

Future study inclinations based on early-education language exposure, Rebecca Pfeiffer
Panel 4
Cutting Edge from Chemistry
Keating 209, Moderator: Robert Beer

Electrocatalytic Oxidation of Small Organic Molecules with Core-Shell Platinum Coated Nickel Nanowires, Kathryn Belcher

Toward Practical Artificial Photosynthesis: Enhanced Performance of Photoelectrochemical Cells with Metal Nanowires, Dakota Wolf

Composition-Dependent Catalytic Activity of Pt-Au Nanowires for the Oxidation of Small Organic Molecules, Rosario Troia & Ian Dillon

Synthesis and electrochemical characterization of Pt-based core-shell nanowire electrocatalysts for the oxidation of small organic molecules, Daniel Ma

Designing Strains of Bacillus subtilis with Fluorescent Protein Tags to Translesion Synthesis Polymerases, Nicholas Bafundo

Panel 5
Health Sciences & Technology
Zoom, Moderator: Ellen Watts

Comparing Elastic Energy Models of Lipidic Membranes, Eric Lutts

Opportunistic Multi-Modal User Authentication for Health-Tracking IoT Wearables, Alexa Muratyan

Effects of Increased Smartphone Use and Poor Viewing Habits on Neck Posture, Nico Padua

Key Factors Influencing Adverse Health Outcomes in the Aging population: the Roles of Self-Perceptions of Aging, Functional Limitation, and Pain, Ashley Blasi

Examining the Relationship Between General Anesthesia Exposure and Cognitive Performance, Samantha Dargie

Panel 6
Policy Studies
Zoom, Moderator: Eric Riklin (joined by Olena Nikolayenko)

Ideology and Data: A Study of Soviet Science, Danielle Moynihan

Youth Political Engagement on Instagram, Brianna Wagner

Examining the Socioeconomic Impact of the China-Pakistan Economic Corridor, Marta Granados

Sexual Harassment and Cultural Norms in Immigrant Communities: Findings from In-Depth Interviews with Bangladeshi American Women, Shahidah Khanom

Impact of Liberation Theology on Mass Mobilization: Findings from the Philippines, Gabrielle Rivera
Oral Presentations, 2:00pm-3:00pm

Panel 1
Community-Engaged Research Showcase
Keating 204, Moderator: Bianca Campagna

Take Space, Make Space - Campus Spaces and Student Collaboration on Fordham's Rose Hill Campus, *Amelia Medvad & Carlos Rico*

Social Activism Among Jesuit-Educated Students, *Patrick Sawyer & Ellena Dickerson*

Assessing the Impact of Public Policy on the Housing Crisis in New York City, *Sotiris Georgakopoulos*

Mutuality, Service, and Spirituality: The Work of LSA Family Services in East Harlem, *Carlos Orbegoso*

Panel 2
From Bench to Bedside
Keating 206, Moderator: Patricio Meneses

Analysis of cardiac-specific effect of HCM-linked variant of RNaseZ in Drosophila melanogaster, *Megan Kurz*

Interdependence of gap junction-mediated cell-cell communication and phagocytosis in RPE cells, *Morgan McGrath*

The effect of ovarian hormones on the activity of genes regulating metabolism, *Olivia Doll*

Molecular dynamics simulation studies of newly designed peptide-bound pyrimidine and cholesterol derivatives to target PANC-1 Human Pancreatic Tumor Cells, *Paige McCallum & Madeline Bashant*

Validating Virus Efficiency for TDP-43 Replacement After 18 Months of Delivery, *Olivia Morrissey*

Panel 3
Treasures from the Humanities
Keating 208, Moderator: Sarah Duncan-Park

The Effects of Dynamics and Tempo on Musically Induced Emotions, *Sarah Cassidy*

Bokujin Kai and the Language of Abstraction, *Megan Sluzhevsky*

Was there an Irish Potato famine or “An Gorta Mór” (The Great Hunger)?, *Paige Hoffman*

“Brain Death” and the ICU: Intense Confusion about Unconsciousness, *Nicholas Bafundo*

Percorsi Postcoloniali Nella Città: Igiaba Scego's Relationship to Rome and its Monuments, *Alison Rini*
Panel 4
The Magic of Science
Keating 209, Moderator: Robert Beer

Cognitive Representations through Searchlight RSA, Laura Reno

Diagnostic Sensors in a 3D-Printed Bionic Hand, Jacqueline Maker

Light Matter Interactions of Acoustically Levitated Droplets, Komal Gulati

Weather Discrimination in Scene Processing Regions, Tess Durham

Panel 5
COVID-19 Research
Zoom, Moderator: Jillian Minahan Zucchetto

The Effect of the COVID-19 Pandemic on the Mental Health of Essential Workers in the Filipino Community, Clara Victorio

COVID-Related Stress and Growth, Erin Rosen, Shine Lita, Xavier Barker, Keara Kennedy

How COVID-19 Related Stress Impacts Feelings of Hopelessness, Caitlin Rogers, Boyana Maras, Meghan Smith, Samar Zagha, Keya Makwana

Gender Differences in Job and Life Satisfaction from 2016 to 2020, Tiffany Rado, Megan Mali, Martin Zehirov, Kristina Stevanovic

The Impact of Covid-19 Related Social Isolation on the Relationship Between Loneliness and Depression in Older Adults, Zuzanna Smurzynska, Basia Cdno, Kerin Chen, Alexander Slaughter

The Impact of COVID-19 on Well-Being and Career Plans for College Students, Tereze Nika

Panel 6
Anti-Racism & Social Justice
Zoom, Moderator: Ellen Watts

Environmental Racism and Discriminatory Public Policy in the South and Northwest Bronx, Catherine Kien, Jenna Goldblatt, Yajunaida Torrealba, Phillip Krehbiel

Investigating Development and Lasting Effects of the Fordham University Action Plan, Catalina Castillo-Lozano & Abigail Lo

The Costomer's Guide to Naturally Kinky Curly Hair, Myca Hinton

American Fears of Interracial Romance as Seen Through the Bachelor Franchise, Clare Duffy
Panel 7
Please Don’t Stop the Music!
Zoom, Moderator: Eric Riklin (joined by Eric Bianchi)

The Detail of the Pattern is Movement: Combination and Circularity in Caroline Shaw's Partita for 8 Voices, 
Kristina Lazdauskas

The Palmieri Effect: Modern Jazz in Afro Cuban Music, Ezekiel Montes Perez
ART HISTORY

Abstract 1: Bokujin Kai and the Language of Abstraction
Author: Megan Sluzhevsky
Mentor: Asato Ikeda
College: Fordham College at Rose Hill

Bokujin Kai was an avant-garde calligraphy group formed in the Kyoto area of Japan in 1952. The five founding artists had two goals in mind when creating their group: to completely revolutionize the traditional idea of calligraphy, and to establish calligraphy as a modern and important art form internationally. They took an art form that was thought to be impossible to modernize, and changed all standards that were assumed to be part of calligraphy. Throughout history, the defining characteristics of calligraphy were the paper, ink, and Chinese characters. Members of Bokujin Kai, particularly Morita Shiryu and Inoue Yuichi, removed or changed every aspect thought to be inherent to this art. From the use of different materials, to the exchange of Chinese characters for gestural abstraction, this influential Postwar group was able to achieve their goal of “world relevance,” impacting not only Japan but artists worldwide.

This movement is important not just as a form of subversion of tradition, but also in that it created a common voice between artists internationally. Morita was able to foster relationships with influential Western artists and find common ground in the language of abstraction. Bokujin Kai was able to rebel against historically Orientalist ideas not only because of the inventiveness of their art, but because they created a common understanding and an egalitarianism in the art scene. In the past, Asian artists were not seen as innovators. Bokujin Kai debased this idea by inspiring Western artists and universalizing the Eurocentric history of art.

BIOLOGICAL SCIENCES

Abstract 2: Feeding and Grooming Behavior of Captive Chilean Flamingos
Authors: Li Ying Wei, Marley Cutrona
Mentor: J. Alan Clark
College: Fordham College at Rose Hill

Chilean flamingos (Phoenicopterus chilensis) are one of five species of flamingos that are native to warm, tropical areas in South America. These flamingos are social birds that feed, nest, and mate in groups. The Bronx Zoo has a Chilean flamingo enclosure that houses 45 captive individuals. Studying the behavior of birds can indicate whether or not the birds are living in an ideal environment. Behavioral activities of birds are influenced by ecological factors and activity patterns can indicate whether or not they are receiving adequate care in captivity. This study compares the allocation of time to grooming and feeding behavior in the morning versus afternoon. We found more grooming behavior in the morning and more feeding behavior in the afternoon, which is in accord with prior studies of wild and captive flamingo flocks. Studying captive flamingos in flocks that are reluctant to breed, can provide more information on flock-wide response to an environment that is influenced by humans.
Abstract 3: Effect of Age, Sex, and Time of Day on Sea Lion Vocalizations at the Bronx Zoo
Authors: Keara Kennedy, Jennifer Krakowski, Manpreet Grewal
Mentor: J. Alan Clark
College: Fordham College at Rose Hill

California sea lions (Zalophus californianus) are a species that rely on vocalizations for communication, reproduction, movement, and location of prey. Understanding the mechanisms used by California sea lions in vocalization as well as factors that affect the frequency and temporal variation of acoustic signals can provide insight into the proximate and ultimate causes of these behaviors. Two main questions were asked in this study: first, how does age and sex of a given sea lion influence the frequency of vocalizations exhibited by the individual? and second, do California sea lions exhibit differences in vocalization frequency at different times of the day (e.g., during feeding hours, during peak foot traffic, etc.)? By closely observing a captive population of California sea lions at the Bronx Zoo in New York City, this study analyzed the effects that age, sex, and time of day have on vocalizations produced by members of this species. The study found that California sea lion pups produced the greatest average number of vocalizations, followed by adult males, with adult females producing the lowest average number of vocalizations. The data also showed that the population of sea lions produced the greatest number of vocalizations during the time period from 12pm-2pm. The results of the study indicate external factors having an effect on the vocalization behavior of sea lions and that age/sex influences frequency of vocalizations. These results, when compared with past literature on the species, indicate differences between captive and wild populations.

Abstract 4: Social Interactions of Captive Gelada Baboons
Authors: Zoë Araujo, Molly Gleason, Kaitlin Schmoyer
Mentor: J. Alan Clark
College: Fordham College at Rose Hill

Understanding the complex interactions and social behaviors of captive gelada baboons is crucial to their health, wellbeing, and reproductive success. Therefore, it is important to identify and interpret the interactions between the geladas. Social interactions can be divided into three categories: affiliative, submissive, and agonistic. It is crucial to know these three categories of behavior to appropriately elucidate the social interactions observed in captive geladas. This study's objective was to investigate the social interactions of the gelada baboons and to understand if one sex performed a category of behavior more frequently than the other sex. To examine this, gelada baboons at the Bronx Zoo were observed for twenty-five 15 minute periods. All the social interactions of the individuals on exhibit were recorded. The adult male gelada baboons at the Bronx Zoo displayed more agonistic behavior than the adult females, who were more likely to participate in affiliative behavior. The results proved to be statistically significant when a t-test was conducted (n=5, t=11.12, p<.001). This indicates that males are more aggressive, potentially to maintain social dominance, while females spend their time facilitating social bonds. Future studies will focus on finding an association between social interactions displayed and age. This study increases the understanding of captive social interactions of geladas, which can be used to help conserve and maintain the wellbeing of the species.

Abstract 5: The Effect of Energy Availability on the Territorial Behaviors of Anna’s Hummingbirds
Author: Julia Reynolds
Mentor: J. Alan Clark
College: Fordham College at Rose Hill

The relationship between energy availability and territoriality in hummingbirds was tested within an Anna’s Hummingbird territory in Scottsdale, Arizona. To manipulate energy availability, nectar access
sites in the form of artificial flowers on two hummingbird feeders were blocked with plastic wrap so that
nectar became less accessible to hummingbirds over the course of nine days. On each day of the study,
one artificial flower was blocked, and observations of territorial behaviors were recorded. These territorial
behaviors included energetically expensive behaviors (chases) and energetically inexpensive behaviors
(announcement songs, chattering vocalizations, and gorget displays). In response to declining energy
availability, a territory owner Anna’s Hummingbird spent more time out of sight and performed fewer
territorial behaviors. The results of this study are consistent with the findings of a previous study in which
a territory owner hummingbird reduced territoriality when energy availability declined so that the energy
rewards received from exclusive access to a territory outweighed the costs of performing territorial
behaviors. These findings may contribute to the captive management of territorial bird species by helping
conservationists accommodate agonistic territorial behaviors within captive bird habitats.

Abstract 6: Analysis of cardiac-specific effect of HCM-linked variant of RNaseZ in Drosophila
melanogaster
Authors: Megan Kurz, Ekaterina Migunova
Mentor: Edward Dubrovsky
College: Fordham College at Rose Hill

Hypertrophic Cardiomyopathy (HCM) is a heart disease characterized by thickened heart walls. The
severity of HCM symptoms vary, as some individuals are unaffected while others might experience a
range of symptoms such as palpitations and arrhythmia to sudden cardiac death. In 2013, a study
intimated an association between severe cases of HCM and mutations in the ELAC2/RNaseZ gene. This
gene encodes RNaseZ protein, a vital aspect of the tRNA maturation process. High homology of fly and
human RNaseZ allowed us to study this protein in Drosophila. Once the pathological mutation of
ELAC2/RNaseZ is introduced, flies exhibit the same heart hypertrophy as HCM patients. To determine
whether HCM is caused by processes within the heart or influence from other organs, the next step was to
study the effect of heart cell-autonomous mutations. My goal is to study if having mutant RNaseZ only in
the heart is sufficient to cause fly heart hypertrophy. I used a histological method to study heart
morphology in flies. I fixed and placed the flies in paraffin before slicing them with a microtome and
placing them on microscope slides. After taking photos of the fly heart cross-sections, I measured the
heart wall thickness to analyze the effect of heart-autonomous RNaseZ mutations on heart morphology.
Being able to understand whether or not the heart is the only organ influencing the development of HCM
will contribute to the search for targeted HCM treatments by enabling us to direct future research on the
underlying mechanism of this disease.

Abstract 7: Heart Specific Mitochondrial Knockout of RNaseZ and its impact on Drosophila Heart
Morphology
Author: Cameron Wolschina
Mentor: Edward Dubrovsky
College: Fordham College at Rose Hill

Mutations in the human ELAC2 gene produce a dangerous form of cardiac pathology-infantile
hypertrophic cardiomyopathy (HCM). This gene codes for RNaseZ enzyme which is critical in assisting
with the maturation of tRNA. RNaseZ also functions in both the nucleus and the mitochondria. In patients
carrying mutations in ELAC2, RNaseZ activity was impaired and they displayed complications like heart
disease and mitochondrial dysfunction. Even though this correlation was observed, it is still unknown
whether mitochondrial dysfunction is what causes heart disease. Fly homology and protein function is
similar to that of humans, allowing us to study RNaseZ activity in the fly model. The purpose of this
study is to observe the importance of RNaseZ in mitochondrial function by knocking out the enzyme in
mitochondria of heart cells only, allowing it to retain its normal function in the nucleus. I hypothesized
that this heart specific mitochondrial knockout of RNaseZ would have an effect on the fly’s heart
morbidity. Using CRISPR technology, a heart specific promoter and the Cas9 enzyme introduced a heart specific mitochondrial RNaseZ knockout into the flies. These knockout flies were observed and found to be viable into adulthood, so were prepared for histological methods. Following this procedure, the cross sections of the fly hearts were collected and analyzed. Here I present my findings from the observed differences in the fly heart morphology. Gathering this data is significant in further understanding the development of HCM in flies, ultimately providing insight on how it functions in humans as well.

**Abstract 8: HCM Phenotype Associated with Heart-Specific Mutant RNase Z in Flies**

*Author: Cyanne Runyon*
*Mentor: Edward Dubrovsky*
*College: Fordham College at Rose Hill*

In Dr. Dubrovsky’s Drosophila lab at Fordham University, I have been studying how heart tissues containing ELAC2-related hypertrophic cardiomyopathy (HCM) mutations contribute to the HCM phenotype. HCM is a disease that causes the heart muscles to thicken, making it more difficult for the heart to contract. This disease can be fatal in human infants. Some mutations in the ELAC2 protein have been linked to fatal cases of HCM. This protein is essential in the maturation of tRNA molecules. Study on the link between mutations in ELAC2 and HCM has been carried out using Drosophila melanogaster and it’s ELAC2 homolog, RNase Z. The two mutations selected for this study, HCM1 and HCM2, are conserved in both ELAC2 and RNase Z. They have been shown to impair heart function, reduce lifespan and fitness levels in flies as they do in humans. However, it is not clear if these phenotypes arise as secondary to heart dysfunction or if they happen due to damage in other tissues caused by mutant RNase Z. To study this, we have used a fly model with these mutations expressed only in the heart to characterize the effects on longevity and fitness. Here I present my findings on fly fitness, evaluated by a negative geotaxis assay, and fly longevity, which was found by counting surviving flies each day until all had died. These findings shed light on where these mutations act and could give researchers a better way to target treatment for this disease in the future.

**Abstract 9: The spatiotemporal expression of Juvenile hormone receptor Gce in the absence of its paralog Met in Drosophila**

*Author: Jacqueline DeRusso*
*Mentor: Edward Dubrovsky*
*College: Fordham College at Rose Hill*

Juvenile hormone (JH) is crucial for insect growth and development. Drosophila is unique in that it has not one, but two receptors Met and Gce, encoded by two paralogous genes, that mediate JH signaling. The flies carrying either a Met or gce null allele are viable, but the double receptor knockout flies die during the pupal stages and phenocopy the JH-deficient flies. The expression of either of the receptors can rescue this lethality, demonstrating that they are redundant during earlier stages of development. However, Met and Gce have unique functions during adult stages and can no longer compensate for one another. I hypothesize that the unique functions may be due to different expression patterns of Met and Gce in the adult stages, which does not change regardless of the presence or absence of the other receptor. To test this hypothesis, I plan to generate a fly model in which the expression pattern of one receptor, Gce, will be studied in the absence of the other receptor Met. I am utilizing CRISPR/Cas9 technology to knockout the Met gene. Thus far, I have established the MetKO gRNA stock and ensured its proper functioning by performing a gRNA efficiency test. I am currently screening the lines carrying the MetKO allele, after which they will be recombined with previously generated Gce-3xFLAG flies. Using this fly model, I will analyze the expression pattern of Gce which will hopefully provide insight into what leads to the differentiating functions of the paralogs in the adult stages.
Abstract 10: Tagging Juvenile Hormone Target Gene JhI-26 Using CRISPR/Cas9 Technology in Drosophila
Author: Li Ying Wei
Mentor: Edward Dubrovsky
College: Fordham College at Rose Hill

Juvenile hormone (JH) is one of the major insect hormones that controls many important processes including reproduction and metamorphosis. Drosophila is unconventional in its response to exogenous JH as it does not exhibit the classical anti-metamorphic response; JH does not induce the formation of supernumerary larva in Drosophila. The underlying molecular mechanism of JH action is not entirely known, and in an effort to understand it further, genes directly regulated by JH were identified. One such target identified is JhI-26, a gene unique to dipteran species. Despite its potential role in the JH signaling pathway, the biological function of the encoded protein remains unknown. Preliminary data shows JhI-26 expression in a tissue that previously had no association with JH, making it a gene of increased interest to study. As a first step towards my goal to study JhI-26, I aim to create a fly model expressing epitope tagged JhI-26 protein by employing CRISPR/Cas9 technology and use it to track the expression of the target of interest. The guide RNA (gRNA) and single-stranded oligo DNA nucleotides (ssODN), which serves as the donor template, have been designed and injected into the fly embryos expressing germline specific Cas9 endonuclease. The resulting flies will be crossed with appropriate balancers to establish multiple lines, which will be screened for the presence of the modified allele. Following identification and confirmation of successful modification, the stock will be used to study the spatiotemporal expression pattern of JhI-26.

Abstract 11: Multinucleated Cardiomyocytes in Flies with RNaseZ-Related Cardiac Hypertrophy
Author: Jacob Bartz
Mentor: Edward Dubrovsky
College: Fordham College at Rose Hill

Hypertrophic cardiomyopathy (HCM) is a common disease that causes heart walls to thicken. An extreme inherited form of the condition is caused by recessive alleles in the ELAC2 gene. ELAC2 homologs are present in all forms of life. It codes for a protein essential to the maturation of tRNA molecules. To study this condition, the Drosophila homolog of ELAC2, dRNaseZ, was identified. A fly model bearing the same recessive mutations as humans was created. After imaging and analyzing the fly hearts, it was discovered that the heart walls are thicker, just as is found in humans. The next step was to identify the mechanism for why the hearts are thicker; it was hypothesized that mutant fly hearts have extra cells, larger individual cells, or a combination of both. Using 4xtinC-GFP, a fluorescent protein expressed in the nuclei of heart cells (cardiomyocytes), we found an increase in nuclei number in the mutant fly hearts. However, it was still not clear whether the mutation causes increased cell division, which would result in more cells, or multinucleation, resulting in the same amount of cells but with multiple nuclei. To answer this question, we have used a new fluorescent protein, 4xtinC-Tomato, to visualize the cellular membranes of cardiomyocytes. With a combination of 4xtinC-GFP and 4xtinC-Tomato, we discovered that mutations of RNaseZ lead to cardiomyocyte multinucleation. Studying the mutations in Drosophila may give insight into what factors contribute into heart wall thickening in ELAC2-related HCM in humans.
Abstract 12: A CRISPR-Cas9 Mediated Knockout of RNaseZ in Drosophila Brain
Author: Max Luf
Mentor: Edward Dubrovsky
College: Fordham College at Rose Hill

The RNaseZ gene is a vital and highly conserved gene with homologs in all domains of life. It plays an essential role in the maturation of tRNA. Mutations of this gene in humans have been linked to a diverse range of encephalopathies and result in poor quality of life for patients. Despite the established association, it is still not known how RNaseZ mutations lead to observed neurological diseases and this necessitates further study. In Dr. Dubrovsky’s lab we use Drosophila as a model to elucidate the underlying mechanisms of these diseases. To study the role of RNaseZ in the brain I used CRISPR-Cas9 technology to knockout RNaseZ in the Drosophila nervous system. PCR, HiFi DNA assembly, and gateway cloning were used to synthesize a vector carrying the endonuclease Cas9 under the control of the neuron-specific promoter Elav. This vector was injected into Drosophila embryos to produce transformants carrying my Elav-Cas9 transgene. Expression of Cas9 in transgenic flies was confirmed via Western Blot. This, together with a previously generated stock carrying RNaseZ-specific guideRNA, allows me to knockout RNaseZ in a pan-neuronal manner. I analyzed the viability and life cycle progression of flies carrying this tissue-specific knockout and here I present the outcome of my studies. Next, I will be able to model mutations of RNaseZ identical to those found in human patients using this novel Elav-Cas9 fly. This application has the potential to lead to the identification of therapeutic targets for treatment in human patients who suffer from RNaseZ-linked rare diseases.

Abstract 13: Impact of a high fat diet on retinal inflammation in B5-KO mice
Author: Kate Uhling
Mentor: Silvia Finnemann
College: Fordham College at Rose Hill

Age Related Macular Degeneration (AMD) is the leading cause of irreversible blindness in adults over 50 years, affecting 11 million in the US and 170 million worldwide. Research has been conducted to understand what factors impact the underlying molecular mechanisms and biological pathways of this disease. Every night, photoreceptors in the eye shed off disk-like fragments from their outer segments. These photoreceptor outer segments (POS) are in close contact with retinal pigment epithelium (RPE) at the back of the eye. RPE cells are responsible for the phagocytosis of these shed POS fragments, clearing out debris for retinal renewal. This is a highly regulated process, and any delay or issue can lead to an accumulation of undigested particles on the apical side of the RPE that, over time, may cause inflammation and can lead to the development or progression of retinal diseases that affect vision. In vivo research on rodents has shown that αVβ5 integrin receptors play an important role in this retinal renewal process. Complete knockout of the αVβ5 integrin receptors play an important role in this retinal renewal process. Complete knockout of the αVβ5 dimer is fatal in mice, but β5 integrin knockout produces viable mice with impaired POS renewal that will never reach peak levels of phagocytosis. This experiment was conducted with the question of how a high percent fat diet may impact inflammation and visual deterioration in β5-KO mice. Inflammation, as indicated by the genetic expression of the Iba-1 gene coding for microglia, was used as a marker for retinal deterioration and visual impairment.

Abstract 14: A Comparison of Photoreceptor Tip Length After Light Onset in 129 and C57 Wild-Type Mice
Author: Daniella Denysov
Mentor: Silvia Finnemann
College: Fordham College at Rose Hill

In the mammalian retina, photoreceptors are light sensing neurons responsible for vision. Photoreceptor cells are continuously exposed to light, making them particularly susceptible to damage over time. To
address this, the cells of the retinal pigment epithelium (RPE) diurnally phagocytose the photoreceptor outer segments (POS) of the neural retina in a process termed outer segment renewal. This mechanism of POS shedding and subsequent phagocytosis by the RPE is essential for maintaining healthy vision for life. Previous studies have demonstrated that in 129 wild-type mice, photoreceptor tips of the retina expose phosphatidylserine (PS) before they are shed, indicating that PS-marked photoreceptor tips may promote phagocytosis by the RPE. We investigated photoreceptor PS-marked tips in another wild-type strain, C57, to compare to 129. Evaluation of tip length was performed quantifying tip length at light onset and one hour after light onset using fluorescent staining of freshly-excised retinal tissue. RPE flatmounts were stained with PS biosensor pSIVA and imaged on a confocal microscope. At light onset, tips in C57 and 129 were the same length. At one hour after light onset, tip lengths were shorter in both mice, but the length in C57 was significantly longer than in 129. Our results indicate that while the rhythm of tip elongation is similar in both wild-type strains, the absolute lengths of PS-marked tips differed one hour after light onset. Further studies will address whether this difference translates into different levels of RPE phagocytosis between the strains.

Abstract 15: Interdependence of gap junction-mediated cell-cell communication and phagocytosis in RPE cells
Author: Morgan McGrath
Mentor: Silvia Finnemann
College: Fordham College at Rose Hill

Retinal pigment epithelial (RPE) cells are connected via membrane protein complexes called gap junctions. Consisting of clustered channels of oligomerized connexin proteins, gap junctions allow passage of ions and small molecules between adjacent cells. Like macrophages, RPE cells are highly phagocytic. RPE phagocytosis of photoreceptor outer segment fragments (POS) is crucial to retinal function and, accordingly, to eyesight. Some data suggest that gap junction communication affects the phagocytic activity of macrophages. Here, we explore the relationship between gap junctions and RPE phagocytosis. Primary RPE cells were isolated from retinal tissue of both Royal College of Surgeons mutant rats, whose RPE cells can bind but not phagocytose POS, and wild-type rats with fully functional RPE phagocytosis. These cells were then fed with and without POS particles isolated from pig retina and gap junction inhibitors before analysis by western blotting and confocal fluorescence microscopy. Our preliminary imaging demonstrates that wild-type and mutant RPE cells form gap junctions with Connexin-43, and that Connexin-43 staining in cells fed with POS particles is less intense than in medium-fed control cells. Additionally, western blots probed for the POS marker rhodopsin show that gap junction inhibition reduces POS particle uptake in a concentration-dependent manner. Together, these initial results indicate that POS particles influence gap junction protein distribution in RPE cells and that gap junction activity influences RPE phagocytosis. Ongoing experiments compare responses by wild-type and mutant RPE to determine if POS binding is sufficient to alter gap junctions, or if complete phagocytosis is needed.

Abstract 16: Fitness costs and benefits of gene expression plasticity in rice under drought
Authors: Colleen Cochran, Simon C. Groen, Elena Hamann, Irina Ćalić, Rachel Konshok, Michael D. Purugganan
Mentor: Steven Franks
College: Fordham College at Rose Hill

The objective of the study was to use existing data on rice, the most important food crop in the world, to identify the type and number of genes with plastic gene expression in rice, and to determine whether plasticity is adaptive. Plasticity refers to how a phenotype, or trait, changes across different environments for a given genotype. When plasticity is adaptive, individuals that show greater responsiveness to environmental variation are favored. Although much work has examined the plasticity of traditional
phenotypic traits, less research has focused on the plasticity of gene expression. We hypothesized that we would find plasticity in genes related to drought and stress response and that plasticity would be adaptive in variable environments, meaning that more plastic genotypes will have greater overall fitness across drought and watered treatments. We analyzed data from a field experiment in which 230 varieties of rice were subjected to drought and watered treatments in common gardens, with replicates of each genotype in each environment. To determine if plasticity is adaptive and its associated costs, we regressed plasticity on fitness both across and within environments respectively. We observed significant plasticity of gene expression for many genes. However, there was a lack of evidence for selection on plasticity. These results suggest that the plasticity of gene expression may be an important response of plants to environmental variation, but it did not appear that greater plasticity of gene expression would be favored across variable environments.

Abstract 17: Plasticity responses to competition in Brassica rapa
Authors: Rachel Konshok, Matthew Fisher, Samantha Maddock
Mentor: Steven Franks
College: Fordham College at Rose Hill

This experiment aims to study the effects of plasticity in an ongoing competition experiment in Brassica rapa. This study will provide critical insight into how Brassica rapa adapts to new environments and will provide insight into what makes it such a successful invasive species. Phenotypic plasticity is an organism’s ability to respond in different ways to different environments. During a previous competition study between Brassica rapa and Raphanus sativus it was found that there were significant effects of competition on flowering time, plant height, and number of seed pods produced. This was found to be true for both intraspecific (same species) and interspecific (different species) environments. The goal of this study is to quantify plasticity and determine how plasticity evolves in response to competition. This experiment will also study other factors that are believed to be affected by plasticity including: size and levels of glucosinolates. Glucosinolates are defense compounds produced by the plant in response to stress, my experiment expect to finds smaller amounts of these compounds in plants that are in competitive environments due to the competition defense trade off. Overall, the goal of this study is to see exactly how Brassica rapa will respond in different competitive environments.

Abstract 18: The Role of Ventral Pallidum Cholinergic Projection Neurons in Addictive Behavior
Authors: Daphne Baker, Jenna Yeisley
Mentor: Eduardo Gallo
College: Fordham College at Rose Hill

Learned associations between drugs and the environmental context in which drugs are experienced may increase craving and long-term drug use. A better understanding of these associations may lead to new therapeutics for drug addiction. Lesion studies have implicated the ventral pallidum (VP) in the formation of drug-context associations. However, little is known about the cell types in the VP and whether they contribute to addiction. I tested the hypothesis that one VP cell population, the VP cholinergic projection neurons (VP-CPNs), are key mediators of the VP’s involvement in the formation of drug-related associations. Mice underwent Conditioned Place Preference (CPP) to cocaine, a behavioral model which measures associations formed between the rewarding effects of a drug and the environment in which those effects were experienced. Prior to CPP, the VP-CPNs of experimental mice were lesioned using the diphtheria toxin receptor (DTR)/diphtheria toxin (DT) system. Using immunofluorescence microscopy, I confirmed a greater absence of VP-CPNs in the experimental group compared to a control group expressing GFP. In the absence of cocaine, both groups exhibited a greater preference for the context initially paired with cocaine. However, VP-CPN-lesioned mice showed faster extinction of CPP compared to controls. These data suggest that VP-CPNs do not play a key role in the acquisition of drug-related associations in CPP behavior but may instead contribute to the persistence of conditioned
associations. This indicates that VP-CPNs are involved in the long-term, potentially maladaptive learning related to cocaine, and may represent a neurobiological target for treatment of drug addiction.

**Abstract 19: Manipulation of Dopamine D2 Receptor Expression in Cholinergic Neurons Affects Impulsive Choice in Mice**
Authors: Joseph Floeder, Jenna Yeisley  
Mentor: Eduardo Gallo  
College: Fordham College at Rose Hill

Impulsive choice, one of the main components of impulsivity, is the tendency to prefer small, immediate rewards over large, delayed rewards. The nucleus accumbens (NAc) is a brain region critically involved in modulating reward-related behaviors and impulsive choice, but the contributions of different NAc cell types are not well understood. Cholinergic interneurons (CINs) account for under 3% of NAc neurons, but their extensive branching allows them to wield control over NAc function. Dopamine release in the NAc, which is implicated in impulsive choice, reduces CIN firing via activation of CIN dopamine D2 receptors (D2Rs). However, little is known about the influence of CIN D2Rs on impulsive behavior. To this end, we used a delay discounting task which measures how steeply rewards lose value (i.e., are discounted) as a function of delay to their receipt. Using a viral-based approach in transgenic mice, we show that selective D2R upregulation in NAc CINs leads to increased delay discounting compared to controls expressing EGFP. Conversely, we show that knocking out D2R in cholinergic neurons results in decreased delay discounting. Moreover, we show that CIN D2R manipulations do not alter the ability to detect differences in reward magnitude. Together, these complementary results suggest that CIN D2Rs are influential at mediating intolerance to delayed rewards, a component of impulsive choice. Given that heightened impulsivity is associated with several psychiatric illnesses including substance use disorder and attention-deficit/hyperactivity disorder, these findings also highlight the potential clinical significance of cholinergic and dopaminergic dysfunction in the NAc.

**Abstract 20: Quantification of brain-wide inputs to accumbens cholinergic interneurons**
Authors: Christine Lim, Jenna Yeisley  
Mentor: Eduardo Gallo  
College: Fordham College at Rose Hill

Motivational dysfunction is implicated in various neuropsychiatric disorders including drug addiction and ADHD. Characterizing the neuronal populations underlying these altered brain pathways promises insight into potential cellular targets for therapeutic intervention. Nucleus accumbens (NAc) cholinergic interneurons (CINs) have emerged as important modulators of reward-related behavior given their widespread influence on other key neurons and dopamine release in this region. Their neuroanatomical circuitry, however, remains to be fully defined.

The goal of my research project was to generate a brain-wide neuroanatomical “map” of the neurons directly innervating NAc CINs. Our method involves injection of a recombinant virus into the brains of transgenic mice to specifically infect and trace NAc CINs and their immediate inputs. After performing immunohistochemistry and imaging serial sections from 4 mouse brains with fluorescence microscopy, we identified ~170 different brain regions directly contacting NAc CINs.

Using third-party deep learning-based software, we then transformed the 2D serial sections into a 3D volume and mapped these image reconstructions to a universal mouse brain atlas. This enables quantification of NAc CIN inputs by brain region in an accurate and replicable manner. Preliminary data shows major input brain regions include prefrontal cortex, bed nucleus of the stria terminalis, centrolateral amygdala, and thalamus, all of which have been linked to reward seeking.
This quantitative “mapping” of monosynaptic projections to NAc CINs will inform subsequent studies on the functional contributions of CIN inputs to different aspects of motivated behavior. Such information may advance the search of neurobiological substrates for treatment of motivational dysfunction.

Abstract 21: Mapping Monosynaptic Inputs to Ventral Pallidum Cholinergic Projection Neurons
Authors: Emily Huegler, Jenna Yeisley
Mentor: Eduardo Gallo
College: Fordham College at Rose Hill

To understand the motivational dysfunction seen in mental health disorders, we must study the neurobiological underpinnings of abnormal reward processing and motivated action. The ventral pallidum (VP), a brain region in the basal ganglia, is integral in processing external cues influencing reward-related behaviors. Among various cell types in the VP, the specific function of cholinergic projection neurons (VP-CPNs) is unknown. To fill this knowledge gap, I aimed to generate a neuroanatomical “map” of the brain regions and cells that innervate VP-CPNs most prominently. To identify brain-wide VP-CPN inputs, I used retrograde monosynaptic rabies virus tracing techniques to express a fluorescent marker in the presynaptic cells that directly contact VP-CPNs in transgenic mice. I harvested four brains and collected serial brain sections to establish individual brain libraries. A set of 40-50 sections from each brain was processed for immunofluorescence microscopy. Resulting images were aligned and then mapped to a whole mouse brain standardized atlas using specialized software to automatically count individual cells within defined brain subregions. I have begun a quantitative analysis of the relative abundance of VP-CPN inputs. Preliminary results show dense inputs from the nucleus accumbens, amygdala, hypothalamus, hippocampus and other limbic areas. These brain areas are involved in appetite, aversion, effort exertion, and homeostasis maintenance, suggesting that VP-CPNs may play a role in integrating distinct reward and motivation signals. This new information will guide future studies aimed at determining how those inputs modulate VP-CPN function and behavior, providing new insight into treatment targets for motivational dysfunction.

Authors: Eric Purisic, Devin Rocks
Mentor: Marija Kundakovic
College: Fordham College at Rose Hill

Anxiety and depression are sex-biased psychiatric disorders, with females twice as likely as males to develop these disorders. Previously, the Kundakovic lab produced a study examining sex differences in the effects of early-life stress on later development of anxiety- and depression-like behaviors in mice. The impact of early-life stress was more profound in females, both in changes in behavior and the expression of candidate genes linked to these disorders. My project studied two genes called X-chromosome escapees, which escape inactivation of one of the X-chromosomes in females. These genes, Kdm5c and Kdm6a, are epigenetic modifiers that regulate gene expression through histone modification and are implicated in the development of depression and anxiety behaviors. We also examined their Y-linked paralogues in males. Initially, I conducted gene expression analysis in the ventral hippocampus, a brain region critical for emotion regulation. The results showed a female-specific increase in the expression of Kdm5c and Kdm6a with no Y-compensation in males in response to early-life stress. Then, I performed gene expression analysis on the dorsal hippocampus, a region involved in cognitive function. The results show that in the dorsal hippocampus, there is no significant change in expression of Kdm5c and Kdm6a in either sex in response to early-life stress, with only Kdm6a’s Y-linked counterpart showing decreased expression after early-life stress. Our results indicate that Kdm5c and Kdm6a respond to early-life stress in a region-specific and sex-specific manner providing a potential mechanism for the sex-biased effects of early-life stress on the development of anxiety and depression.
Abstract 23: The effect of ovarian hormones on the activity of genes regulating metabolism
Authors: Olivia Doll, Devin Rocks
Mentor: Marija Kundakovic
College: Fordham College at Rose Hill

Obesity presents a growing health concern in the developed world, and women become more vulnerable to this condition following transition through menopause. There is currently no treatment available for postmenopausal obesity without its own serious side effects. Previous studies using mice have shown that estrogen signaling in the brain maintains healthy weight by promoting physical activity and thermogenesis. Estrogen Receptor Alpha (ERα, Esr1) mediates metabolic estrogen signaling in the brain, particularly in the hypothalamus. Genes Tac1, Rprm, Lepr, and Dlk1 have been shown to interact with estrogen to regulate physical activity, thermogenesis, energy homeostasis, and fat cell differentiation. To examine the molecular mechanisms underlying the metabolic effects of circulating ovarian hormones, this study used qRT-PCR to compare the hypothalamic levels of expression of these five candidate genes in naturally cycling, ovary-intact mice with those of mice that underwent ovariectomy. We found that hypothalamic levels of Tac1 and Lepr do not vary significantly between ovariectomized females and cycling females in either the high estrogenic or low estrogenic phases of the estrous cycle (the rodent analogue of the human menstrual cycle). However, Esr1 and Dlk1 were both more highly expressed in high estrogenic, cycling females than in ovariectomized females, and Rprm was more highly expressed in ovariectomized females than in high estrogenic, cycling females. As hypothalamic tissue is highly heterogeneous, any significant difference found in bulk tissue suggests even more pronounced differences among specialized types of cells. These results will help inform future studies targeting specific neuronal populations to reveal how these estrogen responsive cellular populations interact to regulate metabolism.

Abstract 24: Unlocking the Swab: Characterizing Amphibian Skin Fungi
Authors: Jennie Wuest, Stephen Kutos, Elle M. Barnes
Mentor: J. D. Lewis
College: Fordham College at Rose Hill

Amphibians play an important role in ecosystems all over the globe. Currently, they are being threatened by the spread of a deadly wildlife disease caused by the fungus Batrachochytrium dendrobatidis (Bd). Many studies have shown that certain cutaneous bacteria provide a natural resistance against Bd, as a result of competitive interactions. However, we know little of the fungal diversity that exists on their skin and how those fungi interact with the disease and other cutaneous microbes. To fill this gap, we explored the culturable fungal diversity of the skin microbiome of the eastern redback salamander (Plethodon cinereus) at various sites in the New York City area. Individuals were swabbed and plated on PDA and MMN media to maximize culture diversity. Following morphological isolation of the fungal cultures, we extracted, amplified, and sequenced the full ITS region.

Our results suggest a diverse fungal community present on the skin microbiome of P. cinereus. From 28 individuals, we isolated over 100 morphologically-distinct strains. Twenty-eight of these distinct strains were selected for genomic identification and resulted in 25 OTUs, mainly in the divisions Ascomycota and Mucoromycota. The number of distinct OTUs identified reveal a culturable species-rich fungal microbiome, suggesting the potential for certain strains of these skin-associated fungi to be inhibitory or facilitatory to Bd growth. In the next stage of this project, we will perform challenge assays with these cultures and Bd to determine inhibitory potential and to assess if fungi play a critical role in the microbial defense of amphibians to Bd.
Abstract 25: Nutrient Drivers of Toxic Cyanobacteria Blooms in the Lake in Central Park
Author: Paige Wallner
Mentor: John Wehr
College: Fordham College at Rose Hill

Anthropogenic nutrient loading to freshwater lakes can result in the development of harmful algal blooms (HABs) that degrade ecosystems and recreational activities. The Lake in Central Park in New York City attracts thousands of visitors daily, but is impaired by toxic cyanobacteria HABs dominated by species of Microcystis during summer months. Recent water quality data indicate hypereutrophic concentrations, with soluble reactive phosphorus (SRP) between 100-150 μg/L, and chlorophyll-a concentrations between 100-180 μg/L. Our goals were to assess the importance of nitrogen and phosphorus as drivers of cyanobacteria HABs and toxin production. We conducted a 2x2 factorial dilution bioassays using phytoplankton assemblages collected from the lake, and diluted using 1:2 and 1:4 dilutions with +N and +P treatments. We incubated flasks in the laboratory at 20°C on a 12:12 LD cycle and 100 μmol-photons/m2/s. After 12 days, we measured algal biomass via chlorophyll-a. At both 1:2 and 1:4 dilution levels, the addition of nitrogen stimulated a stronger response in algal growth than phosphorus. The effect of nitrogen (240% chl-a increase) compared to phosphorus (30% chl-a increase) was more pronounced at higher 1:4 dilution level, suggesting that nitrogen may be the primary limiting nutrient in this system. Concentrations of microcystins were also influenced more strongly by nitrogen (67% increase) than phosphorus (30% decrease) at 1:4 dilution level. Our results suggest that reducing nitrogen inputs may improve water quality and reduce the prevalence of harmful algae blooms in this frequently-visited recreational lake.

Center for Community Engaged Learning

Abstract 26: Student Success and Housing Access in NYC-based Catholic Higher Education Institutions
Authors: Mariana Beltran Hernandez, Aidan Donaghy
Mentor: Vanessa Rotondo
College: Fordham College at Rose Hill

Catholic higher education institutions, especially ones located in urban areas such as New York City, contend with increasingly complex issues of student body diversity and success, especially within the context of the ongoing COVID-19 pandemic. Understanding that all aspects of a student’s life, including housing, identity, and marginalization, impact higher education success, this study attempts to illuminate the particular successes and problems New York City-based Catholic colleges and universities have with regards to marginalized students. This study is ongoing, and is comprised of a survey for New York City-based Catholic college students and recent graduates who are marginalized because of their race, ethnicity, religion, sexual orientation, gender, or socioeconomic class in order to understand how students of various marginalized identities find community and success through the lens of housing availability. Early findings have indicated that LGBTQ-identifying students have particularly strong feelings about the steps Catholic universities should take in making housing more accessible and inclusive for marginalized people, and further research will explain these dynamics further and allow the authors to expand on their recommendations, which include adjusting housing policy and examining funding sources to allocate more resources to marginalized students’ housing.
Abstract 27: Take Space, Make Space - Campus Spaces and Student Collaboration on Fordham's Rose Hill Campus
Authors: Amelia Medved, Carlos Rico
Mentor: Vanessa Rotondo
College: Fordham College at Rose Hill

There is a vital need for campus spaces that facilitate dynamic student conversation and collaboration, in both an informal, social scope, as well as a formal, academic one. Fordham University, a Catholic Institution that prides itself on ideals of social justice, community engagement, and intellectual rigor, ought to foster an environment that is more inclusive and diverse, and which fosters conversations among community members with different perspectives to create a richer, more dynamic intellectual space. Physical spaces, which make up the built environment of our campus, play a significant role in enabling students--especially students of color and marginalized communities--to interact, collaborate, and ultimately create change. It is critical, we argue, that Fordham create spaces on our campus where students of color and marginalized communities may be able to voice their opinions and create community, as well as spaces which bring together students from all backgrounds to invigorate our campus’ social and academic culture. We aim to identify the existing spaces that succeed in creating collaboration in order to identify best practices specific to Fordham, and to also identify underutilized or exclusionary spaces on campus for which policy or design changes could be implemented to create a more democratic environment. Based on our research, we will make specific recommendations for change on the Rose Hill campus, informed by the perspectives of the students who make up our vibrant campus community.

Abstract 28: Social Activism Among Jesuit-Educated Students
Authors: Patrick Sawyer, Ellena Dickerson
Mentor: Vanessa Rotondo
College: Fordham College at Rose Hill

With an understanding that Jesuit institutions, like Fordham, have a responsibility to expose students to both the academic and social justice missions that define the Society of Jesus, it is important to investigate the ways in which Fordham has struggled with uniting both pillars of the order. Fordham’s stance on the importance of students engaging in social justice can be characterized as confusing at best, and contradictory to the Ignatian Values which the university stands for at worst. Until the inception of the Center for Community Engaged Learning, the Dorothy Day Center for Service and Justice—named after the infamous social activist, anarchist, and devout Catholic—served a campus which bans student protest. Despite Fordham’s avoidance in uniting social justice initiatives with its mission to educate its students, young people seeking to engage in social justice movements (from online advocacy to participating in violent protest) seem to flock to the institution. Given this, we seek to investigate how Fordham students are socialized towards descent and activism, and whether a Jesuit education impacts students’ views on the value of participating in social justice initiatives. We intend to gain an understanding of Fordham students’ views on social justice, through the lens of Ignatian Values, by conducting a survey seeking the opinions of currently enrolled Fordham students, supplemented with informal interviews of Fordham faculty and clergy members serving the Bronx.

Authors: Katharine Duffy, Amalia Sordo Palacios, E. Smith
Mentor: Vanessa Rotondo
College: Fordham College at Rose Hill

The current COVID-19 pandemic has affected almost every aspect of life around the world, especially in metropolitan areas like New York City. Specifically, education and access to technology have been areas
where improvement is needed and deficits have become glaring. This study aims to investigate the relationship between digital access disparities within New York City, focusing on the Bronx and Manhattan boroughs, and educational outcomes, primarily quality of education and perceptions of continuing education. To do so, we plan to recruit junior and senior high school students to answer a survey, created by our team, to attain our data. We intend to use only the data concerning technological access and educational outcomes to investigate our variables. We also will be working with the Bronx Community Foundation and their Bronx Digital Equity Coalition to support our research and contribute to their efforts to eradicate the digital divide.

Abstract 30: Environmental Racism and Discriminatory Public Policy in the South and Northwest Bronx
Authors: Catherine Kien, Jenna Goldblatt, Yajunaida Torrealba, Phillip Krehbiel
Mentor: Vanessa Rotondo
College: Fordham College at Rose Hill

The Northwest and South Bronx have become increasingly gentrified, and public policy has undoubtedly contributed to the poor conditions that members of these communities must face. More specifically, systems of oppression on both small and large scales have resulted in the increase in health risks for residents of these areas, especially due to the rise of powerful businesses pervading the Northwest and South Bronx. In addition, considering the environmental injustices that compromise the living conditions of Bronx natives, it is clear that the placement of institutions that contribute to the heavily polluted areas, such as waste management facilities, is a consequence of discriminatory public policy.

Through our research we are investigating the impacts on Bronx residents' health as a result of environmental racism. Specifically, we are evaluating how Bronx residents are disproportionately affected by gentrification, i.e., how the development of wealthier, typically chain, businesses have impacted the health and safety of Bronx residents. Moreover, we aim to understand how government, both at the local and national levels, intervention, or lack thereof, has contributed to environmental racism throughout the South and Northwest Bronx. We will find this information by examining previously published data of health problems that Bronx residents face. Then, we will work with Fordham professors and partner with The Bronx is Blooming and Bronx River Alliance to understand the history of this issue and understand current public policy. Finally, we will host interviews with Bronx residents to document the first hand accounts of Bronx natives affected by environmental racism.

Abstract 31: Investigating Development and Lasting Effects of the Fordham University Action Plan
Authors: Catalina Castillo-Lozano, Abigail Lo
Mentor: Vanessa Rotondo
College: Fordham College at Lincoln Center

On June 29, 2020, President Joseph M. McShane, S.J. released the Fordham University Action Plan with the stated intention of “addressing racism” and “educating for justice” in the aftermath of the murder of George Floyd and the ensuing protests. With the mentorship of Vanessa Rotondo, Abigail Lo and Catalina Castillo-Lozano will investigate the development process of this plan by interviewing a diverse group of staff, faculty, and students to evaluate the effects of the plan on the Fordham community during the Fall 2020 semester and propose amendments to the plan.
Abstract 32: Assessing the Impact of Public Policy on the Housing Crisis in New York City
Authors: Sotiris Georgakopoulos, Arnav Bhutada, Christopher Kerrane
Mentor: Vanessa Rotondo
College: Fordham College at Rose Hill

Co-investigators Sotiris Georgakopoulos, Arnav Bhutada, and Christopher Kerrane operated under their mentor Vanessa Rotondo's guidance. The research question seeks to examine the existing barriers that inhibit community organizations from affecting affordable housing policy change in their localities. This report synthesizes the findings from various interviews with community organizations and government officials to delve into the realities of housing insecurity in New York City during the economically and morally devastating COVID-19 pandemic. The report sheds light on the government response to the housing crisis triggered by the pandemic's economic repercussions, the daily struggles that the homeless face in New York City, the works of several community organizations that seek to combat housing insecurity, and government officials' views on policy.

CHEMISTRY

Abstract 33: In silico studies of binding interactions between b cell receptors CD22, integrin, neuropilin 1 and newly designed glucosyloxy derivates
Authors: Mia Rico, Saige M. Mitchell
Mentor: Ipsita Banerjee
College: Fordham College at Rose Hill

In this work, we focused on designing new glucosyloxy stilbene-peptide conjugates to target overexpressed CD22, neuropilin 1, and integrin alpha 1 receptors. Using ChemDraw and Chem 3D we first designed specifically targeted peptide conjugates of stilbene. The peptides utilized were tumor targeting peptides, and rich in arginine moieties. Then using AutoDockVina, we docked each receptor with the conjugates and examined the various binding affinities. After molecular docking, each combination of receptor and peptide was analyzed using a Protein-Ligand Interaction Profiler. The conjugates were then analyzed using Turbomole and COSMOthermX20 in order to determine the sigma profiles of each. We then used the web server ACP to determine our peptides’ physio-chemical properties, followed by the web server POCASA in order to determine the surface cavities and binding pockets of the three receptors. We then prepared each receptor-conjugate combination to conduct molecular dynamics simulations to explore the stability of the receptor bound conjugates. Lastly, we analyzed the compounds using the web server SwissADME in order to determine pharmacokinetic properties. The results indicate that integrin receptors showed higher binding affinities and stabilities.

Abstract 34: Molecular Dynamics Simulations of Peptide Bolaamphiphile Self-Assembly with Varying Alkyl Chain Lengths
Author: Charlotta Lebedenko
Mentor: Ipsita Banerjee
College: Fordham College at Rose Hill

Self-assembled peptide bolaamphiphiles are excellent nanomaterials for biomedical applications due to their highly tunable structures and high biocompatibility. This study uses in silico methods to examine four asymmetric peptide bolaamphiphiles with tryptophan and serine amino acids as head groups. The bolaamphiphiles vary in the length of their hydrophobic alkyl chain that connects the headgroups. Self-assembly was studied using molecular dynamics simulations in GROMACS and Desmond, and properties of bolaamphiphiles were examined using COSMO-RS and ADME studies. United atom molecular dynamics simulations in water were run using the GROMOS 54A7 united atom forcefield in GROMACS
Abstract 35: Molecular Dynamics Studies of Newly Designed Anticancer Peptide-Polyphenols  
Authors: Lucy Hart, Saige M. Mitchell, Rachel E. Daso  
Mentor: Ipsita Banerjee  
College: Fordham College at Rose Hill  

Polyphenols are naturally derived molecules with characteristic antioxidant and anticancer properties. In this work, we have designed twenty-five novel tumor targeting peptide-polyphenol conjugates for specific targeting of both estrogen receptor positive and triple negative breast tumor cells. Four point mutations were performed on a tumor targeting peptide, making five peptides in total, all of which were predicted to have anticancer properties. Peptide-polyphenol conjugates were designed on ChemDraw and energy minimized on Chem3D. I-TASSER studies were performed on each peptide and ADME studies were performed for all peptides and conjugates. Receptor-ligand docking studies were conducted using Autodock Vina to predict the binding ability of conjugates to estrogen receptor alpha (ER), which is overexpressed in ER+ breast cancer cells and peroxisome proliferator-activated receptor alpha (PPAR), which is overexpressed in both ER+ and triple-negative breast cancer cells. Potential binding pockets were predicted for each receptor by POCASA. Sigma Profiles of each of the conjugates were obtained using COSMOS-RS. Interactions between conjugates and receptors were identified by the Protein-Ligand Interaction Profiler. Receptor-ligand complexes were then subject to molecular dynamics studies to further probe interactions and the stability of the conjugates within the receptor binding pockets. Several of the novel peptide-polyphenol conjugates had good pharmacokinetic properties and breast tumor targeting abilities and are therefore promising candidates for breast tumor-targeted drug conjugate applications.

Abstract 36: Molecular dynamics simulation studies of newly designed peptide-bound pyrimidine and cholesterol derivatives to target PANC-1 Human Pancreatic Tumor Cells  
Authors: Paige McCallum, Madeline Bashant, Saige M. Mitchell  
Mentor: Ipsita Banerjee  
College: Fordham College at Rose Hill  

Pancreatic adenocarcinomas are known for being one of the deadliest cancers. Their complex molecular structure and lack of proper screening contributes to poor prognoses and high mortality rates. Previous studies have identified cell surface receptors such as epidermal growth factor, cholecystokinin A and B as well as LRP1 for targeting PANC-1 pancreatic cancer. Using peptides with known anti-cancer properties, we have designed heterocyclic compounds composed of functionalized pyrimidines and cholesterol mimics that can specifically be functionalized for targeting the CCKAR receptors and EGFR receptors. We studied the characteristics of the binding interactions of twelve peptide based novel drug candidates and correlated receptor binding studies using docking and molecular dynamics simulation studies as well as pharmacokinetic analysis using ADME. Our results indicated that bioavailability of the molecules were in the range of 0.17 to 0.85, and the ilogP indicated that the molecules were membrane permeable. Furthermore, overall the compounds showed a higher binding affinity when the heterocyclic compounds
were attached to the targeted peptides compared to the peptides. These results indicate that the newly designed conjugates may have potential applications for targeting PANC-1 tumor cells.

Abstract 37: Evaluation of Ionic Liquid-Bio-organic Amphiphile Interactions using Computational Approaches
Author: Rachel Daso
Mentor: Ipsita Banerjee
College: Fordham College at Rose Hill

Ionic liquids (ILs), bulky salts with unique physical and chemical properties, have been used in applications from organic synthesis to batteries to dissolving, extracting, and purifying biomolecules. Recently, our lab has shown that bio-organic amphiphile-IL composites can enhance biocompatibility of ILs for possible applications in tissue regeneration and drug delivery. In this work, computational methods have been utilized to probe the physical and chemical interactions of newly designed bio-organic amphiphiles with fourteen ionic liquids. We used COSMO-RS methods to analyze the electrostatic surface of the components and to calculate thermodynamic properties of mixing. We found that symmetry of the electrostatic surface profile was a key indicator of favorable mixing as well as complimentary electrostatic density between different components. Favorable mixing was driven primarily by hydrogen bonding for the hydrophilic amphiphile and Van der Waals forces for the hydrophobic amphiphiles, however the same ILs were favored among all three amphiphiles. The biocompatibility of each IL was also evaluated using SwissADME. Molecular dynamics simulations revealed that self-assembly of the amphiphiles was driven by hydrogen bonding and pi-stacking interactions and that the introduction of ILs to the solution did not disrupt their ability to self-assemble. This work serves to illustrate some of the factors that influence the formation of bio-organic amphiphile-IL hybrids. The techniques shown in this work shed light on the physical and chemical properties of novel IL hybrid mixtures and can be applied to screen IL hybrids for specific therapeutic applications in the future.

Abstract 38: Cellular and Molecular Dynamics Simulations of Designed Scaffolds Promoting Cardiac Cell Regeneration
Authors: Saige Mitchell, Harrison Pajovich, Mindy Hugo
Mentor: Ipsita Banerjee
College: Fordham College at Rose Hill

Damage to heart often results in permanent cell death because cardiac tissue lacks the regenerative capacity found in other cell types. Thus, the damage sustained during myocardial infarctions is long-lasting and can result in further complications such as reduced cardiac function. For this reason, the creation of biomimetic scaffolds to promote growth of cardiac tissue has gained attention. Biocompatible scaffolds must contain components of the extracellular matrix in order to promote proliferation and differentiation of the cells. In this work, we developed a scaffold composed of decellularized leaf components, an angiogenesis-promoting peptide, and a bioorganic polymer (polypyrrole, PPy) that promotes electrical conductance. The scaffold was shown to promote cell growth over a period of several days in a co-culture of cardiomyocytes and smooth muscle cells and found to have electrical properties. The cells showed differentiation as indicated by alpha-actinin and troponin T assays which indicated the formation and organization of sarcomeres. The results of the molecular dynamics simulations showed that the scaffolds were able to sustain stress without putting strain on the system. In addition, PPy was found to increase the elasticity of the scaffold. This is important for cardiomyocytes in particular because of their inherent contractility. Interactions that were most prominent in the scaffold assembly included hydrogen bonds, salt bridges, pi-stacking interactions, and pi-cation interactions. The results of this study indicate the potential application of this scaffold in cardiac tissue engineering because of its ability to promote cell growth and metabolism while maintaining elasticity.
Abstract 39: Molecular Dynamics Simulations to examine interactions between amyloidigenic peptides and amino acid conjugates
Authors: Margaret Whalen, Saige M. Mitchell
Mentor: Ipsita Banerjee
College: Fordham College at Rose Hill

The incidence of amyloid diseases, including Alzheimer’s and Parkinsons disease, in the global population has increased significantly in the past few years. The hallmark of such diseases is the formation of misfolded amyloid plaques that aggregate extracellularly in the brain and are cytotoxic. There are currently few approved treatment options that specifically address the pathology of these amyloid-based diseases, though there have been studies that employ designed peptides, metal nanoparticles, polyphenols, and certain ionic liquids for amyloid defibrillation. In this work, we conducted computational studies using three newly designed plant-based polyphenol-amino acid conjugates that may be potentially applicable in mitigating beta-amyloid (Aβ) and alpha-synuclein (ASN) peptides. Autodock Vina, Biotec’s Protein-Ligand Interaction Profiler, and Desmond were used to study the interactions of the drugs with Aβ(1-42) and ASN through docking and molecular dynamics simulations. SwissADME was used to examine the pharmacokinetic and cytotoxic properties of the conjugates. We found that the designed conjugates had better affinities for Aβ(1-42) and ASN in comparison to the neat polyphenol and amino acids. The conjugates also had favorable pharmacokinetic properties and low cytotoxicity. Such polyphenol-amino acid drug conjugates may have potential applications in reducing protein misfolding that causes Aβ plaques and ASN and thereby may have potential applications in alleviating neurodegenerative diseases.

Abstract 40: Electrocatalytic Oxidation of Small Organic Molecules with Core-Shell Platinum Coated Nickel Nanowires
Authors: Kathryn Belcher, Brett Musialowicz
Mentor: Christopher Koenigsmann
College: Fordham College at Rose Hill

The oxidation of inorganic molecules, such as ethanol, is integral to many devices such as fuel cells and blood glucose meters. As it currently stands, fuel cell reactions require platinum as a catalyst, but platinum is expensive and is not abundant, which has prevented widespread commercialization of these devices. In addition to the high cost, catalysts with Pt are easily poisoned by partially oxidized carbon species such as carbon monoxide formed during the oxidation of small organic molecules. To remedy this, we have prepared a core-shell catalyst consisting of a Ni nanowire core with a thin platinum shell. This allows the structural and catalytic properties that make Pt such a viable choice as a catalyst to be combined with more abundant and less expensive transition metals to reduce cost. We employ a modular synthesis method to prepare uniform nanowires, which we are able to characterize the crystal structure, composition, and morphology of using energy dispersive X-Ray spectroscopy, X-Ray diffraction, and scanning electron microscopy. We are investigating the catalytic activity of the core-shell nanowires towards the oxidation of ethanol in acidic conditions using electrochemical techniques including linear sweep voltammetry and chronoamperometry. These preliminary results indicate that the structure of the catalytic interface varies with Pt composition, and that the Pt-Ni catalysts should lessen the effects of CO oxidation because the core-shell Ni alters the electronic properties of Pt. Due to this, the Pt-Ni nanowires are expected to outperform their pure Pt catalytic counterparts for these reactions.
Abstract 41: Performance Analysis of Metal Alloy Catalysts for Fuel Cell Reactions
Author: Julia Mayes
Mentor: Christopher Koenigsmann
College: Fordham College at Rose Hill

Fuel cells are a promising renewable energy technology. These electrochemical devices convert a fuel, such as methanol, into energy. The commercialization of fuel cells has been stunted due to the high cost and limited abundance of platinum, the most effective catalyst for the electrochemical reaction that takes place in the fuel cell. In addition, Pt is poisoned by an intermediate of the reaction, inhibiting its catalytic abilities. A core-shell structure catalyst with a Pt surface but a transition metal (such as Ni) core would help offset the price of the catalyst, while also potentially optimizing catalytic performance by decreasing the poisoning of Pt. The structural interactions between Ni and Pt have been shown to lessen the poisoning during oxidation of methanol. In prior work, we have developed a method to synthesize Pt-Ni nanowires with varying percentages of Pt on the outer shell. In March of 2020 our progress was halted due to the COVID-19 pandemic. Moving forward, in a “post-COVID” world, when we are able to be fully in-person in our laboratory, our goal is to evaluate which composition yields the best catalytic performance of both methanol and glucose oxidation using cyclic and linear sweep voltammetry. This performance data will also be compared to that of PtAu alloys and PtCo alloys that my labmates have evaluated.

As an interesting note, it has been shown that the structural interactions between Ni and Pt help to lessen the poisoning during oxidation of methanol. In prior work, we have developed a method to synthesize Pt-Ni nanowires with varying percentages of Pt on the outer shell. In March of 2020 our progress was halted due to the COVID-19 pandemic. Moving forward, in a “post-COVID” world, when we are able to be fully in-person in our laboratory, our goal is to evaluate which composition yields the best catalytic performance of both methanol and glucose oxidation using cyclic and linear sweep voltammetry. This performance data will also be compared to that of PtAu alloys and PtCo alloys that my labmates have evaluated.

Abstract 42: Toward Practical Artificial Photosynthesis: Enhanced Performance of Photoelectrochemical Cells with Metal Nanowires
Authors: Dakota Wolf, Elizabeth Morisseau
Mentor: Christopher Koenigsmann
College: Fordham College at Rose Hill

A promising technology in capturing solar energy are photoelectrochemical cells (PECs), which can be used for artificial photosynthesis. This project’s main initiative is to use silica coated gold nanowires to improve the efficiency of PECs. These gold nanowires wires display the property of surface plasmon resonance, which causes them to scatter light. Incorporating these wires within the active layer of a PEC scatters the incoming light and increases its path length within the device. This increase in pathlength increases the likelihood of contact between photons and the photosensitive dye within the dye sensitized photoelectrochemical device (DSPC), which ejects an electron into the system and creates a current. By increasing these collisions, the current output from the DSPC device should increase. This project is currently attempting to observe the scattering spectra of varying concentrations of wires in order to maximize the PEC’s efficiency.

Abstract 43: Composition-Dependent Catalytic Activity of Pt-Au Nanowires for the Oxidation of Small Organic Molecules
Authors: Rosario Troia, Ian Dillon
Mentor: Christopher Koenigsmann
College: Fordham College at Rose Hill

Glucose sensors have valuable applications in monitoring glucose levels in diabetic patients through the oxidation of glucose. Commercially available sensors detect and quantify glucose using enzymes. However, these sensors are limited to certain ranges of pH, temperature and O2 levels. We work to explore the catalytic performance of metal alloys, composed of gold (Au) and Platinum (Pt), for the detection of glucose. Precious metals are stable over a wide range of temperatures and pressures and they exhibit high catalytic activity for the oxidation of a broad range of small organic molecules. We hope to understand the effects of Pt and Au concentrations on the oxidation of glucose. Preliminary results reveal three main oxidation peaks in the linear sweep voltammetry (LSV) of Pt catalysts in the presence of
glucose, which have been assigned to the oxidation of different parts of the glucose molecule. In a LSV, the catalysts are placed onto an electrode and the electrode potential is swept inside of a solution containing glucose. The LSV displays three anodic peaks. The first peak, between 0.2 - 0.4 V, coincides with the oxidation of the hemiacetal hydrogen on C1 leading to gluconolactone. The second, at 0.7 - 0.9 V, is associated with the oxidation of the carbon backbone leading to the production of a range of intermediates including CO and CO2. The final and third peak at 1.0 - 1.2 V has been observed in literature, however, we plan to explore it in more detail.

Abstract 44: Detecting glucose in the presence of small organic molecules using PtAu NW catalysts
Author: Ian Dillon
Mentor: Christopher Koenigsmann
College: Fordham College at Rose Hill

Diabetes rates have been increasing in today’s society and are expected to double within another twenty years. Effective and inexpensive methods for detecting and quantifying glucose concentrations in the blood are critical for the effective treatment of diabetes. Although enzyme-based detectors are commercially utilized for glucose oxidation, environmental limitations reduce their effectiveness. Platinum (Pt) nanowires (NWs) provide an alternative for enzymatic sensors. Non-enzymatic Pt nanowire catalysts can bypass these restrictions due to their unique shape and atomic surface configuration. In terms of examining the effectiveness of Pt catalysts, two approaches are employed: sensitivity and selectivity which are both measured via linear sweep voltammetry. Sensitivity records the catalytic activity in response to changes in glucose concentration, while selectivity measures the sensitivity in the presence of other organic molecules. Prior work has shown that pure Pt NWs demonstrate high sensitivity, but lack selectivity since platinum can absorb a large number of functional groups. Bimetallic alloy nanowires consist of a uniform mixture of two metals and allow for the possibility of new atomic surface configurations and for new active sites toward SOM oxidation. Since the pandemic, progress has been halted given our access to the lab has been restricted until this semester; many of our previous NW solutions are also no longer usable. Thus, we have been working on synthesizing new nanowire samples so that we can resume testing selectivity by the summer. The main focus of the project this summer will be to examine the selectivity of PtAu alloys to glucose oxidation in the presence of common interferents.

Abstract 45: Synthesis and electrochemical characterization of Pt-based core-shell nanowire electrocatalysts for the oxidation of small organic molecules
Authors: Daniel Ma, Kathryn Kingsbury, William Beatrez, Gurpreet Singh
Mentor: Christopher Koenigsmann
College: Fordham College at Rose Hill

The electrochemical oxidation of small organic molecules such as methanol, ethanol, and glucose is important for the operation of devices such as fuel cells and sensors. These oxidation reactions are typically catalyzed by platinum (Pt) nanostructures supported on mesoporous carbon. Despite Pt’s broad applicability as a catalyst, Pt is very expensive and is easily poisoned by partially oxidized carbon species, such as carbon monoxide, requiring high overpotentials for effective catalysis. In this project, we combine the beneficial structural and catalytic properties of one-dimensional nanostructures with a core-shell morphology to develop a catalyst architecture based on less expensive and more abundant first-row transition metals such as Co, Ni, and Cu. We employ a modular assembly process that combines ambient solution-based techniques to prepare core-shell nanowires with predictable morphology, size, and composition. Electrochemical characterization of the oxidation of methanol under acidic conditions reveals that the core-shell nanowires maintain significant enhancements in performance over commercial nanoparticle and pure Pt nanowire samples. The mechanism of methanol oxidation is examined as a function of composition in the core-shell nanowire utilizing carbon monoxide stripping and formic acid oxidation experiments. In the proposed work, we will further explore the effect of composition in the Co-
Pt wires on the catalytic properties of the wires and the mechanism of methanol oxidation and other small organic molecules.

**Abstract 46: Synthetic Progress Toward a Fused Azepine Semiconductor**
Authors: Julia Flood, Alison McCostis, Rachel Falisi
Mentor: Julia Schneider
College: Fordham College at Rose Hill

In the field of organic electronics, molecules are often converted into electron acceptors by introducing nitrogen atoms, allowing them to be used in OLEDs and organic solar cells. Currently, a vast majority of nitrogen-containing organic semiconductors are synthesized via amine chemistry, which limits the scope of possible structures. This project attempts the first synthesis of conjugated azepines via the cyclization of vinyl azides. The final structure will represent a new class of organic semiconductors and provide a new synthetic pathway to fused azepines. The first major step of this synthesis is a Suzuki Coupling Reaction. This reaction has been successfully completed in two variations. In the first, a single thiophene was conjugated to a benzene ring, and in the second, two thiophenes were conjugated to a benzene ring, forming a benzene-thiophene trimer. Both of these products can be reacted in a Knoevenagel Condensation to form the vinyl azide. This poster will show our progress in the synthesis of the compound including NMR spectra and computational calculations.

**Abstract 47: Evaluating the Efficacy of seq2seq Predictive Models to Forward and Retrosynthetic Organic Reaction Prediction**
Author: William Borrelli
Mentor: Joshua Schrier
College: Fordham College at Rose Hill

Rapid forward and retrosynthetic organic reaction prediction remains a budding area of artificial intelligence research in chemistry. IBM’s freely available predictive AI, RXN for Chemistry (https://rxn.res.ibm.com/), treats reaction prediction as a language translation problem, converting a string sequence of reactant molecules, in the form of SMILES strings, to products. In this way, prediction is done by finding a conversion from the “language” of reactants to the “language” of products, without considering the minutia of chemical transformations or reaction mechanisms. Though this method circumvents the arduous task of encoding all the fundamental “rules” of organic chemistry, it does not necessarily obey conservation laws or other physical principles, and thus is susceptible to “alchemy” and other pathologies. This work aims to illuminate areas where transformer models fall short and to consider how to remedy cases where the fundamentals of organic chemistry are violated. Using a data set of 100 organic chemistry reactions sourced from undergraduate academic resources, we evaluated the performance of the model and identified areas where it is generally successful, as in substitution reactions, and unsuccessful, as in elimination and organocopper reactions, at predicting outcomes. For the retrosynthesis model, we found characteristic examples of a lack of atom conservation and nonsensical chemical transformations. We also compared the differences in molecular complexity and synthetic accessibility between predicted and literature reactions to probe how AI plans reactions compared to humans. The forward model produced a similar distribution of these metrics as the literature, whereas retrosynthetic predictions did not.
Abstract 48: Applying the Drosophila olfactory network to drug discovery
Author: Nolan Chiles
Mentor: Joshua Schrier
College: Fordham College at Rose Hill

Ligand-based virtual screening is a widely used application of artificial intelligence for drug discovery. A common approach is to encode the chemical motifs within a set of molecular structures as a binary fingerprint vector, and then use machine learning methods to predict the activity or inactivity in receptor binding screening assays. However, such ligand-based methods are hindered when chemical motifs exist simply by chance and play no role in interacting with the receptor. Recently, it has been observed that artificial neural network architectures that more explicitly mimic the architecture of biological networks can have significant advantages for limited training data. One of these—the Drosophila olfactory network—implements a locality and novelty-sensitive Bloom filter algorithm. Bloom filters are an efficient way of “remembering” if an item has been encountered using only a very small amount of storage space. This variant calculates the similarity of a query item to previously stored inputs. This is relevant to the problem of drug design because it provides a method for evaluating the structural similarity between a small set of molecules known to be chemically active with a receptor compared to an unknown molecule. Using an experimental dataset of candidate drugs for the human muscarinic acetylcholine receptor M1, a target for diseases such as Alzheimer’s and schizophrenia, we compared the performance of a simulated Drosophila olfactory network to other traditional approaches for ligand based screening.

Abstract 49: Designing Strains of Bacillus subtilis with Fluorescent Protein Tags to Translesion Synthesis Polymerases
Authors: Nicholas Bafundo, Carolyn Greenwald
Mentor: Elizabeth Thrall
College: Fordham College at Rose Hill

Translesion synthesis (TLS) is a cellular defense against DNA lesions in which specialized polymerases are used to copy damaged DNA. Although TLS polymerases benefit a cell, these enzymes are highly mutagenic and thus their access to the replication fork must be tightly controlled. The majority of TLS research has used the Gram-negative bacterium Escherichia coli as a model system, but little work has been done on Gram-positive species. We propose to investigate the molecular mechanisms of TLS in the Gram-positive and genetically-tractable bacterium Bacillus subtilis. Single-molecule fluorescence imaging techniques will allow us to track the location and activity of individual proteins within a cell, and thus to uncover the pathways and interactions that govern TLS. The goal of this project is to design and validate B. subtilis strains in which the TLS polymerases and other replisome proteins have been tagged with fluorescent proteins. While the COVID-19 conditions did not allow the necessary laboratory work to be performed, it was possible to plan the steps of strain construction and validation so that the laboratory component can be done when feasible. We expect to find that the designed strains result in viable cells with functional fusions to the proteins of interest. These strains can then be used in imaging experiments to track the location of the tagged proteins, with the goal of discovering important mechanisms in TLS, such as the conditions under which TLS polymerases are activated and the process by which the polymerases gain access to the damaged DNA strand.
Communication and Media Studies

Abstract 50: American Fears of Interracial Romance as Seen Through The Bachelor Franchise
Author: Clare Duffy
Mentor: Brandeise Monk-Payton
College: Fordham College at Rose Hill

Throughout my time researching the portrayal of interracial relationships on The Bachelor, I found that the show models how Americans continue to fear interracial dating, as seen through the discomfort of on-screen discussions on the subject, the stereotyping of contestants of color by fans, contestants, and producers, and the reactions of fans of the franchise to interracial dating. I focused primarily on the first season with a Black bachelorette, the stereotyping of a Black male contestant as a rapist and womanizer, and the franchise’s choice to hastily choose a Black bachelor under immense pressure from the fan base and the media, with no consideration towards his mental health. These case studies all worked to prove that unless The Bachelor radically diversifies their production crew and commits to full social media background checks on contestants, the show will continue to provide a platform for racists and remain a violent space for Black contestants.

Computer and Information Sciences

Abstract 51: Opportunistic Multi-Modal User Authentication for Health-Tracking IoT Wearables
Authors: Alexa Muratyan, William Cheung
Mentor: Sudip Vhaduri
College: Fordham College at Rose Hill

With the advancement of technologies, market wearables are becoming increasingly popular with a range of services, including providing access to bank accounts, accessing cars, monitoring patients remotely, among several others. However, often these wearables collect various sensitive personal information of a user with limited authentication, e.g., knowledge-based external authentication techniques, such as PINs. While most of these external authentication techniques suffer from multiple limitations, including recall burden, human errors, or biases, researchers have started using various physiological and behavioral data, such as gait and heart rate, collected by the wearables to authenticate a wearable user implicitly with a limited accuracy due to sensing and computing constraints of wearables. In this work, we explore the usefulness of blood oxygen saturation (SpO2) values collected from the Oximeter device to distinguish a user from others. From a cohort of 25 subjects, we find that among 92% of the cases, SpO2 can distinguish pairs of users. From detailed modeling and performance analysis, we observe that while SpO2 alone can obtain an average accuracy of 0.69 and F1 score of 0.69, the addition of heart rate (HR) can improve the average identification accuracy by 15% and F1 score by 13%. These results show promise in using SpO2 along with other biometrics to develop implicit continuous authentications for wearables.

Economics

Abstract 52: The Prospect of Economic Development Through Financial Inclusion as a Conduit to Capital Accumulation
Author: Zachary Brower
Mentor: Paul Bartlett
College: Fordham College at Rose Hill

I offer an empirical examination of the deficient flow of capital into less developed economies. With this, I review the neoclassical economic understanding capital flows in relation to the marginal product of
capital. This provides a foundation for an understanding of the “Lucas Paradox”, in which the higher marginal product of capital inherent in less developed economies fails to result in these economies experiencing an increased inflow of capital. I offer financial inclusion as an indicator of capital markets imperfections to explain this paradoxical flow of capital. In this effort, I show that general access and ownership of accounts at financial institutions is indicative of the functionality of financial institutions within an economy. A global analysis, employing cross-country ordinary least square regressions, empirically supports that financial inclusion in the form of account ownership at a financial institution is a stronger indicator than income in the form of gross domestic product per capita in explaining the flow of capital into an economy. The effect of this relationship is conveyed through a survey of economic history in Africa, as colonialism as an impediment to the extension of financial inclusion has resulted in a African economies failing to experience economic development through capital accumulation. Previous studies have shown the microeconomic benefit of achieving financial inclusion for the individual, with little examination of the macroeconomic effect. My results indicate that expanded financial inclusion may result in economic development through an increased inflow of foreign capital.

Abstract 53: Experiments on Employee Autonomy
Author: Andrew Souther
Mentor: Subha Mani
College: Fordham College at Rose Hill

In a traditional workplace the employer dictates the task to employees, who decide on an effort level in response. In this project, we investigate the impact of worker autonomy over task. Our laboratory experiment mimics a stylized workplace where, in stage 1, subjects are offered a choice between multiple real-effort tasks. Across treatments, we vary the amount of control subjects are offered in choosing the task. In stage 2, subjects choose to allocate a portion of their future earnings from the task into a public good. In stage 3, subjects complete the real effort task along with a survey. By varying the amount of employee participation in stage 1, we have experimentally isolated the effect of worker autonomy on worker’s productivity, pro-social behavior, and job satisfaction. Further, we can ask: is there a behavioral difference between meaningful participation in this process, compared to the simple effect of completing the task you wished to complete? Our experiment design allows us to untangle these subtleties in the concept of autonomy.

Engineering Physics

Abstract 54: Development of a Soft Robotic System to Replicate Gripping Motion of a Human Hand
Author: Mellina Calzolaio
Mentor: Stephen Holler
College: Fordham College at Rose Hill

Conventional robotic systems are designed with various rigid pieces that are joined together by links. These rigid systems create limitations in the adaptability of the system and have higher risks of human injury. In order to develop a robotic system with an ability to adapt, soft material must be integrated into the system of the robot. Soft robotics aims to develop robotic systems that mimic natural, biological movements. The soft material of the robot allows for a degree of deformation and adaptability that can not be achieved in traditional, rigid structured robotics. This research project aimed to develop a soft robotic hand that mimicked a gripping motion when pneumatically actuated. The soft body of the fingers were developed with 3D printed molds and then fabricated with a two part polymer. Inside the fabricated fingers there is a series of small air chambers that act as actuation paths. The inflation of these paths result in the curling motion of the soft body, replicating the curling motion of a finger. The actuation of the
fingers is powered by an air pump motor that is controlled by a series of solenoid valves. The air pump motor and solenoid valves are controlled with code implemented by an Arduino. This results in a controlled actuation of specific fingers and allows for the ability to replicate different hand motions. The future of this project aims to further develop and improve the gripping motion to move towards picking up objects and integrating sensors into the soft fingers.

Abstract 55: Light Matter Interactions of Acoustically Levitated Droplets
Author: Komal Gulati
Mentor: Stephen Holler
College: Fordham College at Rose Hill

To understand the different types of aerosol particles in the atmosphere, we will look at light scattering in these levitated droplets along with holographic imaging. This allows us to know the orientation of aggregates corresponding to specific light scattering patterns and hence study their optical properties. In this way, we will categorize these complex particles based on their optical properties. This research has a direct application in fighting against climate change as it helps identify and study harmful particles present in the atmosphere.

Abstract 56: Effects of Increased Smartphone Use and Poor Viewing Habits on Neck Posture
Author: Nico Padua
Mentor: Martin Sanzari
College: Fordham College at Rose Hill

As mobile device usage has increased, so has the incidence of forward head posture (FHP), a relationship colloquially known as “text neck syndrome.” Previous research data supports this relationship, however, inconsistencies in methodology remain a barrier as researchers have not approached a consensus on key topics. The most important of which is the lack of a commonly accepted FHP determining angle. Additionally, some studies only record an estimation of phone use time, and many researchers conduct measurements at an unnatural positions for the individual. This study utilizes smartphone data and photogrammetric measurement to investigate variables commonly associated with “Text Neck.” To address the inconsistencies in research methodology, I developed a procedure that emphasizes accuracy, consistency, and efficiency. Using this method, within ~5 minutes, a participant in the study can answer 5 survey questions and report readily available screen time data from their smartphone. Simultaneously, video is recorded lateral to the individual at neck level to allow for multiple photogrammetric measurements of posture at the resting position and at the phone viewing position. This allows for the most accurate representation of posture. I am continuously recording data using this method and progressively developing it. Due to the previous findings, a positive correlation between all variables is expected, strengthening the research behind text neck. I anticipate that the results will exhibit the validity of my novel method. Potentially, this method could be commonly adopted within Physiotherapy research to enhance consistency within the field and allow for data pooling to occur.
**Fordham College at Rose Hill**

**Abstract 57: Wellbeing and the Psychological After Effects of Isolation in the COVID-19 Pandemic**
Authors: Sophie Epstein, Alyse Peduto, Dennis Cogan, Emily Ferrari, Gabriela Jakubek, Emily Lewis, Sophia Magee, Finula Milici
Mentor: Rachel Annunziato
College: Fordham College at Rose Hill

While health has been at the forefront of the international mindset for the past year, other aspects of health have been compromised. Mental well-being is facing unprecedented obstacles as quarantine has been enacted at its expense. Especially amongst adolescents and young people, the effects of isolation on mental health are beginning to unfold. Online schooling and an overall lack of regular exposure to their peers in group environments has made social interaction more sparse. Does this change contribute to social anxiety? Especially as we begin to reenter what looks like a more normal society, the effects of this will become increasingly apparent. This study will collect survey data to summarize how adolescent mental health has been adjusting to such stark changes in social patterns. Social anxiety and behavior, in particular, can begin to be quantified through questionnaires that we will distribute to a group of young people, on which they will respond with their physiological responses or psychological feelings of nervousness in various given social situations. By studying and understanding the anxiety of adolescents in social situations, this study will provide insight on the social and psychological effects of COVID-19 pandemic as we begin to transition back into more normal social routines.

**Abstract 58: The Impact of Socioeconomic Factors on the Diagnosis, Presentation, and Prevalence of Huntington’s Disease in Patients Across the United States**
Authors: Dalina Cobaj, Chase Behar, Sydni Britton, Carrie Durkin, Alexander Eap, Sumsee Islam, Maeve Kelly, Hasib Mia, Olivia Spano, Frederiki Tsekas
Mentor: Rachel Annunziato
College: Fordham College at Rose Hill

Huntington’s disease is characterized as a rare neurodegenerative disorder that is caused by the repeat of CAG in the Huntington gene. It often presents in patients with motor, cognitive, and psychiatric symptoms around the average age onset of forty years. Through medical innovation, predictive genetic testing has been developed to ascertain whether high-risk individuals will develop Huntington’s disease later on in life. Patients who receive predictive genetic testing results that indicate that they will develop Huntington’s disease are able to develop and implement plans of care with their healthcare providers early on. This potentially could reduce the severity of their symptoms in the future. However, access to predictive genetic testing is limited due to its high cost. Therefore, the purpose of our study was to evaluate the impact of socioeconomic factors on patient outcomes for Huntington’s disease in the United States. Though there is a significant amount of data on Huntington’s disease on the global scale, we found that there is very limited data for patient outcomes and the epidemiologic prevalence of Huntington’s disease on the state-level in the United States. To address our aims, we synthesized data from research conducted on Huntington’s disease on both national and global levels to determine the role of socioeconomic factors on patient care. We hypothesized that patients who belong to higher socioeconomic class will tend to have more tolerable symptoms because they are able to access predictive genetic testing, psychological counseling, and other forms of diagnostic testing under private insurance in contrast to those belonging to a lower socioeconomic class.
Abstract 59: Implications of the COVID-19 Pandemic on Higher Education Faculty Members' Perceived Stress Levels
Authors: Umar Mian, Nicole St. Jacques
Mentor: Rachel Annunziato
College: Fordham College at Rose Hill

The present study seeks to examine the changes in higher education faculty members’ perceived stress due to the COVID-19 pandemic. The study also aims to compare perceived stress by faculty members with various aspects of instruction style, number of courses being taught in one semester, and respective academic departments. In doing so, the pandemic’s effect on higher education faculty members can be better understood, and professors at greater risk of experiencing increased levels of perceived stress can be determined. We hypothesize that faculty members who report a greater ability in emulating an in-person classroom setting through course participation requirements and the creation of student-faculty connections typical of higher education courses prior to the pandemic will report lower levels of perceived stress. Graduate and undergraduate professors from various academic departments at Fordham University were invited via e-mail to be interviewed for the study. If they agreed to partake in the study, participants were interviewed for 10 to 30 minutes via virtual live video communication software, such as Zoom and Google Hangouts. Participants were asked questions about their instruction style, adjustment to teaching during the pandemic, perceived feelings of stress, and perceived differences in teaching overall before the pandemic compared to during the pandemic.

Abstract 60: Transitioning to Adulthood during the Coronavirus Pandemic: Young Adult Patterns in Moving Out of the Family Home (Interview Study, Data Collection Underway)
Author: Valeria Venturini
Mentor: Rachel Annunziato
College: Fordham College at Rose Hill

In the past, intergenerational coresidence benefitted the older generation, but in the present, young adults living with their parents is more beneficial to the younger generation. However, moving out of the family home is a signifier of the transition from young adult to adult in the United States. Certainly, economic constraints impact parent and adult child coresidence. The current study also looked at other demographic and social influences that may be involved in the decision to move out of the family home. Young adult mental health is also a variable in this decision and stage of development for young adults; mental health problems in young adults was recorded during the coronavirus pandemic and accompanying job market. Research on this topic is lacking in the United States. It is the aim of this study to illuminate demographic factors that may contribute to a young adult’s decision to move out of the parental home, especially during the coronavirus pandemic and economic downturn, as well as address the nuances of the dynamic development an individual undergoes in the transition from adolescence to adulthood. Interview data was collected and synthesized to study this. We expect to find that more young adults will delay this transitional step because of a variety of economic, demographic and social factors, but also that circumstances surrounding mental health and the coronavirus pandemic may contribute to this trend as well. The research findings will be presented at Fordham’s 14th Annual Undergraduate Research Symposium.

Abstract 61: Future study inclinations based on early-education language exposure
Author: Rebecca Pfeiffer
Mentor: Rachel Annunziato
College: Fordham College at Rose Hill

The dominant usage of the English language in international settings creates potential advantages for native English speakers, but within the United States, less is known about how being raised speaking
other languages influences educational outcomes later in life. At Fordham University, students entering with another language background can be granted credit by taking New York University’s placement exam on a 16-point scale, yet further recognition of study could be useful in providing more holistic understandings of a student’s education - both in structured and personal settings. For those born in a country where they are raised speaking an alternative to the most common language at home, some perceptions may be drawn based on that background. Students from lower socioeconomic backgrounds may feel judgments about their education if they reveal a language background, while those from wealthier backgrounds may be more celebrated for their language background. The goal of my research is to identify correlations between the experiences students have in learning multiple languages and their future interests - including areas of study, career paths, and continued pursuance of language education. These aims are being examined through survey responses that encourage further information about the limitations and advantages students have discerned through their language studies. Data collection for this project is ongoing. This research intends to assist in the creation of language learning programs and the promotion of early education in foreign languages.

Authors: Ryan Donovan, Samantha Wong
Mentor: Rachel Annunziato
College: Fordham College at Rose Hill

This paper compares various US administration's economic policies' effect on unemployment. It aims to look at what common variables are most effective in decreasing unemployment rates. This paper will study different economic policies ranging from President Reagan's 1981 Tax cuts to President Obama's American Recovery and Reinvestment Act and finally President Trump's CARES Act. This paper will use quantifiable data in tax revenue, civilian labor force, jobs created and the unemployment rate in conjunction with secondary source analysis of respective economic policies for each administration analyzed. Our preliminary findings indicate that support for low income individuals and expansion of Medicare spending has helped decrease unemployment.

**History**

**Abstract 63: Was there an Irish Potato famine or “An Gorta Mór” (The Great Hunger)?**
Author: Paige Hoffman
Mentor: Christopher Maginn
College: Fordham College at Rose Hill

The events of 1845-1852 in Ireland are referred to as both the Irish Potato Famine and “An Gorta Mór” (Great Hunger). Both terms carry different implications. A famine is implied to be simply a shortage of food, while An Gorta Mór refers specifically to the social, political and religious institutions that allowed for the problem to reach extreme lengths. An Gorta Mór places blame on the British government, which implemented the societal structures which contributed to widespread death and emigration of Irish people. Simply put, An Gorta Mór refers to a genocide, while the Irish Potato Famine refers to an agricultural problem.

This paper will take an objective standpoint and aim to answer the question: “Was there an Irish Potato famine or “An Gorta Mór” (The Great Hunger)?” During the famine, and in the years since, there has been continuous academic discourse about who was responsible. Archbishop John Hughes, Irish immigrant and founder of Fordham University, wrote about the famine in A Lecture on the Antecedent Causes of the Irish Famine in 1847. This ongoing dialogue about the famine has led to intense historiographical debate as to what really happened during those years in Ireland, and has had serious
implications in recent years, as Irish nationalists have attempted to use An Gorta Mór as justification for their ideology. Answering the question of who, or what, was really responsible for the disaster will provide much needed clarity on an issue that has remained so emotive and poignant even nearly two hundred years after it occurred.

Abstract 64: Ideology and Data: A Study of Soviet Science
Author: Danielle Moynihan
Mentor: Garret McDonald
College: Fordham College at Rose Hill

After the Bolsheviks officially came to power, they faced many unique challenges in establishing a socialist country. To this end, many Russian establishments and institutions transformed from “bourgeois” to socialist, including scientific institutions. Soviet scientists sought to integrate Marxist-Leninist ideology into old and new scientific endeavors to progress the Soviet Union as a socialist world power. While not so unique in the context of science itself, Soviet science remains unique in its historical and sociopolitical context, influenced particularly by the demands of the Cold War. This research presentation will discuss Soviet genetics, physics and engineering, analyzing both the science and the scientists, which are some of the most notable, for better or for worse, of the 20th century.

History and Medieval Studies

Abstract 65: Archaeological Reconstruction Drawings of Medieval London
Author: Clare Lewis
Mentor: Maryanne Kowaleski
College: Fordham College at Rose Hill

This project entails researching, compiling, and writing about archaeological reconstruction drawings of medieval London for the Visual Sources section of Fordham’s Medieval Londoners database. The Medieval Londoners website is a collaborative project dedicated to assembling resources about medieval London for the purpose of research and education. The Visual Sources section will provide a searchable catalog of images relating to medieval London including paintings, maps, illuminated manuscripts, and other images. Archaeological reconstruction drawings are often commissioned to enrich published archaeological excavation reports, or to better illustrate historical scenes in books and on websites. Based on archaeological findings, as well as historical descriptions of buildings, streets, and other architectural features, these artistic renderings incorporate other elements like figures to give the images a more realistic, lifelike quality that helps to contextualize scenes of everyday activities in medieval London. Currently, these reconstruction drawings are spread out among various websites and print sources. Although they are valuable resources, the disjointed nature of their records makes it difficult to identify the source and original context of each image. This project will, for the first time, bring together references and descriptions of these reconstruction drawings in one searchable location with full metadata to provide easier access for researchers, educators, and students studying medieval London. In order to further develop Fordham’s Medieval Londoners database, this project will also leave a comprehensive body of research notes to facilitate future additions to the archaeological reconstruction drawings collection.
Integrative Neuroscience

Abstract 66: Review of previously reported TCF20 mutations in human subjects suggests further investigation using TCF20 mouse models of autism spectrum disorders
Authors: Sydney Taylor, Anjali M Rajadhyaksha
Mentor: Daniel Leeds
College: Fordham College at Rose Hill

Large-scale exome sequencing has revealed a wide range of TCF20 de novo mutations (DNMs). Commonly observed phenotypes from these individuals include intellectual disability, autism spectrum disorder, sleep disturbances, attentional abnormalities, speech delays, balance issues, and macrocephaly. TCF20 (also termed AR1, SPBP, SPRE-binding protein) encodes a transcriptional coregulator. TCF20 is widely expressed but shows higher expression in premigratory neural crest cells. A recent study has found mice heterozygous for TCF20 knockout of exon 2 have social communication difficulty, interaction defects, and repetitive rigid behavioral patterns. TDG and TCF-4 are two possible downstream targets of TCF20 that rescue phenotypes of TCF20 knockout mice. This review identified seven previously reported TCF20 mutations within the ZNF domain. Interestingly, a de novo mutation (DNM) which causes ASD in two unrelated patients in ZNF does not cause autism in two other individuals. This information, combined with the fact all individuals with ZNF mutations have intellectual disability (or such information was not recorded), indicates dysfunctional TCF20 ZNF domains may have an important role in neurodevelopment. This review proposes the creation of ZNF domain knockout/duplication mice and several behavioral tasks used in previous mouse models of autism while discussing the phenotypic trends of humans with TCF20 mutants, especially in the ZNF. The mentioned studies within this proposal aim to identify if duplication and/or deletion of the TCF20 ZNF domain results in ASD-related phenotypes as seen in patients.

Abstract 67: Cognitive Representations through Searchlight RSA
Author: Laura Reno
Mentor: Daniel Leeds
College: Fordham College at Rose Hill

Localizing function in the brain has been an elusive long-term goal in the study of cognition. Prior studies have utilized four reference abilities (RAs) to capture cognition (Salthouse, 2009). Full-brain cortical networks have been tied to these abilities using common multi-voxel patterns across subjects in distinct age groups. Using voxel searchlights the current study explores purely local cortical representations of cognition, less commonly explored. This work analyzes 240 subjects’ responses to cognitive tasks from the four RAs. The current study further employs representational similarity analysis (RSA, Kriegeskorte, Mur, & Bandettini, 2008) to the similarity of brain activities from tasks within the same RA; RSA can capture representational consistencies within each subject even when exact voxel pattern may vary across subjects. We found distinct topographical localizations for each RA that were mostly consistent across age and suggested refinements of broader functional divisions of the brain from prior literature.

Abstract 68: Cell-Free Circulating Mitochondrial DNA in Mitochondrial Disease Patients
Author: Lily Van Petten
Mentor: Amy Roy
College: Fordham College at Rose Hill

Mitochondria are the energy-producing bodies that nourish human cells. They proliferate independently of the cells that contain them using their own separate set of genes. The replication of these genes is crucial to the production of mitochondria and the health of the entire organism, as 90% of the energy...
utilized by the human body is generated from these cellular components. Mitochondrial DNA (mtDNA) can be found within the cell as well as in a cell-free form. This research investigates the role of genetic mutations that result in a group of disorders known as mitochondrial diseases, which show highly variable symptoms and severity. These are primarily life-long inherited disorders beginning in childhood. Past research has shown that these disorders show high comorbidity with many psychological and developmental conditions, such as chronic stress and anxiety, depression, PTSD, as well as Autism spectrum disorder, diabetes, and more. Cell-free mtDNA levels increase in response to both physical and psychological stress. For this reason, it was hypothesized that data collected from 127 patients suffering from a range of mitochondrial diseases would display a difference in ccf-mtDNA (cell-free circulating mtDNA) levels in the presence of various comorbidities. MtDNA can be measured by centrifuging blood samples and comparing levels between groups experiencing different physiological and psychological conditions and those without. No correlation between psychological or developmental conditions was found to be significant. However, these data, along with past research show that ccf-mtDNA may be a biomarker for mitochondrial diseases as well as anxiety.

International Studies

Author: Carsyn Fisher
Mentor: Christopher Toulouse
College: Fordham College at Rose Hill

This article aims to examine the relationship between economic crises in the United States and remittance flows from the U.S. to Mexico. In order to conduct this research, I draw on previous research conducted on migration and remittances, analysis of the dynamics that dictate Mexican migrants’ roles and experiences within the U.S. economy, and macroeconomic data from sources including the World Bank and the Banco de Mexico. My case studies focus specifically on the 2008 recession and the COVID-19 recession of 2020 in the U.S., and the effect these events have had on Mexican migrant workers and the remittances they send to their families and origin communities. Through these case studies, I find that myriad factors influence remittance levels between the U.S. and Mexico, and there is not a definitive negative relationship between economic conditions in the U.S. and remittances sent from the U.S. to Mexico. This thesis concludes that the relationship between recessions in the U.S. and remittances to Mexico is complex and must account for effects on migration flows, negative impacts on certain industries, and more.

Italian

Abstract 70: Percorsi Postcoloniali Nella Città: Igiaba Scego's Relationship to Rome and its Monuments
Author: Alison Rini
Mentor: Francesca Parmeggiani
College: Fordham College at Rose Hill

This paper, drawn from my senior honors English thesis, explores how author Igiaba Scego conceptualizes the postcolonial subject through her relationship to Rome, Italy. Scego, born in Rome in 1974 to Somali political refugees, writes about characters with complex cultural and national identities, including herself, in relation to the urban places they occupy in both Italy and Africa. This paper focuses specifically on her most recent nonfiction work alongside photojournalist Rino Bianchi, "Roma negata: percorsi postcoloniali nella città" (Rome Denied: Postcolonial Paths in the City), which examines places
like buildings, parks, and monuments which hold significance for the history of Italian colonialism in order to draw attention to and problematize the historical context for Rome’s aesthetically beautiful architecture and monuments. Igiaba Scego’s background provides her with a unique lens with which to view present-day Italy and draw connections between the country’s past and present. The urban space of Rome enables Scego to unfold her own cultural identity and to connect it with the broader Somali and other diasporic communities in Italy

**Mathematics**

Abstract 71: Comparing Elastic Energy Models of Lipidic Membranes  
Author: Eric Lutts  
Mentor: Rolf Ryham  
College: Fordham College at Rose Hill

The present research deals with a derivation of the continuum mechanical energies used to describe lipid bilayer membranes. Lipidic membranes play a critical role governing life as we know it. Specifically, their elasticity, or the ability to change their shape to suit different cellular needs, is what allows cells to take in nutrients, remove waste, and communicate with other cells, processes essential for life. Derivations of bilayer energy were first performed by Hamm and Kozlov in the early 2000s. At the time, researchers made certain smallness assumptions to simplify the mathematical expressions. However, motivated by advances in simulation and experiment, researchers have now revisited the continuum mechanical derivations and called into question some of the assumptions. Unfortunately, there is still no consensus in the field as to the correct form of elastic energy. Our research aims to rectify these inaccuracies. To make initial progress, we consider a two-dimensional membrane and carry out the Hamm and Kozlov derivation without the smallness assumptions. We then use this derivation to compute a mathematically precise expression for energy, allowing us to compare the results from continuum mechanics and molecular dynamics. We will consider the two approaches equivalent if our computations are similar to current research done in molecular dynamics under a range of two-dimensional deformations.

**Music**

Abstract 72: The Detail of the Pattern is Movement: Combination and Circularity in Caroline Shaw's Partita for 8 Voices  
Author: Kristina Lazdauskas  
Mentor: Eric Bianchi  
College: Fordham College at Rose Hill

In Partita for 8 Voices, a contemporary acapella suite composed for octet Roomful of Teeth, Caroline Shaw recycles and reinvents the Baroque suite from a postmodern perspective. Shaw throws into question Romantic and modernist musical and ideological conventions in three ways. First, Shaw undoes so-called traditional musical narratives, including the Romantic musical-work concept and the artistic hierarchy separating composer, performer, and listener. Second, she uses musical cycles and ideological circularity to combat the modernist desire for linear progress. Third, she combines traditionally disparate musical and extramusical material, including Tuvan throat-singing timbres, minimalist ostinatos, poetic excerpts from T.S. Eliot’s Burnt Norton, and text from Sol LeWitt’s wall drawings, with an ironic air. This collage of typically dichotomized elements—both old and new, “high” and “low,” “Western” and “non-Western”—indicate Shaw’s embrace of the postmodern spirit. Building on Jann Pasler’s definition of the term, postmodernism prioritizes a pluralistic mindset in which the “Western” perspective loses dominance and allows for multiple viewpoints to all contain some validity. However, postmodernism itself is a
product of the “Western” musical tradition. Shaw’s postmodernism is therefore rife with contradiction: moments of interpretational freedom are counteracted by attempts to regain conventional compositional control and borrowed techniques become potential threats of musical appropriation. Partita ultimately illustrates the fragility of the postmodern condition by straddling the line between a recapitulation of musical traditionalism and an upheaval of its values.

Abstract 73: The Palmieri Effect: Modern Jazz in Afro Cuban Music
Author: Ezekiel Montes Perez
Mentor: Nathan Lincoln Decusatis
College: Fordham College at Rose Hill

This paper examines how salsa music was influenced by modern jazz in the work of Eddie Palmieri, who is regarded as one of the most important figures in Afro-Latin jazz fusion. The concept of combining jazz, Afro-Cuban, and traditional Puerto Rican styles dates back to the early 1940s in New York City. By combining these distinct styles, Latinos in America have developed a distinct musical identity. What makes Palmieri special and how has he succeeded in influencing this musical movement differently? He was one of the first to successfully incorporate elements of the jazz and psychedelic styles into Afro-Cuban music in the late 1960s and early 1970s. This mixing of musical styles into a new organic whole is most clearly demonstrated in his famous 1970 album Superimposition. Through transcription and musical analysis, this paper will identify several ways in which Palmieri performs this “superimposition” of styles in four representative tracks from this record: “Pa’Huele,” “17.1,” “Que Lindo Eso, Eh!” and “Bilongo.” My analysis will reveal that Palmieri mixes quartal, whole tone and chromatic harmony from jazz with traditional salsa textures to create a new Afro-Latin “third stream” music. Finally, to help sonically illustrate these musical ideas, I will record a concert based on my arrangements of Palmieri's tunes that have been discussed in the paper. I will organize a small conjunto of local musicians in my hometown in Aguadilla, Puerto Rico, and will record a live session to be debuted along with my paper presentation.

Abstract 74: Asian/Asian-American Jazz: A Musical Analysis
Author: Miguel Sutedjo
Mentor: Nathan Lincoln-DeCusatis
College: Fordham College at Rose Hill

Jazz is an inherently American music. In the early 20th century, Black American musicians combined African rhythms with European harmonies to create an improvisation-based music, elevating individual expression and spontaneous group interaction into a complex art form that was exported around the world. One question that arises is how have international and American immigrant jazz musicians integrated themselves into an American musical tradition rooted in the Black experience. Because Asian/Asian-American jazz artists do not fit into the Black/White dichotomy that pervades the discussion of race in jazz, how have Asian/Asian-American musicians combined jazz and other "Asian" sounds in their music? Through transcription and musical analysis of tunes by three prominent Asian/Asian-Americans, I uncovered how this sonic rapprochement of cultural identities is possible. In "Bali" (2018), Joey Alexander plays in a modern jazz trio-style reminiscent of Herbie Hancock, while the percussive and lyrical nature of the melody reflects Balinese gamelan music. In "Minamata" (1976), Toshiko Akiyoshi composes similarly to other big band arrangers like Gil Evans, while utilizing Japanese instrumentation (Nō chant). In "Fishing Song of the East China Sea" (2011), Fred Ho draws from the free jazz tradition pioneered by musicians like Pharoah Sanders to improvise on a traditional Chinese theme (东海渔歌). By blending their Asian cultural and musical heritages with this American musical tradition, Asian/Asian-American jazz musicians have carved out their own unique sonic alcove within the jazz world, similar to how Black American musicians combined African and European influences to create jazz.
Natural Sciences

Abstract 75: Elucidating the Epigenetic Map of the Kcc2 Gene
Authors: Jessica Caushi, Eveline Murphey-Wilson
Mentor: Alma Rodenas-Ruano
College: Fordham College at Lincoln Center

One of the key factors responsible for the homeostatic balance between excitatory and inhibitory synaptic activity is the sudden triggering in the expression of the kcc2 gene, which codes for KCC2, a protein that play a significant role in regulating intracellular chloride levels. My goal for this project was to use zebrafish as an in vivo model to understand how transcriptional mechanisms and epigenetic marks may modify the accessibility of the gene. My main hypothesis is that the activation of kcc2 expression is mediated by epigenetic marks that undergo a shift from a repressive state, where DNA is inaccessible for transcription factor binding, to an activated state, where DNA is made accessible. To test this hypothesis, I first conducted immunostains with synaptotagmin and kcc2 on a zebrafish 5 days post-fertilization, a developmental timeframe where inhibition is already turned on. I then executed a ChIP assay to try and understand what the histone epigenetic map of kcc2 looks like before and after KCC2 expression is triggered. Last, the extraction of RNA and subsequent cDNA synthesis were completed to tell us which genes are expressed and what the expression profile of the genes look like.

Philosophy

Abstract 76: “Brain Death” and the ICU: Intense Confusion about Unconsciousness
Author: Nicholas Bafundo
Mentor: Hannah Daru
College: Fordham College at Rose Hill

In 1968, Harvard University’s “A Definition of Irreversible Coma: Report of the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death,” sparked a heated and ongoing debate in the bioethical literature about whether or not neurologic criteria could be used as a valid criterion of death. I argue that a balanced view of what exactly constitutes a human being, as expressed in the philosophies of Aristotle and St. Thomas Aquinas, is crucially necessary in order to determine when the ceasing-to-be of an individual has occurred. The conclusion of Aquinas’ hylomorphic theory applied to the issue of “brain death” is that an individual with a non-functional brain but who otherwise appears to be alive is still a human being. Both Aquinas’ hylomorphic theory and the current case of Jahi McMath point to the need to critically reexamine the concept of “brain death” from both a clinical and philosophical view.

Physics

Abstract 77: Making Lattice QCD Accessible
Author: Sean Hannaford
Mentor: Christopher Aubin
College: Fordham College at Rose Hill

The Standard Model of particle physics is the theory which describes our universe at its smallest, most fundamental level. Despite its importance, there is still much work left to be done in refining the theory. In particular, quantum chromodynamics—the study of the strong force—remains a difficult field of study due to the nature of quarks and gluons. The large coupling constant of the strong force prevents it from being studied analytically via pen-and-paper methods like perturbation theory, and therefore numerical
methods are required. This project is focused on producing a package of programs that would be able to perform numerical simulations of two-color quarks and gluons. These simulations utilize discretized spacetime latices and Monte Carlo integration techniques to generate a configuration of fields produced by gluons. Once configured, the data is used to construct a Dirac matrix which, when inverted with the biconjugate gradient stabilized method, allows for one to calculate some of the observable quantities of a particle that might exist in the system. Goals of this program include calculating the mass of the pion and optimizing the package so that it may be used as a research tool for future students.

Abstract 78: Accessible Particle Physics for Undergraduates: Simulating Three-Color LQCD, Adding in Quarks
Author: Danielle Moynihan
Mentor: Christopher Aubin
College: Fordham College at Rose Hill

Quantum Chromodynamics (QCD) can be used to describe the fundamental particles and their interactions. This research project studies the strong nuclear force through interactions between gluons and quarks on a lattice using numerical simulations called “Lattice QCD.” The project creates this lattice as a 3×3 Special Unitary matrix to describe the eight combinations of “colors,” which are charge-like quantities in QCD. The project code uses Python 3 to simulate three color interactions, which yields accurate results within a reasonable time span for smaller experiments. This fulfills a critical goal of this project, to make particle physics more accessible to undergraduates.

Abstract 79: Diagnostic Sensors In a 3D-Printed Bionic Hand
Author: Jacqueline Maker
Mentor: Stephen Holler
College: Fordham College at Rose Hill

Artificial intelligence diagnostic tools are becoming prevalent in healthcare settings, especially since the onset of the coronavirus pandemic. Diagnostic devices decrease unnecessary hospitalizations and precautionary doctor visits and provide a picture of patients’ everyday health. In addition, diagnostic devices make it possible to perform telehealth procedures. The purpose of this project was to incorporate heart rate monitor (HRM), pulse oximetry, and temperature sensors into a 3D-printed bionic hand to serve as a diagnostic device. Dr. Stephen Holler’s Engineering and Design Lab had previously created an electromyogram (EMG) bionic hand, and we modified the previous design to fit the diagnostic sensors.

There were two types of heart rate monitors incorporated into this device, electrocardiogram (ECG) and photoplethysmography (PPG) sensors. The PPG heart rate monitor also serves as a pulse oximeter. PPG works by emitting an LED, typically an infrared or green LED, into the skin. Since biological substances absorb light, the intensity of light reflected back is greater or lesser depending on which phase of the heartbeat is occurring and how much oxygen is in the blood. The intensity of light is measured using a photodetector, and the measured voltage is proportional to the intensity of light reflected into the photodetector. The ECG works by placing electrodes on the skin that measure the electrical activity of the heart. A heartbeat is generated by a moving wave front that acts as an electric dipole and moves from the atria down through the ventricles. On the cellular level, the heart muscle cells are polarized in their resting state, and they become depolarized by nerve cells which causes the contraction of the muscle. The heartbeat ends with the subsequent repolarization of the ventricles. The graph generated by the ECG shows the voltage across the chest versus time. For both the PPG and ECG monitors, the signals produced by the devices are transmitted to an Arduino board, which is programmed using the Arduino platform.
Political Science

Abstract 80: “The Tyranny of Their Mirrors:” Social Backgrounds & Variations in Conservative Judicial Philosophies
Author: Andrew Millman
Mentor: Robert Hume
College: Fordham College at Rose Hill

This project seeks to examine and compare the judicial behaviors of the five conservative justices on the Supreme Court, especially John Roberts and Neil Gorsuch, through the lens of their social backgrounds and opinion-writing and -joining patterns. The research for this project focused on the frequency with which all nine justices on the high court joined each other’s opinions and were joined by each other justice, as well as a control group of three earlier Supreme Court terms for comparison. This is the best indicator of whether justices are in alignment on a case, not just on the outcome but also the reasoning behind the outcome. I will lay out four hypotheses relating to either Roberts or Gorsuch and how their social backgrounds influence their jurisprudence in ways that deviate from the expected and then use this research to confirm or reject those hypotheses. In doing so, this project seeks to shed light on a set of Supreme Court justices, especially among the conservative bloc, whose votes seem increasingly harder to predict. As seen in recent terms, there is no longer a single usual swing vote, as there might have been in the past, but at least two conservative justices who are liable to side with liberals on certain cases. This research seeks to determine on what issues and in what circumstances those unexpected votes occur.

Abstract 81: Media Dissemination in Myanmar's Spring Revolution
Author: Rebecca Pfeiffer
Mentor: Olena Nikolayenko
College: Fordham College at Rose Hill

The ongoing coup in Myanmar is taking place in a country that has historically faced a great deal of external influence. As recent decades have worked to stronger define a political system, the country’s military force has been increased, especially in prior administrations. The coup d’état on February 1st, 2021 by the military’s National League for Democracy party has killed hundreds of citizens in Myanmar, drawing international consideration on how to intervene in the conflict. Protestors currently facing the military coup are adapting to methods that work around the online and physical blockages they face. The goal of my research is to understand the practices of communication protestors are using in this movement. The spread of information among protestors, rural groups with limited media access, and international reporters all occur in different methods. The impact of translation of knowledge across local languages and international agencies’ languages is essential in viewing how news of the revolution is being spread. This understanding can influence how international organizations respond to the military coup by determining their information’s factual basis in their decisions to intervene in the conflict. This research is being done across social media platforms to determine the methodology and process of protestors and the information they are providing to their audiences. This project’s data only covers February to March 2021 and the initial responses by protesters.

Abstract 82: Chinese Student Protest Abstract
Author: Kyle Chin
Mentor: Olena Nikolayenko
College: Fordham College at Rose Hill

The 1989 student hunger strikes in China were an integral part of that year’s pro-democracy protests centered in Tiananmen Square, and would go on to inspire similar demonstrations in Ukraine the
following year. While the Ukraine based hunger strike would prove relatively successful, the Chinese protest which inspired it would not. Addressing this divergence, this study argues that the concept of political opportunity structure explains the Chinese hunger strike’s ultimate failure. This project distinguishes domestic and international dimensions of political climate to explain the strike’s occurrence. Based upon archival research, this study finds that the leading cause of the Chinese strike’s failure was relative stability of the Chinese unitary state (especially in comparison to comparable autocratic regimes at the time). The strike warrants further scholarly attention because it had far-reaching repercussions not only for Chinese politics but also for contentious politics in the Soviet Union.

Abstract 83: How has the COVID-19 pandemic impacted the civil resistance and success of the Criminal Justice Reform Movement in New York, specifically regarding Governor Andrew Cuomo’s recently proposed Criminal Justice Reform legislation.
Author: Caitlyn Humann
Mentor: Olena Nikolayenko
College: Fordham College at Rose Hill

Prison reform has been a contentious issue in the United States since the eighteenth century. Yet despite the countless attempts to reform the prison system, many Americans believe that people are put into prisons that are unfit to live in. Punishments on a racial bias, inhumane living conditions, and increased risk of reincarceration are just some flaws of the American prison system. Due to the COVID-19 pandemic, which was first reported to have infected a New Yorker in March 2020, inaction by government officials is more troubling than ever before as the virus continues to spread throughout ill-equipped correctional facilities. Unfortunately, that means that New York Governor Andrew Cuomo’s recently proposed Criminal Justice Reform legislation that has been in motion since 2018 has been inactive. Advocates say his actions don’t match his redemptive tone. This research investigates how the COVID-19 pandemic impacted the success of the Criminal Justice Reform Movement in New York, specifically regarding Governor Andrew Cuomo’s recently proposed Criminal Justice Reform legislation. Drawing on qualitative data from 2018 to 2021 regarding various criminal justice reform advocacy groups and NYS legislation, this analysis uncovers how various criminal justice reform advocacy groups have changed their claim-making as a result of COVID-19. This study contributes to social movement literature by underscoring the importance of claim making in explaining a social movement outcome.

Abstract 84: Youth Political Engagement on Instagram
Author: Brianna Wagner
Mentor: Olena Nikolayenko
College: Fordham College at Rose Hill

Social justice issues have been at the forefront of 2020. After the murder of George Floyd on May 25, 2020, millions of Americans burst into street protests. Instagram became another outlet for this rage and provided a platform for political discussions and organizing. In particular, young people became engaged in online discussions of racial injustice in contemporary America. Based upon in-depth interviews with 15 undergraduate students in the Northeast, this study examines youth political engagement on Instagram. The project investigates how race and gender shape students’ participation on the social media platform. The results suggest that minorities tend to engage in political discussions on Instagram more than white youth. The study also finds that female students are more politically engaged on Instagram than male students. This study contributes to political science literature by demonstrating the impact of sociodemographic variables on students’ online political engagement in the aftermath of large offline protests against racism and social injustice. Unlike most previous studies, this project focuses on Instagram, rather than Facebook or Twitter, because it is one of the most popular social media platforms with the young generation in the early 2020s.
Abstract 85: Examining the Socioeconomic Impact of the China-Pakistan Economic Corridor
Author: Marta Granados Hernandez
Mentor: Olena Nikolayenko
College: Fordham College at Lincoln Center

Since its launch in 2013, the literature on China’s Belt and Road Initiative (BRI) has focused on its impact on security and geopolitics in Eurasia. Less attention has been paid to the effects of the BRI on socioeconomic development in recipient countries. The BRI is creating an alternative economic and political framework through a model of state capitalism that seeks economic growth without sociopolitical reform. What effects will this model have on BRI recipient countries? To answer this question, the presentation will provide an interdisciplinary examination of the China-Pakistan Economic Corridor (CPEC) in Pakistan, analyzing the impact that physical and digital infrastructure will have on its economy and society. As it is currently conceived, the CPEC assumes that the trade of goods from China to the global markets via Pakistan will lead to sustained economic growth in Pakistan. Nevertheless, trade alone will not generate sustained economic development unless Pakistan makes structural changes to its governance and economies. This research project shows that the CPEC could potentially increase trade and foreign direct investment, leading to better living conditions in Pakistan, but this will only happen if the country carries out structural reforms that bring greater accountability, stronger rule of law, and more transparent business practices. These findings imply that the success of the BRI and its corridors stems from the recipient countries’ policies and their domestic political structures rather than from China’s investment proposition per se.

Abstract 86: Gendered Media Framing of Participants in Political Violence: The Case of Women in the Palestinian Intifadas
Author: Kelsie Greene
Mentor: Olena Nikolayenko
College: Fordham College at Rose Hill

Focusing on the media coverage of Palestinian women’s engagement in the two Intifadas, this paper examines patterns of gendered media framing of participants in political violence. Assuming that gendered narratives are employed strategically, the paper investigates how Arab and Western media exploited gendered representations to position female perpetrators of violence in categories that reinforced certain conceptions of gender. Based upon the analysis of discourse in several Arab, American, and British newspapers, the study found that Arab and Western media employed similar gendered stereotypes in their representation of female Palestinian agents of violence, which served to diminish their political agency. However, there was considerable variation in the interpretation of female violence across media sources. These empirical results contribute to both gender theory and international relations literature by indicating the malleability in representations of gender and the potential consequences of gendering agents of violence on conceptualizations of conflicts.

Abstract 87: Sexual Harassment and Cultural Norms in Immigrant Communities: Findings from In-Depth Interviews with Bangladeshi American Women
Author: Shahidah Khanom
Mentor: Olena Nikolayenko
College: Fordham College at Rose Hill

The South Asian community in the United States has shown lack of receptiveness to feminist ideas that challenge dominant gender norms in their countries of origin. In particular, older generations disregarded movements such as the #MeToo movement and hushed discussions on the persistence of sexual harassment in American society. According to a national survey by the Asian Pacific Institute on Gender Based Violence, only 18 percent of Asian or Pacific Islander women, compared to 34 percent of Hispanic
women and 45 percent of Black women, reported experiencing rape, physical violence, and/or stalking by an intimate partner in their lifetime. Yet, sexual violence is a serious problem in the South Asian community. This study examines the role of honor in perpetuating the rape culture and silencing survivors of assault in the South Asian community in America. Based upon interviews with survivors of assault, the project investigates women’s experiences with assault and their perceptions of dominant gender norms. The results indicate that the notion of honor in South Asian communities, even while in the United States of America, plays a detrimental role in silencing survivors of assault. Women are reluctant to come forward out of fear of bringing shame upon their family. This study uncovers the reproduction of dominant gender norms in immigrant communities within the United States. This research contributes to existing literature by demonstrating how the intersection of immigration status and education influences women’s response to assault.

Abstract 88: Impact of Liberation Theology on Mass Mobilization: Findings from the Philippines
Author: Gabrielle Rivera
Mentor: Olena Nikolayenko
College: Fordham College at Lincoln Center

This study examines the effects of liberation theology on mass mobilization in Southeast Asia. Specifically, the study analyzes the role of the Catholic Church during the “Junk Terror Law” protests held in June-July 2020. Since Ferdinand Marcos’s rule in the 1970s, the Catholic Church has been forced to reevaluate its role in sustaining the authoritarian incumbent. The concept of liberation theology refers to the idea that the alleviation of social, political, and economic oppression for all was ultimate salvation; heaven could be attained on Earth rather than waiting for it to come in the afterlife. Drawing on texts of public statements and sermons by Catholic priests, this study traces how the church reacted to human rights violations under Rodrigo Duterte’s presidency and conveyed its stance on anti-government protests. The analysis finds that liberation theology has not yet inspired a particular political spirit or urgency to protest within Catholic Filipinos. Liberation theology has, however, played an increasingly integral role in enriching attitudes that view religion as a communal activity and a way to encourage civic participation due to the continuing efforts of local churches and parishes led by Filipino religious leaders. This study contributes to the growing interdisciplinary research on religion and politics by underscoring the importance of religious institutions in championing human rights.

Psychology

Abstract 89: Weather Discrimination in Scene Processing Regions
Author: Tess Durham
Mentor: Elissa Aminoff
College: Fordham College at Rose Hill

Scenes are complex visual images. Previous studies have found brain regions, including the parahippocampal place area (PPA), retrosplenial cortex (RSC), and occipital place area (OPA) to be associated with scene processing. Weather is a feature not yet considered to modulate scene processing in the brain. This study aims to understand to what extent weather affects the representation within these regions. The BOLD5000 dataset (Chang et al., 2019) of real-world scenes and corresponding fMRI data, was used. Selected stimuli were from three weather conditions: sunny, cloudy, and overcast. 20 scene categories (e.g., street) with equal quantities of each weather condition were selected. Relational similarity measures of weather, pixel composition, and ROI correlations were analyzed for each category, then concatenated across categories. We investigated the magnitude of representational similarities for when the weather condition was the same, compared with when the weather condition was different. The results showed no significant difference in the similarity of pixel composition. Right hemisphere RSC
(RHRSC) was the only scene-selective region to show a difference: greater similarity for when the weather was the same. The results suggest that weather similarity effectively predicts the modulation of voxel data, and thus scene representations in the RHRSC. This expands upon the role of the RSC as participating in gist-like semantic changes across scenes and supports that weather is an important feature of scenes. The RHRSC may be involved in a semantic weather discrimination process.

**Abstract 90: The Relationship Between NSSI Age of Onset and Current NSSI: Moderating the Effects of Coping Strategies**
Author: Nicole Cardinali
Mentor: Margaret Andover
College: Fordham College at Rose Hill

Nonsuicidal self-injury (NSSI) is defined as the intentional destruction of one’s own skin or body without the intent of suicide. NSSI has become more significant in early adolescence, notably starting between the ages of 11 and 13. Research has found that an earlier age of onset is often associated with worse outcomes and more severe current NSSI rates (Ammerman et al., 2018). The purpose of this study is to extend upon current research by examining the role coping strategies play in moderating this relationship, specifically using problem-solving, avoidance, and social support seeking to do so. Although the original data set that was used for this study had 564 respondents, this study focused on people who have self-injured, narrowing the sample size to 122 individuals. The data found that an earlier age of onset is associated with more frequent current NSSI. The association between age of onset and NSSI in the past month was moderated by use of avoidance and seeking social support; however, problem-solving did not have a significant effect on the association. These results indicate that this relationship is significantly dependent on coping techniques, and highlight the importance of investigating these coping strategies as an intervention method for individuals who engage in NSSI. Using more targeted intervention methods will help understand why young individuals engage in nonsuicidal self-injury, create onset prevention strategies, and reduce overall rates of NSSI.

**Abstract 91: Evaluating the Importance of Risk-Benefit Analysis for Risky Behaviors among Individuals with Non-Suicidal Self-Injury**
Author: Kathryn Evans
Mentor: Margaret Andover
College: Fordham College at Rose Hill

The association between completing one high-risk behavior and then engaging in another has been long established (Benthin et al., 1993). Further, individuals are more likely to engage in risky behavior if they evaluate risks of the behavior to be outweighed by the possible benefits (Benthin et al., 1993; Zimmerman, 2010). In addition to the evaluation of risk/benefit analysis, NSSI versatility, measured as the number of NSSI methods used, may also play a role in the perception of these factors. Past literature has suggested that NSSI versatility may be reflective of acceptance of and familiarity with self-injury (Anestis, 2014) and potentially injury more generally, which may include other risky behaviors. The aim of the current study was to investigate differences in perceptions of risk and benefit for risky behaviors among individuals with and without an NSSI history. Perceptions of risk/benefit were investigated for both self-injurious behaviors and risky behaviors more generally. Further, we aimed to supplement gaps in the existing literature by evaluating the role that NSSI versatility and specific methods of NSSI may play in the risk/benefit analysis in individuals with a history of NSSI. Most notably, the outcomes of this study indicate that those who engage in NSSI have an understanding of the risks associated with NSSI, these findings could influence the way NSSI intervention is done moving forward.
Abstract 92: Statistical Analysis of Mortality Rates of COVID-19 Patients Suffering from Diabetes
Author: Sonola Burjia
Mentor: Rachel Annunziato
College: Fordham College at Rose Hill

Sars-Cov-2 is a novel respiratory virus that emerged in Wuhan, China at the end of 2019 resulting in the COVID-19 pandemic, which is one of the greatest global health emergencies on Earth. As the number of cases escalated, it was found that certain groups of people, such as those over 65-years-old, with compromised immune systems or pre-existing underlying conditions are at a higher risk of severe illness and/or death if infected by Sars-Cov-2. People with diabetes mellitus, a metabolic disease affecting glucose processing, are believed to be more susceptible to this disease due to the side effects of diabetes anti-inflammatory drugs, which cause overexpression of ACE2, an enzyme that facilitates movement of virus inside the organism. Through this research study, I statistically compared comorbid diabetes patients in different US states from March 2020 to July 2020. Utilizing statistical analysis, the data shows that the overall risk of death due to COVID-19 increases with density and it depends on the geographical region in the US. However, neither the density nor the geographical region significantly affected the chance of survival of a diabetes patient suffering from COVID-19. This research study offered more understanding on comorbid diabetes in the US. Similar studies can be utilized to reduce comorbidity caused by circumstantial factors, such as geographical location.

Abstract 93: Students for Others: Correlates of Adherence to COVID-19 Guidelines
Authors: Julia Flood, Kristina Stevanovic
Mentor: Rachel Annunziato
College: Fordham College at Rose Hill

Objective: The present study aimed to determine correlates of adherence to COVID-19 health precautions among college students. Drawing from the literature, the following constructs were considered: self-efficacy, conscientiousness, social support, collectivism, empathy, and fear of COVID-19. Participants: Undergraduate students (N=92), recruited from psychology classes and social media, who were living on- and off-campus served as participants during fall 2020. Methods: Participants completed a short self-report survey, delivered online, measuring COVID-19 health precautions and its possible correlates. Results: Preliminary analyses demonstrated no differences in adherence between students living on- and off-campus. Based on linear regression analyses, the significant predictors of adherence were conscientiousness, collectivism, empathy, and fear of COVID-19. Conclusions: College student adherence was largely driven by interpersonal motivators coupled with a modest level of fear, rather than more general constructs. These findings offer implications for cultivating health behaviors during the pandemic as well as more broadly.

Abstract 94: Indicators of Well-Being in College Students
Author: Kristen Bohovich
Mentor: Rachel Annunziato
College: Fordham College at Rose Hill

Well-being has been shown to be closely related to several factors. Three major ones according to research are stress, happiness, and social support. It is unknown if there is a single, isolated factor that is the most important to well-being. This study sought to examine if one of these major indicators of well-being would emerge more significantly than others when examined together in a sample of college students. It was hypothesized that social support would be the strongest indicator of well-being. The study had 117 participants recruited from psychology classes and social media at a private northeastern university. Participants were asked to complete an online survey containing questions about demographic information, as well as measures of well-being, stress, happiness, and social support. Regression analysis
showed that happiness was the most closely related to well-being, with stress close behind, and social support displayed the weakest relationship. The results suggest that well-being interventions for college students should target happiness in order to improve overall well-being. This study should be replicated with different samples of college students across the country in order to determine the generalizability of these findings.

Abstract 95: The Effects of Dynamics and Tempo on Musically Induced Emotions
Author: Sarah Cassidy
Mentor: Rachel Annunziato
College: Fordham College at Rose Hill

Previous research has shown that music has the power to induce genuine emotional responses in listeners. The present study explores the impact of tempo and dynamics, while maintaining a consistent melody, on induced emotions. 29 participants listened to four renditions of Mozart’s Piano Sonata No. 11 in A Major—the original version, a faster version, a slower version, and a more dynamic version. After listening to each version of the song, participants were asked to complete the Geneva Emotional Music Scale (GEMS-25), which measures musically induced emotions through 9 emotional categories and 25 subcategories. Results showed that the overall emotional experience of listeners was not significantly impacted by changes in tempo and dynamics. However, these musical factors do influence specific emotional categories. These results suggest that tempo and dynamics do have the power to evoke specific emotions within a listener, which can be useful for music producers, composers, and music therapists. Future research should evaluate the relationship between music genre and musically induced emotions in order to understand whether the type of music significantly impacts a listener's feelings.

Abstract 96: Appearance-Based Pressures from Peers and the Associations with Anxiety Symptoms in Children and Adolescents
Author: Kelly Christ
Mentor: Natasha Burke
College: Fordham College at Rose Hill

Peers play a significant role in the psychosocial development of children and adolescents. Individuals who do not meet culturally sanctioned appearance ideals by virtue of their weight status (e.g., overweight or obese) are more likely to face negative evaluations from peers within their social environment. As such, it is possible that perceived pressures from peers to meet appearance ideals are related to both social anxiety and school-based anxiety. Goals of the current study were to assess 1) the associations between pressures from peers regarding appearance and symptoms of a) social anxiety and b) school-based anxiety in children and adolescents and 2) the aforementioned associations by gender. We hypothesized that higher levels of reported appearance-based peer pressures would correspond to higher levels of both social and school-based anxiety in children and adolescents. Additionally, we hypothesized that these associations would be stronger for girls compared to boys. Participants (N = 167, 54.4% female; 13.5±2.7 years old) were recruited from the community and pediatric clinics. Zero-order correlations will be used to assess associations between study variables. With the findings from our study, we hope to provide further insight on the potential influence of appearance-based pressures from peers on levels of anxiety to improve the prevention and treatment of social and school-based anxiety in this age group. Further research will be necessary to longitudinally assess whether such potential associations have long-term influences on anxiety symptomology or vulnerability to adverse mental health conditions into adulthood.
Abstract 97: Ecological Momentary Assessment of Distress Tolerance as a Dynamic Predictor of Suicidal Thoughts and Behaviors among Bronx Residents
Author: Grace Denomme
Mentor: Christopher Conway
College: Fordham College at Rose Hill

Previous research highlights decades of clinical and theoretical attempts to target the sources of suicide. A majority of said research focusing on suicide aims to target a broader set of psychological phenotypes, together referred to as STB, which extend beyond death by suicide. Generally, STB include suicidal ideation and suicidal behavior or even a related problem such as nonsuicidal self-injury (NSSI), which is self-inflicted injury without the intention of dying. STB are much more common than suicide attempts or death, which makes them easier to track. The purpose of the present study is to examine DT as a predictor of STB in individuals from Bronx, NY—a diverse population that is generally at higher risk for poor health outcomes, including STB. DT as a predictor has yet to be investigated in relation to STB on a within-persons basis. Our two main aims of the study are to (1) describe the moment-to-moment variability in DT in high-risk populations, and (2) evaluate the contemporaneous effect of DT on STB risk. Ascertaining knowledge on those goals will allow us to determine malleable, clinically relevant factors underlying vulnerability to suicide for those living in high-risk, diverse populations. We expect that this study will depict DT as a variable that ebbs and flows naturally and has significant STB associations in high-risk residents of the Bronx. If this is indeed the case, it would support the development of psychological interventions that would highlight the importance of DT in the field of psychology.

Abstract 98: Demographic Factors Affecting Suicide Ideation
Author: Alexis Cosenzo
Mentor: Christopher Conway
College: Fordham College at Rose Hill

Mental health conditions, including suicidal tendencies and behaviors, take on different forms which can range from suicide ideation to suicide attempts. This project explores the relationship between various demographic measures and suicidal behaviors and tendencies. Through a comprehensive literature review, this project attempts to identify trends among groups of individuals based on their geographic location, socioeconomic status, and racial/ethnic background in order to better understand trends in suicidal behaviors and tendencies. The study also explores the impacts of COVID-19 on rates of suicide in relation to these demographic factors. This information will be used to provide context for the results of the MOMENT study, an ecological momentary assessment (EMA) study which evaluates thoughts of death and suicide among residents of the Bronx. The project also explores the use of formr, a relevant survey framework, as a tool for data collection and analysis for the MOMENT study.

Abstract 99: Use of Ecological Momentary Assessment in Studying Emotion Regulation in Individuals with Depression and Thoughts of Suicide
Author: Sophia Idso
Mentor: Christopher Conway
College: Fordham College at Rose Hill

Ecological Momentary Assessment (EMA) is a research method of measuring behaviors, emotions, moods, or experiences of participants as they are occurring in real time. By utilizing a method that measures these experiences as they happen, it is possible to study changes in behavior, moods, experiences, etc. throughout the day, and hopefully be able to understand what experiences in the flow of daily life may lead to changes in behavior and/or choice of emotion regulation techniques. Research on this topic has mainly used reflective self-report over a long period of time, rather than short and frequent
self-report such as EMA. This project consisted of a literature review to understand and evaluate how
EMA could be used to study emotion regulation techniques used by individuals with depression and
thoughts of suicide. In addition to the literature review, we created a diary study survey to study emotion
regulation in adults living in the Bronx experiencing depression or thoughts of suicide. We did this using
the survey framework formr and the survey created will be used in the MOMENT Study for Dr.
Conway’s Lab in the Psychology Department at Fordham University.

Abstract 100: The Impact of COVID-19 on Well-Being and Career Plans for College Students
Author: Tereze Nika
Mentor: Lindsay Hoyt
College: Fordham College at Rose Hill

The 2019 novel coronavirus (COVID-19) pandemic has impacted college students across the nation. A
large national study of college students found that 80% of their sample reported that the pandemic had
negatively impacted their mental well-being (Active Minds, 2020). The current study examines the
impact of COVID-19 on college students’ career plans; explores whether changes in career plans are
associated with individual characteristics (i.e., first-generation college student, family income, gender,
college year, and race); and investigates whether changes in career plans affect well-being. Data for this
study come from a diverse group of 544 college students across the country who were recruited via social
media. Overall, 27.6% of students reported a change in their career plans due to the pandemic. Men,
middle-income students, and upperclassmen were more likely to report a change in career plans.
Regression analyses indicated that experiencing any change in career plans was associated with more
anxiety, more stress, and less hopefulness. Specifically, students who went from having a plan (e.g.,
graduate school, working full time) before the pandemic to a current state of uncertainty reported the
highest levels of anxiety and stress. Further, students who never had a career plan (before the pandemic or
currently) reported significantly less hopefulness. These results add to the literature regarding the well-
being and career plans of college students, that a disruption in students’ career plans are associated with
worse well-being.

Abstract 101: COVID-Related Stress and Growth
Authors: Erin Rosen, Shine Lita, Xavier Barker, Keara Kennedy
Mentor: Jillian Minahan
College: Fordham College at Lincoln Center

Relationships that an individual has in their life, as well as their perception of these relationships, has the
potential to affect their quality of and outlook on life. Previous research has shown that there is less
loneliness among individuals who have a positive view of the social support in their life and more
loneliness for those with a negative view of the social support in their life (van Roekel et al., 2015). This
can be especially impactful during stressful periods in a person’s life, such as throughout the current
COVID-19 pandemic. As the pandemic is a new and ongoing area of study, there is much to be learned
from the changes in lifestyle and routine that it has caused throughout the world, especially in the domain
of our social environments. This study examined the relationship between various social factors,
including received and provided social support (e.g., emotional and instrumental) and loneliness and
COVID-related stress and growth. Most previous research has focused solely on the negative
consequences of the pandemic, but this study also examined COVID-related growth. Controlling for
sociodemographics and depression, loneliness was related to increased COVID-related stress and
decreased COVID-related growth. Providing advice or emotional support to others and receiving advice
or emotional support from others was significantly correlated with increased COVID-related growth.
Interestingly, giving advice or providing emotional support to others was also related to increased
COVID-related stress in addition to increased COVID-related growth. Future studies may investigate
other factors that impact COVID-related growth and COVID-related stress.
**Abstract 102: How COVID-19-Related Stress Impacts Feelings of Hopelessness**  
Authors: Caitlin Rogers, Boyana Maras, Meghan Smith, Samara Zagha, Keya Makwana  
Mentor: Jillian Minahan  
College: Fordham College at Rose Hill

Our study aims to examine the relationship between COVID-19-related stress, engagement in COVID-19 preventative behaviors, sense of control, and hopelessness. Due to the long-term isolation, worry, confusion, and lack of control that many people experienced in the past year, hopelessness is a very relevant topic that should be further explored in the context of this pandemic. This study included 1,917 participants from the 2020 Health and Retirement Study Leave Behind Questionnaire. There was a much higher percentage of females, 60.5%, than males, 39.5%. The approximate mean age in 2020 was 68.94 years. The sample was predominantly White with 72.8% of participants self-reporting as White. The model controlling for sociodemographic variables, such as age, gender, and race, and including COVID-19-related stress, control constraints, and engagement in COVID-19-related behaviors as predictors accounted for approximately 39% of the variance in hopelessness during 2020, $F(6, 1803) = 190.02, p < .001$. While each of the predictors significantly predicted hopelessness, control constraints were the most impactful predictor ($\beta = .60, p < .001$), suggesting that feeling a lack of control was strongly related to feeling hopelessness in 2020, above and beyond the impact of COVID-19-related stress and even beyond the implementation of behavioral control strategies via preventative measures. These findings highlight the importance of a sense of control on feeling hopeless, without it, people may develop distressing mental and physical issues. However, there are countless external factors which may be out of one’s control which could also account for feeling hopelessness.

**Abstract 103: Gender Differences in Job and Life Satisfaction from 2016 to 2020**  
Authors: Tiffany Rado, Megan Mali, Martin Zehirov, Kristina Stevanovic  
Mentor: Jillian Minahan  
College: Fordham College at Rose Hill

COVID-19 has dramatically transformed the ways in which we approach and engage in the spheres of work and life. With more people working from home, there may be a shift in attitudes towards work-life satisfaction. Data obtained from The Health and Retirement Study’s Psychosocial and Lifestyle Questionnaire examines how such factors have altered work-life satisfaction. The present study examined gender differences in both job satisfaction and life satisfaction from 2016 to 2020. The sample of this study consisted of participants who completed the job satisfaction questionnaire in 2016 with a follow up questionnaire given in 2020 ($N= 384$). The mean age of participants in 2016 was 58.27, and approximately 62.27 in 2020. A repeated measures ANOVA indicates a result approaching significance, $F(1, 382) = 3.88, p = .05$, such that males showed an increase in average job satisfaction from 2016 ($M = 3.35, SD = .83$) to 2020 ($M = 3.52, SD = .79$) compared to females who showed a slight decline in job satisfaction from 2016 ($M = 3.40, SD = .68$) to 2020 ($M = 3.38, SD = .75$). Regarding life satisfaction, no significant difference was found between genders with life satisfaction increasing in both groups over the four-year period. Potential factors for the decrease in female job satisfaction is explored— such as the influence of COVID-19 on the workplace environment. These findings suggest that future research could explore methods of maintaining job satisfaction between men and women across varying social environments.
Abstract 104: Key Factors Influencing Adverse Health Outcomes in the Aging population: The Roles of Self-Perceptions of Aging, Functional Limitation, and Pain
Author: Ashley Blasi
Mentor: Jillian Minahan
College: Fordham College at Rose Hill

Negative attitudes toward aging are prevalent throughout the United States and recent studies have found that self-perceptions of aging (SPA) influence health outcomes in late adulthood (e.g., Kotter-Grühn et al., 2009). However, the majority of research has focused on its consequences rather than its influencing factors. As physical health has been demonstrated to affect SPA, factors like functional disability and pain likely affect identity and SPA in this population (e.g., Westerhof & Wurm, 2015). Thus, the current study investigated: 1) the relationship between chronic and recent pain, functional limitations, and SPA, and 2) the interactive effect of functional limitations and pain on SPA within a sample of adults over 65. The current study utilized data from 5,126 individuals who participated in the 2014 Health and Retirement Study, a nationally representative longitudinal study. Results suggest that while controlling for sociodemographic, health, and psychosocial factors, the experience of both chronic pain ($\beta = .09, p < .001$) and recent pain ($\beta = .12, p < .001$) are significantly positively associated with negative SPA. Results showed that pain was more strongly related to SPA than functional limitations ($\beta = .04, p < .01$) were. Results also show a small interactive relationship between functional limitations and recent pain on SPA ($\beta = -.03, p < .01$) such that the negative impact of functional limitations on SPA is stronger among individuals who experience low pain. These findings highlight the importance of pain on SPA throughout the aging process. Future research may further divulge the relationship between pain and SPA over time.

Abstract 105: The Impact of COVID-19-Related Social Isolation on the Relationship Between Loneliness and Depression in Older Adults
Authors: Zuzanna Smurzynska, Basia Cdno, Kerin Chen, Alexander Slaughter
Mentor: Jillian Minahan Zucchetto
College: Fordham College at Lincoln Center

Recent literature demonstrates a connection between loneliness and depression (e.g., Cacioppo et al., 2010). This connection may have been further exacerbated during the COVID-19 pandemic due to social distancing guidelines. We hypothesized that levels of loneliness and depression would increase in 2020 as compared to 2016. Additionally, the magnitude of the relationship between levels of loneliness and depressive symptoms was expected to strengthen when comparing the correlation between both variables in data collected prior to and during the pandemic. The study’s sample included 1,917 participants who completed the Health and Retirement Study Questionnaire in 2016 and 2020. The main measures for the current study were the Three-Item Loneliness scale and Depression scale. Using paired-samples $t$-tests, there was a significant difference in the level of loneliness in 2016 ($M=4.28, SD=1.54$) compared to 2020 ($M=4.41, SD=1.60$), such that levels of loneliness was higher during 2020, $t(1530) = -3.65, p < .001$. However, there was no significant difference in the level of depression in 2016 ($M=1.05, SD=1.59$) compared to 2020 ($M=1.05, SD=1.60$), $t(1877) = -.133, p = .894$. Based on correlational analyses, results suggest that the relationship between loneliness and depression was stronger during 2016 ($r = .41, p < .001$) compared to 2020 ($r = .37, p < .001$), which is in contrast with our hypothesis and highlights the complex relationship between the variables. Overall, these findings support the claim that the pandemic has powerful implications on global mental health.
Abstract 106: Stress, Depression, Anxiety, & Coping Among Working Mothers During COVID-19  
Author: Maria Zarcone  
Mentor: Mary Procidano  
College: Fordham College at Rose Hill  

The COVID-19 pandemic has had great psychological impacts on a number of populations all over the world. Working mothers living in the United States are a particularly vulnerable population for higher levels of depression, anxiety, and stress during the pandemic. Wang et. al (2020) found that women in their sample suffered a greater psychological impact of the first coronavirus outbreak than men which included higher levels of anxiety and depression. Research done by Alon et. al (2020) states that 21% of children in America live with only their mother, suggesting that the burdens of COVID-19 and shutdowns will fall disproportionately on mothers. The current study investigates predictors of depression, anxiety, and stress levels amongst working mothers during the COVID-19 pandemic. A survey was created and distributed to the target population via working mothers’ Facebook groups. Primary analysis suggests that higher levels of anxiety and depression amongst working mothers during the COVID-19 pandemic are predicted by lower levels of reported job satisfaction pre and during pandemic, higher levels of reported stress regarding homeschooling children, higher levels of COVID-related stress, and higher likelihood of using avoidance style coping mechanisms.

Abstract 107: Suicidality in College Students Predicts Lower Sense of Belonging and Reduced College Persistence  
Author: Roscoe Garner IV  
Mentor: Elizabeth Raposa  
College: Fordham College at Rose Hill  

Student attrition rates remain a large problem within the United States, with up to 50 percent of college students in the United States failing to receive a degree within the first 6 years of college (O’Keefe et al., 2013). Mental illness is often overlooked as a predictor of college dropout, despite it being a prevalent issue affecting college students (Kalkbrenner, 2016). Previous surveys suggest that suicidal ideation may be a prevalent mental health problem among young adults (National Survey on Drug Use and Health, 2017). One factor that may influence the impact of suicidality on college persistence is the student’s sense of belonging on their college campus, as this can predict college students’ resilience and success in school (Hoffman et al., 2002; Lambert et al., 2013). Thus, the current study used a large, nationally representative sample of college students to investigate whether self-reported suicidality was associated with motivation to persist in college, and whether this relationship was moderated by the student’s sense of belonging on campus. Analyzing data from the Healthy Minds Study, it was revealed that endorsing suicidal ideation within the past year was associated with reduced persistence towards a degree, when covarying for the effects of sex and age. In addition, moderation analyses showed that the association between suicidality and reduced persistence towards a degree was less pronounced for those with a stronger sense of belonging on campus. These findings could have implications for college health centers and how they screen students for suicidal ideation and behaviors.

Abstract 108: Validating Virus Efficiency for TDP-43 Replacement After 18 Months of Delivery  
Author: Olivia Morrissey  
Mentor: Amy Roy  
College: Fordham College at Rose Hill  

TDP-43 is an essential RNA binding protein that represses nonconserved cryptic exons. Loss of function of this protein is linked to neuron degeneration in ALS, Alzheimer’s Disease, and Frontotemporal Lobe Dementia, specifically in the hippocampus CA2/3 area. This outcome makes TDP-43 a good target for a viral replacement to rescue the neurons present. The neurodegeneration was remedied with an AAV9
virus to replace the nonfunctional TDP-43 protein with a functional TDP-43 protein. The purpose of this experiment is to determine the effectiveness of a TDP-43 knockout mice model and the success and longevity of the AAV9 virus in restoring TDP-43 functionality. ECFF mice with a TDP-43 knockout and FF control mice were bred and their hippocampi were stained with three different antibodies 18 months after viral injection - hTDP-43, mhTDP-43, and NeuN antibodies. The stains from the knockout mice 18 months after injection were analyzed by counting the number of neurons in the CA1 and the CA2/3 areas, which were utilized to determine the success of the knockout in the mice and whether the virus is still effective after 18 months. After 18 months, the hTDP43 stains showed no evidence of continued viral expression and the knockout mouse model appeared to be successful in the hippocampal CA2/3 area of the ECFF mice. I found support for my hypothesis that after 18 months, there will be little to no activity remaining from the virus and additionally, the knockout was determined to be successful in the ECFF mice.

**Abstract 109: Decreasing Stress with Writing Exercises**
Author: Andres Salgado  
Mentor: Amy Roy  
College: Fordham College at Rose Hill

A large body of research has demonstrated that writing interventions, specifically expressive writing, can help students cope with anxiety and stress and positively impact academic performance. The current research study adapted an expressive writing exercise from Rozek et al. (2019) to be used with students enrolled in General Biology courses at Fordham University. In light of previous findings, we hypothesized that students in the expressive writing intervention would show fewer depressive symptoms, lower stress levels, less test anxiety, and better exam grades than students in a control condition. Moreover, we predicted that differences between students in the expressive writing intervention and those in the control condition would be greater for underrepresented minority (URM) students than others. 39 students in Introduction to Biology agreed to participate in the study. Students were randomly assigned to either an expressive writing or control condition. Participants completed a brief battery of questionnaires assessing stress, test anxiety, and depressive symptoms at three-time points (Time 1, beginning of the semester; Time 2, after midterms; Time 3, after finals). All study procedures were carried out through Qualtrics. Unexpectedly, students in the expressive writing intervention scored lower than students in the control group on midterm exams, and, on final exams, no significant effects of the expressive writing intervention were demonstrated. However, results supported increased stress, anxiety, and depressive symptoms in URM students. Although this study did not show positive findings, the current study can serve as a basis for future work aiming to use expressive writing with larger samples.

**Abstract 110: The Effects of Recalling Altruistic Memories and Their Influence on Well-being**
Author: Julianna Scofield  
Mentor: Karen Siedlecki  
College: Fordham College at Rose Hill

The current study examined whether retrieving memories of altruistic acts increased well-being. Participants (N = 153) were asked to complete an on-line survey and were randomly assigned to one of three conditions in which they were asked to recall a memory where they: performed an act of altruism, witnessed someone perform an act of altruism, or was the recipient of an altruistic act. Participants also completed measures of anxiety, depression, interpersonal reactivity, satisfaction with life, positive and negative affect, the Brief Mood Introspection Scale and the Short-Form Memory Experiences Questionnaire (SMEQ). Results indicated a main effect between the conditions of witnessing an act of altruism and when the participant was a recipient of altruism in the conditions of time perspective, visual perspective, emotional intensity, sharing, and distancing. Given the results of the study, future research could examine why the two specific conditions that garnered a main effect on the above-mentioned
SMEQ conditions have a larger impact on some of the ten memory characteristics assessed by the rather than others.

Abstract 111: Examining the Relationship Between General Anesthesia Exposure and Cognitive Performance
Author: Samantha Dargie
Mentor: Karen Siedlecki
College: Fordham College at Rose Hill

Despite the prevalence of general anesthesia in modern medical procedures, little research has examined whether the physiological mechanisms of anesthetics are associated with long-term cognitive impairment. Previous research using rodent models have identified an association between anesthesia exposure and cognitive performance in learning and spatial memory, but few human studies have examined these effects across different cognitive constructs, focusing instead on postoperative cognitive dysfunction and mild cognitive impairment. The current study used an exploratory approach and conducted secondary data analysis using data from the Virginia Cognitive Aging Project. This large dataset allowed us to examine the association between general anesthesia exposure and cognitive performance across the cognitive constructs of episodic memory, processing speed, reasoning, and spatial visualization, both cross-sectionally and longitudinally. Results showed that previous exposure to anesthesia was a predictor for a significantly worse performance in episodic memory, reasoning, and spatial visualization tasks, while no association was identified within the construct of processing speed. General anesthesia exposure was not significantly associated with cognitive decline over time for any of the constructs.

Abstract 112: Implicit Bias and Negative Perceptions of Non-Arab Americans Toward Arabs: Associations Between Knowledge, Media Consumption, Social Contact, and Negative Attitudes
Author: Isabella Tomei
Mentor: Tiffany Yip
College: Fordham College at Rose Hill

The present study investigated the implicit bias, negative attitudes, and open-ended perceptions of Americans toward Arabs, in addition to the exploration of whether knowledge of the Arab World and Middle East, consumption of media, and frequency of social contact predicted negative attitudes toward Arabs. Americans over the age of 18 (n = 162; 62% female; 17% Asian, 4.3% Black, 3.10% Latinx, 8% Native American, 77.9% White) completed an Implicit Association Test (IAT) and a Qualtrics survey either through the Fordham Psychology Research Participation System (SONA) or Amazon Mechanical Turk (MTurk) in the fall of 2020. Results indicated significant implicit bias toward Arab last names compared to last names of various origins, in addition to explicit negative attitudes toward Arabs across several situations. Moreover, Americans who had less social contact and frequently consumed reality television and political dramas were more likely to have negative attitudes toward Arabs. However, a lack of knowledge concerning the Arab World and the Middle East did not predict negative attitudes. Lastly, open-ended perceptions of Arabs were predominantly negative and stereotypical, both in general and in the media. Exploratory findings revealed that higher levels of conservative self-identification predicted higher negative attitudes toward Arabs. These findings have important implications, such as highlighting the discrimination Arab Americans face, spreading awareness of the persistent perpetuation of negative stereotypes and misconceptions, and emphasizing the need for cultural awareness programs and positive representations of Arabs in the media, educational systems, and workplaces.
Abstract 113: The Relationship Between Heading and Post-Concussive Syndrome in College-Age Soccer Players
Authors: Katherine Farber, Eric McConathey, Cara Levitch
Mentor: Molly Zimmerman
College: Fordham College at Rose Hill

The present study explored the hypothesis that repetitive ball heading during soccer games and practice has a relationship with common symptoms of Post-Concussive-Syndrome (PCS), including symptoms of depression and anxiety, vigilance, sleep, and memory changes. In college players, heading of the ball was not associated with PCS symptom presence and severity. In contrast, the assessment of potential covariates indicated that they had the strongest relationship with PCS measures. An IQ estimate was a predictor of anxiety symptoms \( p = .005 \), but individuals with higher education had lower levels of symptoms \( p = .049 \). Concussion history \( p = .011 \) and race/ethnicity \( p < .001 \) were predictors of depression symptoms. Concussion history was also related to worse psychomotor vigilance test (PVT) scores. Women had both higher sleep efficiency \( p = .049 \) and higher PVT times \( p = .001 \) than men. Although the study hypothesis was not supported, our findings highlight the importance of considering common demographic factors and their relation to PCS symptoms.

Sociology

Abstract 114: LGBTQ+ Christians in the United Methodist Church: How Politicization and Polarization Led to a Schism
Author: Megan Farr
Mentor: Orit Avishai
College: Fordham College at Rose Hill

Much scholarship has been done regarding how debates over sexuality within Christianity led to political polarization surrounding LGBTQ+ issues, but there is a notable gap in existing research when it comes to the cyclical nature of this phenomenon – namely, how modern political polarization surrounding LGBTQ+ issues leads to the further entrenchment of Christian denominations in their existing positions regarding sexuality. This research will situate itself in this gap, specifically within the context of the United Methodist Church’s recent schism over the place of LGBTQ+ people in the Church. If the United Methodist Church is to hold itself out as a social justice-oriented denomination, why has it been brought to a schism over LGBTQ+ rights? Using scholarship regarding theological debates about homosexuality, political science work on the issues of polarization and politicization, and statements from the denomination itself, this research asserts that the wealth of theological justifications for both sides of the question of homosexuality indicates that the recent schism in the United Methodist Church is due less to theological differences than to political polarization around LGBTQ+ issues. I find that not wanting to “take a side” in modern political debates about sexuality played a larger role in the Church’s schism than theological disagreements did. Understanding the factors at play in the United Methodist Church’s recent decision to split will lead to greater clarity for LGBTQ+ people in the Church and will contribute to the work of activists seeking to create a more inclusive and accepting environment for LGBTQ+ Christians.
Theatre

Abstract 115: The Costumer’s Guide to Naturally Kinky Curly Hair
Author: Myca Hinton, Amanda Morrow
Mentor: Jessica Shay
College: Fordham College at Lincoln Center

As part of Fordham Theatre’s initiative to support Anti-Racist and Social Justice initiatives in the area of Costume and Costume Design, and with a particular interest in better supporting our BIPOC students and colleagues in the areas of Hair and Makeup, Myca Hinton and Amanda Morrow have created this extensive, thorough, and helpful Guide to Natural/Kinky/Curly Hair Types. This guide covers everything from the history, cultural significance, and even laws governing the care and styling of naturally kinky/curly hair types, appropriative styles, and how to address hair for a production. It technically addresses the specifics of hair type, porosity, products, styling tools, and processes of hair care, style vocabulary, wig types, and extensions—replete with abundant illustrations and links to videos for further research. This guide is an imperative resource not only for costume, hair, and makeup professionals specifically, but for theatre, film, video, or TV artists and professionals of any type—essentially for anyone working with visual representation of people with natural/kinky/curly hair types. With the lack of BIPOC representation within the design world, it is imperative that designers are aware of both the difference and significance of kinky/curly hair types, and how best to style them. If we are to do better at supporting our BIPOC artists—we must raise our awareness and understanding of natural/kinky/curly hair types, what it means when we ask a person to style their hair in a certain way, and how much labor, time, and money it will cost to do it.

Theology Religious Studies

Abstract 116: "Religious Reading:" Insights from Medieval Christians for Secular People
Author: Sophie Cote
Mentor: Robert Davis
College: Fordham College at Rose Hill

In 2016, Harvard Divinity Bulletin published an article by Amy Hollywood entitled “Secular Death”. In this essay, Hollywood, a secular scholar, undermined the binary between secularism and religion by drawing on explicitly religious sources for spiritual aid in her grief from losing several family members. She is part of an academic tradition of inspecting religious experience, secularism, and spirituality. In this project, I examined the work of these scholars on the specific subject of spirituality—namely, the relationship between religious and secular expressions of spirituality. I conducted this analysis in order to determine how sources of spirituality from religious contexts can still contribute to the spiritual possibilities available to people who identify as secular. What I have found in my research is that experience as an aspect of secularity or religion is often sidelined by preeminent scholars in favor of theories of cognition and belief. This distinction implies a fundamental divide between the experiences available to secular and religious people. In my project, I attempt to complicate this distinction by using the work of Amy Hollywood, Robert Orsi, and Georges Bataille, among others, to show that the religious experiences described in accounts of medieval Christian mystics can provide insight into the benefits secular people may find in encouraging such experiences in themselves. In other words, my project claims that secular people may find value in engaging with religious rituals and practices within their traditional contexts.
Author: Carlos Orbegoso
Mentor: Brenna Moore
College: Fordham College at Rose Hill

The project is an interdisciplinary research endeavor to tell the story and analyze the work of LSA Family services, a community organization in East Harlem founded in 1958. Its core mission is to serve the most vulnerable and marginalized, mainly immigrant newcomers, to meet their basic needs for food, healthcare, education, and safety. Research has been conducted on the organization’s history and has analyzed the experiences of between 20 to 40 Spanish-speaking immigrant families in East Harlem who have all been served in different forms by the Little Sisters of the Assumption Family Health Services (LSA). The goal of LSA is to empower and strengthen the served families by affirming their dignity and to have a larger positive impact in their community. Mutuality, a “power-with” relational model of care, is the unique element to LSA, which differentiates them within the field of human services, yet their work has never been analyzed academically. How has mutuality been incorporated into the service of families in East Harlem by LSA, and what has been its effectiveness? What practices offered by LSA have been the most helpful when integrating immigrant Spanish-speaking families into the East Harlem community and giving them a dignified life? How has their spirituality of “mutuality” articulated by the Catholic nuns who founded LSA animated their work? What are the limitations of their work and their model of solidarity? Through these questions, the project has analyzed the data from a theological and humanitarian perspective to engage with issues of immigration, social justice, service, and spirituality.

EXTERNAL PROJECTS

Abstract 118: A Telehealth Adaptation of CARE: Navigating Pandemic-Related Stress and Anxiety in a Group Parenting Intervention
Authors: Kristen Gardiner, Anne Pang, Anna Kilbride, Adella Nikitiades
Mentor: Amanda Zayde
College: Fordham College at Rose Hill

Aim: To investigate the relationships between pandemic-related stress and anxiety symptoms prior to and following participation in an adaptation of CARE, a mentalizing-focused group parenting intervention, delivered to an under-resourced urban community during the height of the COVID-19 outbreak.

Methods: Participants (N = 10) of CARE groups that were initially delivered in-person and shifted to video telehealth during COVID-19 completed self-report surveys prior to their first telehealth session and at 20-week follow-up. A Pearson correlation was used to determine the relationship between Pandemic Stress Index responses and GAD-7 scores prior to participation. Change in GAD-7 scores over the intervention was analyzed using a paired samples t-test and Cohen’s d effect sizes.

Results: There was a significant correlation between self-reported impact of COVID-19 on daily life and anxiety prior to participation in CARE telehealth sessions (r = 0.62, p = 0.039). Participants also reported significantly fewer anxiety symptoms at 20-week follow-up than prior to their first telehealth session, 95% CI [2.23, 8.57], t(9) = 3.86, p = 0.004, d = -0.94.

Discussion: The decreases in anxiety associated with participation in CARE suggests that the telehealth adaptation was able to provide effective support for caregivers experiencing high levels of pandemic stress and anxiety, with implications for the use of mentalizing-focused group interventions in the context of widespread fear and unraveling situations.
Abstract 119: Improving the framework for learning in biophysically-detailed model and adaptability to play Atari games
Author: David D'Onofrio
Mentor: Samuel Neymotin
College: Fordham College at Rose Hill

We have developed a biophysically-detailed model of neurons and neural circuits using the NEURON simulator with Python libraries (NetPyNe), to replicate specific functions of the visual and motor cortex. The network is tested in a simulated environment of the Atari game ‘Pong’ provided by OpenAI’s Gym. The complex architecture of the network makes it challenging to assess synaptic connections that contribute to behavior. To improve visualization of the model, I developed a plotting function to analyze the model’s receptive fields from different circuit components. This mapping function is an analytical tool to observe the structure and strength of recurrent connectivity within neural populations. This allowed our research group to determine where specific recurrent connections are within motor populations at different depths within the circuit’s hierarchy, and the strength of these connections in relation to other synaptic connections. In the current model, reinforcement learning at the synapses between visual cortex and motor cortex is spike-time-dependent. Initially, the learning was skewed because artificial momentum in the OpenAI gym software interfered with precise control from the biophysical model of motor cortex and the game environment. To address the technical challenges of momentum, I encoded the model to eliminate momentum before each next move. When every action triggered by the model moves the racket to completion, the model can clearly observe the effect of each action and reward or punish synapses appropriately. This biological-detailed model allows us to test our understanding of the human brain, and the circuit-based learning mechanisms that support goal-directed behavior.

Abstract 120: The Effect of the COVID-19 Pandemic on the Mental Health of Essential Workers in the Filipino Community
Author: Clara Victorio
Mentor: Roy Taggueg
College: Fordham College at Rose Hill

The COVID-19 pandemic has negatively impacted many people’s mental health. Essential workers have been especially affected by the pandemic due to concerns about the shortage of PPE and the possibility of transmitting the virus from the workplace to their household. Early research on essential workers revealed that some populations were disproportionately affected: upwards of 30% of US nurses who died of COVID-19 and related complications were Filipino, despite Filipinos comprising only 4% of US nurses. The goal of this research was to analyze the effect of the pandemic on the mental health of essential workers in the Filipino community. It was hypothesized that essential workers would be more likely to report moderate to severe symptoms of depression and anxiety. Data was collected from March to November 2020 from a comprehensive survey released by the University of California Davis’ Bulosan Center for Filipino Studies. Respondents reported whether they were essential workers and answered PHQ-9 and GAD-7 questionnaires, which measure the severity of depression and anxiety, respectively. Multiple logistic regression analysis was applied to the data. When controlling for personal and systemic demographic variables, respondents who were essential workers were 2.5 times more likely to report moderate to severe symptoms of depression than respondents who were not. This relationship was even stronger after controlling for variables assessing whether the respondent lived with people belonging to vulnerable populations, had health professionals in the family, or lived in multigenerational households. The results suggest a significant relationship between essential workers and depression.