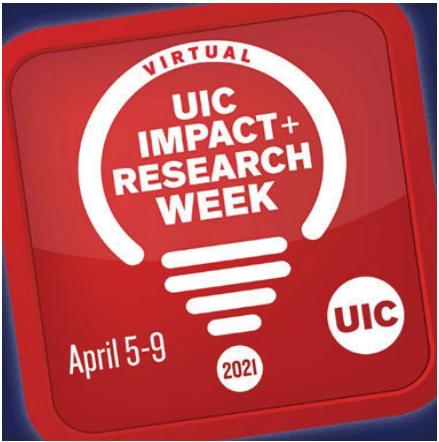
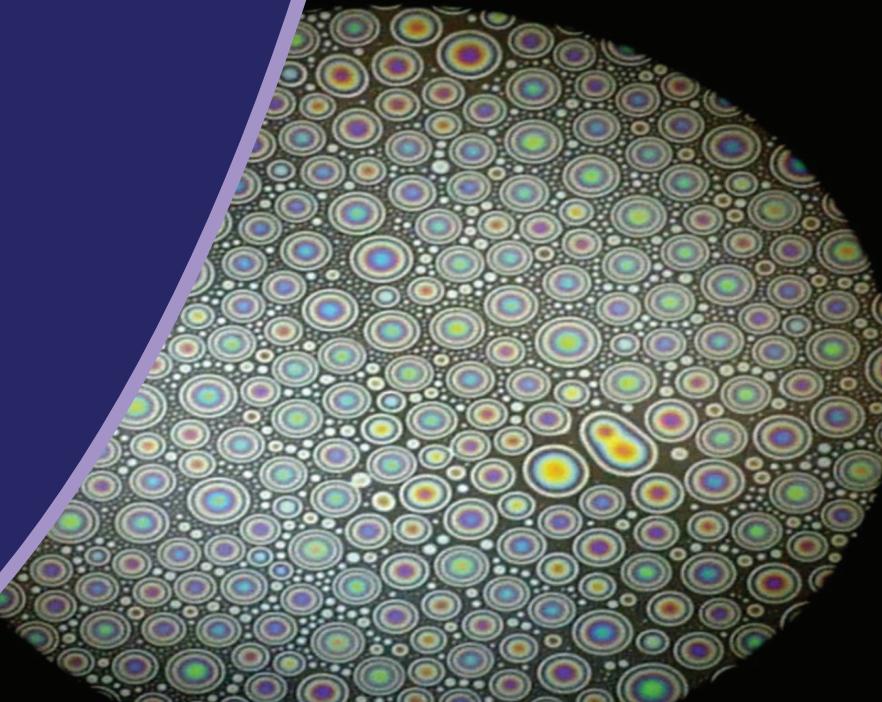


2021



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Honors College Research Poster Presentations

1. Agarwal, Ishan

Purification of a SCF E3 Ubiquitin Ligase Protein and Characterization of its Copper-Binding Site Through NMR Spectroscopy

Undergraduate - Neuroscience

Ubiquitin is a small protein and serves as a marker for proteasomal degradation, thus playing a key role in the regulation of protein turnover in response to physiological and pathophysiological conditions. Ubiquitination, which is the process of ubiquitin conjugation to proteins, is involved in multiple diseases, notably affecting cancer development and progression in numerous ways. There are particular clinical drugs, such as disulfiram and bortezomib that specifically target the ubiquitination pathway. The purpose of this research project is to understand the role of metal binding to a ubiquitin ligase complex (SCF E3-ligase) for its biological activity in the degradation of protein substrates at cellular membranes. In order to accomplish this task, the protein purification of the full length and different fragments of the SCF E3-ligase was performed and optimized using first a mammalian expression system and then a bacterial expression system. It was determined that a mammalian expression system resulted in contamination of the purified product so a switch to a bacterial expression system was made. Using the purification buffer conditions optimized through the mammalian expression system and applying them to bacterial expression system purification, protein yield increased as did purity. The optimization with a pGEX bacterial expression system is still ongoing and the purified products will be used in nuclear magnetic resonance (NMR) spectroscopy to identify its copper binding site, which is an important metal that is found throughout the body and involved in numerous drugs. These results will potentially further research in the effects particular drugs, such as those involving copper, have on the ubiquitination pathway and proteasomal degradation.

2. Ahmed, Maryam

Effects of U.S. Immigration Policies on Canadians' Ability to Live and Work in the United States

Undergraduate - Computer Science

Throughout the decades, the United States and Canada have shared a bilateral relationship that spans trade, travel, defense, and global affairs. Both countries have a history of working closely together to initiate change and progress. Of particular importance (especially in recent years) is the flow of immigration from Canada to the United States. Monumental developments surrounding U.S. immigration policy have greatly influenced the ability of Canadians to live and work in the U.S. over time, which calls for the general public to further examine how ties between the two countries will influence future immigration. This thesis serves as a literature review of U.S.-Canadian immigration and how U.S. immigration policy has affected how Canadians are able to settle and work in the United States. It provides an overview of the history of immigration between both countries as well as major catalysts that heavily impacted movement across the border, such as the rise of the manufacturing industry and periods of extreme poverty. Analysis of different types of visas used to enter the U.S. indicates that policies have generally expanded from the 1900s and onward to be inclusive of both working professionals and students. Provisions in most policies have benefited both immigrant and nonimmigrants from Canada; however, the Trump administration scaled these back with newer restrictions. The historical overview serves as a basis for current immigration policy changes and their effects as well as a backdrop to the current state of affairs between the U.S. and Canada as it relates to the COVID-19 pandemic, which has led to a slowdown in immigration across the border. However, the Biden administration has a more pro-immigration stance with many policies aiming to help immigration applicants, resulting in more opportunities for Canadians to settle across the border.

3. Ajikumar, Midhun

Impact of CRISPR/Cas9-Mediated Knockdown of CXCR7 in Non-Small Cell Lung Carcinoma

Undergraduate - Integrated Health Studies

Abstract EGFR mutations in NSCLC cells constitutively activate MAPK, PI3-K, and STAT signaling pathways, resulting in uncontrolled cell growth, proliferation, and metastasis. EGFR mutants have clinically exhibited sensitivity to EGFR tyrosine kinase inhibitors (TKIs), marked by the loss of downstream signaling activity. However, these

tumors acquire TKI resistance over time using a multitude of mechanisms, including Epithelial to Mesenchymal transition. Previous research has shown that atypical G-coupled protein receptor CXCR7 is overexpressed in TKI-resistant mesenchymal cells and maintains MAPK activity in the presence of drug, ultimately driving cell proliferation again. The prospect of removing the CXCR7 resistance mechanism introduces the possibility of reversing the mesenchymal phenotype of TKI-resistant cells and re-sensitizing them to TKIs. Attempts to inhibit CXCR7 translation using short-hairpin RNA (shRNA) have shown only transient and incomplete effects. DNA level manipulation tools such as zinc finger nucleases pose targeting difficulties and are cost ineffective. In an effort to achieve a complete knockdown of the CXCR7 gene, CRISPR/Cas9 technology was employed via a lentiCRISPRv2 plasmid containing an sgRNA sequence insert for CXCR7. The plasmid was transfected into mesenchymal drug-resistant cells using a 2nd generation lentiviral system and screened for CXCR7 expression via real-time PCR and Western blot analysis. Transfected cells were observed to express significantly less CXCR7 and reverted to an epithelial phenotype. Subsequently, cells were treated with TKIs and exhibited more TKI sensitivity than their previously resistant state, noted by decreased downstream signaling and increased cellular apoptosis when challenged with TKIs. A lack of a complete knockout demonstrates the need for further improvements, such as subcloning or concentrated lentivirus. A complete knockout can significantly delay or prevent EGFR TKI resistance in EGFR mutant NSCLC by completely removing the CXCR7 mechanism from NSCLC, carrying with it the potential to improve patient prognosis.

4. Akhras, Mohammad

Curcumin Attenuates Serum- and HGF- Induced Mesothelioma Cell Proliferation and Migration Mediated by C-Met Signaling Axis

Undergraduate - Biological Sciences

Malignant pleural mesothelioma (MPM) is a devastating disease that has an incubation period of more than 20 years and the prognosis is poor with a median survival time of one year. In majority of the cases, distant metastasis to brain, lung, bone and soft tissues is seen, thereby making it a very difficult disease to treat. Incidence of MPM is causally

linked to previous exposure to asbestos and erionite. Currently there are no proven treatments for MPM. Receptor tyrosine kinases (RTK) are known to play an important role in tumorigenesis. Several of them are either overexpressed and/or mutated and acquire gain-of-function status. Either way, they fuel the oncogenic addictions of cancer, amplify the autocrine loop and thus, promote tumor development. Hepatocyte growth factor (HGF) and its cognitive receptor c-MET are both highly expressed in a variety of tumors, including MPM.

There are several plant-derived products that are currently being investigated for their cancer chemotherapeutic potential and one of them is curcumin, the principal curcuminoid of the Indian spice turmeric. For ages, turmeric has been used in traditional medicine against a variety of symptoms. The past decade has witnessed numerous studies aimed at validating the various medicinal properties associated with turmeric using curcumin.

In this study, I am investigating the effect of curcumin on serum- and HGF-induced proliferation of malignant mesothelioma cells. My preliminary results show that both, serum and HGF stimulate tyrosine phosphorylation of c-Met in a time-dependent manner. Further, pre-treatment of mesothelioma cells with curcumin (1-10 µM) attenuated C-Met tyrosine phosphorylation and cell proliferation. HGF stimulated phospholipase D (PLD) signaling in mesothelioma cells and inhibition of PLD significantly reduced HGF-induced cell proliferation. Also, curcumin blocked HGF-induced PLD activation in mesothelioma cells. Our results suggest a role for PLD in HGF-induced mesothelioma cell proliferation with curcumin exerting its effect on c-Met phosphorylation and activation of PLD signaling axis that regulates proliferation. Further investigations are in progress to understand the link between c-Met phosphorylation, PLD activation and mesothelioma cell proliferation, and the mechanisms by which curcumin attenuates c-Met→PLD→[?]→MPM cell proliferative pathway.

5. Alazmah, Malake

The Biopsychosocial Perspective on the Pandemic of the Inner Mind: A Literature Review

Undergraduate - Biological Sciences

COVID-19 is a term that is all too familiar to many worldwide now, but in the beginning of 2020 it was a word unknown to many as its destruction was not yet underway.

“COVID-19” refers to the development of the infectious virus called SARS-CoV-2 that began in Wuhan, China. Its effects go beyond the body as this disease has been detrimental to the mental health of those affected and bystanders alike. The outbreak of the 2020 pandemic has resulted in the rise of depression, anxiety, and mental health issues alike as its onset rapidly shattered the comfortable routine of many. Thousands have lost loved ones, jobs, social interactions, emotional stability, and a sense of normality following the spark of this pandemic. To understand the repercussion of these factors, a biopsychosocial framework of these impacted individuals must be studied. Researchers must pay close attention to the interaction of three interconnected factors: biology, psychology, and social functioning. I will be focusing on college students who have been affected by the lifestyle changes of the pandemic. I will be conducting a survey distributed at the University of Illinois at Chicago that aims to poll the opinions of college students on the effects of the pandemic. This survey will include variables like the national lockdown, social distancing regulations, online schooling, loss of jobs and volunteering opportunities, cancelling of important events and more. The purpose of this study is to understand that the impact of COVID-19 goes beyond the expected effects the virus has on the body as it infiltrates the mind and mental health of college students. Understanding that its effects go beyond the body will allow professors, families, and even politicians to implement and adapt new resources and methods to alleviate these stressors and prioritize the mental health of these students.

6. Ali, Ayman

Functional Analysis of Changes in Gut Microbiome of COVID-19 Patients

Undergraduate - Biological Sciences

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is part of a family of pathogens called coronaviruses and causes the disease COVID-19. It has been found to be highly infectious among the human population, causes severe symptoms, and has had a significant impact on public health. The microbiome plays a vital role in maintaining

health and can become disrupted when the body is exposed to various pathogens, causing an imbalance in the natural microbiota. Many datasets and studies have used this imbalance as a tool to differentiate between COVID-19 and other illnesses; however, there is a lack of functional analysis of bacteria in the gut. This project aims to examine the function of bacteria found in the gut microbiome and analyze how the functionality changes in patients with or without COVID-19. The functional profile of the gut microbiome will be assessed using the software package PICRUSt2. Functional differences between COVID-19 and healthy microbiomes will be compared in order to elucidate gut microbial changes not available through taxonomic differences alone. This will provide a better understanding of host-community interactions, relating compositional changes to host immunity.

7. Ali, Mustafa

Clinical Outcome of Catheter Ablation in Early Onset Atrial Fibrillation Across Race-Ethnicity

Undergraduate - Medicine

Abstract Title: Clinical Outcome of Catheter Ablation in Early Onset Atrial Fibrillation Across Race-Ethnicity Authors: Baha'a Al-Azzam, M.D; Mustafa Ali, BA; Victor Qiao, BA; Annette Diaz, BA; Ana Ongtengco, BA; Miguel Perez, BA; David Tofovic, M.D;

Katherine E Shapiro, BA; Aylin Ornelas-Loredo, BA; Faisal Darbar, BA; Yining Chen, Dawood Darbar, M.D Background: Atrial fibrillation (AF) is the most common sustained arrhythmia in clinical practice. Disparities in the prevalence, treatment and outcomes of AF across race and ethnicity are increasingly recognized. Despite

demonstrating lower prevalence of AF, Patients of African and Hispanic descent suffer disproportionately higher burden of ischemic stroke and poorer quality of life than non-Hispanic white population. Catheter ablation (CA) has been demonstrated to be an effective treatment to restore and maintain normal sinus rhythm in patients with AF.

Significant racial disparities in the use of CA in patients with AF have been recognized. Compared to whites, African and Hispanic patients have a lower rate of CA when hospitalized for AF. However, limited is known whether the effect of race-ethnicity would extend to influence the outcome of CA. we are aiming to explore the effect of

these factors in a racially diverse, multi-institute cohort. Methods: Subjects are being prospectively enrolled in the UIC AF Registry. All Patients included in the study so far have non-valvular AF confirmed by echocardiography. Patients have undergone at least 1 CA procedure as a treatment for AF. Patients follow up will be reviewed at 3, 6, 9, and 12 months to assess the recurrence of AF, rate of hospitalizations, risk of ischemic stroke, intraprocedural parameters, procedural complications and predictors of procedural success. Results: A total of 135 subjects were enrolled in the study so far, with 56 (41.5%) African Americans (AA), 53 (39.3%) European Americans (EA), and 26 (19.2%) Hispanic/Latino patients (H\L). All patients have undergone at least 1 CA procedure after enrollment to the study. Baseline clinical characteristics were similar across race-ethnicities except for median household income, CHADVASC score, Congestive heart failure (CHF) and Chronic Obstructive Pulmonary disease (COPD) (Table 1). Hispanic\Latino patients tend to be younger than AA and EA patients. However, EA patients tend to have smaller indexed left atrial volume when compared to H\L and AA patients. For patients undergoing CA, it is noticeable that paroxysmal AF is the most common type of AF across all races. Future Projection: We will continue to expand our cohort across all race-ethnicities and follow those patients to better understand the short- and long-term outcomes across different races. This study may enable clinicians to individualize the use of CA procedure as a potential therapeutic technique for AF.

8. Alluri, Viraja

Passive Keyboard Dynamics as Markers of Acute Suicide Risk: A Case Study using the BiAffect App

Undergraduate - Biological Sciences

Although studies have identified predictors of long-term suicide risk (who is at risk for suicide across their lifespan), few predictors of short-term risk are available (when a high-risk individual is most likely to make a suicide attempt). Better tools are needed for clinicians to identify times of high risk for patients and intervene appropriately. The goals of this work are to evaluate the ability of passively-collected keyboard behavior metadata (via the BiAffect smartphone app) to predict acute risk for suicide. COVID-19 delayed

data collection; however, data were evaluated from one participant (recruited for past-month suicidal ideation as part of a suicide-focused RCT), with 54 days of keyboard metadata (daily speed, backspace %, total keypresses) and self-reported suicidal ideation severity and psychiatric symptoms via Qualtrics. The participant met criteria for major depressive, social anxiety, and generalized anxiety disorders on the SCID-5, with a history of suicidal behavior. Daily total keypresses significantly predicted greater same-day SI severity ($\rho(54) = .28$, $p = .04$). Faster daily typing speed correlated with greater rejection sensitivity ($\rho(54) = .34$, $p = .01$), anger/irritability ($\rho(54) = .33$, $p = .01$), and interpersonal conflict ($\rho(54) = .28$, $p = .04$). Daily backspace percentage was negatively correlated with mood symptoms, including depression ($\rho(54) = -.25$, $p = .05$), hopelessness ($\rho(54) = -.32$, $p = .01$), worthlessness/guilt ($\rho(54) = -.27$, $p = .05$), and mood swings ($\rho(54) = -.31$, $p = .02$). Daily keyboard metrics in the form of total keypresses, average typing speed, and backspace use may be useful passive indicators of emotional distress and short-term suicide risk. Of note, keyboard metrics were particularly associated with interpersonal symptoms and hopelessness, which are both strong predictors of suicidality. BiAffect therefore holds promise as a tool for passively tracking acute distress and suicide risk, even among patients with complex psychiatric histories.

9. Amir, Zehra

GEOMETRICAL MODELLING OF ORDERED DISCRETE GROUPS

Undergraduate - Mathematics, Statistics, and Computer Science

In this project we review the basic theory of ordered groups. This theory is fundamental to an active research area of modern mathematics and covers a large class of torsion-free groups. We introduce some preliminary concepts about group theory, presented groups, and compatible orders. Next, we build on the classical identification of orders with their positive cones, and we create a graphical representation of orders for torsion-free abelian groups of finite rank using TikZ.

10. Aposaga, Franciene

Migration of First-Generation Filipino Nurses in Chicago

Undergraduate - Nursing

Since the 1960s, about 150,000 Filipino nurses have migrated to the United States. This makes the Philippines the leading exporter of foreign-educated registered nurses in the country. Filipino nurses come to this country because they are promised higher wages and the best possibility of permanent settlement. The United States uses this strategy of overseas recruitment, on the other hand, as a common solution in filling nurse shortages within the health institutions. This study aims to determine the oral accounts of the different experiences and firsthand knowledge of three first-generation Filipino nurses who immigrated to the United States and are living in Chicago. An understanding of their reasons why they migrated, their purpose why they wanted to become nurses, and their experiences living in Chicago were discussed and analyzed in this study. Moreover, this study incorporated a discussion of the background of nursing in the Philippines and the U.S. to lay out a baseline understanding which can provide a perspective on the results of the interviews within the participants. This study discussed the following: 1) Nursing in the Philippines, 2) Immigration, 3) Nursing in the United States, and 4) Reasons why nurses decided to stay. The findings of this study revealed that there are similarities and differences in what motivates the participants to migrate to the United States with family and love being one of the big reasons why they wanted to move, and there are language and cultural barriers that the nurses encountered living here in Chicago which shows that social and cultural factors affect their experience living in this country and city.

11. Aquino, Mikaela

The Effect of Akt-mediated Nup93 Phosphorylation on Nucleocytoplasmic Transport

Undergraduate - Neuroscience

Nuclear pore complexes (NPCs) regulate selective nucleocytoplasmic transport across the nuclear envelope through diffusion and RanGTP-mediated transport. Nucleoporin93 (Nup93), an essential component of NPCs, contains an Akt phosphorylation motif (RXRXXS*/T*) and thus can be phosphorylated by Akt kinase. However, the function of Nup93 phosphorylation is yet unknown. Preliminary data from the Lee Lab show that impaired Nup93 phosphorylation leads to increased association with Nucleoporin62 (Nup62). Furthermore, other studies determined that Nup62 is involved in the nuclear

import of active β -catenin and binds with Nuclear Transport Factor-2 (NTF2) to translocate RanGDP to the nucleus. The Ran gradient across the nuclear pore is necessary for the active transport of large molecules. This project aimed to examine the effect of Akt-mediated Nup93 phosphorylation on proper nucleocytoplasmic transport through its interaction with Nup62.

Mouse embryonic fibroblast (MEF) cells— WT-Nup93 (wild type) and AA-Nup93 (unphosphorylated)— were used from mice with mutated Nup93 phosphorylation sites. The cells were stimulated with Tumor Necrotic Factor- α (TNF α) and 10% Fetal Bovine Serum (FBS), respectively, to investigate possible effects during inflammation versus cell proliferation. Proteins, such as Ran and β -catenin, were examined using immunofluorescence (IF) staining to study the influence of Nup93 phosphorylation on protein localization. Additionally, the MEF cells were harvested for protein lysate to conduct western blots and validate findings observed through IF imaging.

In vehicle treatment, AA-Nup93 cells showed higher Ran expression compared to WT-Nup93. When treated with growth serum, AA-Nup93 cells exhibited lower Ran expression that was similar to the Ran expression levels of WT-Nup93. The phosphorylation status of Nup93 did not appear to affect β -catenin localization. The results suggest that Nup93 phosphorylation status is involved in the nucleocytoplasmic transport by affecting Ran expression, but not β -catenin, through Nup62.

12. Arowolo, Jumobi

Combined Functions of Anthrax Receptor Genes and MMP14 in Retinal Angiogenesis

Undergraduate - Biological Sciences

Anthrax toxin receptor genes 1 and 2 (Antxr1 and Antxr2) are the receptors responsible for binding the anthrax toxin and are highly expressed in endothelial and epithelial cells. Previous studies have shown that the loss of the Antxr genes affects endothelial cell behavior, such as endothelial cell tube formation, proliferation, migration, and extracellular matrix (ECM) deposition, possibly in combination with Mmp14, in human umbilical vein endothelial cells (HUVECs). In this study, we will be using conditional

Antxr1, Antxr2, and Mmp14 alleles and three different Cre recombinase proteins – VECadherin (expressed in endothelial cells), PDGFRB (expressed in pericytes), and SMA (expressed in smooth muscle cells) – to generate pairwise conditional knockouts of the three alleles. The objective is to determine the effects of removing genes in pairs in endothelial or mural cells to see if the Antxr genes and Mmp14 play a role in angiogenesis – the formation of blood vessels. We will study vessels of the neonatal retina, which are an ideal model for analyzing sprouting angiogenesis. To do this, we will breed the mice to generate double homozygous, cre positive triple homozygous males and then mate them with double heterozygous, no cre females. We will perform tamoxifen injections from postnatal days 1-3 (P1-P3) to induce Cre recombination and remove the genes of interest, and then collect and dissect the retinas. We will stain, wash, mount, image, and analyze the retinas by counting tip cells and measuring outgrowth to compare double homozygous null retina to littermate controls. The results of this study have the potential to increase the current understanding of endothelial cell behaviors, such as the few mentioned above, specifically relating to angiogenesis and the role these genes play in it, which could potentially be applied to tumor angiogenesis and the human development disorders caused by the Antxr1 and Antxr2 genes.

13. Arteaga, Adriana

VMS Interactions in Post-Menopausal Women

Graduate - Nursing

During menopause, women endure various symptoms, such as hot flashes, sleep disturbance, and memory and mood changes. However, the relationship between menopausal symptoms, cognition, and mood have not been fully assessed yet. This longitudinal study evaluates the relationship between cognition and mood in menopausal women by investigating how objective hot flashes affect cognitive performance and mood scores in women who display moderate to severe vasomotor symptoms (VMS). Cognitive performance was observed through a full cognitive battery, which measured participants' verbal memory, visuospatial ability, verbal fluency, working memory, auditory attention, and visuoperceptual speed. In this analytical paper, 54 participants' cognitive performance and baseline mood scores, determined by the Center for

Epidemiologic Studies Depression (CES-D) test, are examined in relation to their objective hot flash frequency. Participants completed 7 cognition tests and filled out a CES-D 20-item questionnaire. To record the objective hot flashes, participants wore an ambulatory sternal skin conductance monitor to measure VMS. An automated algorithm was used to A regression analysis is performed for each participant scouring cognition, mood, and VMS in order to establish the relationship between these menopausal symptoms. It is predicted that as cognitive performance increases, we also see an increase in mood scores.

14. Asatouri, Brayan

Maximum muscular hypertrophy

Undergraduate - Biological Sciences

The goal of this project is to provide a tool for beginner or advanced weight trainers to maximize their muscle hypertrophy. We will be going over the proper diet and training regimen to achieve this goal. Also, there will be an explanation of how genetics affect this process and what one has or does not have control of when it comes to muscle hypertrophy.

15. Ayemoba, Abigail

The Influence of Depression and Trauma History on Emotion Regulation Skills in Women

Undergraduate - Psychology

Prior literature has shown that major depressive disorder (MDD) has effects on employment of coping and emotional regulation styles in adults. However, not all women with MDD display maladaptive emotion regulation skills, suggesting factors that may moderate or exacerbate risk patterns. Childhood maltreatment may be one potential moderator in this relationship. Specifically, adults with childhood trauma are likely to display deficits in their use of emotional regulation styles. In this study, we examined the interplay of MDD history and childhood maltreatment in predicting adult women's use of emotional regulation strategies (i.e., rumination, reappraisal, and suppression) and overall emotional reactivity. We predicted that maltreatment serves as a moderator, such that

maladaptive emotion regulation skills would be most prevalent among women with MDD history and childhood trauma. Participants were 117 adult women, ages 18-65, with history of MDD ($n = 67$) or no history of psychopathology ($n = 50$). To determine history of childhood maltreatment, participants completed the Childhood Trauma Questionnaire (CTQ). Emotional regulation was measured with the Ruminative Response Scale (RRS) and the Emotional Regulation Questionnaire (ERQ); emotional reactivity was assessed by the Emotion Reactivity Scale (ERS). Linear regression analyses revealed no significant MDD by childhood maltreatment interactions in the prediction of emotional regulation strategies. However, analyses indicated main effects of MDD history on rumination, reappraisal, and emotion reactivity. Relative to healthy controls, women with a history of MDD were more emotionally reactive and likely to employ rumination, and less likely to use cognitive reappraisal. Finally, there was a significant main effect of childhood maltreatment on emotional reactivity, such that greater trauma history was associated with higher emotional reactivity. Results from this study suggest depression history appears to be a unique predictor of emotion regulation deficits among women, whereas childhood trauma and depression history act independently to predict emotional reactivity patterns.

16. Ayisi, Rita

Advancing the Collection and Use of Patient-Reported Outcomes and Patient Contextual Data to Improve Quality and Outcomes in Ambulatory Care through Health Information Technology

Undergraduate - Biochemistry

When the clinician does not pay attention to the patient's context such as financial hardship, social support, treatment plan, etc. contextual errors occur which is when an otherwise medical appropriate care plan is inappropriate because it does not take into account relevant patient context, such as an inability to afford medication. These contextual errors can be prevented by contextualizing care in which clinicians identify the underlying contextual factors (such as inability to afford a medication) and address them (e.g., by prescribing a less-costly generic). Clues of underlying contextual factors are called "contextual red flags." Clinical Decision Support (CDS), a technology in the

electronic medical record has been developed to help prevent contextual errors by calling attention to both contextual red flags and contextual factors in patients. For this project, the potential of “contextualized CDS” is being studied to advance the contextualization of care by the randomization of a controlled intervention trial. An assessment is being conducted to measures the outcomes and the averted costs that are correlated with overuse and misuse of medical services. The way averted costs are being studied is that a group of actors is presenting as if they are real patients at physician practices, like “mystery shoppers.” The actors are called unannounced standardized patients (“USPs”). These actors strictly follow the same script at each visit. At some visits, the physicians seeing them will have the “contextualized CDS” and at others, they will not (a control group). The physicians are not notified they saw a USP until after they write their orders in the medical record. The costs of the orders written in the intervention group to the control group will then be analyzed. This will directly involve looking up the costs of care in these two groups using Medicare Expenditure data.

17. Babiar, Daniel

The Flu Vaccine: Danger-Filled Shot or Life-Saving Preventative Measure?

Undergraduate - Biological Sciences - Neuroscience

Amid the COVID-19 pandemic, discussions about the safety and effectiveness of vaccines are ongoing throughout the world. Those turning to news outlets or their peers for vaccine information may be obtaining opinions rather than supported facts. A lack of accurate information and the spread of misinformation among the public may contribute to mistrust of vaccines. The goal of this educational presentation is to provide easy to understand information to members of public who do not have an extensive scientific background or education. By sharing information about the flu virus and its vaccine with infographics instead of scientific jargon and wordy slides, I plan to expand both the scientific and non-scientific communities’ knowledge. To counteract the lack of confidence in the flu vaccine due to inadequate information or misinformation, I will consider the cause of the flu, explain the production of the flu vaccine, and disprove several myths. I will begin by discussing the different influenza strains and explaining how strains mutate. I will cover the production methods of egg based, cell based, and

recombinant influenza vaccines along with an emphasis on the safety of each vaccine type. I hope my presentation will reduce misconceptions about vaccines overall, restore confidence in the flu vaccine, and enable community members to make an informed decision when offered the vaccine.

18. Babu, Vidya

Leukocyte chemotaxis to CXCL10 in an in vitro blood-brain barrier model

Undergraduate - Biological Sciences

Many disorders of the central nervous system such as multiple sclerosis (MS) stem from disruption of the blood-brain barrier (BBB) and ensuing infiltration of autoreactive leukocytes that severely damage nerve tissue. Our research objective is to identify the mechanisms by which pathogenic immune cells circumvent the BBB in MS and its animal model experimental autoimmune encephalomyelitis (EAE). Recent work in the lab has established that primary mouse splenocytes strongly respond to the proinflammatory chemokine CXCL10 with Caveolin-1 dependent transcellular migration across the BBB. However, these splenocyte preparations contain a mixture of hematopoietic cells that can potentially respond to CXCL10 in a disease-relevant manner. Therefore, the objective of my study is to determine whether the CXCL10-responsive cellular population consists primarily of CD4+ T cells, CD8+ T cells, neutrophils, or monocytes. We hypothesize that the identified leukocyte interactions can be attributed to CD4+ T cells. In this study, we isolated splenocytes from EAE mice and cultured them with interleukins and myelin antigen to promote survival and expansion of autoreactive CD4+ T cells while maintaining neutrophils and monocytes. Mixed splenocytes were allowed to transmigrate across primary mouse BBB endothelial cells with or without CXCL10. Cells were fixed, stained with antibodies against effector T cells, neutrophils, and monocytes, and imaged by fluorescence microscopy. Preliminary evidence suggested that all three populations are capable of chemotaxis towards CXCL10. Future studies are required to optimize the immunostaining for precise identification of leukocyte population behavior with respect to caveolae and CXCL10. These findings will guide future studies addressing innate and adaptive immune cell populations at the BBB in MS/EAE and enhance understanding of the pathways by which autoreactive immune

cells cross the BBB and exacerbate disease. Ultimately, this research will contribute to the aim of developing new neuroprotective strategies and translational therapies for MS and other neuroinflammatory diseases.

19. Bahena, Evelin

The impact of implementing bilingualism in a classroom

Undergraduate - Education

Chicago Public Schools offer bilingual services to their students although many of them lack the resources needed to help students within their homeroom classes. This presentation focuses on the impact of implementing bilingualism in an 8th grade CPS classroom for the whole school year. All of the students in my classroom are bilingual and speak both English and Spanish at different fluency levels while my mentor teacher only speaks English. During the first and second quarter of the school year, the 8th graders completed two surveys to share their opinions and thoughts about bilingualism in their classroom. The students also completed a few worksheets and read books in both English and Spanish. One finding revealed the positive impact the different bilingualism activities and surveys had on the students' reading and writing grades. Another findings represented the positive relationships and classroom environment the students and teachers began to build. Findings from this research can provide teachers with different tools in which they can use to implement bilingualism in a classroom and having a positive impact on the students.

20. Banks, Maia

BlackLivesMatter: How Media Can Change the Narrative but Not the Movement

Undergraduate - Communication

Over the years, social media has become increasingly present in various social issues around the world. With digital advocacy on the rise, many platforms have joined Twitter, in that their use to discuss politics has made its way to the conversation on these particular apps. With that being said, this paper aims to analyze the relationship between Digital advocacy and social media platforms. Utilizing the BlackLivesMatter movement and Instagram as the platform of choice, this research aims to examine the ways in which

left and right wing media informs the public on certain social issues, while also providing a better understanding on their reporting through the lens of traditional and non-traditional social media accounts. Looking back at the moment where the BlackLivesMatter social media presence took the internet by storm during the murder of George Floyd, this paper evaluates the effectiveness of Instagram as a platform to bring attention to media coverage or the absence of it. To examine this research, a comparative analysis of two traditional and two non- traditional Instagram news reporting accounts were used to dissect their reporting styles, looking at their use of captions, pictures, hashtags, and their post (what they choose to cover). The data was collected from May 25th ,2020 the resurgence, or the increasing presence of the BlackLivesMatter movement on social media due to George Floyd, to November 22nd, 2020, one month after a decision to drop third-degree murder charge against former Minneapolis police officer Derek Chauvin in the killing of George Floyd was made. In this, the data collected shows that there are major differences in reporting styles when looking at traditional and non-traditional media, through responsibility, omission, ect. In addition to this, Instagram was found to be an appropriate tool to bring attention to media coverage or the shortage of it, being a platform of many narratives.

21. Batmunkh, Nia

Assessment of Away From Home Eating and Chronic Disease by Race Among Older Chicago Adults

Undergraduate - Nutrition Science

Overweight and obesity are associated with the development of many chronic diseases, including cardiovascular, gastrointestinal, type 2 diabetes mellitus (T2DM), and several cancers. Poor dietary habits, lifestyle, environmental factors, and socio-economic inequities can contribute to obesity and related health conditions. Over the past several decades, Americans have been consuming more processed foods and meals away-from-home as convenience became an important factor. Consuming more meals away-from-home has potential health implications. Food away-from-home (FAFH) generally contains more calories, saturated fat, and fewer fruits and vegetables, indicating reduced diet quality. Men and women were recruited from two academic medical centers in

Chicago as part of a larger study examining diet, microbial metabolism, and colorectal adenoma risk among African Americans and non-Hispanic Whites. Those invited to participate self-reported as African American or non-Hispanic White were ages 45-75. Subjects were assessed on the day of their endoscopic procedure, interviewed about 3 weeks later by phone, and assessed again in person about 4 weeks after the full access screening/surveillance colonoscopy. Two 24-hour dietary recalls were collected from each participant. FAFH consumption frequency was analyzed using the data collected in the two diet recall days. All food recalls were reviewed, and the total number of meals and snacks consumed per recall day was recorded in addition to the number of FAFH meals. The Healthy Eating Index-2015 (HEI-2015) was used to quantify diet quality. This study's primary aim is to determine associations of frequency of away-from-home eating with nutrient intake/diet quality and chronic diseases, including obesity overall and by race among a convenience sample of older non-Hispanic White and Black adults from the greater Chicago area. Limited research has been conducted comparing the differences in frequency of FAFH between racial groups and their associations with obesity and chronic disease.

22. Bellam, Revanth

Examining the Extent of Triclosan Resistance in Cells with Mutant FabI Enzyme derived from S. aureus

Undergraduate - Neuroscience

Triclosan is a broad-spectrum antibacterial agent – common in many cleaning products – that is known to competitively inhibit FabI, consequently inactivating the essential fatty acid biosynthesis in a number of common bacteria. There are particular mutations in FabI exhibiting resistance to triclosan inhibition. We hope to gain further knowledge about these sites of mutation by introducing mutant fab gene via a plasmid into E.coli cells, and using these bacterial cells as a ‘factory’ to mass-replicate our desired protein (FabI) with the addition of Isopropyl β - d-1-thiogalactopyranoside (IPTG). When we are able to successfully produce large amounts of our protein, we will be able to better analyze the target sites of interest. Gaining a better understanding of FabI mutant sites will allow us

to develop analogues to drugs such as triclosan, which will prove effective in a number of clinical isolates.

23. Benchehida, Iman

Effects of COVID-19 on Mental Health in Adults.

Undergraduate - Neuroscience

Infectious disease outbreaks have affected populations for centuries and have changed the course of history, having lasting effects on societies, economies, population size, war outcomes, as well as government legislation. While the main focus of the study of pandemics is usually the physical health of those affected, pandemics also have lasting and detrimental effects on the mental health of entire populations. Currently, the COVID-19 outbreak has brought much change to the day-to-day lives of civilians. The requirement of populations worldwide to quarantine as a method to decrease contagion has greatly impacted the social networks and social support for many, and for students, who now attend school virtually and greatly lack social and recreational activities.

According to a recent study by the Center for Disease Control (CDC), 25.5% of young adults between the ages of 18 and 24 reported having seriously considered suicide in the previous 30 days. This research project is designed as an anonymous survey to gauge the effects COVID-19 has had on participants 18 and over using the PHQ questionnaire. The results will indicate if an effective response to the 2020 COVID-19 pandemic, and whether recommendations for interventions to be put into place to manage an anticipated spike in population mental health issues.

24. Bhatt, Lopa

Application of Graphene Liquid Cell

Undergraduate - Physics

In recent years, membrane-based in-situ sample holders have been developed to protect liquids from the vacuum of the transmission electron microscopy (TEM) column, allowing us to study fluids at high spatial resolution. Over the last few years, different window layer materials have been utilized in these liquid cells (LC) including amorphous silicon nitride and 2-dimensional materials such as graphene or boron nitride. Using

graphene liquid cells (GLC) appears to alleviate some of the electron beam induced radiolysis effects in the liquid and new approaches, such as aloof spectroscopy now enables virtually damage free chemical analysis within a TEM. Even though liquid cell provides a very effective way of studying liquids at nanoscale, their applications have been very limited to cases where the knowledge of the in-situ temperature of solution is not required. To accurately measure the temperature of the aqueous sample under an electron beam while being able to get atomic resolution images has been a challenge in the field of electron microscopy. While several methods, including diffraction and electron-energy gain spectroscopy have been developed over the years, plasmon-based thermometry is one of the only approaches that combines high spatial resolution and accuracy of temperature of material under investigation. In plasmon-based thermometry, the shift of plasmon energy as a function of temperature is quantified which provides a direct means of calibrating the sample temperature. The focus of the project presented here is to utilize aberration-corrected in-situ scanning transmission electron microscopy combined with electron energy-loss spectroscopy (EELS) to map the thermal expansion coefficient as a function of temperature of nanometer thick water layers confined between 2D materials. The goal is to show that plasmon peak shift, which can be directly associated with the thermal expansion coefficient (α), tracks the calculated values of α very closely during freezing/melting phase transitions of water.

25. Bhattacharya, Ishita

Analysis on Multilingual Access to Healthcare Resources and Information During the COVID-19 Pandemic

Undergraduate - Liberal Arts and Sciences

Research from past pandemics has suggested inequity of healthcare access due to language barriers that form due to lack of information accessible to multilinguals. Considering the severity of the COVID-19 pandemic, it is essential to evaluate the availability of comprehensible healthcare information. This evaluation is especially important for communities where English is not the dominant language, such as New York City, where 48.5% of households speak other languages. In addition, there has been an increase in usage of medicalized terminology, such as “polymerase chain

reaction,” the meaning of which is not understood by the majority of the general population, let alone non-native speakers of English. Usage of medicalized terminology during public communications can result in the failure to disseminate important, comprehensible information to the public. In light of the above, this investigation aimed to analyze the efforts of various major US cities to provide coherent information to the general public regarding the pandemic. Using an evaluation form devised from the Health Information Technology Institute, resources from these cities, primarily in e-format ($n = 28$), were quantitatively and qualitatively assessed. Results from the study illustrate that local government public health departments of various cities have taken adequate measures to make healthcare information comprehensible, thanks to the development of novel programs such as translator plug-ins. However, there still exist issues regarding accessibility that need to be addressed such as availability of non-electronic format resources, time taken to implement translation technology, and ranking of useful information.

26. Bohne, Jason

The Evaluation, Comparison, Selection, and Implementation of Derivative Pricing Methods into a Trading Algorithm

Undergraduate - Mathematics, Statistics, and Computer Science

The aim of this thesis is to analyze and apply the most common pricing methods for European and American options to real financial market data in order to determine the accuracy of each method. Moreover, by evaluating the accuracy across a variety of market conditions, we hope to determine whether there is a significant difference between each methods' results and if so, which one is the most accurate across our tests. We will then implement our findings into a trading algorithm which we will test over an out-of-sample data set to either confirm or not confirm our findings.

27. Brahmbhatt, Zachary

Rethinking our Approach to Targeted Violence Prevention: Expanding the Role of Public Health

Undergraduate - Political Science

This paper reviews public health approaches to targeted violence prevention and proposes a novel public health model for the prevention of such acts. In recent years, there has been a significant rise in targeted violence and mass attacks in the United States, mandating a more proactive approach in preventing and responding to such acts. Public health initiatives and programs across the country have demonstrated effectiveness in mediating potential acts of targeted violence, as the current model remains ineffectual. Namely, the approaches employed by these programs target intervention in the “pre-criminal” phase and aim to engage bystanders in order to resolve the violence before it occurs. In this paper, we describe how these programs and their approaches demonstrate that public and mental health strategies are a necessary component of our response to the current threats posed by targeted violence. This includes psychosocial support, community reporting, multi-disciplinary intervention teams, and more. Drawing upon this data and interviews with several public health programs across the country, we conclude the paper with a discussion on a potential public health model for the prevention of targeted violence in the state of Illinois, for which a comprehensive model does not exist. Our failure to prevent the recent spike in mass attacks and violence indicates urgency in the development of a solution.

28. Bravo, Jocelyn

“NO VOTE, NO VOICE?”: ANALYZING UNDOCUMENTED LATINO POLITICAL ENGAGEMENT AND NONCITIZEN VOTING RIGHTS IN THE UNITED STATES

Graduate - Economics

Despite their citizenship status, undocumented Latinos are highly involved in local and federal policy issues. This paper provides a review of literature on the political engagement of undocumented Latinos, with a focus on DACA recipients, college students, and women – specifically mothers. It also analyzes the meaning of “Americanness” and noncitizen voting rights in developed countries, including the United States. Data collected demonstrates that a majority of undocumented Latinos engage in policy advocacy through first-person testimony, event-planning, and lobbying legislators. Despite the risk of deportation, undocumented Latinos report a greater sense

of belonging and agency through their political engagement. This is significant since “Americanness” is found to be associated with a subjective feeling, earned status, and political engagement. Indeed, developed countries that have implemented noncitizen voting rights have done so to empower marginalized communities and improve governance. While local governments need to engage their citizens in referendums or town halls before implementing legislation to expand voting rights to noncitizens, immigrant integration is, ultimately, a local matter. Noncitizens that are residents and have paid taxes should be granted local voting rights. Undocumented Latinos have gained the notion that they have political power through their engagement in policy issues in the United States. To fully integrate them into their local communities, however, voting rights should be expanded to them so that they can voice their beliefs through vote as well.

29. Brenham, Ashlyn

The Portrayal of Women in Medieval Literature and its Effects on the Portrayal of Modern Women

Undergraduate - English

I will be analysing various pieces of literature throughout the cannon, starting with “Beowulf” from the Medieval period all the way through Twilight. I will be looking closely at the way women are portrayed, specifically when it comes to the Madonna/Whore binary, and how it is utilized to show which women are desired and which are not, eventually developing into the modern purity culture. I will also be looking at what others have said about the way women in medieval literature were portrayed, as well as how medieval women were actually seen and expected to behave. This will help me to more closely examine where the binary comes from and how it is seen in real life. I will then continue on to discuss how this binary then evolved throughout the cannon to eventually become what it is today. Finally, I will be looking at how this binary can then be seen in modern day literature, and discussing the effects that this has on women and how they are expected to behave now. The overall goal is to see how the portrayal of women in medieval literature has influenced the way that women are

seen even to this day, with the Madonna/Whore binary having begun and then perpetrated the purity culture that is rife within our society now.

30. Briones, Angelica

Rehabilitation for People Experiencing Long-Term Effects of COVID-19

Undergraduate - Rehabilitation Sciences

The Coronavirus disease 2019, also known as COVID-19, has become a catastrophic health problem that has spread worldwide. According to the World Health Organization (WHO), since this pandemic began through mid-March 2021, there have been 119 million confirmed cases of the virus, resulting in over 2.6 million deaths. As this pandemic continues, the number of cases of COVID-19 has also increased, including the number of individuals with persisting symptoms, often cited in the literature as “long COVID.” This research investigated rehabilitation for COVID-19 survivors who are experiencing these lingering, long-term effects of the virus. Some of these lingering symptoms include fatigue, shortness of breath, loss of smell or taste, memory and concentration problems, and brain fog, which have shown to persist in some COVID-19 survivors up to 60 days after the onset of contracting the virus. These survivors have reported a worsened quality of life as a result of these long-term effects and indicate how debilitating and frustrating the symptoms are. Through a search of major health and medicine literature databases, using key terms such as “rehabilitation,” “COVID-19,” and “long COVID,” this research aimed to provide a better understanding of the lingering effects of COVID-19. As the literature also indicated several names for the symptoms of long COVID, the different references were examined further to investigate the potential need for a different label for the condition, exploring suggestions from healthcare providers. The research also investigated the rehabilitation efforts meant to address these persisting effects of the virus, such as occupational therapy’s role in keeping individuals engaged in more meaningful activities. Moreover, this research summarized the lingering symptoms seen in some COVID-19 survivors, the impact of the long-term effects on individuals, and the rehabilitative strategies being used in response to these negative effects.

31. Brones, Travis
Assessing Mental Health Providers' Cultural Competence Perspectives, Awareness/Sensitivity, and Behaviors
Undergraduate - Applied Psychology
Cultural competence is becoming increasingly important, specifically for mental healthcare workers. This project aims to provide an anonymous group profile of cultural competency perspectives, awareness/sensitivity, and behaviors to inform a large healthcare organization's mental health providers' practices and training. The approach was chosen in consultation with the assessed organization and is a replication of two survey instruments: The Challenge of Cultural Competence in the Workplace: Healthcare Providers' Perspectives (Shepherd et al., 2019) and Cultural Competence Among Italian Nurses: A Multicentric Survey (Cicolini et al., 2015). The results presentation of statistics follows the original studies precedent with percentages/means of results and thematic analysis with anonymous quotes.
32. Bryk, Matthew
Compartment Syndrome of Tibial Nerve
Undergraduate - Applied Health Sciences - Kinesiology
CASE HISTORY: An active 60-year-old male patient was seen in the emergency room following an injury to the right lower extremity due to heavy impact with the ground during a lacrosse tournament. He stated that he felt a sharp pain in the knee and that he could not run the next day. His pain continued to get worse, and he began feeling sharp pins and needles on the plantar aspect of his foot. PHYSICAL EXAM: Examination showed enlarged right thigh girth compared to the left thigh. Manual testing found that strength and reflexes remained throughout the extremity, except for a notable loss of toe flexion strength, decrease in posterior tibialis function, and absence of sensation on the plantar surface of the right foot. DIFFERENTIAL DIAGNOSES: Deep vein thrombosis; popliteal artery entrapment; fibula or tibia fracture; stress fracture, medial tibial stress syndrome. TESTS & RESULTS: An MRI of the right lower extremity found diffused edema involving the deep posterior compartment. FINAL DIAGNOSIS: Compartment Syndrome of Right Tibial Nerve. DISCUSSION: Compartment syndrome occurs when

the tissue pressure inside of a compartment exceeds perfusion pressure from the local arterial supply. This pressure can build up due to bleeding, edema, or soft tissue damage in a closed muscle compartment. Acute trauma and overuse syndrome are the most common causes of compartment syndrome. OUTCOME OF THE CASE: MRI showed an improvement of diffuse edema involving the deep posterior compartment of the right lower leg with minimal persistent edema within the tibialis posterior muscle. RETURN TO ACTIVITY AND FURTHER FOLLOW-UP: Patient was prescribed physical therapy two times per week. He will also receive transcutaneous electrical nerve stimulation for 20 minutes to stimulate the tibial nerve, an electromyography to evaluate the health of motor units, and an ultrasonogram of the tibial nerve.

33. Busch, Rebecca

Vector-Borne Disease and Climate Change

Undergraduate - Biological Sciences

This Capstone project brings to light how trends in global climate change ultimately lead to the movement of vector-borne diseases, creating new health concerns for humans. By investigating past data and its outcomes, as well as predicted future trends, potential diseases of importance can be noted in order for early action to occur. The focus of this is a dissection of a 2005 review article from Nature that discusses the then-current situation and predictions for climate change's role in human health overall. Now, over a decade later, new research can be held side by side to see how close the original researchers were. Not only does this, but such a comparison also comments on whether our methods of prediction are up to par and if environmental concerns are viewed in the proper light. Finally, not all health concerns can be predicted. While vectors, the disease, and their hosts have complex symbiotic relationships that take a substantial amount of time to develop, and thus allow for prediction, diseases like COVID-19 for instance, still are affected by and change the environment. The socio-ecological factors regarding both vector-borne and non vector-borne diseases put many groups at higher risk and are an essential part of such research.

34. Castillejo, Brenda

Effectiveness of Trauma-informed Interventions for Latinx/Hispanic Youth

Undergraduate - Psychology

Trauma rates among the fast-growing Hispanic/Latinx youth population in the United States is a prevalent health concern and calls for the development of treatments that better serve the needs of this demographic. There has been little effort to address the unique barriers Hispanic/Latinx youth and their families encounter when seeking evidence-based psychological treatments that address trauma exposure. Research on trauma-informed treatments for Hispanic/Latinx youth demonstrate a reduction in trauma-related symptoms but suggest that this demographic would benefit from culturally-informed approaches that address this community's shared values and beliefs. As such, this review examines the current literature on trauma-informed interventions for Hispanic/Latinx youth experiencing post-trauma symptoms and/or Posttraumatic Stress Disorder (PTSD). Additionally, the following review highlights gaps in the current research and discusses the increased need for further investigation on this topic. Five relevant trauma-informed interventions that have been used to treat Hispanic/Latinx youth exposed to various traumatic events were reviewed in order to evaluate the treatment outcomes and overall effectiveness. These interventions include both school-based and community-based trauma-informed treatments. The findings of this review highlight promising intervention modalities that researchers interested in treating Latinx/Hispanic youth with trauma exposure should continue investigating. However, the examined literature also contains various methodological limitations that are addressed. Many of the studies examined were conducted in a community or school setting, suggesting that conducting trauma-informed interventions in these environments may help address the unique barriers this demographic faces in accessing quality mental health care. Additionally, this review provides implications for future research. There has been growing interest in developing trauma-informed treatments for Hispanic/Latinx youth and other ethnic/racial minority and these implications provide clinical guidance when working with minority youth. Implications for future research in this field include providing bilingual, bi-cultural staff to provide trauma-informed treatment, modifying existing trauma-related interventions to add relevant cultural components, designing effectiveness studies that contain significant sample sizes comprised of Hispanic/Latinx youth, and implementing a parental

psychoeducation component of the proposed intervention to better support the youth throughout the course of their treatment. Keywords: trauma, post-traumatic stress disorder, trauma-informed interventions, Latino youth

35. Chang, Amy

Proteomics of the Hippocampus in Niemann Pick Type C

Undergraduate - Biological Sciences - Neuroscience

Intracellular lipid traffic is an essential component of normal cell function. Loss-of-function mutations in NPC cholesterol transporter 1 (NPC1) causes Niemann-Pick Type C disease, characterized by a deficit in intracellular lipid trafficking leading to a lethal accumulation of cholesterol and other fatty acid compounds in the lysosomal compartment. Current work in NPC has mainly been centered around the alterations within the cerebellum, and few studies have been conducted in the hippocampus. While these previous publications have targeted changes in specific proteins or peptides, our discovery-based proteomic study will give a more comprehensive view on alterations in the hippocampus proteome. Thus, in this study, methods of mass spectrometry-based proteomic analysis were utilized to elucidate altered protein biomarkers that may be associated with neurodegeneration in the hippocampus. Three-week old hippocampal tissues of the Balb/c Npc1nih null mouse model were homogenized and lysed. Samples were then digested using S-Trap method followed by liquid chromatography tandem-mass spectrometry (LC-MS/MS) acquisition with an Agilent 1260 LC paired with a Thermo QExactive mass spectrometer using a label-free quantification method to test relative abundance between wild-type and NPC1 deficient samples. Peptide masses were searched against the Mus musculus Uniprot database utilizing Proteome Discoverer 2.2. Preliminary data shows that glycolipid transfer protein (GLTP), a lipid transfer protein involved in intracellular transport of glycosphingolipids and translocation of glucosylceramides is down-regulated in the hippocampal NPC1 tissue ($p<0.05$). In addition, Palmitoyl-protein thioesterase, an enzyme that removes thioester groups during lysosomal degradation is up-regulated in NPC1 tissue ($p<0.05$). Since changes in pathways governed by phosphorylation has been noted in NPC disease, current efforts are focused on analyzing global phosphorylation patterns of proteins in the hippocampus.

Analyzing these patterns will allow us to further assess how this protein is regulated in biological pathways and how it is affected in individuals with NPC.

36. Cortes, Noel

Deficit and Strength Based Models: Impacts on Retention

Undergraduate - Business Administration

As the United States continues to grow in diversity, so does the opportunity gap in higher education. Students of color are graduating at lower rates than their white counterparts.

Because of this educators have used two methodologies to access and build curriculum to help students; Deficit Based Model and Strength Based Model. This capstone will explore current barriers that are causing the current opportunity gap, look at data from UIC and other institutions, evaluate the deficit and strength-based models, and add qualitative experiences in an autoethnographic fashion to create suggested solution.

37. Crauszaz, Camila

The Role of Dried Fruits in Oral Health

Undergraduate - Biochemistry

Dried fruits are good sources of nutrients including fibers, antioxidants, vitamins and many bioactive components that benefit human health. The nutrients or fiber content in dried fruits are more concentrated because water has been removed from the fresh fruit. However, the natural sugars in dried fruits are more concentrated, and excessive consumption may lead to increased calories and sugar intake. Dietary sugars, especially sucrose, are metabolized by dental plaque bacteria in the oral cavity to produce acids which demineralize the tooth surface leading to dental caries. Therefore, it is important to understand how dried fruits affect oral health. Not all dried fruits are damaging to the teeth. For example, dried plums (prunes) contain sorbitol, which is not metabolized by certain oral bacteria to produce acid. Raisins contain antimicrobial chemicals that inhibit growth of disease associated oral bacteria. These may be suggested as “healthier” dried fruit alternatives compared to those without these non-fermentable sugars, such as dried apricots, dried dates or dried banana chips. The objective of this report is to highlight the effect of dried fruits on oral health by assessing their ability to contribute to dental caries

and the demineralization of teeth. The following properties of dried fruit were assessed such as chemical composition, sugar content, and their ability to lower the dental plaque pH. Additional factors assessed will include the amount of dried fruit intake and acid production after their consumption. Ethical issues arise when determining the effect of dried fruits and their sugar content on promoting dental caries. Some studies have shown that dried fruits may not promote more demineralization of teeth when compared to fresh fruit. In addition, although dried fruits are sweet and sticky, their retention rate in the oral cavity have not been linked to statistical significant adverse effects on teeth.

38. Crow, Alexandra

The multiorder control of homeostatic need and motivation

Undergraduate - Neuroscience

Need states, such as thirst and hunger, are powerful drivers of goal-directed behaviors. While prior studies have begun to establish key central nuclei that regulate the detection of need states and the brain regions that drive goal-directed behaviors, the communication between these neurobiological substrates remains unknown. Dr. Roitman's lab has demonstrated that dopamine neurons are important for invigorating goal directed behaviors, and their responses to cues that predict reinforcement are sensitive to need states like thirst and hunger. We then ask the question, can these need state pathways be hijacked? We analyzed three different brain regions, the subfornical organ (SFO), the median preoptic nucleus (MnPO), and the arcuate nucleus of the hypothalamus (ARC), and their pathways to the lateral hypothalamus (LHA) in Cre-dependent rats to first determine whether projections from different brain regions interact with each other in the need state pathways.

39. Cruz, Andrea

21st Century Good Neighbor Program: A Phone-Based Isolation Intervention

Undergraduate - Neuroscience

Background Social isolation affects 17% of adults aged 65 or older in the U.S. Previous research has linked social isolation and loneliness to higher risks of physical and mental conditions such as high blood pressure, heart disease, depression, and cognitive decline.

The COVID-19 pandemic has exacerbated the effects of social isolation on the older adult population. Objective The aims of this study are to reduce social isolation by providing weekly calls to isolated older adult residents in Northwestern Illinois and to demonstrate to healthcare learners the benefits of volunteering and its impact on the community. Method Volunteers are trained, provided a client list, and instructed to make weekly calls to establish a social connection with the older adults. Social isolation is being assessed with the UCLA Loneliness questionnaire at baseline and 9 months later. Benefits such as empathy levels of the volunteers are being assessed with the Davis Interpersonal Reactivity Index prior to making the first calls and at the end of the last calls. Results Currently the program has 222 volunteers who are completing weekly calls with 536 older adults. Prevalence of social isolation among this study population is 19.5%. Both volunteers and older adults have reported satisfaction with the program. 78% of volunteers report a renewed sense of meaning and purpose after completing their calls. UCLA isolation scores for the older adults declined over time as weekly call length increased ($p= 0.046$). Conclusions Our study findings suggest that a phone-based intervention is a feasible and effective tool to combat social isolation among older adults. This study is an important and timely intervention as social isolation is a prevalent problem exacerbated by COVID-19.

40. Cuartero, John Ray

The Development of a Pre-Intervention Resource Guide for a Family Lifestyle Program for African American Children with ADHD and ODD Symptoms Living in Poverty

Undergraduate - Kinesiology and Nutrition

Introduction: When making a family lifestyle program for families with children diagnosed with ADHD/ODD living in high poverty communities, it is important to address the family's most pressing health needs which take precedence. It may be the case that these families need other resources in order to fully benefit from family lifestyle programs. One such family lifestyle program taking place in a large Midwestern city is BUILT: Be Unstoppable In Life Together. In order to maximize the impact of this program, it is proposed that an initial assessment of the urgent need of basic necessities

(housing, food, transportation, employment, etc.) and connecting families to the corresponding resources is essential prior to participation. Methods: The resource guide was developed through an analysis of the basic needs of families living in poverty in the large Midwestern city. The effectiveness of the resource guide was evaluated and further tailored through feedback from key informant focus groups. Feedback was coded and themed, which resulted in addition, subtraction, and substitution of resources on the guide. Results: The resource guide included the following types of resources specific to the participating communities: community needs, health resources, physical resources, financial resources, psychological resources, family resources, and miscellaneous resources. Responses from the key informants were coded and fit into the aforementioned themes. These codes informed item tailoring to the resource guide. Conclusion: The assessment of the resource guide and the resource connection process will be valuable to BUILT and future programs aimed towards underserved populations. It is suggested that in order to gain valuable feedback from the community, an evaluation of the pre-intervention resource guide should also take place. It is planned following the BUILT program that participants answer a questionnaire and answer questions during the post-intervention interview about the usefulness and effectiveness of the resource guide.

41. Debruyn, Sarika

Decentering Whiteness in Medicine

Undergraduate - Philosophy

In order to improve the treatment of marginalized groups, physicians and medical students must reconstruct their approach to medicine by shifting to a narrative approach in treating patients. First, we will examine how current approaches ignore racial groups by centering on whiteness. Then, we will examine how white fragility reinforces whiteness while simultaneously harms marginalized groups within medicine. We will offer an alternative solution to this problem by proposing the narrative approach that recognizes the needs and backgrounds of patients, places importance on patients, does not allow room for ignorance, and forces clinicians to recognize their white fragility.

42. Diakite, Djeneba

Phytoprogestin Effects of Flavonoids in Murine Uterus

Undergraduate - Biological Sciences

Botanical dietary supplements are becoming more popular as they hold numerous health benefits. Herbal supplements are usually a mixture of compounds including phytosteroid-like compounds such as flavonoids. Women take these to alleviate menopausal symptoms and gynecological ailments, for instance, dysmenorrhea, endometriosis and infertility. Flavonoids have been studied extensively for estrogen receptor activity, however, their ability to modulate progesterone receptor (PR) has not been understood. In this study, we investigated the effects of three flavonoids: baicalein, kaempferol and apigenin on PR in the uteri of mice. We treated ovariectomized CD1 mice with either DMSO, 1mg/kg progesterone, 6.25 mg/kg apigenin, 6.25 mg/kg kaempferol, 25 mg/kg baicalein, combination of 1mg/kg progesterone and 25 mg/kg baicalein, and combination of 1mg/kg progesterone and 10 mg/kg RU486 for a week, then we collected and weighted the uteri, mammary glands, and liver for further analysis. Total RNA was extracted from the uteri for RNAseq analysis. The uteri were also processed and embedded for histological assessment. Our RNAseq results suggested that both kaempferol and apigenin had PR agonist activities and kaempferol was a better PR agonist. Baicalein, however, showed PR antagonist activities. We also identified gene sets and pathways that were altered by treatment with these flavonoids. We performed immunohistochemistry on the uterine cross sections against proliferation marker PCNA and PR target genes HAND2, FKBP5 and ZBTB16. Our data indicated all three flavonoids reversed the inhibitory effects of progesterone on proliferation in the endometrial stromal cells. Apigenin and kaempferol treatment increased FKBP5 expression in the uterus. Progesterone increased the expression of PR target HAND2 and ZBTB16, but baicalin was able to inhibit the progesterone induced expression of HAND2 and ZBTB16. In conclusion, we have demonstrated that apigenin and kaempferol have PR agonist activity, and baicalein has PR antagonist activity *in vivo*.

43. Diaz-Ruvalcaba, Ramon

Music and its Effects on Physical Activity

Undergraduate - Biological Sciences

Chronic health issues such as heart disease, cancer, and obesity in part arise as a result of physical inactivity in the lives of Americans. According to the U.S. Department of Health and Human Services more than 80% of adults and teens do not meet the necessary physical activity levels that are needed to maintain a healthy, active lifestyle. The objective of this review is to understand the mechanisms by which music can physiologically and psychologically increase performance in athletes and regular exercisers; and to examine how music can influence the amount of discomfort felt for those who attempt to exercise. Studies pertaining to music use during exercise have shown an increase in tolerance towards physical activity. Using the information recollected on physio-psychological mechanism can help health departments create a plan to take on inactivity. Music can be applied using three approaches, 1) as a tool to influence psychological and affective states, 2) as a distractive device and 3) to entice a physio-rhymical response that leads to synchronized movement with the tempo of the music. The characteristics used to characterize music are rhythm, tempo, harmony, intensity and loudness, factors that influence the mood of someone. Factors considered in the research for the participants are age, gender, music familiarity, music preference, music tempo, physical activity intensity, participant training status and the nature of the physical activity. Results from the literature demonstrate a contrasting point of view on the meaning in the decrease in psychological activity during exercise that are not accompanied by physiological responses.

44. DiVenere, Gaetano

Labeling Theory and School Pushout in Chicago Public Schools

Undergraduate - Criminology, Law, and Justice

I have studied the effects of school pushout in Chicago Public Schools and how this topic correlates to the labeling theory of criminology. Chicago Public Schools have been facing a crisis with students dropping out of school, and this fact is contributing to the negative reputation the city of Chicago has built up over the years. I have observed statistics from a variety of sources and have observed the effects of the different methods that Chicago Public Schools has used to "push" students out of school. School pushout is negatively affecting the city of Chicago through the labeling theory of criminology, as school

pushout tends to label students as being deviant from a very young age. This causes students to feel as if they are bound for a deviant lifestyle, thus achieving this lifestyle. With the ever growing problem of crime in Chicago, addressing this issue is essential for the achievement of a better life for generations to come. Through my research, I have found the school pushout is prevalent in Chicago Public Schools and have discovered numerous ways to combat it. I encourage Chicago Public Schools and researchers to address these issues, as the city of Chicago has so much potential to be a safe place for future generations. Nobody deserves to be labeled a criminal from a young age, as everybody has potential.

45. Duncan, Jason

The Effect of Stimulating 5-HT1A Receptors on Behavioral Flexibility in Shank3 Mice

Undergraduate - Biological Sciences

Several cases of autism spectrum disorder (ASD) have been linked to mutations in the SHANK3 gene. Haploinsufficiency of the SHANK3 gene contributes to Phelan-McDermid syndrome, which often presents as ASD along with moderate to severe intellectual disability. A SHANK3 gene deletion in mice results in elevated excitation of cortical pyramidal neurons that alters signaling to other brain areas. Serotonin 1A receptors (5HT1ARs) are highly expressed on layer 2 cortical neurons and are known to have inhibitory actions. 5HT1AR agonist treatment in autistic cases with SHANK3 mutations and possibly other cases may restore excitatory and inhibitory balance that attenuates core behavioral symptoms. Findings from previous studies have suggested that the acute and subchronic treatment of tandospirone in SHANK3 mice has attenuated this excitatory/inhibitory imbalance, reducing repetitive behaviors and cognitive impairments on certain behavioral tasks. In this study, a series of experiments examined the effects of tandospirone treatment on mouse subjects' performance on prepotent response inhibition tests, as well as reversal learning. Some studies have shown that autistic individuals exhibit an innate bias toward certain behaviors in certain contexts, leading to a decreased capability for inhibitory control. The prepotent response test was done to examine whether or not tandospirone treatment alleviates this bias and increases inhibitory control

in SHANK3 mice. The reversal learning task was also performed because the effects of tandospirone on reversal learning have yet to be examined; this task was done by measuring how many trials it takes for a mouse to unlearn a task that it had previously learned. Both of these tasks measure behavioral flexibility, which is one of the neurological impairments associated with many autistic individuals. The findings of this study may suggest that tandospirone could be effective at treating some symptoms of ASD or other disorders that are associated with SHANK3 mutations.

46. Ebrahim, Lena

The Impact of Representative Literature within the Classroom

Undergraduate - Education

Representative literature plays an important role in students' education, particularly students who identify as black, indigenous and people of color (BIPOC). This presentation will discuss the positive impacts representative literature has on students' education where BIPOC make up the majority of student demographic and improvements that have been identified because of the inclusion of representative literature. Research was conducted from a variety of peer reviewed articles, interviews and videos. With this research we can see how representative literature has influenced students and built their self-esteem by communicating lessons of the value of race, gender, ability, and identity. Findings from this study can encourage the inclusion of representative literature traditionally through English Language Arts and literature across the curriculum such as math, science and social studies to help further improve the education of BIPOC students.

47. El Sabbagh, Asma and Ali, Farah

Student Self-Efficacy in Calculus Classes

Undergraduate - Neuroscience

Student self-efficacy directly impacts their engagement and achievement in mathematical educational settings. Active learning, in terms of pedagogical theory, design and implementation has been shown to correlate with students' deeper learning of material. Such a desired shift from rote learning is one of the goals of modern learning environments. To measure our success in attaining this modern learning goal, this project

examines the correlation between student confidence and performance in different classroom environments through the administration and analysis of student surveys. Universities, colleges, and schools have responded to the onset of the COVID-19 pandemic with distance learning. The new virtual learning environment which UIC implemented during the Spring 2020 semester was developed in haste—and learners may have faced challenges as a result. In the Fall of 2020, faculty followed a more structured approach by developing student-friendly online instructional practices aimed at improving student experiences in the virtual classroom. For example, Calculus classes at UIC are now all being taught in virtual learning environments, and we are investigating the impact of this on mathematical learning. Thus, we expanded our pre-pandemic interests into the exploration of student self-efficacy in the online learning environment. We are investigating the effects of this new learning platform on student confidence in calculus classes. The analysis presented in this project compares survey results obtained by our research team in the Fall of 2019, when students took classes in person, and the Fall of 2020, when classes were online. Overall, we found that from Fall 2019 to Fall 2020, there was a difference in students' self-reported confidence that varied by class, ethnicity, gender and other demographics. Here, we compare the results that arose in student self-efficacy by class level, student demographics, and professor demographics to highlight any striking differences in student self-efficacy.

48. Ellis, Hannah

The Impact of American Culture on French Understanding of their Legal System

Undergraduate - French and Francophone Studies

In her article “Lawyers and Courts in French popular culture”, Barbara Villez asserts, without much supporting evidence, that French people hold an Americanized understanding of their legal system. She states that French people have incorrectly addressed judges as “votre honneur”, a direct translation for “your honor” and have attempted to “plead the fifth” in court. These statements inspired me to look further into the relationship between the French public and their understanding of the French legal system. The following question guided my research: What is the impact on the French public and their understanding of justice when the their legal system is replaced by an

Americanized version? By posing this question, I seek to examine the role of television and filming laws in shaping the average French person's perception of the French legal system. I analyzed existing research and governmental reports, such as the Linden Commission, to understand the history of courtroom filming laws and the television watching habits of French people. Then, I watched legal-based documentaries and fictional series to see how the legal profession is portrayed in media. Additionally, I surveyed 121 French people on their television habits and their understanding of their own legal system. The results insinuate that French people do not know the set-up of a French courtroom, but otherwise know generally the basics of their legal system. Furthermore, the survey results suggest that French people are not necessarily interested in watching television series surrounding the legal world. However, both the survey and the background research indicate that American television shows are better received in French audiences than shows originating from France. Thus, French people are not as ignorant of their legal system as originally suspected.

49. Elsayed, Nadeen

Interest Groups: For The People Or For Themselves?

Undergraduate - Political Science

The paper first analyzed whether Planned Parenthood does more for itself as an organization in acquiring resources to provide health services and protect women in championing "bodily autonomy" than it does in helping to expand such services overall throughout the nation. I do this through an examination of the budget for Title X of the Public Health Service Act since the Nixon administration. In response to concerns that an assault on legalized abortion might presage an erosion of financial support for other family planning services, to protect and promote its ends, Planned Parenthood created an institutional vehicle to champion the election of sympathetic candidates to office. This electoral advocacy work is assessed in light of similar actions championed by Planned Parenthood's chief opponent driving the attack on legalized abortion, the Susan B. Anthony List. Empirical evidence on independent expenditures, spending targets, and the overall budget for family planning services over the last two and a half decades are appraised.

50. Escobar, Louie

A Computational Analysis of Medieval Monastic Rules

Undergraduate - History

While all monastic rules address similar themes, their individual differences may lead to patterns of institutional property acquisition and alleged corruption. In order to identify the fundamental differentiating elements of three early monastic rules, this research deconstructed each into its constituent parts, then performed a non-hierarchical analysis based on the categories into which the constituent elements fell and overlap of individual admonitions within each document. As the first millennium drew to a close and Viking raids turned to settlement, monastic institutions blossomed again, but not without considerable conflict. The waves of reform which led to the establishment of important houses such as Cluny, the Cistercians, and the Carthusians each based their legitimacy on claims of superior piety. Patterns of corruption arose within these often ill-fated reform groups which suggest that aspects of sometimes shared monastic constitutions may have enabled wealth accumulating which over time undermined pious, reformative intentions, making fertile ground for future reform activities. This paper seeks to determine degrees of materialism and what shared or unique aspects of three early monastic rules may have resulted in these tendencies. By constructing a rigorous, if simple, initial phylogenetic analysis, this research lays the foundation for later studies to analyze change over time and causal factors in institutional trajectories.

51. Ford, Anna

Preventing Detrimental Stress Responses in Students with Adverse Childhood Experiences using Afterschool Programs

Undergraduate - Biological Sciences

Children living in urban areas with concentrated poverty are at a higher risk for adverse childhood experiences (ACEs) when compared to more affluent areas. The stress response to these experiences can interfere with normal body processes during a critical time for brain development. In particular, excessive glucocorticoids can change dendritic branching patterns and the distribution of gray matter in the hippocampus, amygdala, and

prefrontal cortex in stressed individuals. The physiological response to traumatic stressors can also detrimentally affect physical and mental wellness in ways that constrict social mobility. This project examines stressors experienced by adolescents in urban areas and how afterschool programs could be directed to mitigate the resulting detrimental effects on childhood development. These programs could consider implementing a growth mindset approach to learning and a restorative justice approach to conflict resolution. Furthermore, afterschool programs can build resilience factors among their participants by encouraging mentorships, friendships, and extracurricular activities. These factors could help reduce allostatic load in an affected child to a point where a potentially toxic stress event is transformed into a tolerable or positive stress event. Positive stress occurs when a challenging situation is dealt with effectively and can promote lifelong resilience in the affected child. Ideally, this resilience could contribute to academic success and overall wellness.

52. Fowler, Drew

A Comparative Study of US Presidential Impeachment Trial Procedures

Undergraduate - Political Science

Presidential impeachment is becoming more common in the modern United States, with the impeachment of President Clinton and the two impeachments of President Trump. The processes and procedures for which the Senate goes through are vital to the end product of impeachment. While these impeachment trials are easily labeled entirely political procedures, this is not the case. The framers intended these Senate impeachment proceedings to be fair judicial proceedings, by nature of specifying that the Senate is tasked with holding a trial. These impeachment trials are political proceedings, but they must be analyzed in comparison to other United States judicial trials. The following is a description of a comparative analysis of United States presidential impeachment trial procedures across the four presidential impeachment trials that have taken place. A codebook was created to analyze three impeachment trial aspects and compare the fairness of overall impeachment trial procedures compared to common United States judicial trials. This codebook was then used to analyze the fairness of the four

presidential impeachment trial proceedings, and these results were comparatively analyzed.

53. Gabela, Armin

Gender-Affirming Vaginoplasty: A Patient Perspective on Informational Needs

Undergraduate - Neuroscience

Gender-affirming vaginoplasty lacks universally-adopted guidelines for perioperative management. The Standards of Care developed by the World Professional Association for Transgender Health recommend surgeons provide an extensive consultation with the patient; explaining the surgery itself as well as informing the patient on pre- and post-operative expectations. With the copious amount of information to know about this process, patients may also turn to friends, support groups, the internet, etc. to find the details for themselves. We believe it would be useful to develop an inclusive guidebook outlining the entire vaginoplasty journey. With this study, we sought to determine what information patients seek throughout their process of gender-affirming vaginoplasty. This study consisted of a survey emailed to 30 patients who underwent gender-affirming vaginoplasty between September 2018 and September 2020. Patients were also asked from whom and how did they receive information regarding perioperative considerations and where they would have preferred to get it from. All topics received an average rating of moderately important or higher (≥ 3 out of 5 Likert scales). The topics which got the lowest scores were Fertility Preservation (mean 3.4) and Preventative Cancer Screening (mean 3.7). Of the 30 pre-operative topics queried, participants preferred to receive information in written form for 29 of them (97%), and from the surgeon (rather than other health care providers, friends, or the internet) for 27 topics (90%). A document outlining the expected five-day hospital course and one with post-discharge instructions were rated as very or extremely helpful by 85% and 77% of participants, respectively. Individuals undergoing gender-affirming vaginoplasty have extensive informational needs and these are likely best addressed with written resources rather than a verbal discussion with the patient. Amongst various health care providers who are involved in their transition, patients prefer being informed by their surgeons regarding most preoperative considerations.

54. Gandhi, Krinal

Could differences in schizotypy self-report in Hispanic and Asian identifying groups reflect their cultural context?

Undergraduate - Biological Sciences - Neuroscience

Cultural norms can influence one's beliefs, behaviors, and interpretation of behavior, including psychological disorders. Therefore, it is important to study whether individuals from various cultures differ in response to, the US-developed, schizotypy scales and whether cultural values, beliefs, and interpretation of behaviors play a role in these response differences. Several studies have focused on understanding the response to various schizotypy scales in a cultural context. However, there has been inconsistent evidence of the cultural context in response differences. The purpose of this study was to identify any differences in schizotypy scores between Hispanic and Asian groups. If there will be a difference between Hispanic and Asian groups, then it will be reasonable to say that differences in schizotypy self-report could be due to their cultural differences. I hypothesize that there will be a significant difference between schizotypy scores between Asians and Hispanics because of differences in their cultural norms. The current study included 83 participants consisting of Asians (30.12%) and Hispanics (39.76%).

Schizotypy was measured using the self-reported Schizotypal Personality Questionnaire-Brief Revised (SPQ-BR). The SPQ-BR four-factor models (positive, negative, disorganized, and social anxiety) was used. Another method used to examine schizotypy was the Inventory of Psychotic-Like Anomalous Self-Experiences (IPASE) questionnaire which consists of five domains (consciousness, cognition, self-awareness, somatization, and demarcation). Independent two-sample t-tests were performed on both SPQ-BR and IPASE scores to identify any statistically significant difference between Hispanic and Asian groups. Thus far, the result shows that we will find a statistically significant difference between the Asian and Hispanic groups on the IPASE cognition domain. This study can inform us on how cultures can vary in endorsing experiences that can influence the response to schizotypy scales. Future studies can focus on other cultural groups to continue to identify how cultural factors play a role in response differences to schizotypy scales.

55. Gao, Johnny

The Impact of Structural Violence on HPV in the Chicagoland Area

Undergraduate - Neuroscience

It is now commonly accepted that there is a strong connection between socioeconomic circumstance and health. Between recent advances in the fields of epidemiology and epigenetics, one of the rising theories in healthcare is the idea that where and how you live can have far-reaching and lasting consequence on your wellbeing. Our team aims to quantify and map this specific relationship in the Chicagoland area. We are taking data from 13,000 UI Health patients in an attempt to map the spread of HPV -- a "model illness," in that it spreads in predictable ways -- in relation to census tracts.

56. Garcia, Citlalli

Child Neglect: Description, Outcomes, Laws, & Prevention

Undergraduate - Psychology

I will make a PowerPoint presentation of my capstone project, which is a comprehensive literature review analyzing various aspects of child neglect in the U.S. Child neglect is the omission of caretaking for or supervision of a child who requires it for healthy development (Mennen et al., 2010). Official estimates suggest that neglect accounts for 78% of all 686,000 known maltreatment cases per year, but this is probably an underestimate. Children are dying, and neglect is an important humanitarian issue that needs to be researched. In my presentation, I will rely on information from multiple studies of child neglect in the psychological literature. I will first discuss US legislation that has defined neglect and created ways to deal with neglect legally. Then I will review literature on the three main types of neglect: emotional, physical, and medical. Emotional neglect relates to the omission of emotional connection between a caretaker and his or her child (Wark et al., 2003). Physical neglect is when the basic necessities that a child needs are not provided for by the caretaker. Medical neglect relates to when children are considered at risk due to the lack of medical attention given by the caretaker. All have harmful outcomes that can range to death. In the talk, for each type of neglect, I will discuss definition and measurement, prevalence, short- and long-term outcomes, and

treatment options. I will also discuss forms of prevention for the three types of neglect. I will conclude by discussing the fact that although there have been growing amounts of research on these types of child neglect, there is a lack of research for other types of child neglect, such as educational neglect.

57. Geary, John

Arginine Catabolism in *Acinetobacter baumannii*

Undergraduate - Biochemistry

Acinetobacter baumannii is a gram-negative coccobacillus bacterium that is a common cause of hospital-acquired infections. *A. baumannii* poses an urgent public health threat worldwide due to its widespread, extensive multidrug resistance. This has led to in-depth analyses of the *A. baumannii* genome so as to determine which factors lead to its virulence and drug resistance. Arginine is an amino acid that can serve as a sole source of carbon or nitrogen for *A. baumannii* based on the relative concentrations available to the bacterium. Previous data have suggested that *A. baumannii* uses arginine as a nutrient source during infection. Within the *A. baumannii* genome, there are two known operons that encode for arginine catabolism. The objective of this project is to gain a better understanding of how *A. baumannii* regulates arginine catabolism.

58. George, Diann

The Use of Extracellular Vesicles in the Delivery of Galactosylceramidase in Twitcher Mice

Undergraduate - Biological Sciences

Extracellular vesicles (EVs), cellular secretions consisting of exosomes and microvesicles, facilitate intercellular communication. There is high interest in understanding the physiological and pathological functions of EVs for use in clinical settings. We hypothesize that EVs have the potential to be used as therapeutic vehicles to deliver lysosomal enzymes into deficient cells. Specifically delivering galactosylceramidase (GALC) into GALC deficient cells, such as those of the Twitcher mice model for the human globoid cell leukodystrophy called the Krabbe disease. This devastating neurodegenerative disease results in neuronal and myelin dysfunction and

stems from the accumulation of toxic lipid psychosine and the abnormal metabolism of galactosyl-sphingolipids due to insufficient GALT activity. EVs from a HELA cell line that had previously been modified to overexpress GALT with an HA epitope were prepared. Immunocytochemistry, western blots and a GALT enzymatic assay allowed for characterization of the presence of GALT in cells and EVs. Twitcher mouse primary glial cultures (MPC) were then treated with isolated EVs for 7 days and GALT activity and psychosine were measured. Results confirmed that EVs isolated from HELA cells successfully overexpressed GALT. EV treatment of Twitcher MPCs showed GALT activity with a decrease in psychosine levels. Interestingly, TWI MPCs treated with equivalent EVs-GALT added in 1, 2 or 4 pulses showed equivalent GALT activity after 7 days of culture. Moreover, GALT activity persists but is significantly lower 14 days after treatment. Western blot analysis of astrocytic and microglial markers, GFAP and IBA1, showed no significant changes after the addition of EVs on the cultures. Thus, our study provides insight into the therapeutic potential utilizing EVs *in vitro* for GALT delivery. Further investigation is needed in order to determine the effects of GALT vesicular delivery *in vivo* as an early treatment to provide enzyme early in life to avoid neurological dysfunction.

59. [Gerace, Gina](#)

The Great Escape

Undergraduate - Computer Science

The purpose of this capstone project is to explore video game development at the intersection of art and computer science. In the game, the player is a toy car that is trapped inside of a house. The objective is for the player to escape the house and reach the outside world. The unique aspect of the game is that the player must navigate through the house as a toy that is much smaller than all of the surrounding objects, which puts a fun twist on the usual driving video games.

The game begins in a kid's room, where the player must figure out how to get the door open in order to reach the next level. Once successful, the player finds themselves in a hallway where they must creatively find a way to make it down the stairs. Finally, the player must explore the foyer for objects that can allow them to get outside and escape

the house once and for all.

The goal of this project is to give the player a fun experience that challenges them at times, but is not difficult to the point of frustration. The player should take advantage of the fully fleshed out environment to explore the video game world and take in the thoughtful design put into each level.

60. Ghalyoun, Hanna

Racial and Ethnic Differences in Interpersonal Trauma Exposure Among Young Adults

Undergraduate - Psychology

Racial and ethnic differences in trauma exposure and posttraumatic stress disorder (PTSD) are understudied. Of the available research, there is evidence to suggest that Whites may be more likely to experience any trauma, but African Americans/Blacks may be at higher risk for PTSD after trauma exposure. There is a need for greater understanding of how type of traumatic event exposure may vary across different racial and ethnic groups. A secondary data analysis of 217 young adults with a history of trauma exposure was conducted using a 1) Chi-Square Test of Independence to examine associations between racial and ethnic groups, types of interpersonal trauma, and PTSD diagnosis and a 2) One-Way ANOVA to examine differences in number of traumas across racial groups. Results indicated that there were significant associations between race and physical assault by a stranger ($\chi^2 (4) = 11.056$, $p = .026$), and race and witnessing family violence growing up ($\chi^2 (4) = 17.568$, $p < .001$), with African American/Black participants more likely to experience these events than White participants. There were significant associations between ethnicity and armed robbery ($\chi^2 (1) = 4.796$, $p = .029$) and ethnicity and physical assault by a stranger ($\chi^2 (1) = 4.166$, $p = .041$), with Hispanic participants more likely to experience these events than non-Hispanic participants. The mean number of traumatic events differed by race ($F(4,213) = 5.865$, $p = .001$) with African American/Black participants experiencing a higher number of mean traumas compared to Asian, Caucasian/White, and Multiracial participants. There were no significant associations between PTSD diagnostic status and race or ethnicity. This study provides evidence that traumatic event exposure, and type of trauma experienced, may vary by race and ethnicity, underscoring the importance of the

need for culturally sensitive and effective treatment models for different racial/ethnic groups.

61. Godana, Keneni

Exploring Trends in Racial and Ethnic Diversity in the Geosciences at UIC

Undergraduate - Earth and Environmental Sciences

Studies have shown that degrees in STEM fields such as Biology and Chemistry have been increasing while degrees in the Geosciences have been remaining flat (National Science Board 2010). As a result, racial diversity in the geosciences has also stagnated and seen declines for certain minority groups. In 2019, underrepresented minorities (URM) earned only 15.7% of Bachelor's degrees, while URM groups made up 33.7% of the US population (AGI Geoscience Current 2020). This study explores the trends at UIC concerning undergraduate diversity and enrollment in the geosciences. We first investigated past undergraduate enrollment data to identify trends within the following majors: Biology, Chemistry, Earth and Environmental Sciences (EaES), Physics, Mathematics, and Computer Science. To explore racial diversity within these majors, we referred to the National Science Foundation's definition of URM as Black/African American, Hispanic/Latino, and American Indian and Alaskan Native (AIAN). We recognize that Asians and international students also add to diversity, but for our study they are not included as URM. We found that underrepresented minorities in several STEM majors grew to at least 30% over the past fifteen years, 2005-2020. In general, the Hispanic/Latino population has been steadily growing while the remaining URM groups (Black and AIAN) have not. More specifically in the geoscience discipline, the EaES department had one of the highest percentages of URM out of the STEM majors. Within EaES, the Hispanic/Latinopulation grew from a 5-year average of ~12%(2006-2010)to ~36%(2016-2020), but the 5-year average of Black and AIAN students remained stagnant, respectively ~5% and ~0.5%. While significant progress towards diversity has been made nationwide across geoscience departments and within EaES, the geosciences should focus efforts on attracting students from Black and AIAN identities in order to better represent the U.S. population and provide education for all URM groups.

62. Gonzalez, Elena

Can HelloFresh Address Key Barriers of Food Insecurity? Assessing Desirability of Meal Kit Delivery Services in Low-Income Consumers.

Undergraduate - Kinesiology and Nutrition

Low-income populations in the U.S. show the highest rates of food insecurity while concurrently facing chronic stressors. Socioecological barriers have a direct effect on the diet quality of low-income Americans, which results in high levels of perceived stress and chronic disease. The purpose of this project is to examine how the barriers of food insecurity can be addressed by popular meal kit delivery services like Hello Fresh and Blue Apron. With a review of literature and primary data collection with consumers underway, it is suggested that meal kits may be associated with a reduction in perceived stress and improved confidence in preparing healthy meals at home. In addition, I consider whether low-income consumers would be more willing to use meal kits if they could purchase them with SNAP benefits. Both policy makers and the meal kit delivery industry can take these measures into consideration to develop innovative solutions to combatting food insecurity in the U.S.

63. Gould, Jeremy

Hindsight 2020

Undergraduate - Architecture

2020 brought new urgency to our general health, as well as a new emphasis on engaging, healthy interiors while more of our lives move into our homes. Temporary architectures have sprung up to protect our bodies from the virus in public places and protect our ever-vulnerable, minds while they're confined. Cases of "sick building syndrome" in homes become more apparent as residents confine themselves indoors. Temporary solutions are sometimes "anti-architecture," pushing inside activities outside. People leak out onto the street, hospitals fill, and many are left at home without work or with a lot of time to themselves. At the end of X-Ray Architecture, Beatriz Colomina brings in the writings and philosophies of Byung Chul Han. Her wide investigation of the maladies that transformed architecture of the last hundred years or so suggests that the signature affliction on the 21st century might involve neurological disorders and the closely related

“sick building syndrome.” Today it seems our afflictions are more apparent than ever. We are asked to face ourselves, our families, our habits, our beliefs, and our environments as individuals. Architecture often serves as a mediator to these relationships. This project reimagines vast, empty urban interiors as architectural cushions that try to mold to us, however we fall—empathetic envelopes for the various speeds and scales at which crisis affects the individual. Through my research, I’ve created a timeline which contextualizes key influences and advancements in architectural history, situating the architecture in the societal conditions of its time. By uprooting patterns and methodologies architects deployed in response to crisis, underutilized urban interiors can be reimagined and transformed into these “empathetic envelopes.” The project concludes in a series of drawings and animations which attempt to illustrate the quality of these reimagined interiors.

64. Griffith, Tara

The Epidemic of Type 1 Diabetes: School Lunches

Undergraduate - Biochemistry

Type 1 diabetes is an autoimmune disease where the pancreas is no longer capable of producing insulin, a hormone necessary to break down glucose in the body. Today, about 200,000 youths in the United States have type 1 diabetes and that number is expected to triple in the next thirty years. Studies are finding that the onset of type 1 diabetes may not be entirely related to genetics, but that environmental factors such as the intake of cow’s milk, gluten, or added nitrates may have a greater effect. This paper will analyze the possible relationship between eating school lunches (which are known to be high in cow’s milk, gluten and nitrates) and the onset of type 1 diabetes. Comparisons were made between type 1 diabetics and non-diabetics (control group) and how often each group consumed school lunches, whether or not they received school lunch for free, and their satisfactory ratings of the school lunches. The trend of onset of type 1 diabetes per decade will also be compared to the rate of students receiving aid through the National Student Lunch Program per decade. The relationship between the type 1 diabetic group and non-diabetic group showed no significant difference but when the results of the type 1 diabetic group (diagnosed ages 6-18) were compared to the type 1 diabetic group below

age range (diagnosed before age 6) the results showed a significant difference that supported the hypothesis. The trend comparison between the number of type 1 diabetics per decade of diagnosis and the number of students receiving aid through the National Student Lunch Program per decade were similar which also supported the hypothesis. The results of this study are inconclusive, and it is concluded that a more regulated study with a larger research group must be done to get a clearer understanding of whether the increase in consumption of school lunches has had a direct negative impact on the increase in onset of type 1 diabetes.

65. Gupta, Sonya

Mobile Health Clinics in Chicago: Reaching the “Unreachable” in Medical Deserts to Decrease Infectious and Chronic Disease Prevalence

Undergraduate - Biology and Russian

The COVID-19 pandemic has exacerbated medical deserts and barriers to healthcare in the Chicagoland area. As the U.S. healthcare system evolves, one method for increasing access to health services in medical deserts is the use of mobile healthcare delivery models. These models can be implemented through mobile health clinics, which are vehicles that travel to communities to provide healthcare services, overcoming barriers such as trust, money, and time. In the changing environment of healthcare access in Chicago, mobile health clinics can address the primary care needs of patients and reach underserved areas. Currently, most of Chicago’s mobile public health clinics are specialized, such as asthma-focused clinics, or are used for transport. We hypothesized that Chicago could benefit from the implementation of primary care mobile health clinics to reach medically underserved populations. We set out to determine which areas were in need and how mobile health clinics could alleviate barriers in those areas. We conducted a thorough literature review of mobile health clinics in other cities nationally and globally. Then, we used ArcGIS Pro to map health indicators in the Chicagoland area and find communities with high chronic disease prevalence but little health infrastructure, which we termed “medical deserts.” We constructed a database with locations of current and potential mobile health clinics, building off the Mobile Health Map and Cook County resources as well as up-to-date information. Our results demonstrate that mobile health

clinics can potentially help underserved communities in the healthcare system. In Chicago, these areas typically are high in poverty and composed of mostly ethnic and racial minorities. Furthermore, these clinics have the potential to play a vital role in providing low-cost care and reaching overlooked populations. Through mobile health clinics, the Chicagoland health infrastructure can increase their accountability, practice preventative medicine, and expand access to their services.

66. Gutierrez, Ulyces

Finding the Binding Site of Riboflavin within Vibrio Cholera's Na+ NQR Pump

Undergraduate - Neuroscience

Vibrio Cholera is a gram-negative comma shaped bacterium that is usually spread through feces and contaminated water. Like any organism, it comes in different varieties. In this study, the focus is on Vibrio Cholera NQR, a version of the bacterium that utilizes a Na⁺ NQR pump to maintain homeostasis within its membrane. Previous experiments have proved that the Na⁺ NQR pump was not only essential for keeping the bacterium alive since it's involved with the bacterium's cellular functions, homeostatic conditions and energy production, but it was also responsible for creating the cholera toxin released by the bacterium that causes the symptoms of diarrhea within the infected person. Due to the importance of this pump, it became the site of interest within the bacterium. Previous experiments performed at Juarez Labs in IIT (Illinois Institute of Technology), which involved using different enzymatic inhibitors on different strains of bacteria, showed results that inhibitors like Thioridazine and Clofazimine worked best against Vibrio Cholera NQR. It's believed that inhibitors like these interrupt the bacterium's pumps, like Na⁺ NQR, and thus killing the bacteria. The next step was figuring out where to get the inhibitors to bind on the bacterium, which is where Riboflavin comes into play.

Riboflavin, also known as vitamin B-12, is a cofactor of the whole Na⁺ NQR gradient, meaning that if the inhibitor is able to bind where Riboflavin binds, it would cause the whole pump to collapse, killing the bacterium. Although drug screening and the look for the effective inhibitor won't be carried out for this study, finding the binding site of Riboflavin in the Na⁺ NQR pump is the final objective. Through a variety of tests and

experiments, the binding site of Riboflavin has been narrowed down to three possible spots in the bacterium.

67. Habib, Safa

Dangers of the Hidden Curriculum and the Need for Reform: Sexism in Medical Education

Undergraduate - Integrated Health Studies

Physician suicide rate is a growing concern in the public health field. Despite working to improve the health of others, physicians end up sacrificing their own well-being to do so. There are numerous factors that can contribute to why suicide rates among physicians are high in comparison to other professions. However, this article will discuss the relevance of hidden curriculum engrained in medical curricula as one of the strongest factors. Furthermore, this literature piece will analyze specifically the topic of sexism within the hidden curriculum, which could ultimately explain higher suicide rate among female physicians in comparison to their male counterparts. Once the flaws of the hidden curricula has been examined, this study will aim to analyze the measures that medical schools have taken to combat the negative consequences produced through their implicit academia. To gain validity in these claims, multiple literature pieces were selected through an outlined criteria, looking at the relevance of the article, place of origin, language, and published date. The selected articles were then analyzed for vital information. It can be concluded that although the presence of hidden curricula may not be a direct factor in the heightened physician suicide rate, it prompts stressors within medical students which may contribute to their actions. Although many medical schools have taken initiative to combat the negative impact of hidden curriculum, their actions have not fully rid the consequences. Hidden curriculum continues to be a growing issue in medical studies and without serious reform will ultimately lead to greater harm to the future physician population.

68. Haider, Fatima

How do race and ethnicity influence threat sensitivity during the perinatal period?

Undergraduate - Biological Sciences

The research focuses on perinatal women and investigates factors that are contributing to their perinatal depression and anxiety. Perinatal mental health and postpartum depression are big concerns and affect both the lives of the mother and the baby. The main independent variable that will be focused on are race and ethnicity, but other variables will also be targeted, such as income, education, relationship status, and federal aid. The research focuses on a wide multiracial scale and recruits' women who have a gestation period of 16 weeks or less. For our data, we looked into BIS BAS and IUS survey responses and compared them with all the independent variables such as race and ethnicity in order to find the outcome of the research. The results found in the study may aid future research as well, which can focus on specific racial background in women and how it has an impact on perinatal mental health.

69. Hasnain, Yasir

Manipulation of Purines in Human Plasma and Tissue Culture Media Impacts Effectiveness of Chemotherapies

Undergraduate - Biological Sciences

Most tissue culture media used in lab experiments contain artificial levels of nutrients that do not accurately reflect human plasma. New media, such as HPLM (human plasma-like medium), are being produced that are closer in comparison to human plasma, and therefore offer the opportunity to analyze the effects of drugs or other treatments on cancer cell lines more accurately. To determine the effect that non-physiological tissue culture media has on cancer therapeutics, we screened the sensitivity of nearly 600 anti-cancer compounds in traditional tissue culture media (RPMI) and compared it to HPLM. Among many changes, we found that anti-purine chemotherapy drugs are less effective in HPLM than in the usual tissue culture media such as RPMI. This suggests that HPLM contains some components that allow for cancer cells to overcome the drugs that block purine biosynthesis. Hypoxanthine is a purine found in the human body and HPLM and is a substrate for a salvage pathway of purine biosynthesis that may be responsible for the recovery of cells when inhibited by an anti-purine drug. A double-dose curve experiment was performed measuring breast cancer cell number after treatment with 6-mercaptopurine (6-MP), an anti-purine drug, and increasing concentrations of

hypoxanthine on cells growing in RPMI. The results showed that hypoxanthine alone was sufficient to rescue the breast cancer cells from 6-MP, and can explain the lower sensitivity to anti-purine drugs in physiological media like HPLM. One possible outcome of these experiments is the potential to try to lower hypoxanthine levels in the body by consuming a low-purine diet, which might increase the sensitivity of cancer cells to anti-purine compounds like 6-MP. A thorough literature review assesses the possibility of success in using low-purine diets to mimic RPMI in human plasma, as well as possible side effects and further applications.

70. Hassan, Maheen

THE MOONLIGHTING PROPERTIES OF MALATE DEHYDROGENASE

Undergraduate - Integrated Health Studies

Malate Dehydrogenase-2 is a protein that is present in the human Mitochondrial matrix. This protein is known to have catalytic functions that convert malate to oxaloacetate, however, this may not be the only function of this protein. MDH2 falls into a category of Moonlighting Proteins that are known to express multiple functions. For Malate Dehydrogenase, that function can be the binding of RNA. In order to learn more about the multiple functions of this moonlighting protein and its possibilities, it is beneficial to observe the RNA binding capabilities of similar proteins in other species. This project aims to collect data about the RNA binding capabilities of Malate Dehydrogenases found in various species to better understand the importance of the function in the human body. This data will be collected and analyzed by conducting searches on RBP2Go, a pan-species database specifically for RNA binding proteins, such as MDH2. This research aims to broaden our understanding of RNA binding and Moonlighting proteins that contribute to very important cellular processes in humans and other species.

71. Hassanein, Hussein

Comparison in the detection of SARS-CoV-2 using RT-PCR and RT-LAMP PCR

Undergraduate - Biochemistry

PCR (Polymerase Chain Reaction) has always been a method that is used in most genetics and biochemistry operations in modern day. Invented by Mullis in 1983 after his

discovery of microorganisms that live in superheated environments and their enzymes could operate under those extreme conditions. The enzymes were then used in PCR to amplify genetic material which was then used in multiple modern scientific applications. The corona virus has affected millions of lives around the world in the beginning of 2020 and the only method to diagnose the virus was using the PCR which amplified the genetic material in saliva or nasal swab which would then diagnose if the patient is positive or not. One of the problems that the world faced at the beginning of the pandemic was the fact that the test was slow and not many samples could be run at the same time. The type of PCR that was referred to as slow was the RT-PCR (Reverse Transcriptase Polymerase Chain Reaction) which uses an enzyme that turns single stranded RNA into DNA. The RT-PCR was the gold standard of testing in 2020. But at the end of that year when testing was being overwhelmed a new method of PCR was used to diagnose patients for the virus. The new method was called RT-LAMP PCR and this method was more than three times as fast as the normal RT-PCR and many samples should be run at the same time. The specificity and sensitivity of the RT-LAMP was hypothesized to be lower than that of the RT-PCR but not much studies have been done to prove this hypothesis. The purpose of this research is to be able to compare using samples that were diagnosed in the lab whether RT-LAMP PCR or RT-PCR is more sensitive, specific and efficient.

72. Herr, Victoria

A Journey to Becoming a Math Teacher

Undergraduate - Education

This capstone project follows in the tradition of researchers studying the development of teachers' professional identity. Very few accounts focus on preservice teachers reflecting on their experiences across their university experiences. Personal accounts of pre-service teachers can help future pre-service teachers and others to gain a better perspective on this very early stage of professional teacher identity. Therefore, this first-person retrospective account analyzes my experiences in the teacher education program here at UIC and City Colleges of Chicago observations. In particular, I reflected back on each of my seven field experiences where I served as first an observer in some and slowly took a more active role in the classroom alongside the mentor teachers in others. In each

experience, I honed in on a single significant teaching moment or lesson that resonated with me and have been instrumental in shaping my commitments, my pedagogy, my beliefs, my goals for teaching as well my hopes, fears about the next phase of my professional development. Some major themes that emerged through these reflections were: the toll of emotional labor on educators in the classroom, potentially damaging school safety practices, poor and effective classroom management practices, the need for diverse instruction for diverse learners, and the benefits of a safe and supportive culture established in the classroom environment. While I witnessed similar themes in different classrooms across Chicago, each teacher and school is truly unique along with how the environment is established and pedagogy instructed in each classroom. Preservice teaching is truly distinctive to preservice teachers due to these aspects coinciding with how much hands-on experience mentor teachers allow and encourage. Regardless of the positive and negative aspects observed, every moment in preservice teaching is a moment we learn from, grow from, and religiously reflect on to perfect our own pedagogy.

73. Hester, Breonna

Racial Disparity in Maternal Health

Undergraduate - Nursing

My presentation is on the effects of racial inequality on maternal health. Maternal health is the health of women during pregnancy, childbirth, and the postpartum period. During this time period, access to appropriate and supportive healthcare is crucial for the well-being of the child and the mother. Maternal morbidity is the unexpected outcome of labor and delivery that result in significant consequences for a woman's health outcome.

Maternal mortality is the death of a woman during pregnancy, after pregnancy, or close in time to pregnancy. Studies show an increase in racial disparity in the United States related to maternal mortality, mostly seen with non-Hispanic black women. In Illinois today, non-Hispanic black women are six times more likely to die of pregnancy-related conditions than non-Hispanic white women, and three times more likely to die within a year of pregnancy than any other race or ethnicity. Racial and socioeconomic disparities in maternal health still exist today, even in a culturally and ethnically diverse city such as Chicago. It is unjust that as a black woman, or any minority, you are more likely to die

from preventable health care problems due to the lack of professional and equal health care. Not only are African American women being treated with less respect within healthcare, but they are also not given access to receive the care. Women of color and low-income women experience the least amount of reproductive care including contraceptive education, abortion care, STI screening, and reproductive cancer screening. With less access, these women are at much higher risks for pregnancy associated complications and death. In my thesis and presentation, I will be addressing the disparities these women face as well as recommendations for addressing and preventing them.

74. Hirmiz, Mark

Tracking Multivalent Atoms inside Oxide Structures

Undergraduate - Biological Sciences

From cells phones to electric cars, humanity is in constant demand for higher capacity and more efficient batteries. This demand has called for the development of batteries with greater energy storage. Energy storage can be improved through two main approaches. The first approach is decreasing the amount of packing material to allow for greater energy density and more efficient energy storage. This option, however, greatly decreases safety and can result in unstable batteries. The second approach of improving energy storage consists of finding electrodes and electrolytes that allow for a greater charge of a single electron (Q) or a greater voltage (V). This approach has endless possibilities and can greatly improve energy storage across the globe. The research I have conducted aimed to explore some of these possibilities. Currently, batteries consist of monovalent atoms like lithium. My research, on the other hand, sought to replace these monovalent atoms with multivalent atoms and track their movement within oxide structures. The molecule I tracked was 1% titanium-doped magnesium chromium oxide ($TiMgCr_2O_4$). This project was conducted at 5 different temperatures to see whether the presence of titanium atoms had any impact on the relative mobility of magnesium atoms. The experiment was run in 100K increments from 100K to 500K. The mobility of the magnesium atoms was observed and measured using techniques such as Pair Distribution Function (PDF) analysis and Reverse Monte Carlo (RMC) modeling. It was determined

that a 1% titanium doping of magnesium chromium oxide did not have any significant impact on the mobility of the magnesium ions. Despite our findings, a better understanding of the movement of multivalent atoms within oxide structures has the potential to develop batteries with greater energy storage in the future.

75. Ho, Theresa

Natural Product Drug Discovery: Structure Elucidation using Nuclear Magnetic Resonance Spectroscopy

Undergraduate - Chemistry

Natural product drug discovery to find new candidate medicines involves the process of structure elucidation. In the past, this was done by techniques such as x-ray analysis, which took specialists, multiple attempts and a lot of time. Nuclear Magnetic Resonance (NMR) spectroscopy was on the rise, and with multiple advancements quickly evolving the complexity of structure that could be elucidated, much focus was on making the techniques and instruments as efficient as possible. Presently, Nuclear Magnetic Resonance (NMR) spectroscopy is a technique that is used to elucidate nearly all natural product drugs in the market. One example of a common natural product drug that NMR had helped aid in structure elucidation is the anticancer drug, Halavan. Halavan had originally been obtained via x-ray analysis, but all subsequent analogs were done via NMR. Nevertheless, the main goal was to gain the skill of analyzing Nuclear Magnetic Resonance spectra, and then using the skillset to elucidate a complex structure. This was done by research using organic chemistry textbooks, lectures, peer-reviewed articles, online resources, as well as in-lab obtained spectra courtesy of Murphy Lab UIC. From this, five types of 1D and 2D NMR spectra: ¹H NMR, ¹³C NMR, Correlation Spectroscopy (COSY), Heteronuclear Single Quantum Coherence (HSQC), Heteronuclear Multiple Bond Coherence (HMBC), were studied. These different NMR spectra were used to obtain proton environments, carbon structures, proton correlations, proton-carbon correlations, and multiple bond correlations. Given the chemical formula of C₁₆H₂₂O₁₁ with a weight of 360.3amu, the hydrogen deficiency was calculated to be 6. By analyzing the spectra, key characteristics of the spectra gave partial structures, which were then put together. The final structure elucidation revealed the complex

organic molecule of secologanoside. Secologanoside is a type of natural compound iridoid and presents bio-active pathways such as anti-elastase, allelopathic, and anti-complementary activities, showing medicinal promise.

76. Huynh, Spencer

Effect of Group II mGluR G $\beta\gamma$ on Insertion of AMPA Receptors in the Postsynaptic Membrane During Long Term Potentiation

Undergraduate - Biological sciences

Long term potentiation (LTP) is a form of synaptic plasticity that represents a critical step in learning and memory. Following LTP induction, the density of α -amino-3-hydroxy-5-methyl-4-isoxazolepropionate (AMPA) receptors (AMPARs) located postsynaptically in synapses and which mediate synaptic transmission is increased. (Park, 2018) The higher the density of AMPARs, the greater the excitatory postsynaptic current (EPSC) underlying the synaptic response. Thus, the insertion of AMPARs into the postsynaptic membrane is necessary for maintaining LTP. AMPA receptor insertion is mediated through the fusion of trafficking vesicles with the postsynaptic plasma membrane, a type of exocytosis. (Malinow and Malenka, 2002) The exocytosis of AMPARs is facilitated by SNARE protein complexes consisting of proteins such as SNAP-25. (Kennedy, Davidson, et. al., 2010) G $\beta\gamma$, as liberated by Gi/o-coupled G-protein coupled receptors (GPCRs), such as Group II metabotropic glutamate receptors (mGluRs) can inhibit exocytosis through binding to SNAREs such as SNAP25, competing with fusogenic calcium sensors. (Blackmer, 2001) These interactions have mainly been studied presynaptically. The effect of G $\beta\gamma$ on the exocytosis and insertion of AMPARs into the postsynaptic membrane is unknown.

77. Imran, Arooj

Gun laws and mental health

Undergraduate - Biological sciences

My project looks into gun laws and how they're disadvantageous to those with mental health issues and primarily those with disabilities. I will take a closer look into how the gun laws are structured, support/disapproval of them by different people, and how they

discriminate against disabled people. Furthermore, I will suggest ways as to how to fix these laws in the future so that they do not take away anyone's 2nd amendment rights.

78. Irukulla, Suhitha

Mitochondria Adjacent to Postsynaptic Densities in Vestibular Afferents

Undergraduate - Neuroscience

Mitochondria are critical to all bodily functions because they help cells respirate, i.e., consume oxygen, and they produce ATP which is used by the body for energy. Upon inspection of electron microscopy data from inner ear hair cells, three different sizes of mitochondria have been identified. Therefore, we decided to focus our study on these mitochondria. Mutations in the mitochondrial DNA in the inner ear have been shown to cause deafness and vestibular problems. In order to better understand these disorders, we used IMOD software to create 3D models of the different size classes of mitochondria (large, medium and small). Inner ear mitochondria also vary in their substructure. Those in hair cells have lamellar (stacked) cristae, a high-energy form, while those in afferent and efferent fibers and endings have tubular cristae, a lower energy form. Cristae play a significant role in the mitochondria because they are full of ATPase molecules, which produce ATP and interact with the inner mitochondrial membrane at specific points called crista junctions (CJs) (Rabl et al. 2009). The CJs seem to direct the transport of ATP and Ca²⁺ ions to regions of interest. Previous work in the lab reconstructed mitochondria with respect to the cuticular plate (CP) in type 1 and type 2 hair cells in order to analyze the crista junction density with respect to the "business end" of the hair cell, the stereocilia. After counting the number of crista junctions on the sides of the mitochondria facing towards and away from the CP, they found out that the number of CJs associated with the CP was found to be significantly larger (2X) than that of the side facing away, which means that the cristae likely direct ATP and Ca²⁺ to the cuticular plate. In this model, we are taking the same 3D approach described previously to mitochondria adjacent to the postsynaptic density. There are some key differences between the two models. In this instance, we are reconstructing an afferent-type mitochondrion with tubular-shaped cristae, located inside the calyx. This mitochondrion is medium-sized and has a lower energy profile compared to the mitochondria inside the

type 1 hair cell. It approaches the postsynaptic density adjacent to the ribbon synapse and the CJs seem to interact with the inner membrane of the mitochondria by means of tethers as it approaches the calyx membrane. By studying hair cell mitochondria, we hope to uncover some of the mechanisms leading to disorders that debilitate human patients suffering from deafness, Meniere's Disease, and other inner ear pathologies.

79. Iyer, Janani

Effectiveness of DUI interventions

Undergraduate - Psychology

This project will be discussing the effectiveness of DUI interventions as existing in the State of Illinois. There will be 4 different interventions that are evaluated for their strengths and weaknesses.

80. Jabri, Zainab

Health-Related Life Skills among Individuals with Developmental Disability:

Intersection of COVID-19 and Autism

Undergraduate - Biological Sciences - Neuroscience

Individuals diagnosed with autism are at a higher risk for COVID due to developmental delays and deficits in health-related life skills. However, the extent to which these deficits exist is unclear, as existed assessments for life skills are not specific enough to capture various skills needed during the COVID-19 pandemic, such as keeping the mask on for extended periods of time, following social distancing rules, maintaining social interaction with peers remotely, etc. The current study examines the COVID-related health skills among children diagnosed with ASD. A caregiver assessment was developed, and a total of 36 skills were identified following recommendations from the CDC to promote children's physical and mental health. Six skills were identified in each category: Personal Protection Equipment, Symptom Identification, Social Distancing, Hygiene, Daily Routine, and Health and Well-being. Forty caregivers completed the indirect assessment, and results show that children diagnosed with autism often demonstrate deficits in COVID-related health skills. The distribution of skills did not show a clear pattern across different age-groups, suggesting that the developmental approach failed to

account for these life skills. Preliminary psychometric properties of the assessment were reported, and implications and recommendations for practitioners were discussed.

81. Jacobi, Natalie

A Typographical study of Feminism as it relates to the Rights of Lower Economic Status Women

Undergraduate - Graphic Design

This capstone is a creative project based on exploring feminism through the economic lower class with a typeface and other designs. I used the essay

"TRASHGiRRRLLLZZZ: A Manifesto for Misfit ToYZ" by Elizabeth Broeder to expand on this idea and outline the feelings of women who are taken advantage of by the circle of poverty. From the book Burn it Down!, Broeder used a unique form of writing where words were purposely misspelled, and proper grammar was thrown away. It mimics a "trashy" dialect, one that is often associated with those of a lower economic status. As a typographic study, I replicated Broeder's writing style as a typeface using a modified version of Times New Roman to express precisely how the education system has failed women in poverty. Times New Roman is a suitable typeface for this because it is most often known as a school's standard font, allowing for discussion on education. After finishing my typeface, I integrated it with images of more traditionally feminine activities associated with the 1950s. I chose this era to combine with this typeface because it is known for being the start of the nuclear family concept where a woman is needed to stay home. Combining the "trash girl" and the "1950s woman" together is a commentary on how poverty has ruined some women's chances for a stable life and how traditional femininity rejects everything "TRASHGiRRRLLLZZZ: A Manifesto for Misfit ToYZ" is in an equally toxic way that stifles women. I concluded from this study that the plight of women in poverty is extreme and challenging to pull oneself out of, but looking at their vernacular and strife put together into a typographic feature could be a way to draw awareness to the discrimination they face.

82. Jaen, Zynovia

Regulating expression of the nicotinic acetylcholine receptor α 2 subunit utilizing inhibitory chemigenetics in the habenulo-interpeduncular circuit

Undergraduate - Neuroscience

Nicotine dependence has been proven to result in various long-term negative health effects, yet nicotine is consumed in various ways today with no reliable smoking cessation therapy available. Nicotinic acetylcholine receptors (nAChRs) in the interpeduncular nucleus (IPN) and medial habenula (MHb) of the brain are critical for the behaviors associated with nicotine dependence and withdrawal. The various subunits of these receptors are associated with different genetic expression and function in the habenulo-interpeduncular circuit that directly affect nicotine reward pathways and nicotine withdrawal symptoms, but not all of these functions are well-understood. The nAChR subunit α 2, pertaining to the gene CHRNA2, is strongly coexpressed with accessory subunit α 5 (CHRNA5), and both have been implicated to have greater expression levels in the IPN after chronic nicotine exposure. Subunit α 5 is known to be linked to a higher risk of lung cancer and the nAChRs that contain this subunit have been shown to become sensitized to nicotine after chronic nicotine exposure, however, this subunit cannot be a target for pharmaceutical therapy as it does not form a ligand-binding site. Preliminary studies have shown that the absence of α 2 results in greater somatic symptoms of withdrawal in mice in a novel environment, and because both α 2 and α 5 seem to be closely related and are both more abundant in the IPN than anywhere else in the brain, α 2 appears to be a possible therapeutic target. Our chemigenetic method utilizes an inhibitory designer receptor activated by designer drug (DREADD) to target IPN neurons containing these nAChR subunits to study the effect of chronic nicotine exposure on the expression of these neurons while the activity of α 2 is being transcriptionally regulated. After acute nicotine withdrawal is induced, behavior of experimental DREADD mice will be analyzed and the expression level of nAChR subunits of interest will be evaluated with quantitative PCR. With this research we hope to elucidate an effective pharmacological target for smoking cessation treatments.

83. Jiang, Henry

Committee of the Regions and its role in the European Union

Undergraduate - Political Science

The research question addressed in this project concerns the role that the political groups represented in the European Union's Committee of the Regions (CoR) play in the success of CoR legislative amendments: European People's Party, Party of European Socialists, Group of the Alliance of Liberals and Democrats for Europe, European Alliance Group and European Conservatives and Reformists Group. The two hypotheses proposed are whether 1): Parties in favor of European integration would be more likely to support proposals related to extending the powers of the EU's regions and whether 2) Parties representing countries with strong regions in the EU would be more likely to favor proposals that expand the powers of the EU's regions. The research question speaks to important debates in the study of EU integration. It addresses the growing relevance of the CoR in EU decision-making. The project also relates to legislative dynamics within the European Parliament. Further, the project links the study of voting behavior to the topic of sub-national governance. We analyzed the voting percentages from 2004 to 2013 of EU parties and groups, such as the EPP and PES by plotting their votes on an Excel Spreadsheet. We then analyzed and determined whether the parties and groups are more likely to vote for legislation in favor of decentralization and committee of the regions. Our results indicated that there is a strong tendency for these groups to vote for decentralization. For instance, we found that the PES and EPP were much more likely to vote for those issues over time. Thus, our conclusion meets our hypothesis.

84. Jibrin, Noor

Understanding Root Causes Resulting in Dental Extractions

Undergraduate - Integrated Health Studies

Following the loss of one's primary teeth, the adult mouth will have 32 teeth for the remainder of their life. It is important to maintain this set of permanent teeth as there is not another replacement set. This capstone project will look at the causes that result in the loss and extraction of teeth. This study is important because it will allow for a better understanding of the reasons leading up to individuals losing teeth. This project will include a voluntary and anonymous survey handed out to patients 18 years and older at

Universal Dental clinic. Patients will be given an explanation of the aim of the study and notified that all information is anonymous and completely voluntary. After collecting surveys, the data will be analyzed to understand the reasons resulting in this treatment plan. Anticipated results include cavities/caries being the main cause of dental extractions in patients ages 18+. Understanding what causes teeth extractions can allow providers and patients to prevent this before. The finding of this work will help improve our understanding of patient extractions and improve overall oral health. While this study will only look at surveys given at one time before the extraction, future work may look at a longitudinal study to follow patients and their oral health over a longer period of time.

85. John, Karen

Antibiotic Discovery from a marine *Bacillus* sp. collected in Vietnam

Undergraduate - Biological Sciences

Microorganisms are one of the leading producers of natural products, but in the past, most studies focused on terrestrial microbes and their metabolites resulting in redundancy in isolating the same antibiotics. Although water makes up 70% of our planet, there have been few efforts to isolate antibiotics from marine bacteria, mostly associated with the difficulty in accessing bacteria from deep seas oceans and the high costs for extracting them. Our lab addresses the problems in bacteria-produced natural product discovery by using a matrix-assisted laser desorption/ionization time of flight mass spectroscopy (MALDI-TOF MS) bioinformatic pipeline-IDBac. The use of this IDBac bioinformatic pipeline creates a bacterial library that allows us to simultaneously and rapidly organize bacteria based on the proteins they produce. We tested for the presence of bioactive compounds in bacterial metabolites from G205 *Bacillus* by performing a DAPA which indicated inhibition >90% against *Pseudomonas aeruginosa*. This project focuses on *Bacillus* sp., whose bioactive secondary metabolites have been known to have numerous applications including plant pathogen control agents, drugs with antimicrobial activity, and surfactants.

86. Johnson, Teja

The Academic, Physical, and Social-Emotional Impact on 5th-8th Graders Due to COVID-19

Undergraduate - Human Development and Learning

There is little to no doubt that the implications of the COVID-19 pandemic have affected individuals worldwide. Since the COVID-19 pandemic, schools and children have struggled to find how to maintain the balance between e-learning and continuing on with a productive schooling environment. While COVID-19 left educators and policymakers with little choice other than to enforce e-learning and keep children at home for safety measures, it is worth questioning the impact not attending school has on students. This study aims to investigate how COVID-19's e-learning decisions may have impacted students' social, physical, and mental health. This study surveyed 14 fifth to eighth grade students in the Chicagoland area through the use of written surveys and online interviews. Each student was asked the same questions regarding their thoughts on e-learning and the differences in their physical and social status since COVID-19. After a qualitative analysis of the data, the findings indicated that most students favored being in the classroom, but that some did favor staying at home for various reasons from mental health to better focus at home. It was also found that most students fell short of practicing their regular social skills, physical activity, and attention that they had before COVID-19 and e-learning began. The lack of social, physical, and mental capacities made it increasingly difficult to participate in their online schooling environments. While little research has been done to compliment and build off this idea, more studies need to be conducted to get a better look at the serious mental, physical, and social impacts of COVID-19 on middle school-aged children.

87. Jozwiak, Weronika

Miyazaki (neo) Realism: The Animated Works of Japanese Filmmaker Hayao Miyazaki Through the Lens of Italian Neorealism

Undergraduate - English; Psychology

Many viewers of Japanese filmmaker Hayao Miyazaki's anime films find that they emit a captivating sense of realisms even if they take place in imaginary settings and include fantastical characters. The films also have many commonalities with the Italian

neorealism cinema movement such as the use of real time, loose plot structures, and the choice to linger on details tertiary to the plot. Despite these qualities often being cited as critical ways both the animated films and the films of the movement convey realisms, the similarities have yet to be explicitly examined. The project surveys how Miyazaki's films share qualities with Italian neorealism and how these commonalities are critical to his films being able to evoke realisms regardless of their medium or genre. Considering how on the surface-level animation and Italian neorealism appear to be on opposite ends of a spectrum in terms of realism, the project argues that the shared characteristics between them help in showing how a sense of realism can be achieved in a medium as artificial as animation. While Italian neorealism often focuses on conveying social realism, Miyazaki uses neorealism techniques to ground his viewers in social, magical, and psychological realisms so that he can then engross his viewers in more fantastical stories. Like Italian neorealism, Miyazaki's filmography emerges from a nation left in ruin and loss after World War II. Exploring the techniques used by both the movement and the director allow for an analysis on how these techniques help viewers experience the world of the films, confront their own complicated realities, and reflect on social commentaries. Future research on this topic can explore the complete filmography of Miyazaki in terms of his application of Italian neorealism techniques as well as explore how other anime directors will continue to explore and evoke various realisms.

88. Kadakia, Arya

The Effect of Melanopsin Activation on Cone-Mediated Electroretinograms

Undergraduate - Neuroscience

Melanopsin is a photopigment that is expressed by light via intrinsically photosensitive retinal ganglion cells (ipRGCs). ipRGCs play an important part in the formation of non-image vision. Melanopsin activation can contribute to visual processing via retinal or post-retinal mechanisms although this process is not well understood. To assess whether melanopsin activation can affect retinal signaling, we measured electroretinograms (ERG) responses to L-, M- and S-cone isolating modulations (temporal frequencies: 2, 4, 8, 16 and 32 Hz, contrast 11% for L and M cone stimuli and 50% for S cone stimuli, mean luminance 20,000 Td) under two background melanopsin activation levels, with the

“Mel-HIGH” condition having 12% higher melanopsin activation than the “Mel-LOW” condition. The stimuli were generated in a lab-developed five-primary photostimulator that allows independent control of photoreceptor excitations. The results showed that there were some individual differences in the modulatory effect of melanopsin activation on the measured ERG responses. Specifically, all subjects showed no effect on L-cone stimuli. Compared with the “Mel-LOW” condition, the “Mel-HIGH” condition had higher M-cone mediated ERG response amplitudes but lower S-cone amplitudes at low temporal frequencies in most of the subjects. Our results suggested that melanopsin activation level can modulate M- and S-cone-mediated retinal signaling and potentially affect our visual perception via post-receptoral pathways.

89. Kadamuddi, Tanmayi

Internalization of the Model Minority Myth and Anti-Blackness in South Asian America

Undergraduate - GWS and Biology

Discrimination based on race has long been an issue in the history of the United States. Generally, however, discussions center events in which white Americans display prejudice towards others. This results in the erasure and lack of understanding regarding race relations amongst minority groups. The issue is regardless of utmost importance, seeing as minorities make up more than 28% of the population (U.S. Census Bureau). It can be argued that certain minority groups, such as Asian Americans, enjoy preferential standing when compared to others due to their being seen as ‘model minorities’. This myth dates back to 1966 when sociologist William Petersen used it to describe how Asian familial structure and cultural emphasis on hard work allowed Japanese Americans to overcome discrimination and succeed in the United States (Kasinitz, 2011). It has become an expectation that all Asian Americans are naturally smart, wealthy, and uncomplaining as a way to put down other minority groups. Some research has been done on the emotional effects of this stereotype on Asian Americans and other research has focused on the ways that fellow minorities see Asian Americans as a result of believing in the model minority stereotype. However, no one has taken this information further and studied how experiencing the model minority stereotype can manifest in the social

interactions Asian Americans engage in with others. This lack of understanding is harmful as it trivializes an issue plaguing Asian American society. Thus, conducting research to better discern how Asian Americans themselves can be using the framework of the model minority to be discriminatory against other minorities could eventually lead to building stronger cross-minority coalitions. It is possible that anti-Blackness may be prevalent in Asian American communities so it is reasonable then to question whether internalization of the model minority status and subsequent belief in Asian American superiority could contribute to this sentiment. I hope to identify the social effects of internalizing model minority status on Asian American sentiments towards other minority groups in the United States. Does acknowledgement and approval of this stereotype change the way that Asian Americans interact with Black people in their day to day lives, and if so how? Developing a better understanding of how Asian American thinking and behavior may possibly change as a result of believing themselves to be model minorities can help paint a clearer picture of modern-day race relations in the United States.

90. Kaewmanee, Tippawan

The role of predictability of the magnitude of a perturbation in control of vertical posture when catching an object

Undergraduate - Rehabilitation Sciences

Background: The predictability of perturbation magnitudes plays an important role in control of standing posture. Aim: To examine anticipatory (APAs) and compensatory (CPAs) postural adjustments in response to catching objects of uncertain mass. Methods: Twenty adults caught the object with either light or heavy weight. Electromyographic activity of postural muscles, displacements of the center of pressure, and angular displacement of the shoulder joint were recorded and analyzed during the APAs and CPAs intervals. Results: When the subjects experienced repeated catching of the object with the same mass, they estimated the weight beforehand and generated APAs more precisely. When the object mass changed unpredictably, they generated APAs based on the most recent catch and needed four to six trials to optimize APAs and CPAs. The muscle co-contraction was a primary pattern for catching the object with uncertain mass.

Conclusions: Catching the object of uncertain mass is a challenging task that involves co-contraction of postural muscles to maintain balance.

91. Kang, Christie

Discovering Antibacterial Natural Products in Understudied Bacteria from Iceland

Undergraduate - Biological Sciences

In the past few decades, the prevalence of antibiotic resistance has increased dramatically. Additionally, few clinically relevant antibiotics have been introduced to the market. Historically, secondary metabolites (SM) from bacteria have proven to be good sources of antibiotics, with over 60% of marketed antibiotics derived from *Streptomyces* spp. SM. Furthermore, the discovery of new antibacterial SM has been hindered by the routine study of a specific few genera and little consideration of SM production during the selection step. To overcome these selection biases we applied matrix-assisted laser desorption/ionization mass spectrometry and IDBac to select understudied bacteria acquired through a past collection trip in Iceland. After analyzing an existing data set of 1616 bacterial protein and small molecule fingerprints and 361 16S rRNA sequences, we selected 4 bacterial isolates underrepresented in literature that best captured the diversity of the bacteria from Iceland. Small-scale cultures of each isolate in six different nutrient conditions were grown to activate otherwise silent SM biosynthetic pathways. After the organic layers of the isolates were extracted using ethyl acetate, we tested the SM found in the extracts using single dosage Minimum Inhibitory Concentration (MIC) assays for bioactivity against various pathogens. Overall, this study aims to indicate that incorporating SM production into the selection step of bacteria can lead to identifying new secondary metabolites in understudied bacteria.

92. Katiki, Aishwarya

The Effect of Chromatin Conformation on the Expression of the Nanog locus in Stem Cells

Undergraduate - Biological Sciences

The Nanog locus encodes a transcription factor needed for maintaining pluripotency and self-renewal of embryonic stem cells (Blinka 2016). Expression of the locus is under the control of multiple enhancers located dozens of kilobase pairs from the promoter. Evidence suggests that the interaction with one specific enhancer may result in two distinct chromatin conformations (Arrastia 2020). The distinct chromatin conformations may cause the varying Nanog expression levels and therefore are an area of interest in respect to the ability of stem cells to differentiate into different germ layers. The absence of Nanog in embryos has proven to produce non-viable cells, cementing the necessity of it in the process of embryogenesis (Blinka 2017). However, the actual mechanisms behind the control of Nanog expression remain to be elucidated. As Nanog has a demonstrated role in the development of embryos, understanding of the molecular control behind the locus could be a potential target for ensuring the capability of stem cells to successfully undergo self-renewal and differentiation (Glauche 2010). The generally accepted model assumes that physical interaction is needed between the enhancer and promoter regions; however, there is not enough information to explain how a single gene locus can be controlled by multiple enhancers. Therefore, we are also curious as to whether numerous enhancers in the Nanog locus form a collective “hub” structure or if only individual enhancers are active in single cells. References: Arrastia, Mary V., et al. “A Single-Cell Method to Map Higher-Order 3D Genome Organization in Thousands of Individual Cells Reveals Structural Heterogeneity in Mouse ES Cells.” 2020, doi:10.1101/2020.08.11.242081. Blinka, Steven, and Sridhar Rao. “Nanog Expression in Embryonic Stem Cells - An Ideal Model System to Dissect Enhancer Function.” BioEssays, vol. 39, no. 12, 2017, p. 1700086., doi:10.1002/bies.201700086. Blinka, Steven, et al. “Super-Enhancers at the Nanog Locus Differentially Regulate Neighboring Pluripotency-Associated Genes.” Cell Reports, vol. 17, no. 1, 2016, pp. 19–28., doi:10.1016/j.celrep.2016.09.002. Glauche, Ingmar, et al. “Nanog Variability and Pluripotency Regulation of Embryonic Stem Cells - Insights from a Mathematical Model Analysis.” PLoS ONE, vol. 5, no. 6, 2010, doi:10.1371/journal.pone.0011238.

93. Kelly, Quinn

Reorientation and Reintegration in Nigeria

Undergraduate - Psychology

Violent extremism is a unique challenge for both local governments and international institutions alike. It is not contained to any one region, nation, or belief system; and extremist groups recruit, abduct, and indoctrinate from the very communities they wage terror against. The result is a hotbed of mistrust, anger, or resentment from the communities affected towards those associated with the perpetrating groups – communities where former members hope to rejoin society and find no special welcome. Using data (n=3,122) collected from Borno State, Nigeria in late 2020 by the United Nations University's Centre for Policy Research, I was able to analyze key aspects of the efforts to reintegrate former Boko Haram members back into communities. Most centrally, the potential effectiveness of a government reorientation programme like Operation Safe Corridor on increasing community acceptance of members and reducing calls for punishment or retribution. Participants were asked, verbally via telephone, a 262 item survey of predominantly yes-no questions to understand their opinion on different aspects of their experience with Boko Haram and related conflict, trust and norms, COVID-19, demographics, and so on. Crucially, participants were randomly assigned a theoretical former Boko Haram member – man or woman, age 12 or 28 – who is repentant and wanting to rejoin the community. Each participant was also randomly assigned a treatment condition for the reintegrators: the theoretical member (A) had completed a government reorientation programme and was cleared by the State, (B) they wished to apologize publicly and ask for forgiveness, or (C) nothing. This allowed me to understand the effectiveness of government reorientation programmes in reintegrating former members of extreme groups to communities and explore several hypotheses surrounding attitudes and characteristics of reintegration, both in the community and regarding the former militants.

94. [Khatab, Salma](#)

Is Exercise Medicine for Anxiety and Depression?

Undergraduate - Kinesiology and Nutrition

When looking for remedies to treat any ailment of the body, whether it be a physical or mental illness, exercise is always the last thing to be prescribed. Due to it being a stressor

on the body and therefore on the mind, it is the first option to be thrown to the side. For the longest time, exercise has been constantly overlooked by physicians; for treating any illness and not just when it comes to mental health. However, now more than ever, several studies display that exercise does indeed have overwhelming effects on mental health. Whether it be anxiety or depression, studies have shown that exercise does help not only promote physical wellbeing, but also promotes overall wellbeing, starting with the brain. However, this is not to say that there is not any further research that needs to be done on the detriments exercise can have on mental health as well.

Keywords: Exercise, Depression, Mental health, Anxiety.

95. Kim, Jessica

Cell Culture Method that Best Mimics Growth of Vivo Tumors

Undergraduate - Liberal Arts and Sciences

Mimicking cells *in vitro* is important for research purposes, especially cancer research, and for the comprehension of the cell activity its changes such as its function, morphology, drug resistance, differentiation, interactions, and drug action. Two-dimensional (2D) cell cultures are widely used for cancer research *in vitro*, but its inability to replicate the intricacy of the tumor cells with its microenvironment as *in vivo* conditions limits its reliability since it is grown in a standard monolayer. Thus, it incorrectly portrays drug sensitivity, response to stimuli, cell differentiation, cell proliferation, and more. Three-dimensional (3D) cell cultures are becoming increasingly utilized because of how closely this method mimics the extracellular matrix (ECM) the tumor cell resides in *in vivo* in comparison to 2D cell cultures. It is important to note that 3D cell culturing needs to be analyzed more to further its development, yet it has great potential in terms of mimicking the growth *of vivo* tumors. Although both have their advantages and disadvantages, 3D cell cultures potentially portray a more accurate replica of the cell environment because it allows for the cell interactions in all three dimensions. The 2D cell culture and the 3D cell culture methods provide great insight to the understanding of the complexity of cells and its activity. However, 3D cell cultures provide the necessary information that 2D cell cultures fail to provide.

96. Kittaneh, Deana

Rethinking Resilience: Conceptualizing a More Equitable Approach to Resilience in the 21st Century

Undergraduate - Public Administration

Resilience has been a common-place term in the realm of environmental policymaking. At its core, resilience is defined in this field as the ability to withstand severe weather, often the result of climate change, while maintaining the status quo. However, there has been minimal critique or analysis of resilience-based policies' impact and effectiveness in responding to climate change. This project analyzes resilience-based policies in responding to two extremes of climate change's impacts: flooding in the Great Lakes region and drought in Jordan. First, a literature review of the impacts of climate change on these regions and the development of resilience in the climate change policy literature is conducted, followed by an assessment of resilience-based policies in both regions. For the Great Lakes, the Tunnel and Reservoir Plan (TARP) is explored, and the Disi Aquifer is explored for Jordan. Each policy is assessed for its ability to address the particular water crisis at hand sustainably and equitably for both humanity and the natural ecosystem. This project concludes that the concept of resilience, and its accompanying policies, are unsustainable and significantly contribute to the present inequities in climate change's impacts. The status quo, including the drivers of disproportionate impacts of climate change, is treated as unproblematic. Resilience-based policies seek to protect and maintain existing institutions, infrastructure, economies, lifestyles, and inevitably, existing inequities. Alternatives or adjustments to the concept of resilience are paramount to achieving more equitable and environmental justice-based solutions in both regions and globally.

97. Kobylarz, Gabi

Drug Target Identification with Resistant Escherichia coli TolC- Strain

Undergraduate - Chemistry

Antibiotic resistance is an increasing challenge in the world as bacteria constantly undergo mutations, resulting in the need for newer antibiotics. The discovery of a resistant bacterial colony of Escherichia coli TolC- could lead to the identification of a

target that causes such resistance to the inhibitory compound and that could potentially be used to develop or enhance antibiotics. This research sought to find an uncontaminated strain via gram staining and isolate a resistant colony for DNA sequencing. A resistant colony was selected for at 20 times the MIC value. From the genome analysis, it was concluded that although there was no contamination, there did not seem to be any clear genetic differences between the wildtype and resistant strains. Due to this, continued study and analysis of the inhibitory compound and resistant colonies is necessary to identify this other target.

98. Krishnakumar, Divya

Examining the Influence of Power Distance on Psychological Safety Within Healthcare Teams

Undergraduate - Biochemistry

Patient care is increasingly reliant on healthcare teams, which requires the collaboration of individuals from varying professional backgrounds, including physicians, nurses, therapists, to name a few. To achieve safe and effective care, the individuals who comprise healthcare teams must be able to work well together, interacting with one another in a manner which allows for the successful integration of individual expertise and efficient communication. The inherent hierarchical nature of healthcare ascribes a certain status to individuals on the basis of their profession. For example, historically, physicians have had more status than nurses, who have more status than physical therapists, and so on. These internalized power differences can originate from the primarily hierarchical nature of how medicine is both taught and practiced, resulting in a climate where individuals with less power are marginalized. The power differential established within healthcare teams can also be a contributing factor to the level of psychological safety, which refers to the amount of comfort that members of the team have with speaking up, asking questions, and voicing their concerns, without fearing negative consequences. Where power disparity exists, Power distance becomes a factor influencing team performance. Power distance is defined as the extent to which unequal power distributions within a group are accepted by individuals with less power. The objective of our research is to determine to what extent an individual's level of power

distance influences how psychologically safe they feel as part of their healthcare team. We explore the impact of power distance on psychological safety through cross-sectional survey data collected from internal medicine clinicians practicing in the Midwest region of the United States. Results will shed more light on elements which contribute to a sense of safety in speaking up within teams.

99. Kumar, Priya

Loss of EPHA2 represses GATA-3 function and causes a terminal differentiation defect

Undergraduate - Biological Sciences

Epidermal morphogenesis and differentiation require the coordination of complex signal transduction networks. These signal relays are often initiated at the plasma membrane and transmitted to the nucleus to control gene expression. Receptor tyrosine kinases (RTKs) are integral in orchestrating communication cascades to induce differentiation. We report loss of EPHA2 RTK causes a terminal differentiation defect in 3D human skin equivalents (3D HSE) resulting in the ablation of the granular and cornified layers. In EPHA2-deficient (shEPHA2) 3D HSE, we show significant loss ($P<0.05$) of loricrin, filaggrin, and involucrin protein and mRNA, indicating EPHA2 signaling can impact keratinocyte differentiation at the transcriptional level. GATA-3 is a key driver of differentiation-associated gene expression in epidermis, although the upstream signals regulating GATA-3 activity are unknown. GATA-3 is expressed in the nuclei of suprabasal keratinocytes in mature 3D HSE, mimicking the pattern in normal human skin ($R^2=0.99$). In 2D cultures, GATA-3 accumulates in the nucleus following 24 h exposure to 1.2 mM calcium. However, GATA-3 expression is lost in shEPHA2 3D HSE and 2D cultures. Further, there is a decrease of GATA-driven transcription indicated by a significant loss in GATA binding activity in a promoter luciferase reporter assay ($P<0.001$). Re-expression of nuclear GATA-3 using a retroviral construct in EPHA2-deficient 3D HSE restored differentiation. Taken together, these results indicate that EPHA2 promotes GATA-3 nuclear accumulation to positively regulate the transcription of terminal differentiation genes in epidermal keratinocytes.

100. Kumar, Wasan

Cadmium Promotes Atherosclerosis by Increasing Internalization of Low Density Lipoproteins (LDL) and Oxidized LDL (OxLDL) in RAW 264.7 Macrophage Cells

Undergraduate - Neuroscience

Contemporary literature has established cadmium environmental exposure as a promotor of vascular inflammation and a risk factor for atherosclerosis. Inflammation has been shown to increase LDL receptor expression on macrophage cells. The link between inflammation and macrophages suggests cadmium may increase atherogenesis by upregulating scavenger receptors, which function to bind to LDL and OxLDL.

Environmentally relevant concentrations of cadmium should induce uptake of LDL and OxLDL in macrophage cells. RAW 264.7 (RRID:CVCL_0493) (murine) macrophages were treated with 2 mg LDL, 2 mg histones, and 10 nM, 50 nM, and 200 nM CdCl₂ concentrations for 24 h, 48 h, and 72 h incubation periods. LDL was oxidized by incubation in 10 µM CuSO₄ and OxLDL was diluted to 2 mg/ml and applied to macrophage cells. Cells were stained using Oil Red O (lipid sensitive dye) and quantified by spectrophotometry at 500 nm. There were significant dose-dependent and time dependent increases in lipid absorbance. ICR male mice were exposed to cadmium through drinking water for 8 weeks, followed by a 16 week wash out period (chronic exposure) or no washout period (acute exposure) before sacrifice. Plasma was extracted for assessment of LOX-1, CD36, and SRA-I/II by ELISA assay. Across groups, those fed a cadmium diet had a significant overexpression of scavenger receptors. Our data suggests that cadmium modulates macrophage function by promoting lipoprotein uptake through overexpression of scavenger receptors LDL, histone-LDL and OxLDL.

101. Lay, Kaylee

Comparing and Contrasting Healthcare Around the World

Graduate - Business Administration

Comparing and Contrasting Healthcare Systems America has always been a hugely successful capitalistic country, with programs that benefit the elderly and disadvantaged. On the subject of healthcare, very recently there have been multiple arguments in regard to reforming the healthcare system. These arguments are often centered around how

flawed the private healthcare system is and how apparently flawless fully public healthcare is. Countries with public healthcare systems like Canada and Great Britain. Both of which have decentralized, universal, and fully publicly funded healthcare systems. A country like Germany, is a hybrid because they combine strong public health provisions with private insurance options and the government technically has no role in the direct delivery of healthcare. The United States healthcare system is provided through many different organizations. Healthcare coverage is provided through private insurance (i.e. Blue Cross Blue Shield, United Healthcare) and public health coverage (i.e. Medicare, Medicaid). The U.S. stands out globally with the highest expenditures on health care and by far the biggest spender in absolute per capita terms. However, Americans are the most dissatisfied with their healthcare system in comparison to Canada, Germany, and Great Britain. The cost of healthcare in America is allegedly rising faster than other countries which leaves many others underinsured or lacking proper long-term coverage. Variations do exist amongst the four countries in terms of financing, provider payment mechanisms, and the role of the government, and also the degree of centralization. Large portions of the economy are consumed by healthcare systems specifically in Canada, Germany, and America. There is no standard categorization exists across countries because it is very difficult to separate medical services from long-term services. Also, the monetary values of healthcare expenditures and gross domestic product have to be converted to US dollars. The importance of health care is going to have an even bigger significance in the very near future.

102. Lee, Joanna

Development of stem cell-laden bioink for engineering of complex 3D hydrogel constructs with high resolution and fidelity

Undergraduate - Chemistry

3D bioprinting is an emerging technology that utilizes cells, biomaterials, and/or bioactive factors to regenerate tissues and organs. Recently, innovative bioinks have been developed to enable bioprinting of cell-laden hydrogels. Specifically, shear-thinning hydrogels have been used as a promising bioink, where shear stress is applied during

injection and the bioink self-heals after removing shear stress. However, shear-thinning hydrogels typically require a longer self-healing period after printing, causing a collapse of the 3D bioprinted structures. Therefore, in this study we developed a shear-thinning bioink with a short self-healing period using dual-crosslinkable alginates. Complex 3D structures were printed with the bioink, with and without encapsulated stem cell, that demonstrated rapid self-healing and subsequent mechanical stability. Chondrogenic differentiation was achieved after 3D structures printed with the stem cell-laden bioink were cultured in growth medium.

103. Lee, Olivia

Well-Being from the Ground Up: Community Gardening in Englewood, Chicago
Undergraduate - Anthropology

In this project, I have explored the ways in which community gardeners in Englewood, Chicago cultivate their sense of well-being based on participant observation and interviews with the gardeners. In Englewood, with its distinct history of the Great Migrations, redlining, and economic under-development, the gardeners reinitiate their historical memories of gardening and self-sufficiency to create spaces where they can produce the resources the community has been deprived of: fresh vegetables, safe parks, safe neighborhoods, and on. I illustrate that the process of growing and place-making not only provides for these immediate needs but also creates a sense of agency and demonstrates an alternative way to think about sustaining our lives. The relationship between the gardener and the garden where sustenance of life is based on mutualism provides a critical examination of modern life where our lives are sustained by one-way consumption.

104. Li, Anna

Emotion and Passage Comprehension
Undergraduate - Chemistry, MSCS

Emotion word cognition and reading comprehension are complex phenomena. Previous evidence shows that emotion word recall and recognition is strong even with a delay, regardless of content or context, compared with non-emotion word recall (Brierley et al. 2007). There are multiple levels of reading comprehension (surface-form, textbase, and situation model), which test for different things (recall of the exact word, understanding meaning, and making inferences, respectively). This study seeks to show the presence or lack of interaction between emotion primes and type of reading passage. Since reading comprehension is complex, there may be some or no interaction between certain levels of comprehension and primes. Participants will be asked to complete a Qualtrics survey with videos playing before reading passages, which will be either emotional primes or neutral primes. After they finish reading and answering all passages and questions, participants will be asked to complete a language history questionnaire and vocabulary test to ensure English fluency. I predict that emotion primes, regardless of valence, should result in greater reading comprehension as evidenced by greater answer accuracy and lower response times in easier passages but lower reading comprehension in hard passages. Since emotion words can enhance recall, emotion primes should make it easier to read easier passages. However, since inducing a depressed mood has been shown to make it harder to identify contradictions (Ellis et al., 1997), harder passages should be harder to comprehend. This study will hopefully serve as a basis for future research regarding the interactions between reading and emotion words. Implications include improved pedagogy, since many students do not have stable home lives and may have psychological or emotional distractions at home. Understanding how emotion affects reading comprehension may improve students' understanding of the material by changing how text-based material is used.

105. Li, Grace

The Impact of CARS Question-Type Training in Preparing for the MCAT
Undergraduate - Biological Sciences

The newest version of the Medical College Admission Test (MCAT) includes a Critical Analysis and Reasoning Skills (CARS) section which tests students' ability to understand, infer, and reason from text. Since its inception, it has generally become the

lowest scoring section on the exam. The content of the CARS section includes passages representing topics in the humanities and social sciences. It asks students to critically analyze the passages and tests their comprehension using three types of questions: Foundations of Comprehension (FOC), Reasoning Within the Text (RWT), and Reasoning Beyond the Text (RBT). Past research has shown that instruction about different question types can be beneficial for improving performance on tests of reading comprehension (Raphael & Pearson, 1985). The current study tested whether training students how to recognize question types on the CARS would improve their performance on this MCAT section. In a between-subjects design, 30 participants completed a CARS practice test as a pretest. After the pretest, the participants were randomly assigned to receive training or not. The training exposed students to different question types included in CARS and appropriate strategies for answering them. All participants then completed a final CARS practice test as a posttest. Results indicated that students in the training condition had significantly greater gains from pretest to posttest than did those in the control condition. This suggests that question-type training may support useful skills that lead to improvements in performance on the CARS section of the MCAT.

106. Lian, Amy

An Analysis and Composition in the Style of Frederic Chopin's Nocturnes

Undergraduate - Music

An important Romantic Era composer, Frederic Chopin composed 19 nocturnes for piano, plus 2 that were published posthumously. His nocturnes display a multitude of characteristics, from style and themes to form and inspiration, that are representative of the musical era. As a pianist, I have learned, studied and performed many of these nocturnes, and as a way to end my academic piano career, I aspired to study Chopin's nocturnes and write my own. This involved analyzing form and harmony, among other aspects of the music, and writing a paper that included form diagrams to accompany the score for my original composition. The paper describes the composition process while also synthesizing historical information and previous analyses of these works along with my own observations and contributions, in order to fully inform the piano piece I wrote. I will also be performing this piece myself as part of the presentation.

107. Lieu, Elizabeth

Identifying a metabolic vulnerability in KRAS/LKB1 co-mutant non-small cell lung cancer

Undergraduate - Biochemistry

Lung cancer is the leading cause of cancer related death among both men and women, non-small cell lung cancer (NSCLC) comprising about 85% of all lung cancer cases. NSCLC with co-mutations in the oncogene KRAS (K) and tumor suppressor LKB1 (L) reveal a particularly aggressive phenotype that is clinically challenging due to its lack of response to immunotherapy and lack of targeted therapies. To meet cellular demands for survival and proliferation, cancer cells often undergo metabolic reprogramming. By understanding these metabolic alterations, potential liabilities may be identified and exploited for therapy. By RNAi screening, KL cells were identified as selectively vulnerable to glutamine fructose-6-phosphate transaminase 2 (GFPT2) suppression. GFPT2 is a key enzyme in the nitrogen-related hexosamine biosynthesis pathway (HBP). Activation of the HBP in KL cells was demonstrated by gene expression profiling and metabolomics. Furthermore, using genetically engineered mouse models and cells grown in culture, findings suggest that the HBP is a potential metabolic target in KRAS/LKB1 co-mutants. Identifying this vulnerability potentiates the targeting of the HBP for clinical therapy of NSCLC patients affected by this aggressive phenotype.

108. Lojanica, Djordje

Bacterial Resistance to Antibiotics

Undergraduate - Biological Sciences

The ribosome is the site of protein synthesis in both eukaryotic and prokaryotic cells and it is made up of two subunits. In bacteria, it is composed of the 50S (larger) subunit which contains the Peptidyl Transferase Center (PTC) and Nascent Peptide Exit Tunnel (NPET), and the 30S (smaller) subunit which contains the decoding center of mRNA which makes sure that the base pairing between the codons of mRNA and the anticodon of Amino-Acyl-tRNA are accurate. The NPET is where a growing amino acid chain would leave the ribosome after the chain is formed in the PTC. T-RNA, on the other

hand, is a Ribonucleic acid molecule that reads the messenger RNA and brings in the corresponding amino acid into the peptidyl transferase center of the ribosome in order to form a polypeptide chain or protein. It should be noted that the ribosome is one of the main targets of antibiotics, specifically the PTC and the NPET sites of the 50S ribosomal subunit. When an antibiotic binds to these two sites, protein synthesis is stalled, and ultimately the bacterial growth is stopped. It was also determined in earlier experimentation that the specific tRNAs that are affected are the A-site Aminoacyl tRNA and P-site Peptidyl t-RNA. It was formally believed that PTC inhibitors such as Chloramphenicol, which “competes” with other aminoacyl tRNAs in the PTC; and that macrolides such as Erythromycin, which was thought to block the Nascent Peptide Exit Tunnel, block the formation of all peptides and thus inhibit protein synthesis. However, recent studies have shown that there are still peptides that come out of the NPET and that Chloramphenicol does not block the formation of all the peptides. Research conducted by Dr. Alexander Mankin has shown that the macrolides and PTC inhibitors act in a more context-specific fashion, meaning that they begin inhibition of protein synthesis when a specific arrangement or order between amino acids and the antibiotic is achieved. "In this project, "purification of translational machinery", our driving question is how do different antibiotics, such as PTC inhibitors like Chloramphenicol (CHL), as well as various macrolides such as Erythromycin (ERY), seem to stall the ribosome and ultimately inhibit the production of peptide chains through context-specific modes of action? Determining this will allow for the development of much more effective antibiotics as well as expand the current understanding of protein synthesis and the mechanisms in which antibiotics inhibit it. In order to determine this, 70S ribosomes and tRNAs from the bacterium known as *Thermus Thermophilus* will be used. *Thermus Thermophilus* is a Gram-negative bacterium. Some bacteria are classified as Gram-negative and some are classified as Gram-Positive. The difference can be found in their cell membranes. Gram-negative bacteria is a bacterium that has a thin membrane protecting the cell, whereas Gram-Positive bacteria has 2 membranes with a peptidoglycan space in between, resulting in a much thicker membrane than the formerly mentioned classification. Nonetheless, the Gram-Negative bacteria, even though it has a

thinner membrane, is more resistant to antibiotics compared to the Gram-Positive and thus makes it a better suitor for antibiotic experimentation.

109. Lucky-Ekeka, Ebosata

COVID-19 and its Psychological Effects on Health Care Workers

Undergraduate - Neuroscience

Abstract As the world currently lives under the unprecedented circumstances that COVID-19 brings, health care workers have been on the frontlines working with patients and the public to help tackle this epidemic. However, there has been a lapse in focus on the mental health of providers who ensure our general wellbeing and health especially at these times. A meta-analysis was conducted on 14 different articles to investigate the effects of the epidemic on the mental health of HCWs. From these studies, severe cases of stress related and mental health symptoms like depression, insomnia, anxiety and even PTSD, was observed among HCWs. Front line workers and nurses bore the brunt, having higher cases of depression, insomnia, and anxiety. Female HCWs compared to their male counterparts had higher risks of stress related symptoms like depression and anxiety. There was no account or studies on the effect of COVID-19 on ethnic/minority HCWs compared to their white counterparts. Based on the various factors of the mental health risks of HCWs, there were three common themes: shortage of PPEs, long hours of work in hospitals and high number of deaths witnessed amongst HCWs. Measures that could be beneficial in tackling the risks of mental health deterioration in HCWs were investigated with the hopes of opening further conversations on possible strategies to support HCWs and prevent future occurrences. This project delved deeper into the causing factors of mental health risks and explored strategies/solutions that may be beneficial to health providers during this time and future epidemics. Studies used for this project included patterns observed from health care workers, not only in Europe and North America, but Africa and Asian countries like China as well.

110. Lyszczarczyk, Małgorzata

Gut Microbiome and Maternal Glycemia: A Scoping Review

Undergraduate - Nursing

Background: Gestational diabetes mellitus (GDM) is a metabolic disorder characterized by the onset of hyperglycemia during pregnancy and is associated with short and long-term health complications for both mother and child. Research is emerging that targeting the capacity of the gut microbiome may be an approach to prevent and manage GDM. To date, initial studies show that women with GDM may exhibit a distinct gut microbiota profile with differences in structure, metabolic function, and composition in comparison to women without GDM during pregnancy. However, an examination of the gut microbiome and maternal glycemic control is in its infancy and a comprehensive, systematic synthesis on this knowledge has yet to be performed.

Purpose: A scoping review was performed to examine the relationship between gut microbiome, GDM, and maternal glycemia in pregnancy.

Method and Analysis: We used the framework by the Johanna Briggs Institute, which is an enhancement of the original scoping review framework by Arksey & O’Malley (2005) and the updated version by Levac and colleagues (2010). Non-interventional human studies and animal studies that examine the relationship between gut microbiome, GDM, and maternal glycemia in pregnancy were included. Five electronic databases (PubMed Embase, CINAHL Plus, CENTRAL, and ClinicalTrials.gov) were searched for original research articles in English. The Covidence online platform was used to navigate screening and data extraction by two independent reviewers.

Results: Wide variation between studies exist, with some demonstrating increased alpha diversity of the microbiome in those diagnosed with GDM and other studies demonstrating no change in diversity or structure of the microbiome.

Conclusions: This is the first scoping review to examine and assimilate the current evidence on the relationships between and the maternal gut microbiome and maternal glycemia. This is an emerging research area with great potential for improving the overall health status of mothers and their children.

111. Madugula, Aswini

Exploring the Effects of Informal Neighborhood Surveillance as a Vehicle for Housing Discrimination

Undergraduate - Computer Science

The article being reviewed presents an examination of the Nextdoor app as a vehicle for the propagation of racial disparity in modern American neighborhoods. Dr. Rahim Kurwa explores the history of the application platform, as well as its evolution into the current role it holds as a method of regulating race and promoting gentrification in the United States. Additionally, Dr. Kurwa investigates the critical partnership between police organizations and surveillance apps such as Nextdoor as a means of further establishing the carceral citizenship of racial minorities in predominantly white neighborhoods.

Citation: Kurwa, Rahim. 2019. Building the Digitally Gated Community: The Case of Nextdoor. *Surveillance & Society* 17(1/2): 111-117.

<https://ojs.library.queensu.ca/index.php/surveillance-and-society/index>

112. Mahmoud, Hoda

Computerized Adaptive Testing Mental Health and Socio-Economic Factors

Undergraduate - Biological Sciences

SES can play an important role in causation of mood changes in all age groups. SES is usually described as a combination of education, income and occupation, however many prominent factors play an important role in those three statuses. Race, ethnicity, living conditions, and environment can all greatly impact a person's SES which ultimately needs to be looked at when testing the impact SES has on the levels of anxiety and depression in our population . By exploring the correlation of different SES factors to perinatal depression and anxiety, we can assess more sophisticated and personalized treatments and preventative measures for mothers who are at higher risk of perinatal mood and anxiety disorders (PMAD). PMAD is the leading cause of maternal morbidity and mortality in countries, like the United States. These disorders can have a negative and long-term impact on the mother and the neurological development of the offspring due to the vulnerability of the perinatal period of growth. Although there is an ample amount of studies concentrating on collecting the numbers of women who experience depression during and post pregnancy, there is a scarce amount of studies that explore the different diagnoses of different mental illnesses perinatally and their accuracy. Additionally, there are many studies that have been conducted that explore the association between mental

illness and socioeconomic deprivation in the general population, however, fewer studies have assessed the perinatal population and many of those results are inconsistent.

113. Malo, Dana

Cardiac Angiosarcoma: A Case Report and Literature Review

Undergraduate - Biochemistry/ Economics

Cardiac angiosarcoma is a rare malignant tumor that is commonly diagnosed in the right atrium. At the time of diagnosis, a 44 year old male with signs of atrial arrhythmias and syncope was diagnosed with the cancer. The tumor was about the size of a golf ball, and was putting risk onto the surrounding vena cava and tricuspid valve. He underwent surgical removal of the tumor and underwent chemotherapy as well as radiation therapy. While the average life-span for patients with this type of cancer is about 5 months, the patient is now nearly 10 years out and has surpassed scientific expectations, which can be attributed to the nature of his treatment. It should be noted that the resection of the tumor also required removal of the sinus node, so the patient was administered a pacemaker. Current literature regarding primary angiosarcoma highlights the importance of early detection of the tumor, which stresses the importance of better imaging techniques. Treatment may prove unsuccessful if significant necrosis has occurred, which is a result of late detection.

114. Manalo, Steffi

Weekday Movement Behavior Patterns Amongst Adolescent Females During COVID-19

Undergraduate - Kinesiology and Nutrition

Movement behaviors are the combination of an individual's physical activity (PA) and sedentary behavior over a given period. Amongst females, there are increases in sedentary time (ST) and decreases in PA from childhood to adolescence, potentially exacerbated by the COVID-19 pandemic. Purpose: To describe movement behavior patterns during weekdays among female adolescents during COVID-19. Methods: Nine adolescent females (mostly whites and Non-Hispanics, mean age=12.3±.87 years) wore an accelerometer for 7 consecutive days to measure ST, light physical activity (LPA), and

moderate-to-vigorous physical activity (MVPA) during different periods of the day during the weekday. Periods were defined as before school (6-8:00AM), during school (8-3:00PM), after-school (3-6:00PM), and evening (6-10:00PM). Averages were calculated for LPA, MVPA, and ST at each weekday period and overall day (including weekend). Results: Females spend 103 ± 33.6 min/day in LPA, 35.0 ± 17.5 min/day in MVPA, and 908.54 ± 247.52 min/day in ST. Before school, females spent 6.64 ± 6.03 min/hr in LPA, 2.25 ± 2.22 min/hr in MVPA, and 36.96 ± 21.71 min/hr in ST. During school hours, females spent 6.26 ± 2.23 min/hr in LPA, 2.16 ± 1.14 min/hr in MVPA, and 49.73 ± 2.78 min/hr in ST. After-school, females spent 7.91 ± 2.30 min/hr in LPA, 3.58 ± 3.22 min/hr in MVPA, and 47.15 ± 4.95 min/hr in ST. During evening hours, females spent 6.41 ± 1.81 min/hr in LPA, 1.83 ± 0.85 min/hr in MVPA, and 50.46 ± 3.61 min/hr in ST. Conclusions: ST behavior occupied over half of each weekday period. Nationally, adolescent females averaged 24.6 min/day in MVPA pre-pandemic; our sample evidenced lower PA levels. Our sample achieved 58.57% of recommended MVPA for adolescents.

115. Manguerra Jr, Dave

Exploring Central Nervous System Inflammation in a Mouse Model of Sickle Cell Disease

Undergraduate - Biochemistry

Sickle cell disease (SCD) is an autosomal recessive monogenetic disorder that affects red blood cells, resulting in severe anemia, painful vasoocclusive crises, and widespread inflammation which lead to multiple organ injury. The neurological effects of SCD include strokes, cognitive decline and epilepsy. The rate of stroke in SCD patients is 10% by the age of 10 but increases to 24% by the age of 45. There is a paucity of information related to the effect of inflammation in the brain. We hypothesized the neuroinflammation in homozygous SCD mice (HgbSS) will display an increased number of activated microglia in comparison to heterozygous (HgbSA) and wild-type (HgbAA). To test this hypothesis, Townes Mice with human hemoglobin SCD genes inserted into them were studied ($n=40$; 16 HgbSS; 14 HgbSA; and 10 HgbAA). White blood cell (WBC) counts were analyzed for evidence of systemic inflammation. In addition, we

analyzed the brains from a subset of these animals for evidence of neuroinflammation. We specifically focused on activation of microglia, the resident immune cells of the brain, by staining for the marker Iba-1. HgbSS animals had severe anemia as indicated by decreased hemoglobin concentration ($p<0.001$). Additionally, HgbSS mice had elevated levels of WBC's including neutrophils, lymphocytes, and monocytes within blood. Average WBC counts across HgbAA, HgbSA, and HgbSS were 5.28 ± 3.14 , 6.38 ± 3.39 , and 19.82 ± 4.55 $10^3/\mu\text{L}$, respectively ($p<0.001$). Our preliminary results reveal a difference in the microglia of HgbSS animals compared to HgbSA carriers and HgbAA controls within the hippocampus and cerebellum. We plan to further characterize microglial inflammation by using the pro-inflammatory marker CD68 and the anti-inflammatory marker CD163. This work can provide additional information into categorizing the type of neuroinflammation that occurs in SCD and how it contributes to common neurological conditions seen in patients suffering from this condition.

116. Marattil, Rosann

Fighting Core Youth Oral Health: A Simple and Accessible Introduction

Undergraduate - Biological Sciences

Dental caries, commonly known as cavities, continue to be a problematic disease affecting all ages, but are most damaging at early childhood. This project created a video teaching model to help elementary aged children understand how and why it is important to prevent caries. The main contributor to caries formation is the presence of sugar and how long it is in the mouth. The popularity of sugary foods among this age group along with the lack of oral education in elementary curriculum, makes it important to create and utilize interactive learning models to educate children and parents. The video followed a storyline format where two characters are having a conversation about teeth. The story presented a problem and followed with a description of actions that will either exacerbate the problem or solve it. Certain key ideas were repeated to increase the chance of retention of information from the children. The goal of this project was to present the video to a classroom of third grade students and understand the video's success as a teaching model from feedback from the children and teachers.

117. Marchadi, Harini

Screening of Drosophila flies for mutations affecting lipid transport

Undergraduate - Biological Sciences

The exact mechanics of the lipid transport system in *Drosophila melanogaster* largely remains a mystery, especially with regard to how lipoproteins are loaded. These lipoproteins transport lipids out of the midgut, but the proteins involved in the loading process are largely unknown. This research project aims to make some headway in discovering the missing pieces of the lipid transport pathway. While the complete planned research project was unable to be carried out because of the COVID-19 pandemic, the research that was done still represents some progress in the identification and understanding of proteins that may be involved in the lipid transport pathway. To discover the existence of any new proteins involved in the lipid transport pathway in *Drosophila melanogaster*, mutant fly stocks that had been exposed to a mutagenic agent that produced a series of random mutations on the X chromosome were used. These mutant fly stocks were screened for a mutant X chromosome through the presence of fluorescence under a microscope. These mutant flies were then isolated and observed daily. The life stage at which these flies died was noted in order to determine the eligibility of the flies for staining with Oil Red O, which must occur at second instar or later. Three stocks were evaluated for viability for Oil Red O staining. All three stocks of flies died in the second or third instar, indicating both that some sort of lethal mutation was present and that this mutation was not embryonic lethal. These stocks are thus suitable for Oil Red O staining. If future work with Oil Red O staining does reveal lipid distributions consistent with interruptions in the lipid transport pathway it will serve as an indication that genes on the X chromosome may be involved in the lipid transport pathway.

118. Marei, Nada

Human salivary bacteria reduce dietary nitrates and may benefit health

Undergraduate - Biochemistry

Dietary nitrate (NO_3^-), obtained primarily from green leafy vegetables and beats, is metabolized to nitrite (NO_2^-) by nitrate reductases produced by facultative and obligate

anaerobic oral bacteria during anaerobic respiration. Nitrite formed in the mouth is swallowed, and enters the GI tract elevating the circulating nitrite levels, and is further reduced to nitric oxide (NO) by the gut microbiome. NO is further absorbed into the blood which acts as a vasodilator, causing the inner muscles' blood vessels to widen, thus increasing blood flow, lowering blood pressure, and benefit cardiovascular health. We hypothesize that oral bacteria in human saliva possess nitrate reductase that converts dietary nitrate to nitrite, and in turn, promotes overall health. The purpose of this study was to investigate the nitrate-reducing ability of oral bacteria in human saliva to convert nitrate to nitrite from nitrate-rich vegetable sources. Methods: Stimulated whole saliva samples were collected from adult subjects who refrained from oral hygiene the night before and morning of collection. Saliva samples were incubated with the dietary nitrate source anaerobically at 37°. Dietary nitrate sources tested in this study included ground kale, spinach, radish, beet, and celery. Nitrate reductase activity was assayed using the Griess test. Results: All test vegetables represented as good sources of nitrate, which were readily converted to nitrite by salivary bacteria. It was found that beets and radishes contained high amounts of nitrate, while strawberries, carrots, and onion were not good sources of nitrate. Conclusion: Dietary vegetables including beets, kale, radish, and spinach represent natural nitrate sources available for conversion to nitrite by salivary bacteria in the oral cavity. The conversion of dietary nitrates to nitrites in vegetables by salivary bacteria may contribute to the enterosalivary nitrate pathway and indirectly benefit cardiovascular health. Funding: Research supported by UIC Pediatric Dentistry Dept. IRB: #2006-0916.

119. Martinez Limo, Estefania

Descriptive epidemiology of malaria: Malaria in the indigenous population in the Loreto region of Peru

Undergraduate - School of Public Health

Malaria remains a major public health problem in Peru. Malaria is transmitted by female anopheles mosquitoes and is a significant cause of mortality and morbidity in Peru. Loreto is one of the departments that has the greatest diversity of ethnic peoples, with different languages and the largest volume of the indigenous population. Recent studies

have demonstrated that Malaria largely impacts the Loreto region of Peru but do not talk about barriers that the indigenous population has and what future research needs to be done. Thus, this paper aims to explore malaria in the Loreto region of Peru using a descriptive epidemiology approach from 2016 to 2019. This study examines the malaria problem in the Loreto region and how it is impacting the indigenous population. A literature review was conducted on previous studies and introduced recommendations to better understand the effects of malaria in the Loreto region. Interviews were also conducted to explore the barriers that indigenous communities have. Recommended strategies for interventions to prevent malaria include revisions of the malaria eradication program, connection or reference on how to get malaria-prevented materials, and implementation of health literacy programs regarding malaria. Some limitations that were presented in this study is completing a time limitation results in a small size of the interviews, the interview was accessed through the network (which could result in biases) as well respondents may not feel comfortable providing answers that percent themselves in an unfavorable manner, and lack of peer-reviewed analysis specifically for the indigenous community in the Loreto region.

120. Martin-Giacalone, Kamryn

The accumulation of kinesin in the presence of mutant tau

Undergraduate - Biological Sciences

In neurodegenerative diseases, such as Alzheimer's Disease and tauopathies, there is an increase of tau phosphorylation. Upon phosphorylation, tau undergoes a conformational change, which forms neurofibrillary tangles and results in the exposure of the N-terminal phosphatase-activating domain, or PAD. The exposure of PAD causes the binding and subsequent activation of the protein phosphatase 1 (PP1) and in turn dephosphorylates and activates GSK3 β through the removal of a phosphate from the amino acid serine-9 on the N-terminus of GSK. This study examines the relationship between the dephosphorylation of serine-9, the accumulation of kinesin, and ultimately the reduction in anterograde axonal transport. The phosphorylation of the kinesin light chain by the activation of the GSK3 pathway causes the release of kinesin from the vesicle and thus the inhibition of anterograde axonal transport. This hypothesis is supported by two

primary findings, the first being one of the western blot experiments that compares GSK3 β phos-ser9 immunoreactivity in control neurons and in neurons transfected with mutant full-length tau using anti-phos-ser9 antibody. The results of this western blot analysis showed that the control sample had higher levels of phos-ser-9 immunoreactivity than the sample treated with the mutant tau. This indicates the removal of phosphate from the ser-9 in the latter sample. These results are significant because it supports the hypothesis that addition of full length mutant tau leads to dephosphorylation of phos-ser-9 and thus the activation of the GSK3 pathway, which ultimately leads to the accumulation of kinesin and the inhibition of anterograde neuronal transport. Finally, imaging also shows the release of kinesin and its subsequent accumulations as well as tau aggregations that result in the degeneration of the neuron.

121. Mbou Simo, Sonia Laure

Regulation of the Drosophila Hox gene Sex combs reduced by the Dachshund and Bric-a-brac transcription factors

Undergraduate - Biological Sciences

Hox genes are required to specify segmental or regional identity of animal body parts during development, and differential Hox gene expression is correlated with evolution of new morphological features. This project investigates the mechanisms underlying the generation of segment-specific sense organ patterns on the legs found on the first thoracic segment of the Drosophila adult. The goal of this project is to understand the mechanisms through which two proximal/distal patterning transcription factors Dac and Bab regulate expression of the Hox gene, Scr. We hypothesize that Bab acts directly through a conserved sequence of an Scr leg enhancer to repress its expression in the distal leg and Dac acts indirectly to regulate Scr expression via repression of bab expression. To test our hypotheses, genetic and molecular analyses were performed to determine 1) Whether Scr and the Scr leg enhancer, ScrE, are responsive to Bab; 2) Whether expression driven by ScrE is dependent on Dac function 3) Whether deletion of a conserved domain (CS7) in ScrE, which causes distal expansion of ScrE driven expression, compromises responsiveness of ScrE to Bab and/or Dac. To understand whether Scr, ScrE, ScrE. Δ CS7 are responsive to Bab, we are using standard genetic approaches to generate bab2-gain-

of-function (GOF) clones. To determine whether expression driven by ScrE or ScrE. Δ CS7 is dependent on Dac function, we have assayed ScrE-GFP and ScrE. Δ CS7-GFP expression in dac loss of function (dac LOF) clones in the tibia and ta1 segments of prepupal legs. We have found that both ScrE-GFP and endogenous Scr expressions are turned off in the GOF of bab2 clones in tibia and ta1, which suggests that both Scr and ScrE are responsive to Bab2. This investigation will provide insight into Hox gene regulation and the mechanisms of P/D patterning TFs in T1 leg sense organ development.

122. Mehta, Aditi

Impact of Natural Mentoring Network on Youth Mental Health Outcomes

Undergraduate - Biological Sciences - Neuroscience

Mental health concerns can hinder youth development and result in difficulties pertaining to daily life. Prior research has shown mentoring as a promising intervention for strengthening the psychosocial outcomes of youth. However, meta-analytic evaluations thus far have found only an overall relatively small positive effect size for these outcomes. One hopeful avenue for enhancing the effectiveness of mentoring programs is to better understand naturally occurring mentoring relationships and their potential contributions to youth mental health. This study investigates how both the quantity and type of natural mentors (ex: teachers, coaches) may play a role in the mental health outcomes of youth primarily from low-income backgrounds. We used baseline data from a randomized control trial study of adolescents ($n = 1354$, average age 11.82 years, 63% boys) participating in the Big Brothers Big Sisters mentoring program. Youth self-reported both number and type of natural mentors. We utilized the dual-factor model (DFM) to consider both positive and negative dimensions of mental health through the incorporation of youth-report measures of subjective well-being (life satisfaction, self-esteem) and psychological symptoms (depressive symptoms). Youth were classified into one of four groups depending on having relatively high or low psychological symptoms and high or low subjective well-being. Data are still being analyzed. Implications for program-based mentoring and the dual-factor model will be discussed.

123. Mejia, Eileen

Effects of Eliminating Sugar-Sweetened Beverages on Glycemic Control in Diabetic Patients in Inpatient Behavioral Health Unit

Graduate - Nursing

The majority of Americans exceed the recommended limit of added daily sugar consumption and the main sources of added sugars include desserts, sweets, and sugar-sweetened beverages. Frequent consumption of sugar-sweetened beverages is associated with various adverse outcomes such as diabetes, metabolic syndrome, and insulin resistance. Better glycemic control has been shown to reduce complications that arise from said adverse outcomes. The primary purpose of this study is to test the effects of eliminating sugar-sweetened drinks on glycemic control among diabetics in an inpatient behavioral health (geriatric-psych) unit at St. Mary and Elizabeth's Medical Center (SMEMC). Secondary outcomes examined include: symptoms of anxiety and depression, Ativan (or alternative medicine) used to reduce anxiety associated with hyperglycemic/hypoglycemic events, and time and personnel costs to provide care for said events. This is an evidence-based project that uses a non-experimental, two non-equivalent group, pre-post intervention design. The intervention includes the elimination of sugar-sweetened beverages on the menu, removal of sugar-sweetened drinks at the two snack times, and increased access to healthier beverages throughout their stay. Healthier beverages include flavored water, sparkling water, milk, vegetable juice. Diet and unsweetened beverages, coffee, tea will remain available. Additionally, the providers and nursing staff at SMEMC observed excessive consumption of sugar-sweetened drinks by diabetic patients, glucose variability, increased resource use (e.g., staffing, supplies), and lower patient satisfaction related to an increased need for diabetes blood sugar testing that can be painful, and longer length of stays.

124. Memon, Sumbal

The Resistance of Atherosclerotic Plaques and Pain in Naked Mole-Rats and Their Use in the Prevention of Ischemic Stroke for Humans

Undergraduate - Neuroscience

Atherosclerosis is a disease in which plaques known as atherosclerotic plaques build up inside a blood vessel, thus narrowing the blood vessel and increasing the blood pressure

in the area. If the atherosclerotic plaque builds enough, it may block the blood vessel, leading to a rupture of the blood vessel. Due to this, atherosclerosis is a leading cause of ischemic stroke. However, there exists an animal that is extremely resistant to the cardiovascular issues that millions suffer from: the naked mole-rat. The intent of this presentation is to demonstrate the resistance of naked mole-rats to atherosclerosis and pain and, through that, devise a possible cure for the reduction or elimination of atherosclerotic plaques in humans.

125. Mercer, Ro and Debnath, Kamakshi

Evaluating the Usability of My Journey, a Mindfulness-Based Stress Reduction eHealth Program for Breast Cancer Survivors on Endocrine Therapy

Undergraduate - Neuroscience

INTRODUCTION: Approximately 80% of breast cancer survivors (BCS) are prescribed endocrine therapy (ET) for up to 10 years. ET adherence decreases breast cancer mortality rates by up to 28% and reduces the recurrence risk by up to 50%. ET adherence is critical to treatment efficacy, yet over half of BCS prescribed ET prematurely discontinue treatment. ET side effects can last for years and are an established predictor of nonadherence. Therefore, it is critical that side effects are effectively managed. We present a study that evaluates the usability of a mindfulness-based stress reduction (MBSR) eHealth program designed for BCS prescribed ET. The program, My Journey, aims to help patients manage ET side effects, improve HRQoL, and ultimately increase adherence to ET. METHODS: Usability of the My Journey prototype was measured via the Usefulness, Satisfaction, and Ease of Use (USE) scale, with higher scores corresponding to higher usability. Participants were also asked to provide qualitative feedback on the prototype. RESULTS: Participants (N=15) had a first-time stage I-III breast cancer diagnosis and were predominantly white (53%). Participants found My Journey usable based on the mean USE score of 106.3 (scale= 23-115, SD=7.7, range: 83-115). Open-ended feedback was overwhelmingly positive; notably, participants agreed that it was easy to remember how to use My Journey. Constructive feedback to change the prototype name was implemented in the final version. CONCLUSION: Ease of use and overall satisfaction showed that My Journey is usable for BCS prescribed ET.

The feasibility of My Journey is currently being evaluated in a randomized clinical pilot trial with 80 participants. Feasibility will be measured by examining the demand for the intervention, user satisfaction, and preliminary efficacy. Results are expected in the fall of 2021 and have the potential to inform remote delivery of symptom management interventions.

126. Miranda, Madeleine

RN/APRN/Student Nurse Role in Human papillomavirus Vaccination

Undergraduate - Nursing

According to the World Health Organization, 70% of incidences of cervical cancer are caused by strains of Human papillomavirus (HPV), making cervical cancer highly preventable in the United States since the release of the HPV vaccine. The HPV vaccine, Gardasil, was first approved by the FDA in 2006, then again with an updated version (Gardasil 9) in 2014. However, the number of cases in cervical cancer from 2006 to 2017 have experienced minimal change, ranging from 12,000-13,000 each year (CDC). Nurses play a significant role in patient advocacy and are integrated through all levels of the health care system (in-patient, primary care and outpatient clinics, women and family health centers, schools). This puts a level of responsibility on nurses to advocate for HPV vaccination administration and education. The objective of the scoping review is to comprehensively examine the literature related to the nurse's role in HPV vaccination of varying populations, and will identify gaps in knowledge of their role. Literature from 2010 to 2020 regarding nurses/APRN/student nurse role in HPV vaccination was examined. 107 total articles were identified through databases PubMed, CINAHL, and Embase. 29 articles were selected for data extraction. Nurses are knowledgeable about HPV, the HPV vaccine, its ability to help prevent cervical cancer, and support all eligible people to be vaccinated. Though, nearly all studies reflected that nurses did not perceive themselves as opinion leaders in the domain of HPV vaccination. This perception leads to a lack of confidence within nurses (particularly school nurses) to initiate conversation about the HPV vaccination. Nurses have a wide variety and increased amount of patient interactions, putting them at the forefront of education and influence on patients.

Encouraging and educating nurses about their vital role in HPV vaccination initiation, and completion can help increase the number of vaccinated people.

127. Mirza, Aliya

Eupenifeldin's mechanism of action in human ovarian cancer cells

Undergraduate - Biological Sciences

High grade serous ovarian cancer (HGSOC) is the fifth leading cause of all cancer related death in women. Due to a lack of early detection methods, HGSOC is usually not detected until stage III or stage IV, which becomes harder to treat. Due to this, treatment is more difficult, and leads to frequent relapses and recurrences. In addition, treatment methods have remained largely unchanged for the last thirty years. Natural products have been a lead source in drug discovery due to their unique structures that allow them characteristics capable of having anticancer activity. Eupenifeldin, a secondary metabolite extracted from a fungal species, has a chemical structure that may allow it to induce bioactivities, including anti-viral and anti-tumor activities. The results of cell viability assay reveal eupenifeldin is most potent against the following cell lines: OVCAR3, OVCAR5, and OVCAR8 with an average of 10 nM. A clonogenic assay was performed to measure eupenifeldin's potential as a cytotoxic or cytostatic agent. Results suggest eupenifeldin is a cytotoxic agent at 10 nM. To further understand the mechanism through which eupenifeldin causes cell death, western blot was conducted. Results indicate cleaved-PARP, a pro-apoptotic protein, as most visible at 72-hours in OVCAR3 upon treatment with eupenifeldin or paclitaxel, a chemotherapeutic agent used as a negative control. To solidify our understanding, Annexin-V/PI staining will be performed to see if cytotoxic cell death from eupenifeldin is occurring by apoptosis. As apoptosis may occur in a caspase-dependent or independent manner, a JC-1 assay will be executed to determine which pathway is being taken upon treatment with eupenifeldin. If eupenifeldin continues to show quality results, it can be used towards drug development in hopes of increasing the survival rate of patients with HGSOC.

128. Mirza, Faraz

Values and Their Importance in Spanish Adults with Acquired Brain Injuries

Undergraduate - Rehabilitation Sciences

Introduction: To enhance the therapeutic process, it is important that rehabilitation professionals understand their patients' cultural values. Integrating patients' values into treatment planning can increase patient adherence, satisfaction with care, and may improve health-related and quality of life outcomes. Purpose: To understand what values are the most important in Spanish adults with acquired brain injuries. Setting: In-patient brain injury rehabilitation center in Madrid, Spain. Population: Spanish-born adults with acquired brain injuries ($n=13$; 9 male, 4 female). The average age of participants was 49 years. Methods: Participants completed the 10-item Short Schwartz Value Survey (SSVS) to determine what values were the most important to them. The reliability and validity of the SSVS have been demonstrated internationally. Results: Descriptive statistics indicated universalism was the value with the highest importance rating at 7.31. The other 9 values ranked from most important to least important were: benevolence (7.15), conformity (6.54), security (6.38), achievement (6.08), stimulation (6), hedonism (5.69), tradition (5.54), self-direction (5.46), and power (4.08). Discussion: The Spanish individuals with acquired brain injuries who participated in this study prioritized values that emphasize self-transcendence and conservation over self-enhancement and openness to change. Rehabilitation professionals can use this information in the collaborative goal-setting process to emphasize how targeted outcomes benefit not only the patient but also their families and communities. Implementation of self-transcendent values in the treatment plan, for this population, may have primary benefits such as increased motivation, adherence, and satisfaction of treatment, which can produce secondary benefits such as improving patients' health outcomes and quality of life. Considerations: Understanding what values are important to a culture can inform rehabilitation professionals on how to approach and work with someone from that culture. A larger population is needed to make stronger claims that reflect a culture.

129. Mohammed, Mustafa

Human-Robot Collision Avoidance Scheme for Industrial Settings Based on Injury Classification

Undergraduate - Biological Sciences - Neuroscience

The objective of this paper is to develop a real-time, depth-sensing surveillance method to be used in factories that require human operators to complete tasks alongside collaborative robots. Traditionally, collision detection and analysis have been achieved with extra sensors that are attached to the robot to detect torque or current. In this study, a novel method using 3D object detection and raw 3D point cloud data is proposed to ensure safety by deriving the change in distance between humans and robots from depth maps. A depth camera is used at a birds-eye view in a factory for surveillance over multiple workers and robots. The distance will be used to determine the impact injury of a collision, and this data is used to create warnings for workers. By not having to deal with any potential delay associated with extra sensor-based data, both the likelihood and severity of collaborative robot-induced injuries are expected to decrease. This work has led to the development of an object tracker that predicts potential collisions between humans and robots with minimum safe distance, giving accurate warnings to workers. The methods that have been developed can lead to more promising steps in the creation of a more robust collaborative robot injury risk design.

130. Muppavarapu, Bhavana

The Role of Beta-Arrestins in a Rat Model of Interictal Spiking

Undergraduate - Neuroscience

About 50 million people are diagnosed with epilepsy, making it one of the most common neurological disorders globally. Despite this, many of the molecular mechanisms causing seizures and electrical discharges between seizures (referred to as interictal spiking) are still not well understood. One of the cellular pathways that are enriched during spiking and seizure activity is the mitogen-activated protein kinase (MAPK) pathway. It is thought that inhibition of this pathway could help prevent the onset of seizure activity. Certain molecules outside of the MAPK pathway can cause downstream effects in this pathway that could potentially affect seizure activity. For example, beta-arrestins are adaptor proteins that regulate GPCR signaling. They also act as scaffolding proteins that help form the MAPK complex within the cytoplasm. Previous literature suggests that beta-arrestin 1 inhibits seizure activity while beta-arrestin 2 promotes seizure activity. My capstone project will examine the potential role of beta-arrestin 1 and beta-arrestin 2 in

the development of interictal spikes. To investigate this, I will be setting up Western Blots using tissue from rats treated with tetanus neurotoxin (TeNT) to identify early subcellular changes in levels of beta-arrestin 1 and beta-arrestin 2 at different time points and in brain regions with different levels of spiking. Beta-arrestin levels will be measured in synaptic, cytoplasmic, and nuclear fractions. Alterations in subcellular distributions of beta-arrestins can give us great insight into the functions of these proteins because the roles of proteins are different depending on where in the brain they are found. The results of this investigation will further our understanding of the molecular mechanisms underlying interictal spiking.

131. Myles, Jessica

School Resource Officers: The History, Impact, and Alternative Solutions

Undergraduate - Criminology, Law, and Justice

School Resource Officers are a method of safety patrol in schools that has been aggressively implemented within the past few decades in America. By federal definition, according to the National Association of School Resource Officers, a School Resource Officer (SRO) is a “career law enforcement officer with sworn authority who is deployed by an employing police department or agency in a community-oriented policing assignment to work in collaboration with one or more schools”. Since the war on drugs and shift to punitive punishment, society has begun to hyperfocus on the penalization of juvenile misbehavior. When more school shootings were widely recognized the shift was heightened. A major element to this shift was the mass hiring of School Resource Officers. These responses to delinquency and violence have led to disparities and the main avenue in the school-to-prison pipeline. A few disparities identified are an increased number of juvenile arrests and interaction with law enforcement, negative relationships between students and police, disproportionate impact for children of color, budget deficits, and civil rights infractions. This research aims to explore the roles, effects, and attitudes towards school resource officers. It will specifically address attitudes towards and methods of school resource officers in the context of the Chicago region as well as in general.

132. Narayanan, Yashodha

Effects of Patient Outreach on Pediatric Clinic Visits and Teen Mental Health during COVID-19

Undergraduate - Biological Sciences

The COVID-19 pandemic has presented novel circumstances that have impacted patient access to healthcare, as many patients are unsure if it is safe to go into their clinics.

Additional barriers are presented by a lack of safe and accessible transportation and a loss of insurance for parents facing unemployment due to the pandemic. Many parents also do not have time to bring themselves or their children to appointments, with many of them working from home and with their children's online learning. The purpose of this project is to focus on the impact of telephone outreach efforts implemented during the pandemic to increase sick and well-child visits, specialty appointments, and maintain regular vaccination schedules. Through calling the pediatric population of the UI Health Child and Youth Center, the patients are able to learn that clinics are safe and open, are able to make any appointments they need, and are able to learn about the Path 2 Purpose teen mental health program. A follow-up with patient outcomes after the telephone outreach provides insight into the efficacy and efficiency of the strategy.

133. Naseem, Umair

The role of RMTg-projecting mPFC neurons in ethanol-induced conditioned taste aversion

Undergraduate - Biological Sciences

Ethanol (EtOH) has both rewarding and aversive properties, for example, euphoria and sedation, respectively. The rewarding properties of EtOH highly promote continued, and frequent drinking, whereas aversive properties limit drinking (Verendeev & Riley 2012, King et. al 2013). In humans, these properties are measured using survey-based methods that ask individuals to report how "high, intoxicated, energized" versus "sedated, low, heavy head" they feel after consuming alcohol. Because rats are not able to describe their experiences and emotions, we use conditioned testing to understand how they perceive EtOH. EtOH-induced conditioned place preference is a behavioral paradigm that can measure the rewarding properties of drugs including EtOH. On the other hand, aversive

properties are measured using EtOH-induced conditioned taste aversion (CTA). The rostromedial tegmental nucleus (RMTg) is a brain region involved in aversion. For example, inhibition of RMTg neurons reduces normal fear responding (Jhou et al., 2009a). The medial prefrontal cortex (mPFC) sends a dense projection to the RMTg (Jhou et al., 2009b). mPFC has a lot of functional overlap with RMTg. Though mPFC activity has already been implicated in CTA, it is unclear whether the specific projection from mPFC to RMTg mediates EtOH-induced CTA. To examine this, we measured cFos expression, a marker of recent neuronal activation, after EtOH-induced CTA in the mPFC of rats injected with a retrograde tracer, cholera toxin B (CtB), in the RMTg. In doing so, we were able to determine the level of activation in RMTg-projecting (CtB+) mPFC neurons during CTA and infer their involvement in this behavior. After counting the CtB and CtB+cFos double-labeled cells, the ratio of (CtB+cFos)/CtB was calculated. The average ratio of each subregion of the mPFC was calculated. Due to a low sample size, no significant difference between regions was observed. Additional data from another group of rats treated identical to those described above is currently being collected in an effort to increase our sample size and better understand whether there are specific projections from mPFC to RMTg involved in EtOH-induced CTA.

134. Naser, Ranya

The Bilingual Multitasking Advantage

Undergraduate - Integrated Health Studies

Studies have proven bilingualism to serve as a benefit to one's cognitive abilities; studies have proven that learning a second language to be a good preventative method for chronic illnesses like Alzheimer's. The study of bilingualism and multilingualism has grown significantly and has yet to be further explored in order to determine its effects on multitasking and switch tasking. There is a link between the ability of bilinguals to multitask better than individuals who are bilingual. 30 participants took part in this online study: 10 were English monolinguals, 10 were Spanish-English Bilinguals, and 10 were Arabic-English bilinguals. Participants were assessed for language proficiency through a series of questionnaires and were then asked to participate in two types of multitasking assessments. Through a computerized typing task, participants engaged in a switch-

tasking assessment to assess speed and quality by simultaneously typing a given series of phrases and numbers; completion time and accuracy were analyzed. Background tasking, or the ability to focus on a specific prompt, was evaluated through a dichotic listening assessment in which two short stories were overlapped into an audio recording; participants were asked questions about both stories. Both bilingual groups displayed higher average scores during the dichotomous task as well as an average of faster response times during the switch-tasking assessment. English monolinguals had a statistically significant slower speed compared to both bilingual groups. These data will help determine if bilinguals have an advantage that can be life-saving. For example, faster switch tasking may mean faster reflex responses while driving or doing other tasks. Such data may lead to more scientific breakthroughs, especially when conducted on a larger scale.

135. Neely, LeRayah

Constructing Fermilab's Glidein Workflow Management System's Testing Application

Undergraduate - Mathematics, Statistics, and Computer Science

Particle physics requires copious computing resources to extract physics results. Such resources are delivered by various systems: local batch farms, grid sites, private and commercial clouds, and supercomputing centers. High Performance Computing (HPC) centers have always been an opportunity and a challenge due to the uniqueness of their architectures. GlideinWMS is a workflow manager provisioning resources for scientific computing. It is used by many collaborations including the LHC experiment CMS, all the FIFE experiments at Fermilab and by the HEPCloud portal. It simplifies greatly the use of computing resources for problems that can be broken down into chunks executed on multiple nodes. This project's goal was to accomplish the following: Help to extend GlideinWMS to streamline the execution on supercomputers of highly parallel data selection workflows (skimming) used in High Energy Physics experiments by validating job processing sites by submitting test workflows and allowing operators to submit these test workflows via a web interface.

136. Nguyen, Tu

Serious Game for Learning about the Brain Anatomical Structure and Brain Diseases

Undergraduate - Biochemistry

Game is a familiar concept of a structured form of play, which is regulated by its rules and goals. Every game has content which the players are encouraged to learn about and be good at. Thus, game can be used as a tool for education by engaging the educational goal in the content of the game. Serious game is a type of game that is designed for a primary purpose other than pure entertainment. The serious game has been used in various fields, such as education, scientific exploration, and health care. This project proposes a design of a serious game for learning about the anatomy of the human brain and brain diseases. These learning goals are embedded in the content and the mechanics of the game. The players will engage in active learning by performing different game activities as well as passive learning by viewing the game contents. Like many other serious games, this project aims to take advantage of gaming to enhance the learning experience of the players. Games attract people by allowing them to experience positive feelings from overcoming obstacles, defeating challenges, and getting rewards. Also, the players are engaged because the game makes them the main character of the story, giving the players meaning for their accomplishment in the game. By practicing these game principles, this project aims to design an entertaining and informational serious game for children ranging from the ages of 10-15. This target audience was selected because of their general understanding of the human brain and its role. The players will learn about the brain structure and diseases through interacting with anatomical characters and combating monsters representing different diseases.

137. Noguera, Cindy

Exploring Genetic Counselor's Experiences with Adolescent Patients

Undergraduate - Applied Psychology

Genetic counseling is the process of providing individuals and their families with information on the nature, inheritance, and implications of genetic disorders to support them in making informed medical and personal decisions. In the adolescent population,

many genetic counselors encounter challenges by working with them since adolescence is the time of many distinct changes. Previous research has analyzed adolescents' and parents' perspectives on the field of genetic counseling rather than genetic counselors' own views and experiences. In the studies that included the genetic counselors' voice, they were portrayed as unhelpful. This study aimed to address the gap in literature by exploring genetic counselors' perspectives on working with the adolescent population. Eligible participants for this study were board-certified or board eligible counselors who have provided counseling services to adolescents within the last five years in Illinois, and they were surveyed via Qualtrics XM. When asked about their challenges in counseling adolescents, the majority of the participants believed that engaging adolescents in the session was the major challenge followed by balancing parental involvement while maintaining confidentiality of the patient. For that reason, it is crucial to provide adolescents with appropriate resources that will guide them through the process to minimize parental involvement when appropriate. Overall, this study has illustrated some of the challenges that genetic counselors face when working with adolescents, and it is an indicator that genetic counselors may not have the appropriate knowledge to be as effective in this setting. To conclude, it is important to hear from both sides regarding the experience in order to learn the best strategies for fostering a trusting relationship, so the next generation of genetic counselors is better informed.

138. O'Donnell, Robert

Preoperative Symptom Duration Does Not Affect Clinical Outcomes after High Tibial Osteotomy at a Minimum of 2-Year Follow-Up

Undergraduate - Liberal Arts and Sciences

This project will be in a slideshow format discussing a research project I worked on during my time at Midwest Orthopaedics at Rush. This was an Orthopaedic study done on high knee osteotomies. An osteotomy is the process of removing bone from the tibia in efforts to realign the angle between the tibia and the femur. Patients who receive this treatment have exhausted all other non-invasive procedures such as NSAIDS, physical therapy, and injections. Typically their long limb alignment is classified as valgum or varum depending on if their knee bends out or in regular alignment. This study goes over

whether patients who receive treatment within two years of reporting symptoms receive better outcomes compared to patients who receive the same surgery with more than two years of having symptoms. This study would help physicians better recommend the surgery.

139. Ogunniyi, Victoria

The Case for Code-Meshing: Gauging Instructor Responses to the Use of AAVE in Academia

Undergraduate - Neuroscience

Standard language ideologies posit that there is only one acceptable language form and that any forms outside of this standard should be deemed incorrect. Though studies have investigated how current and prospective educators advance standard language ideologies in academia, such as through an insistence on code-switching, few have gauged how educators respond to specific instances of code-meshing in academic contexts, wherein nonstandard English is used in conjunction with Standard Academic English (SAE). This exploratory study conducted at an urban public research university aimed to gauge educators' self-reported language ideologies and responses to samples of oral and written academic discourse by professors and college students containing code-meshed SAE and African-American Vernacular English (AAVE). Using a modified version of the Language Aptitude Scale (Ford, 1978), participants, all of whom were current or prospective instructors, completed a survey in which they were asked to respond to three code-meshed academic samples, followed by a 19-item section of Likert scale questions gauging agreeability with several statements about AAVE. Eight additional hour-long semi-structured interviews were conducted with faculty in roles that oversee students' academic placement or progression, as well as faculty and graduate students across three disciplines who identified themselves as being conversant in AAVE. Based on their responses, these populations may tend to think about the viability of code-meshing in academia and general academic language diversity in terms of their perception of relative expectations, which is dependent on how they imagine writers and their intended audiences and choices, rather than overarching and anticipatory judgements.

Additionally, strongly positive perceptions of AAVE use in academic texts are influenced

by individual characteristics, such as time spent teaching, familiarity with language diversity, and academic department.

140. Okoli, Deborah

The Effects of Bariatric Surgery on Patient-Perceived Hunger and Appetite and Chronotype Shift

Undergraduate - Psychology

Obese individuals who undergo bariatric surgery experience metabolic changes post-surgery that improve other medical conditions they may be suffered from due to obesity. In addition, these individuals experience changes in levels of circulating endocrine hormones related to hunger regulation as well as changes in self-perceived morning and fasting hunger and appetite levels. Based on this knowledge, the focus of our inquiry is to integrate meal timing (aka length of overnight fasting) with potential changes in dietary behavior pre- vs. post-surgery. In addition, we seek to investigate whether obese women have a later sleep chronotype (i.e., go to sleep/awake) and a later dietary chronotype (i.e., eat more calories later in the day/evening) than non-obese women. Patients who underwent elective sleeve gastrectomy surgery were enrolled in this study. To study post-surgery changes in patient-perceived hunger and appetite, patients were given four mini-meals per day and completed questionnaires before and after each meal assessing their perceived hunger and appetite. This was done before surgery and after surgery. Measurements of hunger included satiety and strong desire to eat. Measurements of appetite included appetite for sweet and salty foods. The responses were collected and converted to a ten-point scale using a software program called ASWIN. To study changes in dietary and sleep chronotype pre- vs. post-surgery, patient-completed actigraphy logs of recorded sleep and waking times and food logs of recorded mealtimes were analyzed.

141. Oros, Giulia

Sweet Dreams: An Exploratory Cross-Sectional on Type I Diabetes and Sleep Quality

Undergraduate - Nursing

INTRODUCTION: This project investigates the potential relationships between sleep characteristics and glucose management in type 1 diabetes (T1DM). The aim of this paper is to review existing research on the incidence of sleep impairment in T1DM as well as utilize survey data collected from ten U.S. adult participants diagnosed with T1DM for analysis. **OBJECTIVES:** An exploratory qualitative study was performed to examine a group of ten participants ages 19 through 42 with T1DM. The following research questions are examined: (1) To what extent does having T1DM have on predicting lower sleep quality and higher excessive daytime sleepiness? (2) How does having a higher or lower A1C relate to sleep quality? (3) How does the number of night awakenings relate to sleep quality and diabetes distress? **METHODS:** Outcomes are assessed in the domains of diabetes management, sleep quality, and night awakenings as self-reported by the participants on the sleep surveys. These measures, along with the predictor being the diagnosis of T1DM in the participant's life, will be assessed. An analysis of the data was collected from the surveys completed by 10 participants completed using frequencies, mean averages, and Spearman rho correlations.

RESULTS: Frequencies on reported sleep behavior revealed that during the time they completed the sleep surveys: 30% of the participants reported never having awoken during the night, 33% reported having been awoken once, 25% reported twice, and 12% reported more than twice in the span of the sleep surveys. Subjects with a higher A1C level were more likely to report less time awake during their night awakenings than those with lower A1C levels.

142. Palmer, Bryttani

Teachers' Use of Bitmoji Classrooms

Undergraduate - Human Development and Learning

Developed to help deliver critical content during the Covid-19 Pandemic, Bitmoji classrooms replicate the physical classroom in the virtual space and are an innovative tool for teachers to deliver meaningful and engaging content to students virtually. Critics of Bitmoji classrooms claim they are a frivolous waste of teachers' time that could be spent elsewhere, and that Bitmoji classrooms pose serious accessibility issues to some students and parents. The purpose of this research is to ascertain how and why teachers are using

Bitmoji classrooms in their instruction during the 2020-2021 school year. Furthermore, this research will assess to what extent teachers consider Web Content Accessibility Guidelines and other accessibility issues when creating and using Bitmoji classrooms in their instruction, with the expectation that Special Education teachers will provide the greatest level of accessibility in their use of Bitmoji Classrooms. This presentation uses survey data collected from 80 different teachers using Bitmoji Classrooms in their instruction during the 2020-2021 school year, and one teacher as a case study for an in-depth look at the motivations behind implementation of Bitmoji classrooms. It is expected that findings will demonstrate that teachers who received professional development about accessibility in technology provide the greatest amount of accessibility in their Bitmoji classrooms, and teachers use Bitmoji classrooms to drive engagement during virtual learning. Findings from this study are preliminary and should be used as the basis for future research's analysis of accessibility of virtual learning and instructional practices during the 2020-2021 pandemic school year.

143. Parihar, Meenakshi

Allosteric Regulation of K-Ras through Calcium Interactions via NIH 3T3

Undergraduate - Biological Sciences

I first off wanted to introduce as to why I decided to do research in this lab, and why I wanted this project to serve as my honors capstone. My first sort of scientific professionalism came from an internship in which I did a lot of literature reviews and research on the STAT-3 gene and K-Ras protein. In my time at UIC as an undergraduate, I was able to find and participate wet lab research involving each of these, which was very insightful as a scientist to apply lab techniques to literature research I had done on my own. While this type of skill is pushed for students to learn in school, it was enlightening to have the opportunity to do something like this outside of class. In general, K-Ras is deemed to be an “undruggable” protein in the scientific community. Although this is of course untrue, it is said this way due to its complex structure and activity. However, recent literature studying K-Ras structure and function has found that K-Ras activity (measured by GTP) increases when mutants of the protein are activated. Although there are not many studies out there, some NMR studies of the protein show

that when ions/antibodies are bound to the allosteric region of the protein, the protein undergoes a structural conformation change in which the mutants are activated. Since the K-Ras protein is involved in many cancer pathways (ie; IL-6), understanding its activity and function can help scientists inhibit its function in pathways, overall eliminating cell proliferation. While this project was originally supposed to use colorectal cell lines (since colorectal cancer pathways involve K-Ras immensely), it now calls for using NIH-3T3 cell lines instead. This was more of an upstairs decision in the Biochemistry & Molecular Genetics department, mainly because cancer cell lines can often be unpredictable and unreliable when concluding data. In this project, our lab has concluded that from NMR studies, the ion that can be bound to K-Ras's allosteric region has similar properties, both functionally and structurally, to that of the calcium ion. Our hypothesis is that we can activate the K-Ras protein by calcium binding to its allosteric region, and in doing so we can determine the effects of calcium-mediated allosteric regulation on effector binding in wild type (WT) K-Ras, as well as its mutants (ie; G12-D, G12-V, etc).

144. Patel, Adam

Habitat Requirements for the Grey-headed Robin (*Heteromyias cinereifrons*) in the Wet Tropics

Undergraduate - Biological Sciences

My research project entailed observing the grey-headed robin (during the early mornings and late evenings) for multiple weeks in order to record their preferred habitat locations (there were three different habitat locations found within the area in which we conducted our research). This information will give us a good idea of how the habitat preferences have changed in accordance with an increase in temperature that Australia has experienced over the last handful of years due to global warming. Our goal is to figure out what habitat is preferred for future restoration projects when this bird will inevitably decrease in population due to climate change.

145. Patel, Ameena

MTK Randomization Analysis of Mitochondrial Crista Junctions in Inner Ear Hair Cells

Undergraduate - Biological Sciences

Mitochondria contain crista junctions, or openings of the inner folds of the mitochondria into the intermembrane space. The function of these crista junctions may be related to ATP production or transport. The purpose of this study was to determine if these crista junctions are polarized toward specific cellular organelles within inner ear hair cells, as well as to determine a valid control group for data analysis. One such organelle is the cuticular plate, which requires ATP to perform its function in returning stereocilia rootlets back to their original position. Mtk analysis is a useful tool in order to determine spatial density and proximity by providing a graph that measures the number of crista junctions as a function of distance from the cuticular plate. We hypothesized that a control group was necessary for comparison to the experimental results. Randomization serves as a control, since it shifts objects (in this case, crista junctions) within a bounded space in a random manner. This study served to understand the function of the various randomization parameters specific to the purpose of the program for our lab. The method involved trial-and-error as well as a systematic approaches toward the goal of randomization of structures within a boundary area. After the randomization procedure was complete, the program was applied to a specific model. The results indicate that there is a non-random association between the crista junctions and the cuticular plate. The implications of these data include the possibility of subtypes of mitochondria and differences in their structure depending on their location within a cell or in different types of cells. Mtk analysis and the randomization procedure will be used on additional models to compare and validate data, as well as to refine the current procedure for randomization.

146. Patel, Anish

Case Study: Effectiveness of Tele-Rehabilitation

Undergraduate - Neuroscience

In recent years, the world has witnessed the rise of a revolutionary method of providing healthcare. In this digital age, telemedicine has offered secure, convenient, and effective communication between healthcare providers and patients. The COVID-19 pandemic of 2020 disrupted all elective medical procedures and forced many outpatient clinics to

transition to a telemedicine platform. Companies such as Livongo Health, Teledoc, and Doxyme suddenly became the new default for many healthcare providers to communicate with their patients. Specialties such as internal medicine allow this platform to be a feasible method of providing care, since most patient visits entail analyzing empirical data and determining a treatment plan with the physician. However, using telemedicine in other specialities does pose some significant challenges. Physical therapy rehabilitation requires hands-on treatment and careful oversight by the physical therapist in order to ensure that the patient is completing exercises properly. This is a crucial aspect of the treatment and has a direct impact on the patient's recovery. Despite these challenges, it is worthwhile to investigate if telerehab is a feasible and effective treatment method for the future, even during times when a pandemic is not occurring. This is especially useful with stroke rehabilitation patients. Typically, these patients are impaired to some degree, which makes it difficult for them to travel to their physical therapy sessions. They frequently have to rely on other members of their family or friends in order to attend their physical therapy sessions. Furthermore, making telerehab sessions more convenient for the patients decreases the likelihood of missed sessions - maximizing the chances for the patients to improve their mobility. In this study, several questions will be investigated. The feasibility of telerehab will be considered, in order to determine if this is a viable treatment method for the future. The preliminary data from patients that underwent telerehab with the Brain Plasticity Lab will be considered and possible opportunities for improving telerehab will be discussed. Finally, the preliminary data from this patient sample will be examined to determine when, if any, changes were observed in patient performance. Answering these questions will help determine the efficacy of telerehab as a treatment method and if deemed successful, promote physical therapists to advocate for telerehab as a treatment option.

147. Patel, Bhagvat

WWI: The War to Begin all Wars

Undergraduate - History

There has been research done on the effects of being in the battlefield on the soldiers of WWI, but this narrative tends to focus on trauma that occurred while fighting. In doing

this, the narrative of soldiers as well as those that took care of them that spent considerable time helping them recover from gruesome injuries gets overlooked. Facial disfigurement and limb loss were not only physically painful, but they caused extreme psychological stress. It is important to look at the psychological effects of facial trauma and limb loss during WWI in light of the innovations brought to plastic surgery. Current narratives tend to focus on the physical trauma and mental health separately. If they do address physical trauma and mental health together, it is in a way that does not follow the actual experiences of soldiers and nurses that had to acclimatize back into their post-war societies. These narratives are relevant in today's world because war has not disappeared. It has changed form, but in the 100 years since WWI, the mental health of those that experience war has been grossly neglected. Looking at the physical and emotional distress that the violence of WWI caused serves as a warning for all generations that follow.

148. Patel, Kajal

Effect of Supplemental Nutrition Assistance Program (SNAP) on the Nutritional Profile of Participants

Undergraduate - Biological Sciences

The Supplemental Nutrition Assistance Program (SNAP) is a government funded program that aims to provide low income families with monetary benefits to supplement their existing food budgets. Its main goal is to reduce food insecurity and provide families with means to live healthier lives. The existing program is a derivative of earlier federal programs that have aimed to alleviate food insecurity in the United States, most famously the Food Stamps program. SNAP is funded under the United States Department of Agriculture's department of Food and Nutrition Services. It was renewed in 2018 by President Donald Trump, ensuring that the program run for another five years until 2023. The program is an entitlement which means that any applicant to the program that meets the eligibility criteria will receive benefits. To qualify for the program, households must fall below 130% of the federal poverty for gross income. Low income families, the elderly, and disabled are mostly eligible while college students, undocumented immigrants, and certain immigrants are ineligible. In 2020, SNAP provided monetary

benefits to 39.8 million americans. The number of participants enrolled in the program has decreased over the last five years by 7 million people, partly due to more participants becoming ineligible for the program. While the program has been successful in providing low income families and individuals with a means to buy food and reducing food insecurities, the extent to which the health and nutritional status of the participants in the program has changed has not been widely studied. This is in part due to the limited data available on the purchases made by SNAP participants as well as the USDA's refusal to release stored data. Some studies have been conducted to evaluate the nutritional status of the program's participants, however these studies are not exhaustive. The aim of this study is to observe the changes in the nutritional status of SNAP participants since 2017 by evaluating existing literature on the topic.

149. Patel, Krupa

Hydrolytic Activity of Strontium Oxide

Undergraduate - Liberal Arts and Sciences

Several metals ions with different charge and solubility were screened for reactivity under biologically relevant conditions. Their reactivity was tested by their ability to hydrolyze model peptide bonds and glycosidic bonds via chromogenic assays monitored by UV-Vis absorption. The environment in which these metals and metal oxides were chemically mimicked those of the biological tissue and oral cavity. To much surprise, strontium oxide possessed the superior hydrolytic activity under a variety of chemical conditions. Strontium oxide was further pursued to explore both its surface chemistry and as well as its relevance to strontium ranelate, which is an antiosteoporotic drug that increases bone formation and reduces bone resorption. The discovery of strontium oxide's hydrolytic activity towards model biomolecules may be translated to a future clinical setting, as strontium is a known component of various dental filling materials.

150. Patel, Nevan

Stereotypical Gender Congruency and Personal Pronoun Use: Can Breaking the Gender Binary in Language be Achieved?

Undergraduate - Biological Sciences

Within recent years, introducing oneself with personal pronouns has become significantly more normalized. This movement of inclusivity has seen more of a push due to the increasing rejection of a gender binary and has resulted in more individuals feeling in tune with their own identity. This study is testing stereotypically gendered pronoun-antecedent congruence through the presentation of “congruent” and “incongruent” pronouns in short sentences involving subjects with some of the most popular gendered names within the past decade. One of the primary aims is to answer whether individuals tend to spend more time when they read a pronoun that may not be congruent with their perception of the gender identity of another. Additionally, this project works to answer if individuals actually remember the pronoun of subjects in a sentence along with their level of confidence of each choice. Through testing both reading time and retention of the personal pronouns presented in these sentences, differences in both “congruent” pronoun use and “incongruent” pronoun use can effectively be compared. The results of this study are important in interpreting whether breaking the gender binary, specifically in the instance of names and their perceived gender, can be achieved effectively. Better understanding this topic will help to gauge the progress that has been made in the field of LGBTQ+ and gender linguistics.

151. Patel, Pooja

Examining the Effect of Clozapine Treatment on the Expression of Long Non-Coding RNAs Associated with Schizophrenia

Undergraduate - Neuroscience

Schizophrenia is an incredibly complex psychiatric disorder. The current and common assumption is that genetics play a role in the development and pathogenesis of schizophrenia. Long non-coding RNAs (lncRNAs) are expressed from larger genomic regions and could represent the ‘genetic’ signal widely accepted. Recently, studies have indicated that several long non-coding RNAs may play a role in regulating schizophrenia-related genes. Of the many long noncoding RNAs that are expressed in the central nervous system, DGCR5 and MEG3 have been said to play a role in regulating the expression of schizophrenia-related genes. The goal of this study was to observe the effects of the antipsychotic, clozapine, on the expression of DGCR5 and MEG3.

Differentiated SH-SY5Y neuroblastoma cells were used as a cellular model to study the impact of clozapine treatment on the expression of MEG3 and DGCR5. For each experiment, one replicate consisted of 6 samples, three of which served as controls and three of which were treated with clozapine administered over three different time intervals: 1, 4, and 24 hours. Fold changes in the expression of MEG3 and DGCR5 in control and clozapine treated samples were determined for each administered treatment duration. The preliminary findings of this study indicate that clozapine treatments administered over different time intervals cause the expression of MEG3 and DCR5 in SH-SY5Y cells to vary from the control expression. While further studies must be conducted to validate the direction in which the expression changes, this study indicates that the expression of lncRNAs, MEG3 and DGCR5, in SH-SY5Y neuroblastoma cells may be impacted by the treatment of clozapine. By continuing to study the impact of clozapine treatment on lncRNAs associated with schizophrenia, we may gain an insight into how antipsychotics such as clozapine can help manage schizophrenia and better understand the complex genetic underpinnings of schizophrenia.

152. Patel, Radhika

Observing Cognitive Flexibility at 12 months

Undergraduate - Biochemistry and Psychology

Young children are constantly learning how to self-regulate their own emotions in ways that facilitate coping with strong emotions in a constructive way. The When to Worry (W2W) study is centered around how different young children grow and learn to manage their emotions in positive ways. The goal of the study is to identify early signs that can potentially help identify when young children need more support to manage their mood and behavior. Cognitive inflexibility aims to account for the difficulty flexibly adjusting to cognitive challenges and reflects the child's active attempts to engage in multiple strategies when confronted with a task. The measure allows for the analysis of how children are able to take different perspectives, shift priorities, and redirect attention from one thing to another. The aim of my research study is to validate the measure of cognitive inflexibility utilized in the Attention Regulation modules of the Disruptive Behavior-Diagnostic Observational system (ARM-DB-DOS). The biggest indicator of cognitive

inflexibility from the attention regulation module is the shape sorter task. The task involves the child actively attempting to push the shapes into the respective holes with the guidance of a parent. The child is given a score from 0-3 depending on the behaviors demonstrated during the task. The research will provide data on the validity of a novel measure of infant attention regulation. The study will allow us to determine what behaviors are developmentally appropriate for humans at 12 months of age. Furthermore, the research will be combined with data from validated parent report measures to determine if more accurate results can be obtained. It is hypothesized that the study will validate the measure of cognitive inflexibility utilized in the ARM-DB-DOS. The research will provide efficacy allowing for valid measurements of the construct in this coding scheme.

153. Patel, Shreekar

Strategies for Equitable COVID-19 Vaccine Distribution

Undergraduate - Liberal Arts and Sciences

There are three steps to vaccinating the country: education, distribution, and uptake. Education relates to how the public will be educated regarding the importance and safety of the vaccines, and how their concerns will be addressed. Distribution relates to the production and delivery of vaccines to the appropriate vaccination sites. Finally, uptake relates to getting people vaccinated at these sites. Because vaccination has just begun, the focus of this paper is to investigate how vaccine education is being carried out, specifically in Chicago. In particular, Chicago is an insightful vaccination case study because high levels of segregation and health disparities exist in the city. The conditions in which people are born, grow, live, work, and age are the social determinants of health, which are causing the health disparities seen in Chicago. It is known that structural (age, gender, socioeconomic status, etc), intermediary (housing, behavioral beliefs, social networks, etc), and healthcare (access to care, affordability, health literacy, etc) determinants influence the ability of those older than 65 years old in getting seasonal influenza vaccinations. Thus, these same determinants will impact the ability of many to assess vaccines. In order to combat the social determinants of health to ensure equitable vaccine distribution, massive efforts need to be made by communities based

organizations, government, businesses, and healthcare stakeholders. Several different methods must be used to educate the public in order to ensure equitable vaccination. Key players are government sites, community health workers, community town hall meetings, and the collaboration of different healthcare stakeholders via the Vaccine Corp Partnership (VCP): each plays a critical role. Inequities are already present, as reflected by current vaccination data. These strategies reduce inequities but still may not eliminate them; they should be implemented with sustainability in mind if the end goal is health equity.

154. Patil, Mallika

BruxAlert

Undergraduate - Computer Science

BruxALERT is a novel oral assistive device that monitors and provides biofeedback to users that portray symptoms of bruxism or are clinically diagnosed with this condition. Bruxism is an oral motor condition, defined as repetitive jaw grinding or clenching activity which could occur during sleep (nocturnal) or awake cycle [2]. Both nocturnal and awake bruxism have the potential to lead to permanent complications such as chronic headaches, facial/jaw soreness, receding gums and lesions of the teeth [1]. The proposed BruxALERT seeks to correct the habitual grinding or clenching action by providing haptic behavioral biofeedback to the user. BruxALERT monitors and records the progression of the habitual activities and provides a monitoring method for the clinicians and the users. Currently there are no commercially available devices that directly addresses the habit of bruxism; rather, the available devices focus on minimizing the harmful results of bruxism. Although research has been conducted on the benefits of biofeedback therapy [3], well-known products such as mouthguards, occlusal splints, and EMG signaled devices do not utilize this specific type of feedback. By utilizing a haptic motor and pressure sensors embedded within an upper retainer along with a Bluetooth-enabled microcontroller, BruxALERT provides a comfortable, discreet, and user-friendly experience to break the habit of bruxism.

155. Peña, Gabby

Behind the Scenes: Youth's Reaction to Police Brutality

Undergraduate - Psychology

The purpose of this study was to determine how social media may influence people's perception on social events and social situations. Through a semi-structured interview, we examined participants' emotional reactions towards the police, their knowledge and reaction to the George Floyd video, as well as their past experience interacting with the police. We hypothesized that social media may make people more biased. Potential subjects were initially identified for this research study through personal contacts and advisor's class email list. Ten participants were recruited. The participants took part in a 35 to 45 minute interview through ZOOM. The data analysis focuses on summarizing the content of the interviews based on participant's experience and the highlight of the interview.

156. Perez, Jessica

Different Classroom Settings Effect The Way Students Take Responsibility for Their Learning

Undergraduate - Nursing

The goal of this project is to compare the way students used resources in two different classroom settings. The data collected came from two classroom settings in an Organic Biochemistry class; one consisted of a traditional lecture and the other used in-class worksheets. During prior classes, the instructor would lecture students using a PowerPoint; however, the instructor then changed her method of teaching. Instead of using PowerPoints, she would hand out worksheets, and students had to fill them out throughout class as well as do practice problems. Overall, the aim of this research projects is to see which one is more effective in making students reach out for help and be successful in the class. It is important to do this because all pre-nursing students take this course and during nursing school each student must advocate for themselves.

157. Raj, Hannah

Fertility in Individuals with Short Telomere Syndromes and Shortened Telomere Lengths: An Integrated Review

Undergraduate - Biological Sciences and Psychology

Short Telomere Syndromes are characterized by significant reduction in telomere length resulting in clinically-diverse presentations, particularly within organ systems with high cell turnover rates, such as the skin, bone marrow, lungs, liver, and gastrointestinal tract. Due to the end replication problem, telomeres shorten with every cellular division; thus, telomere shortening has been associated with the aging process. Given that reduced telomere length and infertility are associated with aging, individuals with shortened telomeres may experience premature infertility. The databases MEDLINE (via PubMed), Cumulative Index of Nursing and Allied Health Literature (CINAHL), and Excerpta Medica Database (EMBASE) were used to identify relevant literature, and MESH terms telomeres, telomere shortening, infertility - male, infertility - female, Short Telomere Syndromes, and Dyskeratosis Congenita were used in conjunction with ancestry searching. Through a rigorous article search, relevant, peer-reviewed studies using human subjects written in English were included, and data was structurally organized and synthesized using Gerrard's Matrix Model. Key findings included (A) females with Short Telomere Syndromes had reduced hormone levels, increased use of in vitro fertilization (as a fertility preservation modality), and increased pregnancy complications; (B) females with shortened telomere lengths had decreased ovarian function, shortened reproductive lifespan, increased in vitro fertilization use, less competent and lower quality embryos, and pregnancy complications; (C) males with shortened telomere lengths had decreased sperm count and function, reduced spermatogenesis, altered sperm morphology, and less successful in vitro fertilization results. Based on the current literature, in clinical practice, genetic counseling should address inheritance patterns and screening processes, individuals with shortened telomeres should be aware of the lower likelihood of successful in vitro fertilization, and pregnancies should be carefully monitored for complications, particularly hematological complications. Research in this field has recently expanded; future studies should include larger sample sizes, male subjects, those with diverse mutation presentations, and multi-institutional efforts.

158. Raj, Sarang

Creating an Inclusive Pleasure-Based Sex Education Informational Package for LGBTQ+ Students at UIC

Undergraduate - Psychology

The current state of sex education in the US is limited and narrow. It is used as a tool to manage the sexual expression and behavior in youth and even adults. The sex education curriculum in the United States utilizes a risk reduction framework, focusing on preventing pregnancy and STIs. Though that intention may be virtuous, it teaches youth to fear sex. By not having relevant information about sex, youth are forced to look to other places for sex education that are mostly undependable, such as pornography. The US sex education curriculum is often not inclusive of race, disability, and pleasure; nor is there a curriculum that is specific to LGBTQ+ individuals. In efforts to combat this negative and non-inclusive sex educational practice, creating a pleasure-centric, LGBTQ+ specific sex education curriculum is important. The aim of this project is to do just that. Creating a pleasure-based pamphlet for LGBTQ+ students, that is inclusive of topics such as orgasms, erogenous zones, and communication. To achieving this, a cross-sectional, quantitative survey was developed and distributed to UIC's LBGTQ+ students. The goal is to better understand the sex education experience of LGBTQ+ students at UIC, understand their perception of pleasure and gather what are some important topics students would want to have in their own sex education. Data collection is in progress and will end by end of March. The data will be analyzed using SPSS Statistics 27. The findings will be used to devise an inclusive, pleasure-based sex education pamphlet and be distributed to LGBTQ+ students at UIC as a resource.

159. Rakhman, Maya

The Effects of Anesthesia Awareness with Recall on Mental Health

Undergraduate - Nursing

Background: Anesthesia awareness, also called intraoperative awareness with recall (AWR), is a phenomenon and complication that may occur when general anesthesia is administered for surgery. “Awareness” is when patients are able to recall the events that occurred during surgery which may include hearing conversations, being unable to breath or move, feeling pain, and experiencing distress. The experience of AWR leaves many

patients with lasting mental hardships and the healthcare system leaves these patients to suffer in silence. Objective: To evaluate the occurrence of anesthesia awareness with recall and the comprehensive effects this has on a patient's mental health. Also, to determine if there is a need for psychological counseling systems readily available to those affected. Data collection: An electronic search was conducted using search terms such as "anesthesia awareness" and "intraoperative awareness with recall" since the year 2000. Articles were also manually chosen using the references of found articles. Results: It was found that AWR can lead to severe PTSD and ultimately suicide to those untreated. Although instances of AWR are relatively rare by statistical standards, the medical staff should still be advocating for the patient's total well being including outside the operating room. It was discovered that based on the experiences of patients, many would have benefitted from a risk assessment tool similar to ones used for patients considered a fall risk or DVT risk. Based on a patient's score for risk of AWR, orders could be already set in place to assess memory of surgical events and trauma related to such. Conclusions: Based on the research, risk of AWR could have been identified pre-surgery if a risk assessment tool was created and used. Following the operation, a mental health professional should perform an assessment on the patient to gage for any memory of events of surgery. Based on that conversation, the patient and the health team could create a plan of care to minimize the psychological effects of AWR. With this type of care, instances of AWR would not lead to severe psychological trauma.

160. Ramirez, Edith

Effects of Progesterone regulation to prevent premature birth and intrapartum hemorrhage: Placenta previa and placenta abruption

Undergraduate - Biological Sciences

Premature birth is any birth before the 37 completed weeks of gestation according to the World Health Organization (WHO) (Granese et al., 2019). Placenta Previa is defined as the placental tissues being near or over the internal cervical area, this condition will occur with severe hemorrhage and early delivery (Karapinar et al., 2015). Placenta Accreta also known as placenta abruption is defined as a rare but serious condition that is abnormally adherent to the uterus, this can occur from placenta previa (Kent et al., 2009). The

research question, this study is aimed to answer was, does progesterone increase the chances of carrying pregnancy to full term on healthy women and those who are at risk of giving birth prematurely like placenta previa, accreta? Knowing this will be highly important as it could help with decreasing the numbers of premature birth which can result in harm or even death for both the fetus and the mother. Premature birth is one of the major causes of neonatal morbidity and mortality (Bryns et al., 2014). It was hypothesized that the use of progesterone will have a positive effect on women with helping women reach full term birth. In this study there was a questionnaire given where 69 out of 321 participants were on progesterone, 61 of the participants were on 17-hydroxyprogesterone (17OHP) and the rest on vaginal progesterone, From the 61 participants using 17-OHP, 20 of them were premature births, and from the vaginal progesterone there were 0 premature births. Seeing the correlation between Premature birth and progesterone suggest that there is a need for better understanding of this relationship. As we can see the levels of progesterone in the blood or urine, provides a biomarker that can predict which women are at risk of preterm birth due to enhanced progesterone inactivation in the uterus an those already at high risk for preterm labor (Bryns et al., 2014).

161. Reddy, Navya

An Analysis on COVID-19 Data: The Effect of Demographics and State of Healthcare Services on Mortality Rate

Undergraduate - Computer Science

The COVID-19 pandemic has caused the death of over a million people worldwide and is affecting everyone in some way. Although multiple vaccines have been developed, it is important to understand the evolution of the virus and the impact it has had on the population thus far. The goal of this project is to explore the effects of COVID-19 on de-identified patients in the United States and visualize how the number of cases evolved over the past several months. From this, we are able to discover whether there are particular months that have a higher number of cases than others and possible reasons for the increase. This study also analyzes whether hospital status, ICU status, or pre-existing medical conditions affect COVID-19 mortality rates. Additionally, this project will

discuss demographic characteristics such as age, race, and sex to determine its effect on the number of cases and deaths.

162. Rehman, Faiz

Designing Simulation Based Learning for Discharge Education

Undergraduate - Integrated Health Studies

In 2020, Centers for Medicare and Medicaid Services will penalize 2,545 hospitals for having too many Medicare patients readmitted within 30 days, according to federal data cited by Kaiser Health News. Hospital readmissions create a financial and economic burden on the health system. It has previously been observed that discharge education can significantly reduce readmission rates. Additionally, simulation based learning has been observed to result in better learning. This research project aims to combine these two elements and design a simulation based learning experience to enhance the patient's discharge education and consequently reduce hospital readmission rates. A simulation based learning experience gets the patient more engaged and to utilize their problem-solving skills which they could then implement in their daily lives. In order to do this, the learning experience was designed as a game in which the patient controls a character who has just been released from the hospital and has to follow their standard post-hospital procedures and implement healthy habits to prevent readmission within 30 days. This will include daily tasks such as exercising, eating healthy, taking medications and other occasional tasks such as following up with the doctor or visiting the local community center for additional support. In collaboration with the Electronic Visualization Lab, we were able to design the first version of the downloadable simulation game. This version will serve as the base model to conduct further research to investigate the impact of simulation based learning on discharge education and improve the game design itself. After proper testing and reiterations of the game design to maximize the learning outcomes, the research will then transition to focusing on implementation in a healthcare setting.

163. Safron, Hannah

Disparate Hypertension Rates and Racial Inequity in Chicago COVID-19 Deaths

Undergraduate - Public Health

Aim: This study aims to describe and display rates of hypertension alongside COVID-19 mortality and sociodemographic characteristics of Chicago community areas. Rationale: Hypertension may be a significant risk factor of severe COVID-19 morbidity and mortality. Visually examining the hypersegregation of Chicago alongside rates of hypertension may suggest who is most vulnerable amidst the COVID-19 pandemic.

Methods: I explore the distribution of hypertension rates across Chicago's 77 community areas using ArcGIS. I then juxtapose the rates of household poverty and percent of African American residents for all 77 community areas and six notable community areas.

Results: The highest rates of hypertension were evident on the south side of Chicago, with moderately high rates on the northeast side. The rates of COVID-19-related deaths were highest in the south side, in addition to the west side and northeast side. When mapping sociodemographic factors, the distribution of household poverty and the percent of Black or African American individuals living in a community area were similar, with the highest rates of both variables clustered in the south and west sides. Conclusions: Community areas with less than 1% of Black or African American residents appeared to have lower hypertension and COVID-19-related deaths compared to majority-black community areas, suggesting that the hypertension burden and COVID-19-related deaths are not distributed equally. Impoverished communities with majority-black populations on the south side seem to bear the brunt of both high hypertension rates and COVID-19-related-deaths, consistent with other literature on systemic racism and structural violence. This mapping exercise has visually represented areas for future health disparity research.

164. Salgado, Zurisadai

Optimizing the YC-PEM and PEM+ to Enhance Family-Centered and Participation Focused Care Plan Development in Pediatric Rehabilitation

Undergraduate - Kinesiology and Nutrition

Purpose: To apply stakeholder input for optimizing the use of two contemporary electronic tools that are designed to enhance family-centered and participation-focused assessment and care plan development in pediatric re/habilitation. Methods: In Aim 1, stakeholders were engaged in the development of the Young Children's Participation and

Environment Measure (YC-PEM) tip sheet. Three rounds of stakeholder feedback designed the content of the tip sheet. In Aim 2, existing caregiver data was organized and further analyzed to generate structure to the Participation and Environment Measure Plus (PEM+). Data analysis led to the following questions: 1) to what extent are the family of participation-related concepts (fPRC) represented in caregiver strategies; 2) is there a pattern between the specific type of home or community activity and type of participation-related concept; 3) is there a pattern between the type of participation-related concept and the types of changes desired for each activity. Results: Aim 1: recurrent feedback by service providers pertained to 1) YC-PEM administration, 2) distinguishing between the concepts of independence and involvement, and 3) tip sheet aesthetic. Aim 2: 1) all four participation-related concepts were represented in caregiver strategies in the home and community; 2) environment and context was the most common participation-related concept represented in caregiver strategies in the home and community; 3) no association between the number of changes desired and the type of participation-related concept in the home or community setting. Conclusion: Results extend further knowledge in the importance of stakeholder input and data to improve the design and uptake of Participation and Environment Measure (PEM) tools. Results provide further knowledge on what service providers most inquire about the YC-PEM when considering its use in practice. Results also provide further knowledge in structuring the PEM+ strategy exchange for caregivers.

165. Samsonowicz, Damian

The DREAMer Narrative: A performance based approach to deconstructing oppression against undocumented immigrants

Undergraduate - Communication

The “DREAMer narrative” was coined in 2001 with the introduction of the DREAM Act which celebrated the educational achievements of undocumented youth in order to justify a path to citizenship. While a well-intentioned tactic to garner political support and achieve a semblance of immigration reform, it has also promoted a culture where access to human rights should only be rewarded to “deserving” immigrants, thus creating a division between the haves and have not. This “DREAMer narrative” has excluded

deported parents, LGBTQ activists, academically struggling students, and former military veterans who have served and been deported. As for those who fit the narrative, it has forced students to excel in academics, ensuring that their academic achievements validate their humanity. Through a performative-based approach, I will utilize concepts from the oral interpretation of literature, a performance field found in intercollegiate speech and debate to fight against this narrative and emphasize that all immigrants, legal and undocumented, deserve human rights. I will use several different characters found from literature such as prose, drama, and poetry to create my argument. In my performance, I argue that documentation status does not validate a person's humanity. This performance stops this narrative and moves us forward to a more inclusive immigrant rights movement because we need to ensure the humanity of all immigrants of all nations, despite the stereotypes that the media paints.

166. Sandu, Shashank

Engineering CRISPR/Cas-9 to mediate long term lineage tracing

Undergraduate - Biological Sciences and Chemistry

This project focuses on engineering a latent lineage tracing mechanism using CRISPR/CAS-9 targeting. Our lab has found that despite inserting inactivating Ribozyme sequences that disrupt the secondary structure of the guide RNA (necessary for CRISPR/Cas-9 targeting), these guide RNAs still become spontaneously activated. By integrating these guide RNAs, termed proguides, into the piggybac vector, this project seeks to both elucidate (a) how spontaneous activation occurs through engineering different proguide variants that contain different sequences in hairpin and tetraloop sequences and (b) utilize this system for a latent lineage tracing tool that can barcode cells.

167. Sarup, Nandini

Development of an Instrumental Measure of Moral Distress to Measure Hidden Curriculum in Academic Medicine

Undergraduate - Liberal Arts and Sciences

Medical students play a crucial role in the development of medicine in the future and it is imperative that they are provided with the utmost guidance and respect. Unfortunately, the academic experience of a medical student is dependent on their successful navigation of the hidden curriculum. The hidden curriculum is an unofficial and unwritten lesson, norms, values, and perspectives that medical students must learn in order to succeed in their field. This presentation bolsters a descriptive review of numerous literature studies that investigate the results of how medical students respond to the hidden curriculum as it constructs their experiences as a student and what parts of the hidden curriculum affected their experience. Thirty five studies from peer reviewed journals were compiled in this literature review to revise a survey instrument. The instrument was created using experiences of students gleaned through the literature review. Findings suggest that a student's experience and perceptions of the hidden curriculum were shaped negatively as the interactions they faced with the hidden curriculum were morally distressing to academic, personal, and/or work experiences. Medical students' beliefs, training, understanding of the medical field and assisting superior figures in the work environment were negatively impacted based on the findings. Conclusions from this study can aid medical professionals and healthcare workers to start to reform the teaching practices and methods employed to benefit the patients and students by providing continuous support, a professional environment, and role modeling to further our future generations.

168. Schulman, KylaRose and Schulman, RobynRose

How Photoshop Apps and Editing Technology Affects Self Image

Graduate - Psychology

Understanding whether exposure to photoshopped images has an effect on the human psyche is very important in that poor self-image can lead to many potential health risks especially in younger audiences. In this study, it is hypothesized that there will be a main effect for photoshopped vs nonphotoshopped images. In a between-subject design, participants were randomly assigned into two conditions: photoshopped and unphotoshopped images. Participants were then asked a series of questions to rank their overall appearance before ranking a set of 6 photoshopped or nonphotoshopped images. After ranking the images, participants then placed themselves into the ranking system of

attractiveness on a Likert scale of 1 to 5, with 1 being the most attractive and 5 being the least attractive. In an expansion of this experiment, 6 undergraduate students were asked to participate in a dot-probe task which was used alongside 8 photoshopped and non-photoshopped images to see what people prefer to look at. In addition, participants were sent an anonymous Qualtrics survey to measure their body image satisfaction.

169. Shafeeq, Ayesha

The Influence of Working Conditions on Disease Onset

Undergraduate - Nutrition Science

Title: The influence of working conditions on disease onset
Introduction: Prior studies have suggested worsening employment conditions, both in the U.S. and Europe. At the same time, these higher-income countries have seen an increasing prevalence of obesity rates and cardiovascular disease, contributing to increasing mortality rates. This study reviews the literature on the extent to which working conditions are related to chronic disease, specifically cardiovascular disease, Type 2 Diabetes, and obesity.

Method/Design: Articles were retrieved from two online databases, Google scholar and PubMed using key search terms. We included articles that met the following criteria: article was published between 1990-2021, it investigated associations among adults in the US or Europe and articles that were published in English. After reviewing the article for relevance, our search yielded 20 articles. Results: This article will help support the need for better working conditions and greater importance toward job security.

170. Shah, Bhavi

Collaborating with a School District to Engage South Asian Immigrants in Cardiovascular Disease Prevention Research: Key Lessons Learned

Undergraduate - Biological Sciences - Neuroscience

Introduction: South Asian (SA) immigrants are the second fastest growing ethnic minority group in the U.S., having a higher risk for developing cardiovascular disease (CVD) compared to non-Hispanic whites. Linguistic, cultural, and system-level barriers can reduce the engagement of SA in public health research. Goal: This research study describes lessons learned from a multisector-research partnership with a school district to

increase engagement of underserved SA immigrants in a 12-month CVD lifestyle trial.

Methods: Northwestern University (NU) partnered with the Skokie Health Department (SHD) to implement the South Asian Healthy Lifestyle Intervention (SAHELI) in a randomized clinical trial to reduce CVD risks in SA adults. SHD brokered a relationship between the SAHELI team and Skokie District 69 (D69), a school district with a large population of SA immigrant parents. Results: Several factors contributed to a successful partnership with D69 and their SA immigrant parents enrolling into the SAHELI study (33 attendees, 24 interested, and 19 enrolled). First, parental health was a priority for D69 leadership, which aligned with the goals of SAHELI partners. Second, D69 already worked with a SA parent liaison who was trusted by the community. Third, the team utilized existing parent-liaison meetings for multilingual presentations.. Fourth, transparency about research processes and addressing data privacy concerns were important for maintaining trust. Lastly, the team implemented D69's strategies for engaging SA parents, including childcare and transportation. Conclusion: A multisector, multicultural collaboration with a school district was effective at reaching and engaging SA immigrant parents in a 12-month CVD prevention study.

171. Shah, Bhuvni

Fairness in Foods

Undergraduate - Engineering

The City of Chicago's Chicago Food Inspection dataset records details about the food inspections conducted to ensure food safety standards in food establishments across the city. The City of Chicago used this dataset, along with other data, to train and employ a machine-learning model for improving the time taken to find a critical violation. With the model, they were able to achieve an average improvement of 7 days during a 60 day simulation period. We use the open-source dataset and codebase to analyse the improvement achieved under the lens of algorithmic fairness.

172. Shi, Emily

I(II)-Catalyzed Oxidative Cyclization-Migration Tandem Reactions of Unactivated Anilines

Undergraduate - Chemistry

An I(III)-catalyzed oxidative cyclization-migration tandem reaction using Selectfluor as the oxidant was developed that converts unactivated anilines into 3H-indoles is reported herein. The reaction requires as little as 1 mol % of the iodocatalyst and is mild, tolerating pyridine and thiophene functional groups, and the dependence of the diastereoselectivity of the process on the identity of the iodoarene or iodoalkane precatalyst suggests that the catalyst is present for the stereochemical determining C-N bond forming step.

173. Siddiqui, Sara

Diastereoselective gamma-Functionalizations of Carbonyl Substrates

Undergraduate - Chemistry

Several valuable bioactive molecules contain gamma-functionalized carbonyls of defined stereochemistry, a defined three-dimensional arrangement of atoms in space. Despite its synthetic value, gamma-functionalized systems are understudied and the available methods to access them are few and present limited scope. Recent accounts of our efforts in gamma-carbon transformations allow for a wide range of Carbon-heteroatom bonds to be made at the distal gamma-site of carbonyls. However, a lack of control over the two stereotopic faces of the observed intermediate prevents access to stereo-defined products, thus presenting a challenge. Therefore, this project is directed toward the development of a robust, general strategy to forge new bonds at the carbonyl gamma-site stereoselectively along with computational study of the stereo-inducing units.

174. Siddiqui, Sumayya

City of Chicago Traffic Crashes Analysis

Undergraduate - Computer Science

The goal of this project is to analyze the crashes that occur in Chicago. The data has been collected by the electronic crash reporting system (E-Crash) at Chicago Police Department (CPD). Records are added to the data portal when a crash report is finalized or when amendments are made to an existing report in E-Crash. Analyzing this dataset can be helpful to the city of Chicago to understand which intersections and streets are

statistically the most hazardous. It also gives insight on whether speed limits are appropriately set. This dataset can help us evaluate the safety precautions set for the streets of Chicago. Some of the questions will be relating to insights on crashes relating to date/time, weather, and lighting conditions. Other explorations will relate to the frequency of crashes in a given time period, injury types based on speed limit conditions, and comparing the number of fatal injuries versus hit and run crashes.

175. Sinfuego, Cherryshe

Glucose Impairment in Women with a History of Gestational Diabetes Mellitus in their Latest Pregnancy

Undergraduate - Bachelor of Science in Nursing

Background: According to the International Diabetes Federation's 2019 Diabetes Atlas, nearly 17 million women were affected by gestational diabetes mellitus (GDM) worldwide. It is estimated that 50% of those with GDM in the United States continued to develop type 2 diabetes. Aim: The aim of this study is to explore differences in random glucose; daily blood glucose (continuous glucose monitoring [CGM]); glucose levels during an oral glucose tolerance test (OGTT); A1c; body mass index (BMI); and mode of baby feeding (breast vs. bottle) by the number of days post-delivery among women diagnosed with GDM during their latest pregnancy. Methods: Data including a random blood glucose; A1c; one week of CGM readings; glucose levels at -15, 30, 90, 120 and 180 minutes during the OGTT; BMI category; and history of breast/bottle feeding was collected. Participants were divided by number of days post-delivery; <100 days, 100-200 days, and >200 days. Means and standard deviations of each variable were calculated and analyzed using one-way analysis of variance (ANOVA). Results: There were no statistically significant differences in average random blood glucose levels; A1c; CGM readings; and BMI between groups. There was, however, a significant difference between the glucose value at 120 minutes during the OGTT between the 100-200 group and the >200 group (124.29 ± 32.56 mg/dl vs. 188.80 ± 38.82 mg/dl; $p < .05$). Although not statistically significant, women who breastfed ($n=8$) compared to those who bottle-fed ($n=10$) had a lower mean blood glucose (105.13 ± 11.78 vs. 117.5 ± 17.34 mg/dl) and A1c ($5.53 \pm .32$ vs. $5.63 \pm .44$ %). Conclusions: Based on these results, a longer post-

delivery period following a history of GDM is associated with significant impairments in glucose compared to those in the early post-delivery period. Women who breastfed their children appeared to have better glycemic control than those who bottle-fed; however, this observation requires more study.

176. Snedeker, Conor

Explicit Constructions in Galois Theory

Undergraduate - Mathematics, Statistics, and Computer Science

Galois Theory, named after the early 19th century French mathematician Evariste Galois, began with the question of the solvability of certain polynomials over, say, \mathbb{C} . Although it began as a simple study of polynomials, it is much more today. In this paper we begin our inquest into Galois theory with the most basic of its finite theory. Gradually, we will see generalizations of the finite field results into more contemporary and interesting objects. In this paper we see that there are basic structures in Galois theory that generalize quite naturally from the finite theory to the infinite theory, and that the question of solvability using radicals for the calculation of roots has a rich and intricate answer. These constructions of Galois theory, governing a correspondence between field theory and group theory, are the fruit of Evariste Galois's efforts and are the primary topic of this paper. In particular this paper will deliver an exposition over the objects of classical Galois theory and beyond.

177. Solayman, Nicole

Delilah/Dana

Undergraduate - English

The screenplay follows the life events of Delilah, a first-generation Middle Eastern woman who was a part of a covert whistleblowing operation. The narrative begins when Delilah learns about the company she works for, VUNICO, which is funding and creating tech for illegal drone-striking throughout the Middle East, and in her home country of

Syria. Delilah and her coworker, Max, work together to disrupt the company's operations and expose the company for its actions in the hope of inspiring change.

178. Sommer, Amber

Impact of Dyslipidemia on Wound Healing and Angiogenesis

Undergraduate - Biological Sciences

Systemic hypercholesterolemia, both of low-density lipoprotein (LDL) and its oxidized counterpart (oxLDL), has been shown to cause a delay in angiogenesis and thus wound healing. While prior research by our lab did not show any significant change in time for wound closure with topical treatment of wounds with oxLDL or LDL, there has not been any investigation of the microscopic effects of topical LDL/oxLDL treatment.

Immunohistochemical stains for PECAM and DAPI were performed on wound tissue from skin punch biopsies of dorsally wounded C57BL6 mice. These wounds were treated topically with high concentrations of LDL, high concentrations of oxLDL, and normal concentrations of LDL for 0, 7, and 10 days following the wounding. The resultant samples were imaged using a epifluorescent microscope. Analysis of the images showed that no significant difference in endothelial cell proliferation between the hypercholesterolemia wounds (of either type) and the normal wounds, except for the day 10 conditions LDL250 and oxLDL. Day 10 LDL250 showed significantly more PECAM staining than day 10 oxLDL, but the significant difference disappeared after normalization to the percentage of DAPI staining. Analysis also showed significant differences in fluorescence intensity of cells expressing PECAM for 3 different comparisons. LDL 250 day 7 showed significantly more intense PECAM fluorescence than oxLDL day 7 and oxLDL day 10. LDL 50 day 10 also showed significantly more intense PECAM fluorescence than oxLDL day 10. However, further analysis is necessary to validate the results.

179. Song, Angie

Sensor-Activated Oral Suction Device for Discrete Sialorrhea Management

Undergraduate - Bioengineering

Cerebral palsy (CP) is a group of neurological disorders caused by abnormal brain development or damage to the developing brain that affects motor control and movement. One main symptom of the disorder is sialorrhea, or excessive drooling, due to increased saliva production or failed mechanisms to clear saliva from the oral cavity. This causes significant medical and psychological impacts such as skin irritation, social embarrassment and lack of independence. To aid in management of sialorrhea, treatments such as Botox injections, surgery, therapy and intraoral devices exist. However, these treatments are too invasive, too obstructive, temporary or cause resistance to training after long term use. My senior design team has developed a portable, wheelchair-attachable suction device for a 20-year-old patient with spastic quadriplegic cerebral palsy and anterior sialorrhea. Main design requirements included the reduction of saliva spillage through a suctioning system powered by a DC vacuum pump, discrete operation, and safety for long term use. Verification testing was also performed to ensure that the device is meeting design specifications for reduction of saliva spillage.

180. Song, Leah

Impact of Covid-19 in Transitioning to Online Education

Undergraduate - Biochemistry

This capstone project explores the impact of Covid-19 on the education system and how students are affected. This project aims to distinguish the stress students are faced with due to the transition to online education. The transition to online learning was inevitable with the rising pandemic. However, the abrupt transition was rough for everyone where faculty members had minimum support and training to teach an online course while the students were faced to learn in a whole new style. The decreased social interaction and prolonged social distancing also added to student's stress levels. Ultimately, students' mental health has been alarming with increasing anxiety and depression. Many students worry about the education quality as well as their academic grades. It is also important to take into consideration the struggles that faculty members face. Many faculty members were inadequately trained to teach an online course which led to low quality of courses. In addition, the sudden increase use of technology and applications dramatically

increased technical difficulties. The project's purpose is to address the decreasing well-being of students, struggles students and faculty members face, and possible solutions.

181. Soto, Cecilia

Technological Literacy; Assumptions on Equity in Technology Present in Classrooms

Undergraduate - Teaching of History

Technology is seen as a monument of progress; technology in the classroom means that a teacher, or a department, or a school is keeping relevant to education trends. However, while there have been efforts to solve students' access to technology there have been difficulties trying to assess a solution to address the necessary knowledge and skills students need to be able to accomplish tasks and succeed with digital resources. By looking into how technology was introduced into classrooms and curricula, this dilemma of a growing digital divide will be explored. Education policies that center increased technology use and literacy have also been examined to see how they potentially merged themselves to goals in student success. These policies and history overview was then transposed over contemporary events involving Black and Brown communities in Chicago's public school system. This was done to see what potential effects technological literacy or the need for it could have on the aforementioned communities and whether that contrasted with white-majority school communities. The potential discrepancies or patterns in how the digital divide impacts students could lead to an acquiring of knowledge on how to combat difficulties students face in both remote learning and in-person learning settings. There are inequities present in the United States education system; by looking at the impact of technological literacy, resolutions to aid students and their school communities could potentially aided by a newfound understanding on the relationship between technology and learning. This research could be expanded by having the focus area increased; while contemporary resources were based on Chicago, a comparison on how different states have managed the present digital divide and issues of technological literacy could reveal even more patterns and discrepancies and lead to better policy creation that potentially better address community needs.

182. Suifan, Heba

Mechanical loading induces clathrin mediated endocytosis of NG2 during TMJ OA

Abstract

Undergraduate - Neuroscience

Temporomandibular osteoarthritis (TMJ OA) is a common degenerative disease that causes cartilage and extracellular degradation of the joint. One of the key initiating conditions of TMJ OA is mechanical overloading. Neuron glial antigen 2 (NG2) is a transmembrane proteoglycan that binds with collagens in the TMJ and is internalized during TMJ OA. The central hypothesis of this research is that mechanical loading induces of the internalization of NG2 through clathrin mediated endocytosis and regulated intramembrane proteolysis. To test the effect of mechanical loading on NG2 internalization, primary mandibular fibrochondrocytes were isolated from 10-day old mice, seeded into an agarose/collagen scaffold, and loaded into a compression bioreactor under constrained static compression at 2.5 N for 2 hours. Samples were analyzed by western blot, immunohistochemistry and a real-time quantitative polymerase chain reactions. Mechanical loading increases the colocalization of NG2 and the endocytosis marker clathrin heavy chain (CHC). When RIP pathways are inhibited using DAPT and DH, there was a reduction in colocalization of NG2-CHC, illustrating some RIP dependent clathrin mediated endocytosis of NG2 after mechanical loading. Furthermore, the expression of key OA biomarkers was altered in both a mechanical loading and RIP dependent manner. These data support our hypothesis that mechanically induced proteolysis of NG2 ectodomain is linked to injury response of cells and contributes to both outside-in and inside-out signaling mechanisms during mechanical loading in mandibular fibrochondrocytes.

183. Suleman, Abigail

From Subjects to Partners: What the Public Should Know about HeLa Cells

Undergraduate - Chemistry & French and Francophone Studies

Introduction. On October 4, 1951, Henrietta Lacks died at 31 years of age from cervical cancer, but the cells in an earlier tumor biopsy did not. Without her informed consent, a

tissue sample from this low-income Black mother was collected at Johns Hopkins Hospital and sent to the laboratory of Dr. George Gey where their cells began to proliferate abundantly in culture. HeLa cells have contributed to medical breakthroughs including the development of the Salk polio vaccine and the discovery of the mechanism of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Yet, while packaged in scientific merit, the history of HeLa cells represent an example of the medical community conducting research on Black bodies without proper informed consent and contribute to medical distrust within many Black communities.

Methods. A literature review is conducted on HeLa cell history and the concept of community-based participatory research (CBPR). In addition, personal experiences working with Henrietta Lacks' cells details their history as it pertains to the ethics surrounding clinical trials involving human subjects.

Results. Beyond their medical contribution and potential, this cell line has shed light upon the ethics of informed consent in the United States. The visual analysis of cells studied in the lab was not significantly different from those distributed by ATCC. CBPR is often employed through social media with an equity lens.

Conclusions/Implications. An intentional collaboration between Black communities and researchers is necessary to confront the ethical dilemmas in HeLa cell lines and inform current and future biospecimen research.

184. Sulieman, Arefa

The Effects of Hypoxic Preconditioning on Naked Mole Rats' Physical Activity Levels

Undergraduate - Biological Sciences

Naked mole-rats (NMRs) are functionally blind rodents that have the ability to sustain their physical activity throughout several hours of extreme hypoxia conditions through intrinsic neuroprotective mechanisms. NMRs' tolerance to low oxygen levels makes them an excellent choice for experiments to determine the effects of preconditioning on subsequent activity. Studies on other hypoxia-tolerant mammals demonstrated how preconditioning promotes tolerance to these harsh conditions e.g. altering respiration levels as well as reducing overall metabolic activity. However, the link between

preconditioning and duration of locomotion have yet to be determined to further explain how these neuroprotective mechanisms play a role in reducing energy demand during postconditioning. We hypothesized if NMRs are preconditioned with low hypoxia levels, then we should expect a shorter duration of NMR physical activity during the postconditioning phase to be better able to tolerate the subsequent exposure under the same conditions. NMRs were exposed to 5% oxygen for five hours in the preconditioning exposure, and were exposed to the same conditions for another five hours in the postconditioning exposure 72 hours later. NMRs' duration of activity was recorded during the exposure to hypoxic conditions for two hours in a randomized order. The results suggest there's a greater decreasing trend in the duration of activity in postconditioning than in preconditioning, and oscillating patterns in both conditions allow NMRs to retain functionality of activity. This suggests exposing NMRs to hypoxia preconditioning enables them to reduce their physical activity in the postconditioning phase to a greater extent, allowing them to better tolerate low oxygen levels the second time by reducing their energy demands. This evidence demonstrates how NMRs protective mechanisms in hypoxia preconditioning and postconditioning may not only protect mammalian brains from irreversible damage, but also provide potential interventions for patients who exhibit hypoxia-related symptoms in conditions as severe as a stroke.

185. Swank, Isabella

Trans-Cranial Stimulation (tCS) As A Therapeutic Intervention For Internalizing Disorders: Changes in Negative Affect, Cognitive Reappraisal, and Heart Rate Variability During Emotional Regulation Tasks and tCS Application

Graduate - Neuroscience

Heart Rate Variability (HRV) can be used to measured autonomic nervous system changes by analyzing inter-beat intervals (IBIs) in Electrocardiogram-Respiration paired data. Changes in HRV can indicate normal and abnormal autonomic function, as well as, non-neurological processes. Increased HRV has been associated with a more resilient emotional regulation response to stressful situations. People with internalizing disorders, like anxiety and depression, have been found to have abnormally low HRV and

emotional regulation ability compared to controls. Trans-cranial stimulation (tCS) poses as a potential non-invasive therapeutic intervention for people with these disorders by targeting theta oscillations in the left dorsolateral prefrontal cortex, an area associated with emotional regulation ability.

In this study emotional regulation tasks (ERTs) with neutral and upsetting images with sham and verum tCS stimulations were utilized to measure changes in emotional regulation abilities. During these ERTs, participants are shown a mix of neutral and upsetting images in pseudo-randomized orders. At specific points in the tasks, the participants are required to use the cognitive strategy of reappraisal in an attempt to regulate and mitigate their negative affect by reframing the upsetting scenarios.

ECG/Respiration data is measured at baseline and throughout the ERTs to observe fluctuations in HRV. After each ERT, participants are asked to rate their negative affect, as well as the intensity of the emotion and how effective they felt they were able to reappraise. Changes in eight HRV metrics were monitored and analyzed, along with the self-reported emotion ratings during the ERTs to investigate the potential influence of tCS on emotional regulation.

186. Syed, Esa

Regulation of Flow induced Vasodilation by Akt and Kir 2.1

Undergraduate - Biological Sciences

Kir 2.1 is an inwardly rectifying ion channel which means it lets in potassium ions while the cell is hyperpolarized. This channel is found in endothelial cells and is known to be sensitive to shear stress and induce vasodilation as a response. This effect has been shown using partial knockouts for the channel where a decrease in vasodilation was observed and overexpressing the channel seemed to get rid of this effect. It has been shown that Kir 2.1 leads to flow induced vasodilation through the NO pathway rather than through the use of calcium activated K⁺ channels. Previous work with western blots showed that Kir 2.1 is necessary for Akt phosphorylation and that Akt is necessary for eNOS phosphorylation which means all three of them are within the same pathway.

Overexpression of Kir 2.1 did not show how Kir 2.1 and Akt are related as well as seeing how Akt affects FIV needs to still be tested. This experiment involves the removal and

cleaning of mouse mesenteric arteries and then cannulating them between two pipettes with varying pressure gradients while bathed in Kreb's buffer. This pressure gradient induces flow and any change in vessel diameter can be measured. In order to test the effects of Kir 2.1, we incubate half the arteries with a dominant negative virus and the other half with a control. This virus causes a change in one of the subunits of the channel to make it dysfunctional so we can observe its role in FIV. At the same time, different proteins are blocked depending on what we are testing to isolate the role of each component in vasodilation and act as controls. The results suggest inhibiting Akt reduces vasodilation and thus it is an important component in the chain.

187. Taha, Feda

Violence reduction and police collaboration in Chicago: Analysis through an abolitionist lens

Undergraduate - Public Health

Much of the early violence reduction efforts were developed in Chicago in the 1990s, including programs like Cure Violence, formally referred to as "CeaseFire" by The Chicago Project for Violence Prevention. This program was founded at the University of Illinois at Chicago School of Public Health. Violence reduction efforts are emergent in Chicago, especially through several different organizations who present liberal, reformist frameworks. What separates these new programs from past violence prevention efforts is that they emphasize collaboration with police. This article will focus on the mission, framework, programming, police collaboration, and funding of several organizations in Chicago working to reduce violence. Many of these organizations have been supported by The City of Chicago Mayor's Office, who released a comprehensive violence reduction plan in 2020 titled, "Our City, Our Safety: A Comprehensive Plan to Reduce Violence in Chicago." This plan emphasizes "Improving and Advancing as well as coordination and data sharing between police and community based organizations. My analysis will offer an abolitionist critique of these programs, as well as suggest alternatives from a public health lens.

188. Tajeddin, Leen

Fundamental Causes of disproportionate COVID-19 infections of Black and Hispanic Communities.

Undergraduate - Biological Sciences

Throughout history African Americans and Hispanics have suffered from racism and were given a different socioeconomic status as the Whites. Due to that many have unequal opportunities and unequal access to multiple resources. Some of which include higher paying jobs, more job opportunities, better access to healthcare, and better healthcare insurances. This has caused an increase in unemployment in these communities and a bigger income gap between them and the Whites. And yet again we see the drastic effects of this systemic racism and inequality through the infection rates of Covid-19. The disease that has changed our world and taken the lives of many leading us to a worldwide pandemic. The coronavirus is by itself a ‘color-blind’ disease where it can infect all people of different races and nationalities. But in America this case is not so true, where the infection rate of African American and Hispanic communities is the highest among all other groups, including White. Not only that, but the death rates related to the virus are double in Blacks than in White. To survey the reasons behind the high rates, Chicago Tribune was searched for articles on disputes on policies affecting minor communities. Articles were searched with the parameters: Covid-19, policy, and communities to find what actions were taken, if any, to help these communities survive this deadly virus. Many policies and regulations were put in place to stop the spread of the virus, but not many that addresses the struggles of African Americans and Hispanic families. The high infection rate is caused by the low-income jobs and lack of access to appropriate healthcare and healthcare insurance that puts African Americans and Hispanics at risk. But the fundamental causes of those risks lie in the structural racism and the socioeconomic status that is imposed on these groups.

189. Talugula, Snehitha

The effect of alternative splice variants of HSP90B1 on mitochondrial function in Macrophages during inflammation in Multiple Sclerosis patients

Undergraduate - Neuroscience

Heat shock protein 90b1 (HSP90b1) is part of the heat shock protein family and is a known chaperone protein of Toll-like receptors (TLRs) in immune cells and is implicated in disease pathways for neurodegenerative diseases. However, little is known about the effect of alternative splice variants of HSP90b1. Alternative splice variants of HSP90b1 may be implicated in the Multiple Sclerosis disease pathology as well. Alternate splice variants are alternative proteins produced from gene splicing of the same gene. Such alternative proteins can also produce altered effects on cellular targets. The common form of HSP90b1 is HSP90b1-201 and one splice variant is HSP90b1-207, which overlaps at the C-terminus of the common form. Human Embryonic Kidney 293T Cells (HEK293T cells) were transfected with the plasmid containing the mRNA splice variants of HSP90b1. Gene expression in these cells was measured and quantified using a qPCR and protein expression was measured using western blot. qPCR data showed increased fold gene expression of the mRNA for the alternate splice variant when the alternate primer was used indicating higher mRNA levels for the alternate protein. It was also found in the western blot that the alternate splice variant protein is overexpressed in the transfected plasmid. Together, this data validates utilization of this plasmid for additional testing on the effects of HSP90b1-207 on immune cells. Future research will explore its effect in multiple sclerosis patients versus control patients.

190. Taylor, Nora

Honors Capstone Business Plan

Undergraduate - Entrepreneurship

My Capstone project is the creation of a business plan that discusses the genesis and funding of Taylor Create, a business I will start after graduation. I am doing market research and meeting with people in the industry to help flesh out the plan. I will also talk about the process of using this business to fund philanthropic initiatives around the world. Taylor Create is a business that focuses on the purchase of houses to be renovated for section 8 housing. After the initial capital, Taylor Create will use its profits for growth and expansion. Taylor Create will set itself apart from competitors by creating homes that families are proud to live in. The requirements for a section 8 house are very minimal in terms of comfort, and Taylor Create wants to offer more than the bare minimum.

Section 8 occupants have a bad reputation for trashing the houses that they live in, but just like everything else, often a few bad apples ruin it for the rest of the bunch. Taylor Create believes that there are individuals and families who want to take care of their space and have something to call home, but they have been dealt some tough cards and need assistance for a season of life. Taylor Create is committed to finding those people and providing a safe environment for them. Businesses are the most sustainable way to make a real and lastly change in our current society. Taylor Create wants to make a change by interacting with its employees and tenants with respect, understanding, and care. This is a business, but treating others well goes a long way. This will be reflected in the compensation to our employees and building of each home.

191. Tetali, Chandana

The Regulation of T-cell Differentiation and Inflammation via Non-Canonical Hippo Signaling in Rheumatoid Arthritis (RA)

Undergraduate - Neuroscience

Rheumatoid arthritis (RA), characterized by systemic inflammation of the joints, is a prevalent chronic autoimmune disease, affecting 1.5 million people in the U.S. and causing life-long disabilities with shortened life expectancy. It remains incurable with current therapies aimed at minimizing inflammation, yet such interventions are met with minimal success and serious health complications for at least 50% of the patients.

Consequently, there is a need for novel therapeutic targets, and one possible approach is the Hippo signaling pathway, which has been recently shown to impact autoimmune inflammation by affecting T-cell differentiation. This study sought to illuminate how the protein TAZ, a transcriptional coactivator, may play a role in regulating the balance between inflammatory (T helper cells 1 and 17) and anti-inflammatory pathways (T regulatory cells) in the non-canonical Hippo pathway. To test the hypothesis that TAZ modulates Th17 differentiation while inhibiting Treg induction, it was first established via Western blot analysis that TAZ expression was significantly elevated in collagen-induced arthritis mouse models. Murine splenocytes were then isolated and cultured in vitro with Th1/Th17/Treg differentiation conditions and danger signals (LPS). After confirming a positive inflammatory phenotype through enzyme-linked immunosorbent

assay (ELISA), mRNA levels of TAZ were measured with real-time polymerase chain reaction (RT-PCR). Preliminary data suggest that IL-6 signaling modulates TAZ while TGF- β downregulates TAZ. Given that the production of IL-6 is instrumental in Th-17 cell differentiation, treatment of RA PBMCs with Verteporfin, an inhibitor for YAP/TAZ, dysregulated monokines that polarize Th-17 cells. Thus, these findings imply that TAZ expression affects inflammation and exacerbates RA pathogenesis by inducing pro-inflammatory pathways through the modulation of Th17 differentiation, while also inhibiting anti-inflammatory pathways via the inhibition of Treg differentiation. Future work may include measuring the expression of other intermediary molecules in relevant signaling pathways and treating T-cells with inhibitors to examine downstream effects.

192. Thakkar, Krishna

Understanding the Role of Rnd1, a Novel Notch Target, in Retinal Angiogenesis

Undergraduate - Neuroscience

Angiogenesis is the process by which new blood vessels form. Notch signaling is critical to angiogenesis and regulates a wide variety of endothelial behaviors such as proliferation, sprouting, adhesion, polarization, migration, and extension. Notch proteins function as transcriptional activators, but the target genes Notch upregulates to control these endothelial behaviors, known as Notch effectors, are still being elucidated. Our lab discovered that Rnd1 is directly and rapidly induced by Notch signaling and could be a Notch effector. By reducing Rnd1 levels in cultured endothelial cells, we demonstrated that Rnd1 regulates endothelial migration and sprout elongation in vitro. To determine the requirement for Rnd1 in angiogenesis in a living animal, Rnd1 mutants were generated in mice via CRISPR/Cas9. Homozygous mutants with no functional Rnd1 in endothelial cells were compared to mice with at least one functional copy of the gene. I compared the vasculature of control animals to homozygous mutant mice in the postnatal retina on measures of vascular radial outgrowth, tip cell density, elongated tip cell frequency, branch point count, tortuosity, and average length between two branch points. My analysis revealed that Rnd1 mutants have a statistically significant increase in average branch length, which implies that Rnd1 may be the protein through which Notch signaling inhibits vessel stalk extension and migration. By identifying and characterizing

Notch targets that regulate specific aspects of angiogenesis, we may be able to develop targeted therapies to treat vascular diseases such as ischemia and retinopathy, or limit metastatic spread through blood vessels.

193. Tran, Thao

Over-expression, purification of Covid19-PLpro, its protease activity and inhibition

Undergraduate - Biochemistry

Covid19 infection was first identified in late December 2019 by the Chinese health authorities in Wuhan, China. Since discovery, the virus has spread globally and caused millions fatalities worldwide. Covid19 papain-like cysteine-protease (PLpro) has been studied as an important role in virus maturation, dysregulation of host inflammation, and antiviral immune responses (1). Therefore, we grew E.coli cells containing the protein of interest which is Covid19-PLpro, purified the protein, and tested with GRL0617 which is an effective antiviral inhibitor in cell-based assays. The presentation would further reveal the procedures and discussions over the results of this process.

194. Trejo, Fabian

A Review of Food Insecurity During COVID-19

Undergraduate - Biological Sciences

Food insecurity was prevalent during the 2008 Great Recession and preliminary evidence suggests food insecurity has dramatically risen during the COVID-19 pandemic. We conducted a literature review in order to describe the prevalence, trends, and any interventions related to food insecurity during the ongoing pandemic. The literature review was complemented by data from food pantries in the suburb of Westchester and in the North Center neighborhood in order to describe the local situation related to food insecurity during the ongoing COVID-19 response.

195. Truong, Huy

Explore A NEAT-ly Wumpus Reinforcement Model

Undergraduate - Computer Science

My research under Professor Gmytrasiewicz's advisory aims towards raising the single-agent environment of the famous Wumpus World to a multi-agent version while applying reinforcement learning models to the participating agent functions. The NeuroEvolution of Augmenting Topologies (NEAT) algorithm was implemented as a control for non-deterministically producing optimal agent functions. My version of NEAT implementation involves initializing a population of primitive deep neural network architectures and evolving them until a "well-performing" network is found. At a high level, my implementation for evolution includes the following: speciating the population of architectures using a genomic distance function, having individuals in a species compete so high-performing individuals can be yielded, and finally, having successful species reproduce using a genetic algorithm. This ensures that the inflow of newborns and outflow of evicted individuals are maintained at consistent rates sustaining a stable population count. Moreover, speciation ensures the retention of a diverse population of network architectures, thus, parallelly developing a promising hypothesis space. At the design level of network architectures, a Long Short-Term Memory (LSTM) is "attached" to an Actor-Critic architecture. The LSTM's role is to tune a useful sequential memory processor that maps a space of environment observation sequences to elevated feature space for the Actor-Critic architecture. Therefore, I named this area the "Memory Retention Unit" (MRU). The "Actor-Critic Unit" (ACU) would map this feature space to an action-distribution and state-value space. In training, after a full forward pass from percept history to stochastic action decision, the environment returns rewards that are used in policy gradient for actor training and loss minimization for critic training. The back gradients of these two subunits are then passed into the MRU so it can tune its gates. I want to examine if this baseline design of the agent function can lead to the development of functions that can exhibit logical reasoning and strategic planning.

196. Tu, Kayeman

KIF13B-mediated VEGFR2 trafficking in Angiogenesis

Undergraduate - Biological Sciences

Angiogenesis, the growth of new blood vessels, is a large contributor to diseases such as cancer and blinding eye disease. Angiogenesis is induced by the interaction between the

Vascular Endothelial Growth Factor Receptor 2 (VEGFR2) and the Vascular Endothelial Growth Factor (VEGF). VEGFR2 is trafficked from intracellular membrane compartments to the cell surface by a kinesin protein called KIF13B to receive VEGF, thereby, making the inhibition of KIF13B-mediated VEGFR2 trafficking a feasible approach in inhibiting pathological angiogenesis. Because clinical potential shown in mouse models still has not been able to clearly identify the precise mechanism of VEGFR2 trafficking, this in vitro research study will better form the basis for the success of future clinical research by first determining to which side of the cell (basal, apical, etc.) that the receptor is trafficked to.

197. Tyszka, Alexa

Cactus Virus X: Transmission, Infection, Host Specificity

Undergraduate - Biological Sciences

Cactus Virus X is a plant virus (Alphaflexiviridae) that has been found to infect *Schlumbergera truncata* (common name: Christmas or Easter Cactus), as well as other plants within Caryophyllales. CVX and its related viruses are poorly named and their hosts are sometimes misidentified, leaving many unanswered questions about their host specificity. The name "Cactus Virus X" itself is unfortunate, because it only refers to the first identified virus on Christmas cactus (a common name). Many questions remain. Where does it come from? How common is it in nature, and how is it transmitted? So far, we have assembled dozens of complete genomes, and assessed the mismatches between viral and host phylogenies, as well as apparent taxonomic assignment errors. Further, we have compared cultivation status (whether the plant sample is grown in a greenhouse, or sampled from its natural environment), collection location, and tracking plant tissue type. Using information from notes taken during other studies, descriptions in methods sections of papers, and other metadata, it appears that sequencing information supported that only cultivated plant samples have CVX, although there are anecdotal reports (unverified with genetic data) of the virus in the wild. Using these data as well as newly discovered sequences from lab plants, we have assembled a roughly tripled dataset of cacti-hosted Alphaflexiviridae, which may be used to guide future taxonomic clarifications.

198. Uddin, Ismihan

Effects of Multilingualism in Children

Undergraduate - Biochemistry

There is currently minimal research on the methods of learning between bilingual and monolingual children. It is well-established that bilingual children have tendencies to be able to learn other languages much faster than monolingual children, but not in other academic areas of knowledge acquisition in general. This study is aimed to determine the differences and similarities between the brain functioning of both bilingual and monolingual children. To test the hypothesis that bilingual children learn differently than monolingual children, I will be analyzing various experiments that have been conducted in regards to the responses of both groups of children, and the physical aspects of the way that their brain's cognitive function. The results have shown that bilingual children have been able to encode visual information faster than their monolingual counterparts. Additionally, there is reason to believe that this stems from the fact that white matter develops faster in the bilingual than it does for monolingual children. This is dependent on the fact that the age of second language acquisition can also have a great impact on the maturation and myelination of certain brain pathways. These results suggest that children who are bilingual have the ability to excel in their learning with different styles than their monolingual counterparts. Instead of grouping all children together, despite their neurological capabilities, children should be more thoroughly assessed based on their responses to various external stimuli to determine the best way to learn, whether that is visually, auditorily, or kinesthetically.

199. Udeogu, Onyinye

Exploring the relationship between feedback, self-efficacy, and memory

Undergraduate - Psychology

Research has shown that students' self efficacy, or confidence in their ability to do well, is positively related to learning outcomes. Some experimental work has also found that different types of feedback during a task can impact self-efficacy and how participants perform on those tasks. In this study, we investigate the influence of feedback on students' self-efficacy during online learning, and whether any changes in self-efficacy

are related to their performance on a final memory test. The experiment included two phases: the learning phase and the final test phase 48-72 hours later. Participants rated their self-efficacy three times during the study: before, during, and after learning. Participants were randomly assigned to one of three conditions: positive, neutral, or negative feedback. During the learning phase, participants watched lecture videos, completed distractor tasks, engaged in retrieval practice, and received feedback associated with their experimental condition. This cycle was completed four times, once for each of the four lecture videos. Participants received feedback based on their experimental condition, regardless of their performance on the retrieval practice items. The feedback was as follows: “Compared to other participants who have participated in this study, you have performed among the highest / at average / among the worst.” Approximately 48-72 hours later, participants completed the final test, which covered material from all four lecture videos. We predicted that feedback would have a significant impact on self-efficacy, such that the positive feedback would result in the largest increase in self-efficacy, while negative feedback would result in the smallest increase in self-efficacy, or potentially even decreases. Based on this first prediction, we also hypothesized that the positive feedback group would have better memory performance on the final test compared to the negative feedback group.

200. Umar, Samira

Soil Carbon Content in Midewin National Tallgrass Prairies based on Influences from Livestock

Graduate - Earth and Environmental Sciences

Agriculture and urbanization has degraded and transformed the tallgrass prairie ecosystem, particularly in the US Midwest. Besides habitat loss and consequent decrease in aboveground biodiversity, soils have also reduced vast amounts of carbon, nutrients and microbial species. Prioritizing the conservation and restoration of this land is beneficial for sustainability, pollution abatement, flood control, and restoration or reintroduction of native species. In addition to row crop agriculture, many former prairies are being used for livestock purposes, with additional effects of grazing and compaction on soil processes. In this study, we examined the impact of grazing on soil carbon content

on field sites at the Midewin National Tallgrass Prairie, Joliet, IL. Old and new pastures were studied, using restored and native prairies as control sites. Restoration of prairies has the potential to return the carbon lost from the soil during farming. Understanding the influence of grazing can help determine the contribution to the loss or gain of carbon from anthropogenic actions and inform restoration practices and the introduction of grazers (e.g. bison).

201. Useini, Hamdin

Antiproliferative Secondary Metabolite Discovery and Isolation from Freshwater Cyanobacterium Tolypothrix sp. UIC 10885

Undergraduate - Medicinal Chemistry and Pharmacognosy

Cyanobacteria are a diverse phylum of gram-negative, photosynthetic bacteria which are known to produce potent antiproliferative secondary metabolites with diverse structures, such as peptides and alkaloids. Cyanobacteria have only been the subject of pharmaceutical research for the last 25 years, providing a new and prolific source of novel drug leads to combat cancer. Here, antiproliferative SPE fractions of Tolypothrix sp. UIC 10885 were found to have potent bioactivity against human cancer cell lines. Bioactive fractions were subfractionated by HPLC and active subfractions were analyzed by MALDI TOF MS, HR-ESI-LC-MS/MS and 1- and 2-D NMR experiments. Using this established workflow, it was determined that the key cytotoxic analyte within the active HPLC subfraction is a peptide that belongs to the balticidin family of peptides, and the formula was determined to be C₇₅H₁₂₀N₁₁O₃₅ with a molecular weight of 1732 Daltons. This peptide demonstrated clear cytotoxic effect on various human cancer cell lines and analytical data did not correlate with any known balticidin peptides. Thus, further dereplication and isolation of this peptide will enable structural elucidation and biological evaluation of this potentially novel antiproliferative compound.

202. Vallejo, Ashley

Comprehensive Scoping Review: How COVID-19 has Impacted Food Insecurity

Undergraduate - Nursing

Due to the COVID-19 pandemic, it has caused a massive change in several individual's lives. Many have lost their jobs and several more are concerned about how they are going to get through the month and put food on the table. This is a worldwide problem and it is crucial to look at this in the lens of food insecurity. How does the pandemic affect those who are already struggling to get by day to day? The goal of this scoping review is to find the key points as to why this is occurring as well as investigating plans and ideas as to how to better this very pertinent issue. Discussion surrounded the early food insecurity impact of the pandemic, food insecurity and pediatric obesity, as well as the disparities faced from food insecurity in adults across the country. Methods to investigate this include in depth elaborations and determining the extent of research articles surrounding this issue, as well as how public health nurses can implement positive changes. Through this research, it is evident that those impacted by food insecurity have been affected tremendously by this. It has also caused more people to suffer from food insecurity than before the pandemic began. More interventions are needed to be implemented in order to help these people as time goes on, and it can start with community involvement. Interventions discussed include raising the taxes of the more wealthy households, offering more local resources, educating families on nutrition, as well as being able to provide health screenings more frequently and efficiently to those who need it the most. Overall, this is a very relevant issue and it can be concluded that by implementing interventions in areas that are facing food insecurity, it can better the health and wellness of those populations.

203. Van Kley, Autumn; Ruminski, Aleksandra; and Gomez, Ivan

Breaking Gender Norms

Undergraduate - Psychology

Social science acknowledges the societal construct that is gender and how it affects the world daily (Risman, 2004). Movements have challenged the gender binary and gender norms, mainly by women in the realms of careers, home, and hobbies. However, there are now also challenges to the gender binary from men, who are making headlines by adopting more feminine hobbies and attire, causing those who cling to societal gender norms to react. This study focuses on the public's reactions to men breaking gender

norms in appearance. We hypothesized that compared to men, women would react more positively toward men breaking gender norms because women have been pioneers in breaking gender norms and show less prejudice than men toward various groups (Wiley & Bottoms, 2013). We distributed an online survey to a diverse group of men ($N = 42$) and women ($N = 107$). The survey included our specially created 8-item scale measure of Attitudes toward Men Breaking Gender Roles in Appearance. Responses were made on a scale ranging from 1 (strongly agree) to 6 (strongly disagree). The scale was statistically reliable ($\alpha = .97$). Higher numbers reflected more positive attitudes towards men breaking gender norms. A one-way ANOVA revealed that, as predicted, women had significantly more positive attitudes toward men breaking gender norms ($M = 5.00$) than did men ($M = 4.27$) [$F(1,147) = 3.84 < 9.08, p < 0.01$]. Even so, both men and women were relatively supportive of men breaking gender norms —men's and women's means averaged high and above the scale midpoint. These results indicate that there is support for the further breaking of gender norms in our society, providing hope for a future where people are free to express themselves without society's judgment based on their gender.

204. Volety, Ipsita

Heparanase 2 plays a key role in regulating virus herpes simplex virus entry and egress through surface heparan sulfate regulation

Undergraduate - Biological Sciences

Herpes simplex virus type-2 (HSV-2) is the most common cause of genital herpes, characterized by painful lesions and inflammation in the anogenital region. Typically, males present with infection of the penile shaft or anal area while women mainly in the vaginal, cervix, and perianal region. HSV-2 genital infection is associated with an increased risk of the human immunodeficiency virus (HIV) transmission and acquisition. HSV-2 can also cause ocular and oro-labial infection, albeit less common than HSV-1. While there is no vaccination or cure against HSV-2, resistance against current therapies, such as Acyclovir, has been reported. Furthermore, viral DNA replication is the only aspect of the viral life cycle that these therapies, which are more than a decade old, work on. New innovative therapeutic interventions that disrupt different stages of viral infection, including entry, protein translation, and egress, need to be developed to

successfully ameliorate the disease. One method would be to develop new drugs that target pro-viral host pathways. In this project, we focus on the host enzyme heparanase 2 (HPSE-2) and how it affects the HSV-2 lifecycle. HPSE-2 is the only known protein to sequester heparan sulfate (HS), a polysaccharide that is ubiquitously expressed at the cell surface, by inhibiting heparanase-1 (HPSE-1). HPSE-2 inhibits HPSE-1 competitively by attaching to the same epitopes as HPSE-1, but with greater affinity. In contrast to HPSE-1 which cleaves HS, HPSE-2 has not been shown to have any enzymatic activity. HPSE-2 inhibition of HPSE-1 activity is known to be tumor suppressive, through the regulation of selective genes that affect tumor vascularity, tumor fibrosis, cell differentiation, ER-stress, and apoptosis. In recent studies by our lab, we have investigated the pro-viral functions of HPSE-1 during HSV-1 and HSV-2 infection using in vitro and in vivo models. In this study, we show how the inhibition of HPSE-1, upon overexpression and knockdown of HPSE-2, negatively affects HSV-2 replication. This shows HPSE-2 to be an important antiviral host defense factor against HSV-2 infection.

205. Vyas, Bhakti

Differential Equation Models for Population Growth

Undergraduate - Mathematics, Statistics, and Computer Science

Mathematical models in biology such as the Verhulst-Pearl logistic population growth model is used widely in the study of ecosystems. This is used to study population growth in bacterias, diseases, human populations, and other populations. There are limited space and resources such as food, water, and energy available to support a population. These available resources and space determine the carrying capacity up to which a population can ideally grow. Carrying capacity varies based on the changes in technology, environment, lifestyle, urbanization, etc. Therefore, there are adjusted models in Mathematics to realistically analyze, predict and control such population growth. In this project, I investigated a few models of differential equations including linear and nonlinear ODEs and a system of coupled partial differential equations; specifically, the logistic model for population growth and the system of equations for two species. This investigation included performing simulations to visualize the behaviors of the models with variations in the values of the components present.

206. Wallin, Allison

Sea-Surface Temperature Changes in the Mediterranean Sea

Undergraduate - Earth and Environmental Sciences

The Mediterranean Sea is often comparable to oceans due to its thermohaline circulation, making it useful to study as a scaled-down model for the oceans in regard to climate change. Its location also makes it of significant importance to human populations through the fishing industry and tourism, as well as being a biodiversity hot spot with a majority of its species being unique to the area. Warming in the Mediterranean Sea has been observed with satellite and field data, which is expected to increase as climate change continues to develop. To assess warming from 1980 to 2020, satellite data from the NOAA Optimum Interpolation data set was analyzed to determine warming rates by month and location within the basins. Warming hot spots were found in the Northwestern Mediterranean Sea and around Italy with the most seasonal warming happening in the winter. This has significant implications for the region in regard to invasive species from the tropics, mass mortalities within hot spots, and other impacts on the biological ecosystem.

207. Weng, Eric

Autonomic modulation and locomotor-balance control: Correlating fluctuation in blood pressure with fall-risk among older adults

Undergraduate - Biological Sciences

This study will find the correlation between blood pressure and susceptibility to slip and trip-related falls among older adults in a safe and controlled laboratory environment following mechanical perturbations during walking, under the direction of Dr. Bhatt and her team. Older adults will undergo repeated trip or slip-like perturbations on a treadmill. Blood pressure will be assessed before the trials and throughout the duration of the perturbation training. Susceptibility of test subjects to slips and trips will be based on the performance during slip and trip simulations in which outcome for each perturbation will be determined as a “fall” or “no-fall.”

208. Williams, Mariah

Students' Perceptions on Teachers' Live Online Class Discussion Practices

Undergraduate - Psychology

Computer-mediated communication comes with many benefits and disadvantages. This has become especially apparent in the realm of online schooling regarding participation. Research has shown there are a broad variety of factors that contribute to participation, however not much of said research speaks to participation from students particularly in the case of live online discussion. Therefore, in this study we conducted a survey that focused on the practices and policies that teachers enforce during live online classroom discussion. We asked participants about their feelings and perception on participating, considering these different policies. The practices were split between low structure, no centralized control over the discussion and high structure, control being maintained primarily by the teacher. We hypothesize that participants' ratings for participation, learning outcome, and approval for the teachers policies will be higher for low structure practices. However, we hypothesized that ratings for stress would be higher for high structure practices.

209. Wojas, Daniela

Pandemic in Perspective: A Comparative Analysis of the Athenian Plague of 429 BCE and the Covid-19 Pandemic

Undergraduate - Classics and Mediterranean Studies

In this paper, I will examine the social effects of an epidemic by contrasting the Athenian plague that struck the polis during the 5th century BCE to the COVID-19 pandemic in modern America. I will focus particularly on how both of these occurrences affected the community and altered the social imagination of the people. In the case of the Athenian plague, I will investigate, among other things, the mark it left on the theater and how it altered the language in tragic dramas; for instance, research suggests that dramas produced during the plague started consistently using vocabulary that alluded to real and metaphorical diseases with more heroes combating illnesses; a sickness also emerges as a political metaphor for stagnation and other social ills. Moreover, by examining both archeological evidence and literature, especially Thucydides' History of the

Peloponnesian War, I will explore how the plague affected the collective Athenian state of mind at that time which manifested itself in the establishment, in Athens, of the cult of the god of medicine, Asclepius, as well as in the construction of his sanctuary on the south slope of Acropolis. In comparing the Athenian plague and COVID pandemic I will look at the role played by religion: while in Athens people believed the plague to be the doing of the plague-god Apollo, surveys today indicate that nearly two-thirds of American believers regard COVID-19 as a message from God . Another similarity includes the attempts by each community to find “the perpetrator” of the disease – during the Peloponnesian War it was suggested that the Spartans were to blame for the plague; in modern America in turn, the coronavirus has fueled xenophobia and especially anti-Asian racism. In this research then, I plan to identify important trends that connect ancient and modern people in the face of a similar crisis.

210. Wong, Kelli

COVID-19 and Emojis

Undergraduate - Marketing

This research project will focus on how COVID-19 has influenced emojis. I will be looking into the different factors that impacted the emergence of new emojis, changes in meanings, and psychological factors (i.e. Does receiving emojis provide comfort to people during the pandemic?). Since we are still living through the pandemic, most of this information will still be relatively new, but also provide some insight and guidance as to how people are coping via messaging and the evolution of emojis.

211. Wong, Nathaniel

Response plans' effectiveness in reducing the number of new COVID-19 cases.

Undergraduate - Biological Sciences

Purpose: Coronavirus (COVID-19) has infected millions of people in the United States of America. To combat this, individual states have had unique response plans to limit the spread of COVID-19. The purpose of this study is to understand which response plans have been effective in lowering the number of new cases. Knowledge of effective strategies is important in creating new strategies to combat spread of disease in future

pandemics. Limited research has been done to show preventive measures against COVID-19 spreading. The purpose of this research is to improve on pre-existing plans and to suggest a plan of action for future pandemics. Methods: Data was compiled by the Center for Disease Control and Prevention, CDC, and was used to pinpoint the number of COVID-19 cases on a certain date. Periods of time were selected to compare COVID-19 statistics within a state. Several states were selected, and the number of new cases were observed to determine if there was correlation between the number of new COVID-19 cases and government responses. Results: Number of new cases have some correlation to certain events or response plans based on state. Plans from certain states were more effective than others. Conclusion: There is correlation between certain events and response plans to the number of new COVID-19 cases. Some state's response plan have been more effective in lowering the number of new cases. Suggested plan is based on a model of response for a COVID-19 outbreak and is limited by the methods that COVID-19 is spread. Suggested plan for future pandemics uses strategies that were most effective in lowering the number of new COVID-19 cases. Future studies should be included to analyze response plans from areas outside of the United States. Further exploration of responses based on population density is required to maximize effectiveness of response plans in future pandemics.

212. Xiao, Cissy

Novel role of Netrin and Ephrins in cornea neuroepithelium regeneration

Undergraduate - Neuroscience

The cornea serves as a protective barrier against the environment, and its transparency is essential for maintaining normal visual acuity. Injury of the corneal epithelium, its more anterior layer, may result in loss of sensation and vision by damage to the dense nerve endings. Growth factors and axon guidance proteins promote the regeneration of these nerves, which provide trophic support, sensation, and contribute to the normal homeostasis of the cornea. My study explores the role of axon guidance proteins belonging to the Netrins and Ephrins families. Netrins consist of secreted proteins that act as guidance signals during development. I focus on netrin-1, a bifunctional axon guidance protein that acts through its receptors deleted in colorectal cancer (DCC), neogenin, and

uncoordinated family members (UNC5H1-4). Netrin-1 has been shown to play a role in diabetic corneal wound healing, yet its role in corneal epithelium regeneration remains to be determined. Ephrins (Eph) receptors are the largest known family of receptor tyrosine kinases, which interact with their ephrin ligands. Ephrin-Eph signaling has been implicated in the central nervous system, but less is known about its function in the peripheral nervous system and the cornea. I am studying the expression of DCC, UNC5H1, neogenin, ephrin-B1, and ephrin-B2 after corneal epithelium injury by immunofluorescence staining and compared to intact mice cornea. I also examined their expression in the intact human cornea. I have found that there is high endogenous expression of all these proteins in the corneal epithelium. After injury, their expression levels quickly recovered as the epithelium healed, suggesting that these proteins may function in directing nerve and epithelium regeneration. These proteins were also expressed in the human corneal epithelium, which indicates that they may have a similar physiological role. My further studies aim at elucidating their role using in vitro and in vivo assays.

213. Xu, Ruidi

Validation of Medical Image Segmentation Software using MATLAB

Undergraduate - Bioengineering

The development of various medical imaging modalities allows for detailed imaging of the human body for use in clinical diagnosis and treatment. Medical image segmentation refers to the processing step that occurs after image acquisition, and the purpose is to separate regions of interest (ROIs) from irrelevant anatomy. ROIs are marked in 2D image slices of various orientations, and the resultant image slices are then combined to generate a 3D model. To accomplish this task, medical segmentation software generally consists of three necessary features: (i) thresholding, (ii) slice-by-slice editing, and (iii) region growing. Based on these guidelines, I am working under Dr. Banerjee of ImmersiveTouch to develop a segmentation software for clinical use. First, ten medical scans from CT and MRI were segmented by various raters. My project focuses on validating the 3D models generated from the segmentation process using MATLAB software. The validation process requires a visual and quantitative comparison of 3D

models from the new segmentation software with an accepted control model. Currently, my software is able to render inputted DICOM and STL files in a 3D coordinate system and view 2D image slices. Additionally, comparison of mean surface distance and 3D volume has been achieved with MATLAB functions. My next step is to incorporate virtual markers for specific anatomical landmarks, which would allow for measurements on physically printed models. The results of my project can assist in determining whether various softwares and automated segmentation methods are accurate enough to be used clinically.

214. Yen, Albert

Generalized Solution to Adjust Transitional Population Censuses that Use the Chinese Calendar

Undergraduate - Mathematics, Statistics, and Computer Science

For many centuries East Asian populations used a lunisolar (Chinese) calendar for calculation of ages, but no demographic historian has corrected single year age distributions of censuses of these populations to adjust for year lengths varying between 353 and 385 days. Using Taiwan as a model stable Chinese population without significant net migration, this study assesses whether census respondents used the Chinese calendar to self-report ages. The age heaping patterns were determined by calculating the average period age ratio of leap years in the Taiwanese censuses between 1905 and 1935. Our result shows that there is a consistent bias (more birth survivors) in Chinese leap years, which have between 383 and 385 days, in the Taiwanese population born before 1905. Further, the magnitude of the leap year bias is similar to the expected birth survivor fluctuations caused by varying year lengths of the Chinese calendar.

However, after the Japanese enforced the Gregorian calendar in government administration in 1906, the leap year bias was not observed for cohorts born after 1906. This provides strong evidence that cultural reliance on the Chinese calendar introduced a systemic but correctable inaccuracy in transitional Chinese censuses. Since vital statistics and census data from colonial Taiwan were of excellent quality, Taiwanese censuses provide a good test case of this age adjustment method for populations in the Chinese cultural sphere. Given that Chinese censuses are otherwise highly accurate, adjusting for

the use of the Chinese calendar will greatly improve the resolution of analysis of single-year events, such as the Spanish Flu.

215. Zavate, Laura

Comparative research - US & UK policing systems & police use of force

Undergraduate - Criminology, Law, and Justice

My paper aims to provide a comparison between the major differences, but also similarities between the US and the UK police task force, having a focus on police use of violence. The paper presents the history of both countries and the evolution of policing from the 15th century up until today. It also presents the underlying factors that contribute to police use of force and corruption such as: inadequate training, accountability, different policing strategies, and discretion. Opposed to the violence that US is experiencing, the UK is more progressive and less bloody. The UK takes police training very serious, and officers are unarmed, unless they hold a high rank in the task force. Additionally, the paper presents the repercussions that police use of violence has on the community and the relationship between civilians and police officers. Linked to this, the paper describes how different ethnic groups experience policing, and how the Black Lives Matter Movement, which quickly became an international movement, is a response to police brutality. My research also presents officer's perception on the job, and an analysis of the responses to police brutality such as abolition and reform.

216. Zayed, Monay

Novel DHA Treatment for APOE4-Associated Behavioral Impairments in an Alzheimer's Disease-Relevant Mouse Model

Undergraduate - Neuroscience / Economics

Alzheimer's Disease (AD) is a neurodegenerative disorder that affects tens of millions of people globally. The greatest genetic risk factor for the most common type of AD, sporadic AD, is the APOE4 genotype. Researchers have looked into treatment options for ameliorating the pathologies that potentially arise from APOE4. One route is docosahexaenoic acid (DHA) supplementation. DHA is an omega-3 fatty acid found in fish oil, krill oil, and algal oil, and it is a vital compound for brain development and

regular neuronal functioning. DHA deficiency has been implicated in patients with AD, most prominently in those who have the APOE4 genotype. Both human and animal studies have shown mixed results on the effects of DHA treatment on AD. This may be due to the limited types of DHA that can cross the blood-brain barrier and the variations between APOE genotypes, which suggests that further research must be completed. Here, we looked into a novel form of DHA, lysophosphatidylcholine-DHA (LPC-DHA) within a lipase-treated krill oil (LT-krill oil) treatment. By using Open Field and Novel Object Recognition tests, we evaluate the role of LPC-DHA-enriched diets on the memory-relevant behavior of mice with different APOE genotypes. The Open Field test results showed no significant differences across the LT-krill oil, krill oil, and control diets, although female mice travelled more than male mice, and APOE4 mice showed more anxiety-like behavior than APOE3 mice. The Novel Object Recognition test results showed that APOE4 mice treated with LT-krill oil performed 28% better than mice treated with the control diet and APOE4 mice treated with krill oil performed 13% better than mice treated with the control diet. This ultimately suggests the LT-krill oil treatment (with LPC-DHA) improves memory-relevant behavior in mice with human APOE4. The krill oil treatment also improves behavior, but to a lesser extent.

217. Zhang, Liang

Maternal Psychological Stress Related to Iron Status in Maternal-infant Dyads

Undergraduate - Nursing

In Chicago, maternal morbidity and mortality is 6 times more likely among Black birthing people than white, despite policy initiative to promote maternal health equity. Disparities in maternal morbidity and mortality reflect experiences of structural inequities – including limited quality obstetric care, implicit bias and racism resulting patient mistrust in the health care system, inadequate social support and financial insecurity. We examined how Black women's experiences and expectations in pregnancy were disrupted by structural inequities, linked to maternal stress and framed by socio-political events. We conducted two focus groups among 16 pregnant Black women to capture how the Black birthing community in Chicago view their intersectional identities and how that identity impacts their obstetric care. Transcripts were audio recorded and transcribed

separately by three members of the research team. Thematic analysis was used to interpret the data. Six themes emerged, including Intersectional identities as young Black women, Mistrust, Hospital reputation, Pregnancy traumas, and Shared decision making. Sub-themes under Intersectional identities as young Black women included Stereotypes/assumptions made based on identity, Being dismissed/not heard/listened to, and judgment around pregnancy. Within the current standard of obstetric care, Black women are vulnerable to receiving inadequate care, experience insufficient coordination and continuity in maternity care, experience structural racism and lack of support. This data can be used to inform the development of a community-based supportive care intervention for Black women, led by Black midwives.

218. Zhang, Wenqiong

New Moms

Undergraduate - Nursing

Background: In Chicago, maternal morbidity and mortality is 6 times more likely among Black birthing people than white, despite policy initiative to promote maternal health equity. Disparities in maternal morbidity and mortality reflect experiences of structural inequities – including limited quality obstetric care, implicit bias and racism resulting patient mistrust in the health care system, inadequate social support and financial insecurity.

Purpose: We examined how Black women's experiences and expectations in pregnancy were disrupted by structural inequities, linked to maternal stress and framed by socio-political events.

Methods: We conducted two focus groups among 16 pregnant Black women to capture how the Black birthing community in Chicago view their intersectional identities and how that identity impacts their obstetric care. Transcripts were audio recorded and transcribed separately by three members of the research team. Thematic analysis was used to interpret the data.

Results: Six themes emerged, including *Intersectional identities as young Black women*, *Mistrust*, *Hospital reputation*, *Pregnancy traumas*, and *Shared decision making*. Sub-themes under *Intersectional identities as young Black women* included *Stereotypes/assumptions made based on identity*, *Being dismissed/not heard/listened to*, and *judgment around pregnancy*.

Conclusions: Within the current standard of obstetric care, Black women are vulnerable to receiving inadequate care, experience insufficient coordination and continuity in maternity care, experience structural racism and lack of support. This data can be used to inform the development of a community-based supportive care intervention for Black women, led by Black midwives.

219. Zhao, Aishi

Neuroprotection in adult naked mole rats allows stable locomotion under extreme hypoxia

Undergraduate - Biological Sciences

Naked mole-rats live in large colonies in underground burrows and have been widely known to have unique physiological traits that allow prolonged survival in oxygen-deprived environments. Energy conservation during hypoxia may be essential in order to decrease O₂ consumption. This research examines the effects of hypoxia on locomotion, and I hypothesize that reducing oxygen will decrease physical activity of the naked mole-rats. The study observes pre- and post- conditioning in acute 5% hypoxia and utilizes quadrant movement to numericalize physical activity. In addition to the hypothesis that there will be decreased movement overall, there will be more movement in pre-conditioning than in post-conditioning. The results show a significant decrease in locomotion during hypoxia both in pre- and post- conditioning settings in contrast to the high number of movement in normoxia. The data did not support the hypothesis that there would be more movement in pre- than post-, however the difference is insignificant. Although physical activity decreased, they are able to have some movement after periods of inactivity, in contrast to mice who are stagnant in hypoxia; these fluctuating alert states and activity support the main hypothesis and are consistent with other published naked

mole-rat studies on hypoxia survival and adaptive mechanisms. Other vertebrate species who are hypoxia-tolerant have adaptations that emphasize restriction of energy consumption and metabolic suppression and we have shown here that the naked mole-rat species may use the same or similar mechanisms to survive hypoxia.

220. Zhou, Chris

Investigation of Biotin-KAI as a Treatment for Wet-AMD

Undergraduate - Biochemistry

Vascular endothelial growth factor receptor 2 (VEGFR2) is a membrane protein which, when activated by its counterpart, vascular endothelial growth factor (VEGF), will trigger a cellular pathway that promotes angiogenesis. Wet-age related macular degeneration (Wet-AMD) is a result of overactive VEGFR2 in retinal endothelial cells, which cause new blood vessels to sprout and leak into the retina, causing vision loss or blindness. Biotin-KAI (kinesin-derived angiogenesis inhibitor) is a novel synthetic peptide that inhibits the trafficking of VEGFR2 to the plasma membrane in endothelial cells; its potential to reduce angiogenesis and vascular leakage was investigated in this project as a potential treatment for wet-AMD. Biotin-KAI is also theorized to be small enough of a molecule to penetrate to the retina if applied topically. Giving topically applied KAI (5 µg) to mice found that it was able to reach the retina in about 30 minutes and in a concentration of $0.43 \pm 0.14 \mu\text{g}/\text{mg}$ total protein. The investigation of KAI as a potential treatment for induced vascular leakage was done by mimicking wet-AMD induced vascular leakage by laser-burning mouse retinas. After inducing the injuries, mice were placed in two treatment groups: KAI and CT23 (control). The amount of vascular leakage between the two groups was measured by intensity of Evans blue, a dye that was previously injected and binds to albumin in the blood. The intensity of the dye was statistically significant between the two groups ($n = 8$), providing evidence that KAI is a potential treatment option for vascular leakage in wet-AMD.

221. Ziadeh, Sanabil

Age Related Macular Degeneration

Undergraduate - Biochemistry

AMD or age-related macular degeneration is an eye disease that is very common in individuals of 50 years and older. The capstone project will focus on dry AMD, almost 90% of individuals diagnosed with this disease have this form. This type results in the erosion of the retina and thins it down. People tend to develop drusen, which are yellow deposits in their macula. As time progresses, these yellow deposits multiply and get bigger resulting in gradual blurred or loss of vision, this eventually leads to the death of your sensitive cells on the macula causing it to get much thinner. The project will involve culturing stem cells, followed by isolating exosomes and using them for hypoxia models for testing. For the first semester, knowledge of this particular disease will be collected, along with current treatments and research methods. At the start of the following semester (spring 2021), I will be responsible for conducting the following steps to obtain reasonable results: Culturing stem cells, isolating exosomes from condition media, followed by fluorescent labeling of the exosomes. Photoreceptor cells known as ARPE-19 (a human retinal pigment epithelial cell line) to generate AMD is then used, which will guide us in evaluating the therapeutic potentials of AMD. We will then grow cells and induce oxidative stress by treating the cells with hydrogen peroxide and then treating them with exosomes, ensuring that we also have a control for comparison purposes. By beginning/ mid of April, all results and data should be acquired and collected to begin the analysis process of all of the results.

222. Zubi, Mona

Arab Youth in Chicago and their Understanding of Intimate Partner Violence

Undergraduate - Public Administration

The purpose of this qualitative study is to explore the ways that Arab American youth in Chicago understand and recognize signs of intimate partner violence. Intimate partner violence (IPV) is a multilevel problem within society that begins with structural violence. Arab Americans face multiple forms of structural violence including being targeted through discrimination and policies. IPV rates within the Arab community are also high. In this study, part of a larger community-based participatory mixed method study among Arabs in Chicago, we analyzed the responses to eight open-ended questions from a survey questionnaire completed by Arab youth (18-25 years; N=44), using content

analysis. Participants were asked to give examples of emotional, physical, and sexual abuse, of warning signs that someone is a victim or perpetrator of abuse in a relationship, of anger management strategies, and of ways to help or protect someone or self from IPV. Participants described different forms of emotional (verbal, manipulation, control, threats, abuse of trust), physical (unwanted physical touch, use of inanimate objects, control, verbal threats), and sexual (use of force, rape, and unwanted touch, lack of consent, psychological, and threats) abuse. Their warning signs of someone being a victim included visual, behavioral, emotional, and control signs, and of someone being abusive included control, verbal, physical, behavioral, and emotional signs. They described behavioral, verbal, emotional and external support as examples of helping a friend in an abusive relationship. They used different forms of behaviors for anger control (physical, behavioral, and verbal responses, general coping mechanisms). As for self-protection, they listed general preventive behaviors and immediate actions. This study shows that Arab youth can recognize different forms of IPV and can identify warning signs of IPV in a relationship that could be used for future IPV prevention interventions.

Impact/CURA Presentations

1. Abdulbaki, Elma

“Heroines, Martyrs, and Cannibals: The Myths of Female Bodies during the September Massacres”

Undergraduate - French and Francophone Studies

In September 1792, the people of Paris, fed up with the injustice and corruption of the courts, decided to take the law into their own hands. They held popular trials in the prisons where they executed approximately 1200 suspected counterrevolutionaries and freed 1400 other prisoners. Amongst them were the Princess de Lamballe and Mlle de Sombreuil, whose stories of execution and salvation became myths in the following years. My work focuses on the mythologizing of these figures and what their myths reveal about women and violence during the French Revolution. The goal of this research is to analyze the impact of the women's myths by tracing their evolution throughout the years. By reading newspaper articles from 1792-1793, and books from the eighteenth and nineteenth centuries, I was able to establish an evolution timeline of the myths in question. These women's stories represent in fact two different kinds of martyrdom. Mlle de Sombreuil is represented as a virgin maiden who was forced to become a cannibal, while the Princesse de Lamballe's body was not only sexualized but defiled and then cannibalized as well. Each woman plays a different role in her myth: whilst Mlle de Sombreuil is an active agent that makes the choice of becoming a cannibal, the Princesse de Lamballe is merely a passive figure that gets tortured. My findings show how myths can be used to fashion history, which can then be used by certain political communities to create and mobilize a nation. The act of turning these female bodies into French martyrs served the agenda of nineteenth-century royalists.

2. Aboobacker, Sabah

AAVE and it's place in the modern world

Undergraduate - Biological Sciences

Despite being one of the most widely used dialects in the United States, African American English(AAVE), has a largely negative view behind it. Discrimination starts young for boys and girls who speak the AAVE dialect, in which schools believe children that speak AVVE must be sent to speech remediation classes or be placed in special-

education classes. While this practice has continued well into the 21st century, younger generations in the US have made certain words and phrases of AAVE a trend. Many make the false claim that the words they use aren't those of AAVE, thus appropriating the language and overlooking the discrimination that black American who actually speak AAVE go through. In the US, why is that when white Americans appropriate the language, it is seen as trendy, yet when black Americans speak the same language, their very intelligence is judged? This study will be 1) exploring the origin of AAVE and how it originally came to be; 2) research how African-Americans that speak the dialect are viewed and treated, both in America and International countries; 3) the cultural appropriation of the language, especially in younger generations on social media and lastly combine all three to see the effect it has on the identity of young, black children in America.

3. Alonzo, Jillian

Sphere Packings, Voronoi Cells, and Probabilistic Inequalities

Undergraduate - Mathematics, Statistics, and Computer Science

Sphere packing is a long-studied area of mathematics that has many challenging open problems and interesting applications in multiple fields such as information theory and statistical mechanics. In statistical physics, sphere packings are closely connected to the study of phase transitions in simple models of gasses. In this project we are pursuing new bounds on the free energy hard sphere model by using probabilistic methods, inequalities, packing densities, and the geometry of Voronoi cells in higher dimensions. I will present on the cumulative experience of first establishing a stronger background in probability theory, then learning to pose goal-oriented questions and review published material for guidance, and ultimately applying what I learned throughout my approach to explore such questions.

4. Antonio, Daniel

A review of state COVID-19 restrictions in physical activity locations in the U.S.

Undergraduate - Public Health

Aims The COVID-19 pandemic prompted states to issue restrictions on physical activity (PA) across the country. The purpose of this study was to describe restrictions in PA locations during the COVID-19 pandemic and to identify the types of documents used and agencies that issued restrictions. **Methods** Governmental websites were searched between March-July 2020 to compile COVID-19-related executive orders, proclamations, guidance documents, FAQs, and websites across all 50 states and D.C. Documents were coded using a coding tool and protocol developed from a review of 5 states' documents. Inter-coder reliability reached 86% among two independent coders with discrepancies resolved by consensus coding. To date, 38 states within all 4 census regions have been final coded. The remaining states will be finalized in March. STATA v.15.1 was used to generate descriptive statistics. **Results** 2,305 documents were collected from 38 states with 1,169 (51%) addressing a PA location; the majority were issued by the Governor's office (38%), park/recreation/natural resources agencies (35%), or health/public health agencies (19%). The type of documents used were guidance documents (38%), executive orders (24%), websites (20%), FAQ/Info Sheets (8%), reopening plans (8%), and governor order/proclamations (2%). PA locations addressed were park/recreation areas (67%), fitness facilities/gyms (43%), campgrounds (34%), beaches (26%), trails (26%), and greenspace (11%). Outdoor activity and exercise were considered "essential" in only 129 (11%) of documents that addressed a PA location. Messaging addressing social distancing was required in park/recreational areas (38%) and fitness facilities/gyms (49%). Capacity limits (85%), physical/social distancing (74%), cleaning procedures (62%), member mask-wearing (21%), and temperature checks to enter (12%) were required in fitness facilities/gyms. **Conclusion** Social distancing messaging and social distancing requirements were common restrictions across PA locations. Confusion or inadequate awareness of restrictions may have resulted from the variation across states in agencies that issued restrictions and the documents that were used.

5. Arendt, Nell; Barron, Daisy; and Hardin Anthony

Undergraduates who feel privileged and prioritize global life goals are equipped to form cross-racial friendships.

Undergraduate - Applied Psychology and Sociology

A large percent of students (42%) attending a racially diverse university chose not to form cross-racial friendships despite adequate opportunities to do so. Using information about students intentions, we discovered which students were most likely to form cross-racial friendships. Students' sense of privilege (university-level and societal-level) and life goals (university-level and societal-level) were used to predict how many cross-racial friendships each student had. Although self-efficacy is assumed to be conducive to students' formation of cross-racial friendships, this was not evident in our study.

Individuals who reported a high degree of privilege at the university and a low degree of privilege in society as well as strong global life goals and weak local life goals were most likely to form cross-racial friendships. This combination of priorities suggests that students who see universities as enforcing a global mission are most likely to form cross-racial networks.

6. Ather, Summayya

Old age and other factors associated with salivary microbiome variation

Undergraduate - Liberal Arts and Sciences

A lot of factors can contribute to the exact makeup of the salivary microbiome. Differences in the oral microbiome occur with old age, which could be due to oral conditions and diseases associated with old age, like edentulism, as well as other unknown causes. The salivary microbiome was sampled in patients from a large urban clinic. For all the subjects age, gender, periodontal status, caries status, presence of edentulism, medications, as well as tobacco usage were recorded. Microbial differences in these clinical parameters were seen, however each contributed no more than a 1% change to the salivary microbiome. Multifactor analysis was used to study the variation in salivary microbiome profiles linked to these factors. In the population sampled, there were significantly higher numbers of edentulous subjects, and increased levels of polypharmacy found with aging. Large differences in alpha diversity and beta diversity of the salivary microbiome in the old age group were largely linked to edentulism. Multivariable analysis will be done to test if after adjusting for differences in edentulism, polypharmacy, tobacco usage, periodontal disease, caries level, and gender, if old age

itself is associated with differences in bacteria. We will test if other factors beyond edentulism, polypharmacy and periodontal disease play a role in the differences seen in oral microbiome with old age.

7. Banks, Jonathan

Dysregulation of MicroRNA Expression in Chronic Periodontitis

Undergraduate - Biological Sciences

Objective: To assess microRNA (miRNA) expression in healthy and diseased gingival tissue of human subjects and identify potential miRNA-target gene interactions and biological pathways relevant to periodontal pathogenesis. **Methods:** Gingival biopsies were obtained from subjects meeting the criteria for “healthy” or “diseased” according to the current AAP guidelines. Total RNA (including miRNA) was isolated using miRNeasy kit (Qiagen). Global human miRNA expression was quantified using microRNA microarray (LC Sciences μParaflo® technology platform). Candidate miRNA expression was further validated by RT-qPCR in a murine ligature-induced periodontitis model at 4 and 8 days post ligature (DPL) placement and *P. gingivalis* challenge. Global pathway analysis of differentially expressed miRNAs were predicted using DIANA mirPath. Gene targets of candidate miRNAs were scanned for potential binding sites using miRWalk software. Several genes with known roles in immune response and potential miRNA binding sites were predicted. **Results:** Significant differences in the miRNA profiles were observed in the inflamed gingiva compared to healthy tissues. Among the 187 differentially expressed miRNAs, 114 were upregulated (fold-change ≥ 2) and 73 were downregulated (fold-change ≤ 0.5) in diseased tissue. Expression of four candidate miRNAs, conserved between human and mouse, were further validated during disease progression in a murine ligature and *P. gingivalis* induced periodontitis model. Interestingly, candidate miRNA miR-106b, miR-101 (downregulated), miR-125a, and miR-145 (upregulated) expression profiles also correlated with disease progression in murine gingival biopsies, indicating a role of miRNA in periopathogenesis. Pathway analysis yielded the following pathways: ECM-receptor interaction, MAPK signaling pathway, and cAMP signaling pathway. For miR-15b-5p and miR-106b-5p, several putative gene targets related to inflammation, cell migration, and cell survival were

identified. Conclusion: Human miRNA expression profiles are significantly different in healthy and diseased gingival tissue. Post-transcriptional regulation of cellular gene expression by differentially expressed miRNAs can modulate inflammatory/reparative biological pathways, suggesting their integral role in periodontal pathogenesis and progression.

8. Brown, Arnold

Understanding Underrepresented Students' Awareness of, Interest in, and Concerns About Study Abroad

Undergraduate - Political Science

This project is born out of work I am completing for my Spring 2021 internship with the UIC Study Abroad Office. Under direction of my supervisor, Kyle Rausch, EdD, Executive Director of the Study Abroad Office, I am researching underrepresented students in study abroad, specifically focusing on Black students and students with disabilities. The constructs I am examining are underrepresented students' awareness of, interest in, and concerns about study abroad and how the UIC Study Abroad Office might increase participation by these groups. The methodology began with a literature review to discover which student populations were the least represented in study abroad and what are some of the challenges these populations face. The literature review revealed that Black students and students with disabilities were the least represented in study abroad nationally and this was also exemplified in UIC data. A survey has been created to find out what barriers these groups face at UIC. To supplement data that the survey will yield, the researcher has also participated in multiple webinar events hosted by national study abroad organizations on this topic. In addition, the researcher has conducted meetings and pop-up advising sessions with campus collaborators who regularly work with these student populations, including both the African American Academic Network and the Disability Resource Center. Preliminary findings lead the researcher to hypothesize that the survey data will indicate that these groups face a multitude of obstacles regarding participation in study abroad, such as familial concerns, lack of accommodations for certain needs, and concerns about cost. Survey data will be collected in advance of Impact & Research Week to confirm or refute these hypotheses and shed

light on other considerations that will help inform future approaches to outreach and resource development by the UIC Study Abroad Office.

9. Callas, Andrew; Serrano, Bert; Rushnaiwala, Bilalahmed; and Dissi, Enis

The Mysteries of Cybersecurity

Undergraduate - BHIS/HIM

Many organizations and individuals have been affected by data breaches because there has been a plethora of compromised confidential information. Two of the major types of healthcare data breaches that we chose to focus our research on were loss/theft and hacking/IT incidents. Correspondingly, the covered entities associated with these data breaches typically fall under a healthcare provider or a business associate. It is vital for these covered entities to be actively taking measures to safeguard patient's protected health information. Moreover, the location of breached information indicates that email and network servers are very popular areas where data breaches take place. After using stratified sampling to record the average number of individuals affected by variable type, the results indicated that covered entity types showed the biggest difference. Healthcare providers should be concerned as to why their data breaches are impacting so many individuals. Healthcare employees should be aware of cybersecurity threats and do their part to greatly reduce the amount of data breaches. Furthermore, ensuring that everyone in the institution follows contemporary laws and regulations as well as meeting HIPAA standards is critical to keeping information confidential. Healthcare organizations should focus on the physical and technical safeguards that will need to be implemented to prevent any future cyberthreats from happening.

10. Dasteh Goli, Kimia

The Effect of knockout of ARID1A or AXIN1 on the Susceptibility of Oncopig Hepatocellular Carcinoma Cells to Chemotherapeutic Agents

Undergraduate - Radiology

Hepatocellular carcinoma (HCC) is an aggressive malignancy with complicated etiology and poor response to treatment at advanced stages. ARID1A and AXIN1 genetic mutations are the most common mutations observed in human HCC. Due to their

physiological and genetic similarities with humans, porcine models are great candidates for translational HCC studies, allowing us to assess targeted therapies for HCC with ARID1A or AXIN1 deficiency, as they share. In this experiment, we have tested the effect of knockout of ARID1A or AXIN1 on the response of porcine HCC cells to sorafenib and doxorubicin. Porcine HCC cells were developed from transgenic pigs called Oncopigs. To develop ARID1A and AXIN1 deficient cells, Oncopig HCC cells were transfected with recombinant Cas9 nuclease and a gRNA targeting ARID1A or AXIN1. Single-cell clones were isolated and mutations were confirmed by next generation sequencing and Western blotting. MTS cell proliferation assays were performed to test the response of the knockout cells to serial dilutions of doxorubicin and sorafenib. The half-maximal inhibitory concentration was determined by Sigma Plot software. Two Oncopig HCC ARID1A knockout clones and two AXIN1 knockout clones were isolated. Gene knockout mutations were confirmed by NGS. Western blotting confirmed AXIN1 protein depletion in the two AXIN1 knockout clones. ARID1A or AXIN1 knockout did not affect the response of Oncopig HCC cells to doxorubicin or sorafenib, as the IC₅₀ of both drugs was similar in Oncopig HCC cells and Oncopig HCC ARID1A knockout cells. The depletion of ARID1A or AXIN1 does not affect the response of porcine HCC cells to the commonly used drugs doxorubicin and sorafenib. This study demonstrates the feasibility of testing the effect of precise gene mutations on chemotherapeutic susceptibility of porcine HCC cells, paving the way for future testing of novel targeted therapies in large animal models of HCC.

11. Diaz, Annette

Clinical Predictors of Rate Control Therapy in Patients with Atrial Fibrillation Across Race-ethnicity

Undergraduate - Biological Sciences

Abstract Title: Clinical predictors of rate control therapy in patients with atrial fibrillation across race-ethnicity Authors: Baha'a Al-Azzam, M.D; Katherine E Shapiro, BA; Annette Diaz, David Tofovic, M.D; Victor Qiao, BA; Aylin Ornelas-Loredo, BA; Faisal Darbar, BA; Yining Chen, Sreenivas Konda, Dawood Darbar, M.D Background: Studies have shown that ventricular rate is an acceptable treatment strategy in patients with atrial

fibrillation (AF). In this study, we evaluated the factors that predicted adequate rate control therapy in patients with AF across race-ethnicity. Methods: We studied 418 subjects prospectively enrolled in the UIC AF Registry and managed with rate control therapy for AF. Responders were defined based on the AFFIRM criteria. Results: Of the 418 enrolled patients, 176 (42%) were African-American, 133 (32%) European-American, and 109 (26%) Hispanic-American. Overall, 205 (48%) met the AFFIRM criteria, and self-identified race did not predict adequate response to rate control therapy (Table 1). Baseline clinical characteristics were similar in responders and non-responders except for resting heart rate (68.2 ± 16.9 bpm vs. 84.4 ± 21.7 bpm; $P < 0.01$). Multivariate analysis identified resting HR (odds ratio [OR] 1.14, 95% confidence interval [CI]: 1.11-1.18, $P < 0.0001$), AF type (3.41, 95% CI: 1.01-11.51, $P < 0.016$) and a history of obstructive sleep apnea (OSA) (2.59, 95% CI: 1.33-5.07, $P = 0.005$) as predictors of nonresponse. In contrast, patients with a history of coronary artery disease (CAD) were much more likely to respond to rate control therapy as compared to those without CAD (0.51, 95% CI: 0.26-0.98, $P = 0.044$). Conclusion: In a diverse patient population, we showed that the resting HR, a history of OSA, CAD and permanent AF were significant predictors of ventricular rate control therapy for AF.

12. Dorris, Victoria

Haiti And Its Current State of Affairs with Their Sanitation and Sustainability Efforts Since the Attempt at Reconstruction Since the January 2010 Earthquake.

Undergraduate - Mechanical and Industrial Engineering

The goal of this independent study is to examine Haiti and its current state of affairs with their sanitation and sustainability efforts since the attempt at reconstruction since the January 2010 earthquake. Utilization rates, production rates and inventory replenishment for resource planning will be optimized. Additionally we will perform lean management techniques to identify circumstances for waste removal and to find potential opportunities to improve the economy where possible. The reconstruction of Haiti would address the country's focus on UNICEF sustainable development goals. The Sustainable Development Goals (SDGs) were adopted by all United Nations Member States in 2015 to end poverty, reduce inequality and build more peaceful, prosperous societies by 2030.

In my research I examined and considered different methods that would address Haiti's reconstruction goal through the perspective of targeting one of the selected SDG'S considering the ways in which lean management techniques, resource planning, Utilization rates, production rates and inventory replenishment could be used to achieve economic growth. While maintaining the priority of waste reduction and removal. The methods included implementation of windmills, solar panels, agriculture and connecting with different non-profit organization and their existing projects. The end goal is to not find the best approach but an approach that could include multiple suggested methods that has longevity and can be continued for generations.

13. Dusane, Shamali

Effect of Multisession Progressive Gait-Slip Training on Fall-Resisting Skills in People with Chronic Stroke

Graduate - Physical Therapy

Abstract Background: People with chronic stroke (PwCS) have demonstrated preserved ability to improve protective stepping following single session of perturbation training for fall-risk reduction 1,2. However, exposure to greater training dosage might induce greater adaptive gains in fall-resisting skills. Moreover, initiating training with a gradual increase in perturbation intensity might be better suited to accommodate sensorimotor and reactive balance impairment of PwCS. Thus, this study examined whether a multisession, treadmill-based training can enhance fall-resisting skills in PwCS. Methods: 11 PwCS underwent a 4-week treadmill-based gait-slip training (four sessions). Pre and post-training assessment was performed on six intensities of gait-slips (level 1 to 6). Training consisted of 10 blocks of each progressively increasing intensity (4 trials/block) until participants fell on >2 trials/block (fall threshold). On the next session, training began at a sub-fall threshold and was progressed further. Fall outcome, number of protective steps, multiple stepping threshold, progression to higher intensities, pre and post-slip center of mass state stability, clinical measures and walking speed were analyzed. Results: Post-training, PwCS demonstrated reduction in falls and number of protective steps on level 5 and 6 ($p<0.05$) compared to pre-training. While increase in pre-slip stability was limited to level 6 ($p<0.05$), an improvement in post-slip stability was noted at challenging levels

5 and 6 ($p<0.05$). Between the first and last training session, while most participants could progress to level 4, there was an increased percentage of participants progressing to level 6 ($p<0.05$). There was an increase in the self-selected treadmill walking speed ($p<0.05$), however clinical measures and overground walking speed remained unchanged ($p>0.05$). Conclusion: Multisession, progressive treadmill-based gait-slip training appears to induce significant improvement in fall-resisting skills among PwCS. Clinical significance: Bilateral slip training to improve stepping and weight-bearing using portable and user-friendly motorized treadmill have a strong potential for clinical translation.

14. Garrett, C.J.

Vicente Huidobro Altazor as New Models for Poetry

Graduate - Creative Writing

This project consists of a poetry chapbook heavily inspired by Vicente Huidobro's Altazor. First published in 1931 and considered to be Huidobro's magnum opus, Altazor is an experimental poem broken into seven cantos that re-imagines the hero of a traditional epic as being a poet falling through the landscapes of changing language-- armed only with a parachute. Utilizing techniques such as poetic excess, juxtapositions and extended metaphors, Altazor seeks to dismantle the constructions and archetypes of poetry and forge a new language that can better frame the ineffable vistas of the human soul, unconstrained and unburdened by linguistic limitations. Galvanized by Huidobro's metaphysical ideas and experimental style of writing, this project has manifested into a 50 page chapbook with two long poems that change tone, dictions and formatting through-out. The first poem is titled "Omni Horizon" and visualizes the poet as being an "avatar of carbon" and a "shepherd of shape-shifting climates" who terraforms a dead, tundra earth through the strength of verse. The second poem is titled "Noiseless Andromeda" and envisions the poet as an astronomer gazing at the night sky, enchanted by an ethereal figure, "a lunar virgin that hangs her expression to the side like a fiery ampersand". The poem simultaneously parallels the Greek myth of Andromeda as well as Altazor's journey through the landscapes of changing language. Both "Omni Horizon" and "Noiseless Andromeda" are rooted in a cosmological diction and the avant-garde

movements of surrealism, emphasizing poetry as being an artifact with the ability to tap into the unconscious. Highly influenced by Altazor and other works such as "Spring and All" by Williams Carlos Williams, the two long-form poems in the chapbook are less about creating a narrative centered around a concrete story-line and instead the metaphysical construction of poetry.

15. Gawenda, Julie; Aamir; Anooshay; and Varanasi, Yaajnavalki

The synergistic effects of APOE genotype and sex on the gut microbiome of a transgenic mouse model of Alzheimer's disease

Undergraduate - Bioengineering

Alzheimer's disease (AD) risk is primarily determined by three universal biological variables (UBVs): age, APOE4 genotype, and female sex. Importantly, female sex and APOE4 genotype interact synergistically to increase AD risk. In AD patients, the gut microbiome (GM), or the collective genome of gastrointestinal bacteria, exhibits dysbiosis, characterized by a significant decrease in putative beneficial bacteria with an increase in toxic species. However, the interactive effects amongst APOE genotype, sex and significant AD pathology on the GM remains unknown. To analyze these effects on the GM, we used EFAD mice, a preclinical mouse model expressing five familial AD mutations (FAD) with the human (h)-specific isoforms (5XFAD+/-APOE+/+; E2FAD, E3FAD, E4FAD), in which neuropathology mirrors human risk. The microbial composition of fecal samples from 8-month (8M) male and female E3FAD and E4FAD mice were analyzed using high-throughput sequencing of 16S ribosomal RNA gene amplicons. Across taxonomic levels (primarily family, genus, species), the GM differed significantly comparing males to females, ♂E4FAD to ♀E4FAD and ♀E3FAD to ♂E4FAD. Similar to AD pathology, the EFAD GM exhibits dysbiosis, greatest in ♂E3FAD < ♀E3FAD = ♂E4FAD < ♀E4FAD. As a modifiable metabolic organ, the GM potentially serves as a therapeutic target via dietary intervention enabling modulation of AD pathology.

16. Gonzalez, Cristina; Abdulbaseer, Salmah and Parekh, Pooja

NURSING HOME INTERPROFESSIONAL RELATIONSHIPS IN HOSPITALIZATION DECISION-MAKING

Undergraduate - Geriatrics

Introduction: Preventable hospitalizations are costly to nursing homes (NHs) and pose unnecessary risks to patients' health. This study seeks to understand how interactions between nurses and providers during hospitalization decision-making could impact preventable hospitalizations.

Methodology: 14 nurses and 13 providers were recruited from 2 UIC-affiliated NHs in Chicagoland. Two nurse focus group sessions and 13 provider interviews were consolidated into a codebook using Grounded Theory.

Results: Five themes were identified in the results: interprofessional relationships, emotions, challenges, interprofessional communication, and unnecessary hospitalizations. By comparing participant responses across these themes, several ways to decrease preventable hospitalizations were identified:

1. NH culture should foster trust building in nurse/provider relationships and support nurses in their role as the “eyes and ears” of providers.
2. Nurses and providers express emotions differently, which may cause communication conflicts. Addressing this may help improve interprofessional conversations about resident conditions.
3. Standardized protocols for hospital admission as well as hospital-to-NH readmission are needed for dependable transfer of information between institutions.
4. NHs need a standard interprofessional communication protocol. Nurses should be trained to be prepared and brief with clinical information communication, and providers should be trained to be better listeners.
5. NHs need to uphold staff training and continuing education to streamline routine treatment and hospitalizations. NHs also need to address lack of equipment, inefficient medical exams/labs, and inadequate staffing/training to use equipment and administer tests.

Conclusion/Discussion: Our results provide initial evidence that nurses and providers differ in their expectations of interprofessional roles and relationships. Since these interactions tend to occur remotely (nurses often describe the patients' condition via phone), differences in expectations could influence decision-making. Future research should further examine these interprofessional expectations to better understand how interventions could reduce preventable hospitalizations.

17. Griffin, Ashley and Jaurigue, Cleofe

The Influence of Building Characteristics and Multi-Hazard Vulnerability During COVID-19 Pandemic

Graduate - Civil, Materials, and Environmental Engineering

Since the beginning of the COVID-19 pandemic, the virus caused significant disturbance to normal operation of society. Many agencies documented the spread of COVID-19 all over the world, which was used for this research in order to analyze alternative ways the virus can spread throughout a specific location. These data were evaluated in two different criteria. First, the correlation between displaced residents and the spread of COVID-19 in the regions affected by natural disasters were investigated. Second, the building age and number of floors were analyzed to determine if building characteristics played a role in the spread of the virus in major cities such as Chicago and New York City. Some examples of natural disasters during the pandemic were the multiple-vortex tornado in South Carolina mid-April, plus wildfires in California and tornadoes and hail in Iowa in mid-August. Coronavirus cases 14 days after the weather event were analyzed in each of these locations. With more recent hazards occurring, such as the Texas Power Crisis, the software ArcGIS was used to visualize the percent change in coronavirus cases by mapping areas of power outages. In big cities where building data are available, cumulative COVID-19 case rates were analyzed together with building characteristics to determine some type of correlation. The ArcGIS software was used alternatively to analyze New York City and Chicago buildings and coronavirus cases. Available shapefiles for the data of these two cities were downloaded from online data portals. For New York City and Chicago, we expected that the case rates of the coronavirus would be larger in areas with older and more occupied buildings. From the visualizations that were created, this assumption proved to be true in Chicago and some parts of New York City. For multi-hazard events, the conclusions that were made varied with the type of disaster.

18. Johnson, Carolyn

“Patient preference for intravenous vs. oral administration of diphenhydramine to relieve opioid induced pruritus in patients enduring a vaso-occlusive crisis (VOC).”

Undergraduate - Biological Sciences

Sickle Cell Disease (SCD), a genetic disease in which sickle shaped red blood cells aggregate throughout the vascular system, is characterized by painful episodes and tissue damage called vaso-occlusive crises. Opioids are typically provided for pain management but also commonly cause pruritus or itching. This side effect can be relieved using the antihistamine diphenhydramine administered either orally or intravenously (IV). This project sought to document sickle cell patients' preferred form of diphenhydramine administration, reasoning for their preference, and how often they received their preferred form. A qualitative approach was used such that 16 individuals with sickle cell disease who had previously received either oral or intravenous diphenhydramine for opioid induced pruritus associated with a vaso-occlusive crisis completed a semi-structured interview. Findings indicate a majority of sickle cell patients prefer intravenous administration. Patients believe IV diphenhydramine requires less time to relieve itching, helps reduce the severity of their itch, is able to target a particular location, and that oral diphenhydramine is less effective. Additionally, half of patients responded they never receive their preferred form of diphenhydramine. These findings may be utilized by the University of Illinois Hospital and Health Science System Sickle Cell Disease Clinic to refine their approach to more effectively treat opioid induced pruritus in sickle cell patients.

19. Jumah, Tamara and Mustafa, Zane

Coronavirus/COVID-19 and Pregnancy Study (CAPS)

Undergraduate - Neuroscience

The purpose of this research study is to explore the impact of the he impact of the Coronavirus/COVID-19 pandemic on the health, well-being, and lifestyle behaviors of women during pregnancy. Participants will be will be asked to complete an online survey that includes questions about your health, pregnancy experience, hospitalization and delivery dates if applicable, feelings, life changes related to the Coronavirus/COVID-19 pandemic, and sociodemographic characteristics (for example, your age, race/ethnicity, education).

20. Khambhati, Murtuza

Selective activation of GABAergic neuron populations in the midbrain tegmentum after precipitated nicotine withdrawal

Undergraduate - Liberal Arts and Sciences

Chronic exposure to nicotine elicits drug tolerance and withdrawal behavior in animals and humans. Past studies focused on the circuitry of the midbrain tegmentum have definitely linked this area of the brain to the withdrawal phenotype, yet the mechanistic roles of activity in discrete structures in this region remain unclear. Thus, our studies focused on a specific nucleus at the basal side of the midbrain tegmentum, the interpeduncular nucleus. We hypothesized that long term nicotine exposure leads to selective changes in activity in two distinct GABAergic neuronal populations within the interpeduncular nucleus, and its associated circuitry. Specifically, we studied nicotine withdrawal in B6. Cg-Tg (Fos-EGFP) mice. We precipitated withdrawal by systematically injecting the nicotinic antagonist mecamylamine in mice chronically treated with nicotine as well as in control mice treated with sucralose. Mice treated with chronic nicotine showed increased excitation of GABAergic neurons as compared to the control mice and also exhibited modified c-Fos activation in downstream nuclei in the brainstem. Thus, our data suggests that efforts to develop new nicotine cessation therapy may benefit from targeting these areas.

21. Khan, Farisa

The Residential Segregation of Muslims in the United States: Dynamics and Consequences

Undergraduate - Neuroscience, Pre-Law

This paper theoretically and empirically explores how Muslims in the United States experience residential segregation. Building on work by Choudhury (2020), I argue that discrimination against Muslims cannot operate on visual cues alone, and that there are strong reasons to expect that the residential segregation of Muslims may rely not just on discrimination against individual renters and homebuyers based on their physical appearance, but also on efforts to symbolically and practically reject Muslim communities at large from neighborhood integration. I argue that attempts to prevent Muslim institutions from being constructed or operating in communities function as

proxies for preventing Muslim residents from moving into, or remaining in, those communities, and anchor this analysis in the historical record of religious land-use discrimination against Black communities dating back to the post-Reconstruction era. I build on the American Civil Liberties Union's database of hate crimes against Muslims and Muslim community and religious institutions and add data from the US Department of Justice on unconstitutional attempts to prohibit Muslim religious land use in American communities (the construction of mosques, community centers, cemeteries, and other spaces). I present descriptive statistics from these data and explore key case studies to illustrate the dynamics and consequences of the most common case types. Finally, I suggest the implications of including Muslims in the framework and debates around residential segregation today.

22. Lach, Thomas

Type I Diabetes Patient Caregivers' Perceptions of Emerging Treatments

Undergraduate - Biological Sciences

In recent years, technological advancement gave rise to two distinct therapies for type 1 diabetes: Islet cell transplantation, an experimental therapy that can potentially provide a functional cure for those with type 1 diabetes complicated with hypoglycemic unawareness, and closed-loop system technology, which can act as a means of blood glucose regulation and automatic insulin delivery through a device attached to the body with little to no user input. This study investigated perceptions, concerns, and decision factors influencing preferences of these emerging therapies for parents of children with type 1 diabetes. Semi structured interviews were conducted with 13 parents of 14 (7 female) children with a mean (standard deviation) age of 10.5 (5.1) years and diabetes duration of 4.2 (4.5) years. Six children were on multiple daily injections as a form of therapy, while eight were on an insulin pump; 12 children were on continuous glucose monitoring technology. Content analysis was performed on the responses to extract underlying themes. Eight themes were identified encompassing the similarities between parents' responses. These themes included: treatment efficacy, equipment usability, accessibility of treatments, desire for more knowledge, children's independence, safety, personalization of treatments, and restoring original body function. Parents desire

treatments that are not only accessible, but reliable enough to give their children autonomy and independence when separated from their parents. There was a heavy emphasis and desire for a cure that would restore the organ function of the children to that prior to diabetes. Parents showed a strong reluctance to both immunosuppressive regimens required following islet cell transplant and allowing their children to be research subjects for these therapies. This research provides a more insightful understanding of the desires of parents regarding type 1 diabetes treatment for their children and can ultimately be used to create a more desirable treatment regimen for diabetics.

23. Lemke, Noah

Do Refuges Inflate Rates of Cannibalism Among Juvenile Wolf Spiders?

Undergraduate - Biological Sciences

Cannibalism, a common interaction among generalist predators, can make food webs difficult to untangle. Yet understanding how these predators affect food web dynamics is important for modeling many ecosystem processes. Among generalist predators include cursorial wolf spiders, which are known to be cannibalistic even as juveniles. What is less certain, however, is how intracohort cannibalism interacts with the presence of alternative prey in complex habitat. While theory would predict that these factors should mitigate the occurrence of cannibalism, and even allow a higher abundance of cannibals to coexist, experimental evidence has shown the contrary. Hence, the goal of this research was to uncover the possible mechanisms underpinning this apparent paradox and gain deeper insights into the foraging behavior of an important generalist predator that might further ecological theory. I developed an individual-based model, calibrated with data from a previous mesocosm experiment. My results show distinct non-linearities that can explain both the theoretical and experimental results, given that some proportion of the modeled population has a reluctance to engage in cannibalism. When this happens, patches of complex habitat might act as a sink when multiple spiders are lured there in search of alternative prey, but instead find one another and incidentally engage in cannibalism. While initially there is a strong, positive correlation between complex habitat and the rate of cannibalism, there is a point of inflection once the environment becomes sufficiently

saturated, and the trend reverses, becoming weakly negatively correlated due to the constraints on foraging efficiency. Though this was replicated at a small scale, the results can have implications for greening measures taken at larger scales. For instance, if only a small number of green patches are created adjacent to farmland, then this might lead to the unwanted effects of decreasing spider abundance, lowering spillover, and disrupting pest suppression.

24. Lozada, Justine

Growing as A Person through Involvement

Undergraduate - Psychology

Being involved on campus saved my college experience. I started college with a mindset of only focusing on my academics. I went to class and went to my dorm. You might have been able to catch me in the computer lab once in a while, but that's it. I wasn't involved at all. I didn't even know about the many events happening on campus. I was content with how I was operating at that time. I didn't feel like I had to do anything else. It wasn't until my junior year when I got involved with the UIC Student Activities Board (SAB) did I realize how much I missed out on and how amazing college could truly be if I just put myself out there. Being a part of SAB helped me grow as a person. I've gotten better at simply talking to people, something that was not my strong suit before. I've put myself out there more. I've built great relationships with students and faculty. I've experienced so much. This wasn't something I jumped at the chance to do on my own. I had a bit of a push, but once I got a taste of what I could be doing I didn't let myself back down. I've reached out for opportunities I know I wouldn't have before and I've accomplished so much. The skills I've learned from being a part of SAB, while I'm not using them to get into a related career field, are skills that I needed to grow as an individual. I can apply them to the career that I want while not having to be a part of anything related to event planning and this is something that I'm truly greatly for. Had I not got involved on campus, I would have graduated feeling unfulfilled and I'm truly proud that won't be my story this time.

25. Michelsen, Gunhild

Right Place, Right Time: Being Involved Changed My Life

Undergraduate - Management

Without UIC, CSI, and Campus Housing, I wouldn't be the person I am today. Every organization I have been involved with has afforded me multitudes of growth experiences. I have had the wonderful opportunity to begin and end my college career at UIC and I will carry that flame with me wherever I go. I was introduced to CSI and UIC Radio by virtue of right place, right time. In my first year, I became involved with the Improv Club where I met the then-Station Manager for UIC Radio. Radio was something I had never considered, my high school didn't have its own station. So I decided to apply for that exact reason, to try something completely new that I had no familiarity with at all. It has turned out to be one of the best decisions I've made. Discover Islam week and meeting new friends Highlight UIC NRHH involvement, martin luther king jr service project. My favorite moment of right place, right time actually has to do with all the stairs from the ground floor to the entry way of CSI. Every week I would climb the many stairs leading up, reach the landing, and turn to the desk worker to have a chat about their day and my opinion on the number of stairs. Because of all those stairs and the friendliness of the CSI desk workers, I met the love of my life, a fellow CSI-er and actually occupying the space right above the radio station. Involvement has shaped every part of my college experience, and in turn, every part of me.

26. Mirza, Faraz

WeCanConnect - Usability Testing

Undergraduate - Occupational Therapy

Background: Cancer has been described as a ‘double whammy’ for people with disabilities. The cancer care system is inadequately prepared to address their unique needs. WeCanConnect (WCC) is an mHealth app to promote peer support and information sharing among cancer survivors with disabilities. WCC’s three main features provide users with multiple circles of support: 1) Connect to Peers allows one-on-one peer matching and engagement, 2) Community Forums enable group-based discussion across users, and 3) the Virtual Library is a hub of evidence-based information tailored for this population. Purpose: To evaluate WCC’s usability (efficiency, errors, and user

satisfaction) among cancer survivors with disabilities. Population: Fourteen adult cancer survivors with known disabilities. Methods: During video Zoom sessions, participants completed a structured series of think-aloud tasks to examine WCC's features and functionalities. Qualitative de-briefing questions were asked after each task and about the app as a whole. Participants completed the System Usability Scale to generate an overall usability score. Data were aggregated, coded and themes identified. Results: The average usability was rated as good-excellent (average SUS = 80.5), yet the qualitative feedback identified opportunities for improvement. Participants appreciated the focus and functionality of WCC as a whole and agreed that it would be a valuable resource for cancer survivors with disabilities. Key areas for improvement were accessibility, preferred wording, and intuitiveness of the design to promote ease of use. Action items based on user-identified concerns were developed to inform the next round of app refinement. Based on user feedback, we created an instructional video to help users understand WCC's features and functionality and how to easily navigate the app. Conclusion: Usability testing with end users with disabilities is an important step in the development of the WCC app and will help ensure its relevance, acceptability, and ease of use.

27. Naleye, Nawaal; Krynski, Isabel; and Nuno, Shanon

Evaluating The Reliability and Validity of the Zones of Regulation Curriculum Among Board Certified Behavior Analysts.

Undergraduate - Applied Psychology

There are several different curricula which aim to teach students social-emotional skills and emotional regulation skills. One that is commonly used within the classroom setting, is the Zones of Regulation (Kuypers, 2011). The Zones of Regulation curriculum takes a cognitive behavioral approach to teach students how to detect, label, categorize, and regulate their emotions. Students are taught to identify their emotional state by indicating which "zone" they are in. Emotional regulation can be difficult for young students to learn but the Zones of Regulation offers a protocol for teachers and clinicians, including behavior analysts, to teach the skill using pictures and visuals. To date, no research has evaluated the reliability and validity of the Zones of Regulation among behavior analysts.

For the current study, behavior analysts completed three different tasks. Participants were presented with the different visuals used within the Zones of Regulation and asked to match the visual to the corresponding emotion, expressively label the emotion displayed in the picture, and to sort the different emotions into the four different zones. Participants were scored on accuracy correct and data was also used to calculate agreement amongst participants in order to determine whether there is consistency amongst respondents. Preliminary data indicate low agreement among participants. Implications and future opportunities for future research will also be discussed.

28. Ospino, Kamal; Carranza, Flora; and Quintero, Maria

Attitudes Towards Police as they Correlate to Race

Undergraduate - Psychology

Currently within the United States, racial divide is strong, with many protests nationwide for racial justice. Two major contributing factors include the state of the nation after a Post-Trump Presidency and police brutality cases around the country. Although police abuse of power is not new, the public salience the amount of cases has risen significantly over the last decade, bringing with it the Black Lives Matter movement that is felt and followed nationwide (smithsonianmag.com, 2017). We studied aims to the relationship between race/ethnicity and attitudes one feels towards police. Prior research suggests that there are important racial differences and we wanted to replicate and extend those findings (Stevenson, Bottoms, and Burke; 2020) (Woolard, Henning; 2020). Specifically, we hypothesized that African American and Hispanic individuals will feel more negatively about police compared to White Americans. To test for this, for our Social Psychology laboratory class, we conducted an anonymous online Qualtrics survey of our on social media as well as across UIC student organizations. We measured participants' self reported race/ethnicity and their attitudes towards the police. For attitudes, we constructed a multi-item scale measure consisting of X items, answered with an X-item response scale ranging from 1 to X, with higher numbers indicating more support for the police. Coefficient scale reliability analysis indicated the the scale was reliable ($\alpha = .94$). A one-way analysis of variance (ANOVA) showed support for our hypothesis. African Americans ($M = 2.33$) and Hispanic ($M = 3.18$) individuals have significantly more

negative attitudes towards police compared to White Americans ($M = 3.76$), $F(2,283) = 18.48$, $p < 0.000$. If the relationship between U.S. citizens of the United States and the authorities is to become better, and if racial tensions overall are wanted to improve, an important first step is to understand racial/ethnic differences in attitude.

29. Pandya, Ashma

Engineering the Geometry of Peptide Nanocages for Targeted Drug Delivery

Undergraduate - Chemistry

Cisplatin ($cis\text{-Pt(NH}_3\text{)}_2\text{Cl}_2$) has emerged as one of the most potent chemotherapeutics for cancer treatment. Despite its high cure rates, its lack of cellular selectivity causes most of the administered drug dose to either destroy healthy cells or be wasted, with only 1% attacking the cancerous mass. Thus, there is considerable effort being put into the design of biocompatible drug delivery vehicles that can selectively target cancerous tissue. We aim to synthesize precisely shaped nanocages consisting of artificial metallopeptides to facilitate selective delivery and unloading of cisplatin. These cages are made of synthetic peptides and have redox-active metal ions such as Cu(I) on the vertices. In highly reducing environments, such as that of a hypoxic tumor, the nanocage is expected to undergo distortions and release the drug cargo. We are studying how the presence of the bent amino acid L--proline in the cage edges affects the cage geometry, which influences the cage topology, size, and redox behavior, and ultimately its binding strength and specificity towards drug cargo. Solid phase synthesis of peptides containing 7, 9 and 11 amino acids with a central L-proline and helix-stabilizing 2-aminoisobutyric acid (Aib) residues has been carried out, followed by metalation with Cu(I) and Cu(II) to induce cage assembly. Structural analysis of these nanocages by NMR, CD and mass spectroscopy indicates the formation of metallopeptide dimers, in which each unit is a helix. Further characterization is underway to determine the three-dimensional kinked geometry of the proline-containing supramolecules. Overall, it is expected that different cage shapes will exhibit selective affinities for different drug molecules. Once we elucidate the relationship between structure and function, these findings will influence the development of chemotherapeutic delivery vehicles and lead to better patient outcomes for cancer treatment.

30. Parekh, Pooja and Sandu, Shashank

**Exploring Anti-Racism in Free Clinic Healthcare: Analysis of Anti-Racism
Workshop at the New Life Volunteering Society**

Undergraduate - Internal Medicine

Introduction: Growing recognition of the harmful impacts of racism and discrimination in healthcare has led to a need to integrate anti-racism training into medical curricula. Free clinics have historically addressed the exclusion of people of color in healthcare, making it imperative to educate and combat discriminatory practices in the provision of care. A unique, interactive workshop on anti-racism was developed as a training series for student free clinic volunteers at the New Life Volunteering Society (NLVS) in Chicago, Illinois. This interactive workshop addresses the necessity of disseminating awareness of race-founded disparities at both the medical school and undergraduate level by providing and analyzing the types of racism, history of discrimination, and frameworks of anti-racism. Methods: Free clinic volunteers consisting of medical and undergraduate students across the Chicagoland region will attend the training and participate in small group case-based discussion after a large group lecture. The course materials were developed as a collaboration among faculty and student NLVS board members. Results: Data collection is ongoing and will be reported at the time of the conference. Qualitative and quantitative data will be collected to assess the workshop's effectiveness in improving participants' attitudes and perspectives on anti-racism in free clinic healthcare. Conclusions: Training will encourage discussion of identifying and addressing anti-racism in healthcare. We aim to reduce the lack of anti-racism training in medical curricula and free clinic healthcare through this workshop, and to encourage students at both the medical school and the undergraduate level to actively recognize, espouse anti-racist ideals, and combat racism in medicine.

31. Purohit, Rudri

Age-related Differences in Reactive Balance Control and Fall-risk in People with Chronic Stroke.

Undergraduate - Rehabilitation Sciences

Abstract Background: Age-related deteriorations in balance control coupled with stroke-related sensori-motor impairments greatly increases fall-risk in community dwelling older adults with chronic stroke (OAwCS). Given the crucial and protective role of reactive balance control in preventing slip-related falls, we aimed to compare age-related differences contributing to impaired reactive stepping and fall-risk in community dwelling people with chronic stroke. **Methods:** Fifteen young and fifteen older adults matched on their stroke-related impairments (Chedoke McMaster assessment leg and foot subscales) were exposed to a novel, large magnitude overground gait-slip under paretic and non-paretic limbs. Baseline balance and mobility measures and isometric strength were assessed. Center of mass (COM) state stability and slipping kinematics were computed. **Results:** OAwCS demonstrated significantly lower COM state stability along with more posterior COM position and more posterior COM velocity at post-slipping liftoff (LO) and recovery touchdown (TD). OAwCS also displayed greater BOS displacement and velocity at post-slip recovery TD as compared to their young counterparts. The altered reactive balance control measures were more pronounced only when the non-paretic side was slipped. Additionally, OAwCS had significantly lower isometric muscular strength in hip flexors, knee extensors and ankle plantar flexors on the non-paretic side. Furthermore, non-paretic knee extensor strength negatively correlated with heel velocity at post-slip TD when the non-paretic limb was slipped. **Conclusion:** Aging has an independent detrimental effect on reactive balance control in people with chronic stroke especially on the non-paretic side. Findings from our study expose specific age-related factors responsible for higher fall-risk in OAwCS as compared to their younger counterparts. Furthermore, our study results indicate that bilateral lower limb strength training combined with reactive balance training on paretic as well as non-paretic sides could be essential for reducing fall-risk in OAwCS.

32. Reed, Jasmine

The Bridge: The Brotherhood of Sleeping Car Porters and their Impact on African American Class Division

Undergraduate - Teaching of History

Following the 1919 Race Riots that rocked the nation, a shift occurred. This shift presented itself as the first ever all Black labor union to be recognized by the American Federation of Labor. This union was called the Brotherhood of Sleeping Car Porters (BSCP), founded by labor organizer, Asa Philip Randolph. Founded in 1925 (just 6 years after the 1919 Race Riots), the BSCP was a new and somewhat radical labor union aimed at protecting and improving the lives of the Black porters and maids who worked for the Pullman Railroad Company. Many believe that the foundation of the union was, at the very least, without conflict in the Black community. My research, however, finds that the creation of the union was not without division in the Black community, especially as it relates to Chicago, where most Pullman porters resided. Black porters were considered middle-class due to the higher wage porters received in comparison to their non-porter counterparts. The idea that Randolph should think to create a labor union on the behalf of the most well-off Black people in the city while at risk of being viewed as a communist, was ludicrous to Black Chicagoans. I argue, however, in the years following the nationwide 1919 Race Riots, an entirely Black body resembling the BSCP was necessary and unavoidable. The Brotherhood stood as a symbol representative of Black unity. It brought together the working-class Black community and the middle-class Black community in order to better unite the African Americans in the fight against growing racial inequality in the United States. Through the symbol of the BSCP, we are able to see a brief period where the gap between economic class was bridged in order to usher in the following decades where historic victories were achieved for the African American community.

33. Russell, Hailey; Castillo,Liz; Patel, Neelam and Zanoni, Bella

Associations Among Gender, Age, and Smoking Status

Undergraduate - BHIS/HIM

The purpose of this research is to identify and analyze any possible associations between a patient's smoking status in relation to their gender and age. Past research has shown that women tend to have lower smoking prevalence rates than men and that adults ages 25-64 tend to have higher smoking rates than that of older adults ages 65 and older. A stratified random sample of 753 patients was selected from Synthea Minnesota Synthetic

Observations Database. Chi-square statistical tests were used to analyze our data for any associations and the results showed that there is no association between gender and smoking status, which is inconsistent with findings from previous, similar studies. There is an association between age category and smoking status, however, showing that adults ages 18-49 have a higher prevalence of being never smokers whereas adults over 50 have a higher prevalence of being former smokers, which is consistent with findings from similar, previous studies and Centers for Disease Control reports on smoking status. Further analysis should be conducted in order to assist in population health management of various age groups.

34. Saldana, Lizbeth; Khatoon, Safa; Joly, Gulbanu and Shahood, Nida

Racial Disparities in COVID-19 Cases and Deaths

Undergraduate - BHIS/HIM

This study explored the existence of racial disparities amongst COVID-19 patients within the U.S. The research was limited to White, Black, and Latino communities on a national scale. The variables include COVID-19 cases and COVID-19 deaths. As the pandemic is progressing and more data/information is coming to light, statistics have been consistently solidifying the fact that in the realm of COVID-19, racial disparities are persisting (The Atlantic, 2020). Quantitative research was conducted using a dataset provided by the COVID Tracking Project, who aggregated data from all 50 states to track the progression of the pandemic. In this study, an ANOVA and Tukey-Kramer Post Hoc test was conducted to analyze the differences in the average number of COVID-19 cases and deaths between White, Black, and Latino races. The results showcased that there are statistical differences in the average number of cases and deaths between the three races. The dataset has some irregularities with the numbers reported as not all states began their recording at the same time and reporting standards differ from state to state. Establishing disparities within the response to a health emergency is important as it helps to minimize its detrimental effects. Information regarding health disparities is needed by healthcare officials such as providers, the government, and policymakers to take the right steps. Ultimately, the goal of these studies is to help ensure the quality of health care for the U.S population and this includes equitable accessibility.

35. Sanchez, Alexi

The Intersections of Disability Justice and Immigration Laws

Undergraduate - Rehabilitation Sciences

The purpose of this research is to investigate on how the theory of intersectionality plays a major role between disability justice and immigration laws. In fact, this is a common issue that is affecting several families and is occurring all around the world. There are three types of groups that migrate from country to county: immigrants, asylum seekers, and refugees. Refugees and asylum seekers forcibly leave their homes and not able to return because of how unsafe their land is due to war, violence, or persecution, often without warning. Due to the trauma's that they experience, most of them develop physical and mental health conditions, but they do not receive the proper services or care. These focused groups face sociocultural, geographic, and economic barriers and, interestingly, gender differences that ties to health-related care barriers in different regions of the world, such as North America, Asia, and Europe.

36. Satoskar, Cara

Patients' Hopes and Desires for Developing Type 1 Diabetes Treatment Options: A Qualitative Study

Undergraduate - Neuroscience

Aims: This qualitative study explored patients' hopes and desires for two developing type 1 diabetes treatments: islet cell transplantation (ICT) and fully closed-loop systems.

Methods: Semi-structured interviews were conducted among a convenience sample (n=19) of patients with type 1 diabetes. The sample included 13 females with a mean (SD) age = 38.6 (14.8) years and mean diabetes duration = 24.9 (12.6) years . A conventional content analysis revealed themes within the interview transcripts.

Additionally, participants were presented with a list of treatment decision factors.

Results: Participants expressed desire for freedom from the physical and emotional burdens of type 1 diabetes. They indicated hemoglobin A1c control, the ability to get off insulin, side effects from immunosuppression regimens, and the risk of hypoglycemic episodes were the most frequent concerns among the predetermined list of decision

factors. The content analysis revealed 11 major themes: treatment efficacy, safety concerns, lack of evidence, accessibility, diabetes control, usability, personalization, trade-offs, satisfaction with current treatment, body image, and the desire for targeted research. There was both positive and negative regard for ICT and fully-closed loop systems. Of notable interest, participants that were well controlled under their current regimens commonly stated that they were unwilling to try either of the new treatments. Participants also specified a desire for a cure only, and were frustrated with the current trajectory of management devices. Conclusion: The results elucidated here may help optimize a treatment plan and/or device development/choice for patients with type 1 diabetes. These patient-reported themes may allow for developing more robust questionnaires that investigate the management needs and desires of patients living with type 1 diabetes.

37. Shetty, Shraddha

Undergraduate Student Journey on Leadership development and Involvement on campus

Undergraduate - Architecture

As an international student, not only did I have to focus on my major but also had to stay involved on campus. I choose to do this by taking part in leadership development programs on and off campus. This has been a very important part of my undergraduate experience here at UIC. By taking part in the programs offered by Student leadership and civic engagement I was able to continue on my leadership involvement journey which started in high school for me. Through Student leadership and Civic Engagement I was able to be a part of “UIC’s Leadership framework” and participate in leadership programs in the exploring, engaging, leading and sharing phase. Taking part in leadership development program and workshops is a way to achieve and practice skills that are often not taught in a classroom setting. My presentation focuses my experience as an undergraduate student and my leadership journey on campus through extracurricular activities.

38. Stasko, Philip

Beyond Political Perspectives: The Relationship Between Psychological Flexibility, Language, and Social Justice

Undergraduate - Psychology

Introduction: With such significant political divide, it is difficult to understand the factors that influence a person's perspectives on social justice issues, or why some people are flexible in their beliefs whereas others seem more rigid. The current study examined the relationship between complex language, psychological flexibility, and perceived importance of social justice issues. Method: Participants reported their political identity on a scale which ranged from "very progressive" to "very conservative." Next, participants completed psychological flexibility measures and a language assessment. Finally, participants completed a preference assessment which asked them to indicate which of two options they found to be most important. The options presented included twelve different social justice issues: racial justice and equity, climate change, national security, and health care, among others. Results: Results of a Pearson's correlation indicate a statistically significant relationship between language ($r = -0.4617; p = 0.0305$), psychological flexibility ($r = 0.0604, p = 0.0029$), and self-reported political identity. These results suggest that individuals identifying as progressive scored higher on the language assessment and psychological flexibility measures than individuals who identified as conservative. Additionally, those who identified as progressive reported preference for various issues, including education, climate change, racial justice and equity, whereas those who identified as conservative indicated a stronger preference for issues including national economic stability and national security, and gun rights.

Conclusion: The results of the current study suggest that individuals who are more psychologically flexible and more flexible with language show a wide range of preferences for different social justice topics than those who are less flexible.

39. Tantoco, Aira; Thongsakounh, Sophia; Adlawan, Brigette and Ng, Jamie

Myocardial Infarction and Healthcare Expenses by Patient Age, Race, and Gender

Undergraduate - BHIS/HIM

Myocardial infarction (MI) is a disease caused by several factors that act simultaneously such as age, gender, family history, eating habits, etc. Past research has shown the

average age of myocardial infarction patients differs between genders, and that black patients accumulate higher healthcare expenses than their racial counterparts. Using the cluster sampling method, we selected 141 cases from the data derived from Synthea. A t-test was conducted to determine the difference in average age amongst male and female patients with myocardial infarction. An ANOVA test was conducted to show the difference in average total healthcare expenses of myocardial infarction patients among different races. Results showed that, on average, white patients spend more on healthcare services compared to other races. In addition, we concluded that male patients are diagnosed with myocardial infarction earlier than female patients. Further research and analysis should be conducted on a larger and more diverse data set to have a more accurate understanding of the population.

40. Tariq, Mara; Ali, Zarish; Tran, Tuyen and Escobedo, Jack

Influence of Ethnicity and Three Major Regions in Minnesota on Healthcare Expenses

Undergraduate - BHIS/HIM

Minnesota has some of the largest racial, ethnic and geographic inequities in health status” (Perry, 2015) and healthcare outcome rates. The goal of the research was to determine how healthcare expenses differ in ethnicity and between the Twin Cities, Central, and Southern regions of Minnesota. The data used was synthetic patient data and associated health records derived from Synthea Wiki in Minnesota. The sample size used for this research was approximately 1,000 patients. The Excel data analysis was used to conduct secondary analysis; two-sample T-test and ANOVA with a confidence level of 95% and an alpha level of 0.05, which gave out results with p-value=0.113 and 0.216, respectively. From the test results, there were no significantly statistical differences in healthcare expenses between ethnicity and the three identified regions. There were limitations in sample size and variables, so further research would be conducted to find out the contributing factors to healthcare expenses using larger sample size and additional variables.

41. Vega, Jonathan

Visualization of Parameters from Multiple Numerical Simulations

Undergraduate - Computer Science

Jet exhaust contains water vapor that condenses and freezes to form line-shaped clouds in the upper atmosphere. These formed cloud trails are contrails, and they have persisted since the introduction of jet technology. While jet contrails may seem like a harmless byproduct, it is linked to global warming due not allowing the heat that is radiating from the surface of the earth to escape. Every year more and more flights are being flown simultaneously and it is speculated to increase in the years to come significantly increasing global warming effects. Using data provided by the Domain Expert, with multiple parameter values such as temperature, weight, height, etc, I wanted to visualize and understand the lifecycle of a contrail formation. The contrails data is on an observable notebook, that is hosted online, and the d3 javascript library was used to visually depict the contrails data to ease exploration and manipulation.

42. Wagner, Charlotte

Women's Labor and COVID-19

Undergraduate - Political Science

The work-prospects of all classes, races, and genders have been impacted by the economic fallout of Covid-19. However, women, especially women of color, have seen their employment dip exponentially. Drawing on news and media output from the beginning of lockdown onwards, the author attempted to further examine the varied impacts and work conditions professional class and working/“essential” class women experience, as well as the federal and private response to women’s specific issues during the pandemic. Overarching themes also include the federal devaluation of the care-sector, the limitations of workplace “flexibility,” and the “motherhood-penalty.”

43. Wilk, Stephanie

Exploring the Metastatic Potential of RFP-tagged MRTFA and GFP-tagged MRTFB

Undergraduate - Biological Sciences

Under normal conditions, isoforms of myocardin-related transcription factors A and B (MRTFA and MRTFB) are found within the cytoplasm bound to G-actin. When G-actin dissociates, MRTFA and MRTFB are free to localize to the nucleus where they are able to activate transcriptional programs involved in activating the actin cytoskeleton, leading to increased cell stiffness. This increased stiffness is thought to play a role in anti-tumor immune responses and cancer metastasis, though this has yet to be explored. To begin studying this interaction, fluorescently labeled MRTF constructs were developed for use in in vitro models of cancer progression/metastasis. The first step in the process was to successfully molecularly clone RFP-tagged MRTFA and GFP-tagged MRTFB gene fragments into plasmid cloning vector pUC19. To ultimately facilitate Cas9-mediated gene editing using homology directed repair, forward and reverse primers with suitable restriction sites and homology arms were designed for MRTFA and MRTFB. pUC19 and PCR-amplified gene fragments for fluorescently labeled MRTFA/B were cut with restriction enzyme KpnI, ligated, and transformed with DH5 α E. coli cells. pUC19 containing MRTFA/B and pSpCas9-2A-Puro can be transiently co-transfected into murine mammary tumor (AT-3) cells, derived from a MMTV-PyMT mouse, a common model for tumor progression. Other downstream experiments, such as collagen invasion assay, can further explore the metastatic potential of myocardin-related transcription factors.

44. Wilson, Edwina

Reliability of physical function measures using Tele-assessment in older adults

Undergraduate - Physical Therapy

Background: Regardless of telerehabilitation being a potential solution to improve physical function and bridge barriers (transportation, motivation etc.) for participation, one of the major challenges faced by older adults, the impact of such exercise-based telerehabilitation are still assessed via in-person clinical tests or qualitative methods (i.e., surveys) which might lack sensitivity to measure change. **Aim:** Thus, the study aims to determine the test-retest and intra-rater reliability of physical function outcome measures routinely used in rehabilitation in a group of older adults using real-time online tele-assessment. **Methods:** Coefficient of determination (R^2) was used to determine the test-

retest (TRT) and intra-rater (IR) reliability for all outcome variables. Twenty-five older adults [age = 71 ± 7.35 , M=12 (48%), F= 13 (52%)] were tested using tele-assessment which is a real-time online assessment for domains like Lower limb strength and endurance (30 second chair stand test), Aerobic endurance (2-minute step in place test), Static balance (One legged stand test), Dynamic balance (4-step square test), Gait assessment (Tinetti). Set-up for the tests (chair, table etc.) were standardized and practiced during the first virtual home-assessment of the exercise space. The tests were either demonstrated by the researcher or video of the test was shown to keep it consistent throughout the tele-assessment. Each individual underwent two sessions separated by ten-twelve days interval for the test-retest reliability and one session separated by seven days interval for intra-rater reliability. Results: Excellent reliability was shown by Tinetti (TRT-1.0; IR-1.0) & 30 sec chair stand test (TRT-0.90; IR-0.83). Excellent to good reliability was shown by 4 step square test (TRT-0.87; IR-0.78), 2 min step in place test (TRT-0.81; IR-0.78), one legged stand test (dominant leg TRT- 0.76; IR-0.89 & non-dominant leg TRT-0.77; IR-0.93). Conclusion: Current study findings demonstrated that the reliability of the individual outcome measure ranged from excellent to good suggesting that these outcomes have sufficient sensitivity for detecting change with telerehabilitation in both clinical and research settings.

45. Wright, Brianna

American Poetry Anthologies, 1910-1940: Modernism and the Canon

Undergraduate - English and Gender and Women's Studies

The purpose of this project is to discover American poets who were well-known in the early twentieth century but have been forgotten over time. I became interested in this project to see what was considered relevant poetry as it was being published, and how the creation of what we consider today as being “the canon” remembers or forgets these poets. I have worked with Dr. Leick of the UIC English Department to accurately show trends and developments in modern American poetry using data from popular anthologies published in the period, including Harriet Monroe’s “The New Poetry” and Louis Untermeyer’s “Modern American Poetry”. Over the course of the 2020-2021 school year, we have compiled a spreadsheet containing more than 1800 poems and 280 poets that

were included in these anthologies between the years 1910 and 1940. In addition to the names of every poem published in these anthologies, the spreadsheet also contains information about each poet: gender, race, sexual orientation, birth and death dates/location. We are using this data to create interactive graphs, charts and maps that can be used to compare these categories and show trends over time on our website, <https://anthproj.digital.uic.edu>. We have been able to use this data to find poets that are still well-known today, alongside poets that were popular but considered “middle-brow” by the tastemakers of the time. The data we compiled has inspired me to seek out more information in the archives, and I plan on making a trip with Dr. Leick to see the Newberry Library to look at the correspondence of Eunice Tietjens, the associate editor for Poetry magazine. I will be discussing the methodology of this project and showing the website we created to highlight the importance of consolidating these anthologies onto a digital medium.

46. Yee, Lauren and Masud, Anwar

Seasonal Effects on Quality of Life

Undergraduate - Kinesiology and Nutrition

Introduction: Anecdotally, once the colder seasons come around people tend to report increased joint pain and struggle to accomodate to the weather changes. Additionally, people with depression also experience an increase in their symptoms towards the colder seasons. Purpose: Evaluate fatigue, pain, and mood factors during different seasons to determine if weather plays a role in severe symptoms. Hypotheses: People with knee arthritis will have increased pain directed towards their knees, anxiety, and depression in colder temperatures. People with knee arthritis and people with depression and anxiety have a positive correlation in experiencing an increase in their symptoms during the colder seasons. Methods: There were forty-four participants (n=44). The average height, weight, and age for the participants was $169 + 9.53\text{cm}$, $44.8 + 9.42\text{ kg}$, $58 + 8.71\text{ years}$. Anxiety and depression was measured through surveys conducted by PROMIS. Pain levels were measured through a KOOS survey. All data collected was observed during warm and cold seasons to measure changes in mood and pain. Statistical Design: Cross-sectional study. A Pearson Correlation was used to determine outcome between different

variables. Results: The correlation between temperature and pain was not statistically significant ($R = -0.175$, $p = 0.263$), but there was a correlation between temperature and anxiety ($R = 0.305$, $p = 0.047$) temperature and depression ($R = 0.329$, $p = 0.031$). There was a positive correlation of pain association with anxiety and depression ($R = 0.853$, $p = 0$). Conclusion: The first hypothesis was partially supported as temperature influenced anxiety and depression and the second hypothesis was supported by showing increased pain will impact increased symptoms of depression and anxiety. Further research is needed to identify other factors of whether pain is correlated with changes in weather.

47. Zhu, Amy; Kamel, Josette; and Cheung, Eric

Racial Disparities in Clinical and Economic Outcomes in Open Parathyroidectomy
Undergraduate - Otolaryngology

Introduction Racial disparities negatively impact health outcomes for minority patients. This study compares patient characteristics and clinical and economic outcomes between different races for open parathyroidectomy. We hypothesized white patients experience significantly fewer complications and have lower costs and lengths of stay compared to other racial groups. Methods A retrospective cohort analysis of the National Inpatient Sample (NIS) from 2015-2017 used ICD-10 codes for all patients undergoing open parathyroidectomy. Propensity score matching was used to control for confounders including baseline demographics, comorbidities, and diagnoses. Post-operative complications, mortality rates, discharge disposition, length of stay, and total cost were compared across races. Results A total of 3,516 patients were identified. Black patients had significantly higher rates of hypocalcemia (19.2% vs 12.3%; $p < 0.001$) than white patients. Length of stay (6.86 days vs 5.52; $p = 0.001$) and total charge (\$88,005.90 vs 77,896.68; $p = 0.014$) were also significantly higher in black patients than white patients. Similarly, Hispanic patients had longer lengths of stay (5.66 vs 4.38; $p < 0.009$), higher total charges (99,211.24 vs 69,179.57; $p < 0.001$), and higher charges per day (26,912.29 vs 24,216.28; $p = 0.027$) compared to white patients. There were no significant differences in infection rates, post-surgical hypoparathyroidism, or respiratory complications amongst races. Conclusions Black patients had significantly higher rates of postoperative complications than white patients. Black and hispanic patients were also

more likely to have longer lengths of stay and greater total hospital charges. The racial disparities highlighted in this study emphasize the necessity for prospective efforts to evaluate and address provider bias, increase physician diversity, and increase cultural competency to provide more equitable healthcare opportunities in our country.

L@S GANAS Presentations

1. Kannan, Lakshmi

Perturbation-Based Balance Assessment: Examining Reactive Balance Control in Older Adults with Mild Cognitive Impairments

Graduate - Physical Therapy

Background: Along with the subjective memory decline, older adults with mild cognitive impairment (OAwMCI) present subtle balance and gait deficits, which although might not affect activities of daily living but attributes to the two-folded increase in falls. While changes occurring in volitional balance control during ADLs have been extensively examined in this population, reactive balance control, required to recover from external perturbations has received little attention. Therefore, this study examined reactive balance control in OAwMCI compared to their healthy counterparts. Methods: Fifteen older adults with (OAwMCI) and fifteen without (CIOA) (>55 years) mild cognitive impairment, and fifteen young adults (18-30 years) were exposed to a stance perturbation test at three different increasing intensities (Intensity I, II & III). Behavioral outcomes COM state stability, step length, step initiation, and step execution were computed.

Results: Stability was the lowest in OAwMCI compared to CIOA and young adults and it deteriorated as the perturbation intensity increased ($p < 0.001$). Step length was the lowest among OAwMCI and was significantly different from young adults ($p < 0.001$) but not from OA. Unlike OAwMCI, CIOA and young adults increased their step length as perturbation intensity increased ($p < 0.001$). OAwMCI showed longer recovery step initiation times and shorter execution times compared to CIOA and young adults as the perturbation intensity increased ($p < 0.001$). Conclusion: OAwMCI exhibit exacerbated reactive instability and are unable to modulate their responses as the threat to balance increases. Thus, they are at a significantly higher risk of falls than their healthy counterparts.

2. Kannan, Lakshmi

Effects of Cogxergaming on Cognitive-Motor Interference in Older Adults with Mild Cognitive Impairment

Graduate - Physical Therapy

Background: Older adults with mild cognitive impairment (OAwMCI) exhibit balance and gait deficits along with cognitive decline resulting in increased cognitive-motor interference (CMI) during dual tasking-DT (simultaneous performance of motor and cognitive task) predisposing these individuals to greater risk of falls. Despite individual benefits of exergaming on balance control, gait function and cognitive function (limited benefits), its effects on DT performance remains unknown in OAwMCI. The limited benefits in cognitive function could be attributed to the inability of exergaming to train cognitive domains explicitly warranting supplement cognitive training. For this reason, our pilot study examines the effects of CogXergaming (Cognitive + Exergame training) on CMI during DT in OAwMCI. Methods: Ten OAwMCI were examined at baseline and 5th week post-training on volitional balance control (limits of stability test) quantified by maximum center of pressure excursion (MXE) under single and DT conditions (Auditory clock test and letter number sequencing); NIH balance (2-minute walk test; 4-meter walk test; standing balance test) and cognitive toolbox (list sort memory test; picture sequence memory test; dimensional change card sort test). CogXergaming lasted for 4 weeks (12 sessions; 1 hour/session) delivered via Nintendo Wii-fit while simultaneously performing cognitive tasks. Results: Under DT conditions, significant improvement in MXE ($p < 0.05$) was observed, however, cognitive performance remained the same post-training. Significant improvement in gait speed ($p < 0.05$) and all tests in NIH cognitive toolbox ($p < 0.05$) was observed post-training. Conclusion: CogXergaming training is an effective and feasible method to be implemented as part of fall-prevention programs in OAwMCI for slowing progression of physical and cognitive decline. Future studies may focus on examining the dosage and efficacy of such training to determine real-life generalization effects.

3. Lopez, Alfredo

Modeling Fallopian Tube-Induced Tumorigenesis and the Influence of Increased Number of Ovulations

Undergraduate - Biochemistry

High-Grade Serous Ovarian Cancer (HGSOC) is the most common and fatal histotype of ovarian cancer and its high mortality is due to the difficulty of detecting the disease as no

early detection currently exists for this disease. Previous studies have shown evidence of HGSOc being originated from the fallopian tube epithelium and not necessarily from the ovaries. Therefore, studying early tumorigenesis from the fallopian tube may help develop a novel strategy to detect HGSOc at an early stage. Retrospective investigations on human patients have shown evidence that the inhibition of ovulation reduces the risk of developing ovarian cancer, thus we investigate how ovulation affects early tumorigenesis. In addition, previous studies have shown that the factors secreted in the process of ovulation might damage the DNA of the fallopian tube epithelial cells suggesting they may play a role in tumorigenesis. Previous validated murine models have shown that mice treated with gonadotropins had an increased number of ovulations. Based on the incessant ovulation hypothesis, the risk of ovarian cancer may increase, however the role of increased number of ovulations on fallopian tubes has not been studied. Herein, we employ a transgenic mouse model with fallopian tube-specific knock-out of the tumor suppressor PTEN to generate a superovulated model and study whether increased number of ovulations regulate tumorigenesis. Our initial characterization of this model suggests that homozygous loss of PTEN, which is more tumorigenic, presents more ovulatory events confirmed by the presence of increased number of corpora lutea as compared to the heterozygous model. These results provide validation of the model as a critical tool to study fallopian tube tumorigenesis since it shows how loss of a tumor suppressor in the fallopian tube sensitizes the tissue to gonadotropin stimulation.

4. Lopez, Sonia

Characterization of Extracellular Vesicles Upon Neutral Sphingomyelinase Treatment of Glial Cultures from A Mouse Model of Krabbe Disease

Undergraduate - Neuroscience, BS

Krabbe Disease is a neurodegenerative genetic disorder that is caused by mutations of the GALC gene that makes a lysosomal protein, galactosylceramidase, resulting in the accumulation of psychosine. Psychosine is a cytotoxic lipid that accumulates in the nervous system and induces apoptosis in cells, more specifically oligodendrocytes. This leads to the destruction of the protective layer of myelin sheaths. The exact mechanism of psychosine-induced toxicity is unknown, but this lipid incorporates into membranes

causing changes that lead to vesicle release. Extracellular vesicles (EVs) contribute to cell-to-cell communication via the transfer of biomolecules that influence the cell environment. Vesicles are formed by various components that change membrane structure, including high levels of the lipid ceramide. Neutral sphingomyelinase (nSMase) is an enzyme that breaks down sphingomyelin to ceramide. To understand the role of EVs in pathophysiological processes of Krabbe Disease, we will decrease vesicle release by inhibiting nSMase with GW486. Using mixed glial cultures, we want to know what cells express nSMase protein, and will have decreased EV release when treated with the inhibitor GW4869. We hypothesize that all cell types will have nSMase, while some will have higher levels of expression. Secondly, we want to know if EV release will decrease when cells are treated with the GW4869 nSMase inhibitor. We hypothesize that some cells with higher levels of nSMase expression will have a bigger reduction of EV release when treated with the inhibitor. To test our hypothesis we made mixed glial cultures from wildtype and twitcher mice and performed immunohistochemistry for nSMase. These cells were also treated with the GW4869 inhibitor and media was collected to isolate and quantify vesicles.

5. Overmyer, Theresa

Genetic Diversity of Milkweed Populations

Undergraduate - Biological Sciences

The overall goal of this study is to answer the question: do seed nurseries have the same genetic variability in their plants as those found in the wild? To answer this question, my PI, partner, and I collected several samples of *Asclepias incarnata*, and *Asclepias tuberosa* from Prairie Moon Nursery and James Woodworth Prairie. We then extracted the DNA from them and analyzed the data in order to compare the samples to one another.

6. Sanchez, Lidia

Use of Real-time Glucose and Activity Monitoring Among Low-income, Urban, Black women

Undergraduate - Integrated Health Studies

Underserved Black women with type 2 diabetes struggle to maintain healthy diabetes self-management (DSMB) due to clinical and societal factors. Black women manage numerous chronic challenges (lack of self-care knowledge, discrimination, and stress), which makes DSMB, such as engaging in physical activity (PA) a low priority. Successful DSMB requires the ability to self-regulate one's behaviors in order to choose healthy behaviors over more appealing, but less healthy choices. We completed a small acceptability trial designed to facilitate core behaviors associated with self-regulation [self-monitoring/assessment, learning, mental contrasting (comparing current values with goal values), and goal setting/review)]. Participants were given continuous glucose monitors (CGM) and Fitbit activity trackers for self-monitoring of glucose and activity. Following the intervention, we conducted semi-structured interviews to explore how the women's experiences reflected the core self-regulation behaviors built into the intervention. Eight black women with non-insulin requiring T2DM were included (age 68 ± 5.2 years; A1C $6.6 \pm 1.1\%$; 15.3 ± 7.2 years since diagnosis). Content analysis revealed themes that were consistent with core self-regulation behaviors: experiential learning through self-monitoring, mental contrasting, and impact on behavior (actual behavior change & motivation to change behavior). Content analysis of the interviews revealed that use of real-time glucose and activity monitoring fostered experiential learning, mental contrasting, and behavior. The women in our study described how they linked their glucose numbers to activity and eating behaviors, which led them to increase their motivation for and uptake of healthier eating and activity behaviors. Use of the Fitbit and CGM may help patients to understand how their medication, activity, and diet affect their glucose levels. Additionally, use of technological devices may be useful in general practices to help clinicians make informed choices about medication dosages, spot dangerous trends in glucose levels, and overall help facilitate a successful DSMB.

7. Soliz, Victoria

In Vitro Optimization of Megalin Detection in Prostate Cancer

Undergraduate - Biochemistry

In the US, prostate cancer (PCa) is the third most common cancer and is currently the second most diagnosed cancer in men. PCa is a hormone-dependent disease, as androgen deprivation therapy remains the cornerstone of PCa treatment. Our lab recently reported that Megalin, a very large multi-liganded endocytic membrane receptor known to endocytose steroid hormones, was expressed in prostate epithelium. Extra-renal activity of Megalin has not been well studied as the widely accepted Free Hormone Hypothesis (FHH) assumes passive diffusion of circulating free hormones into tissues. Thus, when Testosterone (T), the principal circulating androgen, is bound to its serum globulin, Sex Hormone-Binding Globulin (SHBG), it is thought to remain sequestered in the serum inaccessible to tissues. The presence of Megalin suggests that globulin-bound hormones from circulation, including T bound to SHBG, are imported into the prostate. Here we examine Megalin and its endocytic binding partner, Cubilin, as a potential mechanism to regulate SHBG-bound T import into prostate cancer cells. RT-qPCR reactions showed LRP2 and CUBN, gene expression in 22Rv1 cells while LAPC4, PC3, and 957E-hTERT cells only expressed CUBN. Western blot analysis revealed Megalin protein expression in LNCaP, LAPC4, PC3, 22Rv1, and 957E-hTERT cells while Cubilin was not detected in any cell line. T is known to exert its activity through the Androgen Receptor (AR), a transcription factor that translocates to the nucleus upon activation. To test the bioactivity of endocytosed T, the nuclear fraction of 22Rv1 cells treated with T/SHBG was prepared and probed for AR. Western blotting showed an increase in AR expression in the T/SHBG treatment compared to vehicle control, indicating that megalin may mediate internalization of SHBG-bound T. Our findings indicate prostate cancer cells express Megalin, yet further research is needed to determine co-expression and function of megalin and Cubilin in prostate cancer cells.