

19<sup>th</sup> Annual  
Undergraduate Student  
Symposium



April 6 -8, 2021

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Farquhar Honors College  
NOVA SOUTHEASTERN UNIVERSITY

**NSU**  
Florida

## Virtual Undergraduate Student Symposium 2021

The Undergraduate Student Symposium, sponsored by the Farquhar Honors College, presents student projects through presentations, papers, films, and poster displays. The event serves as a “showcase” demonstrating the outstanding scholarship of undergraduate students at NSU. The symposium is open to undergraduate students from all disciplines. Projects cover areas of student scholarship ranging from the experimental and the applied to the computational, theoretical, artistic, and literary. They are taken from class assignments and independent projects. Project presentations can represent any stage in a concept’s evolution, from proposal and literature review to fully completed and realized scholarly work. As in past symposia, the definition of scholarship will be sufficiently broad to include work presented in the biological and physical sciences, the social and behavioral sciences, computer science and engineering, mathematics, arts and humanities, nursing and health care, education, and business. This is the nineteenth annual Undergraduate Student Symposium.

### USS 2021 Keynote Speaker



#### **Nancy Klimas, M.D.**

*Director, Institute for Neuro-Immune Medicine, Nova Southeastern University*

*Director, Clinical Immunology Research, Miami VAMC*

*Professor of Medicine, Department of Clinical Immunology, College of Osteopathic Medicine, Nova Southeastern University*

*Chair, Department of Clinical Immunology, College of Osteopathic Medicine, Nova Southeastern University*

*Professor Emerita, University of Miami, School of Medicine*

Nancy Klimas, MD, has more than 30 years of professional experience and has achieved international recognition for her research and clinical efforts in multi-symptom disorders, myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), Gulf War illness (GWI), fibromyalgia and other neuro-immune disorders. She is immediate past president of the International Association for CFS and ME (IACFS/ME), a professional organization of clinicians and investigators, and is also a member of the VA Research Advisory Committee for GWI, the NIH P2P CFS Committee, and the Institute of Medicine ME/CFS Review Panel. Dr. Klimas has advised three Secretaries of Health and Human Services, including Kathleen Sabelius, during her repeated service on the Health and Human Services CFS advisory committee. Dr. Klimas has been featured on Good Morning America, in USA Today and the New York Times.

## 2021 USS Steering Committee

Nelson Bass, J.D., Ph.D.; Christopher Blonar, Ph.D.; Jessica Garcia-Brown, J.D.; Steven Hecht, Ph.D.; Christi M. Navarro, Ph.D.; Timothy O'Connor, Ph.D.; Sarah Ransdell, Ph.D.; Jose Ramos, Ph.D.; Marlisa Santos, Ph.D.; Weylin Sternglanz, Ph.D.; Jaime Tartar, Ph.D.; Thomas Wuerzer, Ph.D.; Robin St. George; Don Rosenblum, Ph.D.

## 2021 USS Logo Design Winner



### **Kaeleigh Sturgeon**

Kaeleigh Sturgeon is senior Theatre major with minors in Graphic Design, Strategic Communication, and Marketing. At NSU, she is very involved on campus including the theatre program, Social Media Chair for Razor's Edge Shark Talent, Stage 2 Student Production Company, Director of Public Relations for Alpha Kappa Psi, Farquhar Honors College, President's 64, and much more. Kaeleigh is excited to see her design become a reality for this year's Undergraduate Student Symposium!



**19<sup>th</sup> Annual  
Undergraduate Student Symposium**

**April 6 - 8, 2021**

**Abstract Proceedings**

**Farquhar Honors College  
Nova Southeastern University**



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## **A Meta-Analytic Review: The Implications of Virtual Reality with Immersion on Secondary Language Acquisition**

**Dylan A. Darling**

Abraham S. Fischler College of Education and School of Criminal  
Justice

**Greter Camacho Melian**

Abraham S. Fischler College of Education and School of Criminal  
Justice

Faculty Sponsor: **Dr. Aileen Farrar**

Halmos College of Arts and Sciences

### **Abstract**

How can a curriculum be built to fully utilize the capabilities of Immersion in virtual reality (VR) and make it applicable to a classroom learning and individual learning environment? The generalized goal and outcome intended following this research is discovering how to build a sample curriculum for English language learners to help foster memorable and applicable secondary language acquisition. Research linked to both virtual reality and augmented reality has proved the capability for building immersion and engagement in a virtual space where learning processes are presentable and educational output is maximized. The immersion and engagement offered throughout VR is demonstrated to foster retention, recollection, and knowledge utilization in this meta-analysis. Therefore, we deem it as an invaluable platform to construct a curriculum for English language learners across all levels and intend to research the most beneficial ways to map and write a curriculum within the VR space.

## **A New Observation of Microatolls in the Galápagos Islands, Ecuador**

**Amber Orr**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Joshua Feingold**

Halmos College of Arts and Sciences

### **Abstract**

Microatolls are shallow water coral colonies that develop their signature ring-like atoll shape from water depth limitations that prevent living tissue from growing any higher, encouraging outward growth instead. A secondary contributor to formation is the accumulation of sediment on the top of growing colonies, smothering upper surface polyps. Microatolls are described from numerous locations and form from several species in the Indo-West Pacific. However, microatolls occur at only three known regions in the tropical eastern Pacific and form from one species, *Porites lobata*. In the Galápagos Islands early researchers (1970s-1980s) observed microatolls at 2 sites, however they are no longer present at either location. In 2019 several microatolls were discovered in a small embayment on Champion Island. These *Porites* colonies exhibited typical microatoll morphology with depressed dead centers covered in sediment and a living outer ring. The upper portions of the shallowest colonies were at Mean Lower Low Water (MLLW), consistent with other reports of these formations. Colonies ranged from 0.5-1.0m diameter, some forming more elongated, scalloped structures without clearly defined central depressions. Additionally, sea lions (*Zalophus wollebaeki*) may be responsible for a novel contribution to microatoll formation. They were observed swimming close to living coral tissues and poking at them with their snouts, perhaps further limiting vertical coral growth through physical abrasion. The embayment at Champion Island provides the correct combination of shallow depth, sedimentation stress (and sea lion abrasion) to form these distinctive coral structures at one of only three known regions in the eastern tropical Pacific.

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**A statistical comparison of democratic liberties, socioeconomic development, and effectiveness of COVID-19 pandemic response in countries around the world**

**Angel Vasquez**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Ransford F. Edwards**

Halmos College of Arts and Sciences

**Abstract**

The COVID-19 pandemic has shown in full display that state capacity to respond to crises is variable among countries. In this study, the relative performance of 165 countries in containing the pandemic within their borders is assessed and compared with their individual scores on the Freedom Index (FI) and the Human Development Index (HDI) to understand whether the indicators that these indices represent (political freedoms and socioeconomic development) explain the effectiveness of each country's response to the pandemic. A pandemic performance coefficient (PPPC) was created to quantify their individual performance and treated as the independent variable. Bivariate correlation analyses and summary statistics that quantify the significance of the variance of the values of both dependent variables – in relation to PPC values- show otherwise, suggesting that there is not a statistically significant relationship between political rights, socioeconomic development, and the effectiveness of pandemic containment efforts. These results vindicate certain crisis management scholars who argue that there are no organizational patterns required for successful crisis management.

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## **Advocating for Period Dignity: A Survey of Menstruation's Impact on Class Attendance Among Women at Nova Southeastern University**

**Lauren Guedj**

H. Wayne Huizenga College of Business and Entrepreneurship

**Tanha Rahman**

H. Wayne Huizenga College of Business and Entrepreneurship

**Sofia Garcia Austt**

H. Wayne Huizenga College of Business and Entrepreneurship

**Jessie Mandy**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Rita Shea Van-Fossen**

Huizenga College of Business and Entrepreneurship

### **Abstract**

Feminine hygiene products are essential in the life of every woman during their menstruation years. However, 86% of women in the US have experienced starting menstruation in public without having access to supplies. Lack of proper hygiene products on campus subjects an enormous burden on women, creating significant stress. In this study, a survey of NSU students and faculty indicated 90% of the respondents had been caught on campus with no access to feminine hygiene products. 24% of those individuals choose to leave campus during this menstrual period emergency causing them to miss class time and 58% of them choose to use toilet paper to temporarily manage the problem and go back to class. Our findings underscore the necessity for the university to secure a welcoming environment for NSU's female community and enable period dignity. The results of this study support our feminine-hygiene initiative that aims to make menstrual hygiene products free and accessible to NSU students on campus, similar to programs at other universities. The availability of free menstrual products would alleviate the consequences of situational ill-hygiene practices and period-related class absences, which otherwise jeopardize students' academic performance and compromise women's health.

## **Analysis of the effects of SAHA on Cancer Stem cell markers in Non-Small Cell Lung Cancer cells**

**David Babos**

Halmos College of Arts and Sciences

**Jay-Quan Dill**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Thiagarajan Venkatesan**

Rumbaugh - Goodwin Institute for Cancer Research

Faculty Sponsor: **Dr. Umamaheswari Natarajan**

Rumbaugh - Goodwin Institute for Cancer Research

Faculty Sponsor: **Dr. Mir Saleem**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Appu Rathinavelu**

Rumbaugh - Goodwin Institute for Cancer Research

### **Abstract**

In the United States, lung cancer is the third most common form of cancer and shows the highest mortality rate. The most prevalent form is Non-Small Cell Lung Cancer (NSCLC), accounting for 84% of cases. Similar to other solid tumors, several putative surface markers for lung cancer stem cells have been identified, including CD44 and CD133. Cancer stem cells (CSC), with their self-renewal ability and multilineage differentiation potential, are a critical subpopulation of tumor cells that can drive cancer initiation, growth, and resistance to therapy. Reports showed that Hedgehog (HH), Notch, JAK/STAT, PI3K/Akt/mTOR, and Wnt/ $\beta$ -catenin pathways are regulating the transformation of CSCs. In the present study, we analyzed the effect of HDAC inhibitor suberoylanilide hydroxamic acid (SAHA) on CSC markers such as CD44, CD133, and ALDH1A1 in H460 and HCC827 cells. The cells were treated with HDAC inhibitor SAHA (7.5  $\mu$ M), p21 inhibitor UC2288 (5  $\mu$ M), and their combinations, for 24 h. In H460, SAHA treatment alone downregulated the CD44 protein expression but slightly up-regulated its expression in the UC2288 and SAHA combination treated cells compared to the control. On the other hand, in HCC827 cells, CD133 expression was down-regulated significantly in the SAHA and combination treatments. Our results showed that HDAC inhibitor SAHA could reduce the stemness-related markers in the NSCLC cells. Understanding the stemness-related features will not only provide new knowledge related to cancer pathogenesis, but also will shed new light on possible therapeutic approaches that can target CSCs (This project was supported by The Royal Dames of Cancer Research Inc., Ft. Lauderdale, Florida).



**Angel**

**Siena Berardi**

Halmos College of Arts and Sciences

**Julian Glasthal**

Halmos College of Arts and Sciences

**Jada Johnson**

Halmos College of Arts and Sciences

**Samantha Langmaack**

Halmos College of Arts and Sciences

Faculty Sponsor: **Professor Eric Garner**

Halmos College of Arts and Sciences

**Abstract**

In order to cope with the death of her boyfriend, a young girl seeks comfort in a pet that she believes to be her deceased counterpart. Her reality soon becomes distorted and she finds herself coping in an unconventional way, that is, of course, until it catches up to her. Directed by Siena Berardi, Jada Johnson, and Samantha Langmaack and produced by Julian Glasthal. Inspired by Wes Anderson, Greta Gerwig, Bong Joon-ho and Spike Lee.

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**Assessment of Gopher Tortoise (*Gopherus polyphemus*) Activity and Faunal Diversity Associated with Tortoise Burrows using Trail Cameras at Two South Florida Natural Areas**

**Katarina Lee**

Halmos College of Arts and Science

**Adrianna Coican**

Halmos College of Arts and Science

Faculty Sponsor: **Dr. Paul Arena**

Halmos College of Arts and Science

**Abstract**

The gopher tortoise (*Gopherus polyphemus*) is an ecologically important organism distributed throughout the southeastern United States. Gopher tortoises are a keystone species due to the burrows they create. These excavated habitats provide shelter for hundreds of commensal species that escape from wildfires and extreme heat during summer months. Six trail cameras (three at each site) were deployed at the entrance of gopher tortoise burrows in two natural areas (Fern Forest and Military Trail) in Broward County. Motion-activated cameras took pictures of animals at the burrow entrance over a 21-month period. Cameras were left in the field between 5-14 days at a time before retrieving and swapping out SD cards. Data collected thus far revealed a total of ten species recorded at dens in Fern Forest over a total of 104 camera days, while a total of six species were recorded at dens in Military Trail over a total of 135 camera days. Gopher tortoises were captured in a total of 339 pictures at Military Trail of a total of 864 pictures taken and 1,192 pictures at Fern Forest of a total of 7,154 pictures taken. This data will provide insight into the activity and use of dens by the protected Gopher Tortoise and associated animals in its habitat.

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## **Assessment of Student Mastery of Anticipated Learning Outcomes During a BlendFlex STEM CURE Using a Combination of Self-reported and Empirical Analysis**

**Niraj Pathak**

Halmos College of Arts and Sciences

**Ambika Kapil**

Halmos College of Arts and Sciences  
College of Psychology

Faculty Sponsor: **Dr. Arthur Sikora**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Santanu De**

Halmos College of Arts and Sciences

### **Abstract**

Due to the ongoing COVID-19 pandemic, institutions across the world have had to make modifications to existing curricula throughout the university. Course-based Undergraduate Research Experiences (CUREs) are emerging as an effective way to offer research opportunities for students traditionally underrepresented in STEM. These types of courses face the unique task of adapting scientific conceptual and research process concepts to the distance learning format. Biochemistry Authentic Student Inquiry Lab (BASIL) is a freely available, modular CURE. This project showcases a two-pronged approach which combines student self-reported mastery and objective evaluation of lab report responses, both aligned with established Anticipated Learning Outcomes (ALOs) for BASIL. Using pre- and post-surveys, we measured growth in knowledge, experience, and confidence (KEC) as a result of taking the course. Students reported learning more about bioinformatic experiments and concepts better than their wet-lab counterparts. KEC tied directly to ALOs had an average gain score of 67.0% while those referring to techniques increased 61.5%. Student lab report responses aligned to ALOs were analyzed on a Likert scale from one to five. Due to the emergency shift online, this analysis has provided preliminary data on the mastery of biochemical ALOs during online learning. The students' mastery of wet-lab ALOs coincided with our findings that lab courses need enhanced strategies to teach critical STEM lab-research skills in an online setting. Such novel assessment strategies developed based on learning objectives help fill this skills gap and enhance the exposure of undergraduate students to vital STEM research experiences.

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## **Association Between Nutritional Status and Hypertension in a Rural Community in Dang District, Gujarat, India**

**Sneh Shah**

Dr. Kiran C. Patel College of Osteopathic Medicine

Faculty Sponsor: **Dr. Christi M. Navarro**

Dr. Kiran C. Patel College of Osteopathic Medicine

### **Abstract**

The relationship between overweight-obesity status and hypertension is well-known throughout the world, especially in low socioeconomic communities and developing countries. Both high blood pressure and obesity are preventable risk factors for noncommunicable disease, death, and disability. The prevalence of obesity-overweight status in India is increasing faster than the global average and diabetes in Southeast Asia has surged over the past few decades. There have been few systematic studies focusing on the public health development in rural communities of India like the Dang District. The objectives of this cross-sectional study are to examine the prevalence of hypertension and nutritional status among this population and the association between hypertension and nutritional status in individuals from a rural community in Ahwa, Dang District in the state of Gujarat, India. Hypertension was defined by the American Heart Association (AHA) cut-offs for blood pressure and both WHO and South Asian cut-offs were used for nutritional status indicators. BMI was calculated using height and weight measurements. Frequency tables will display the prevalence and distribution of blood pressure and BMI by gender and age. We will also examine the strength of the association by calculating odds ratios for hypertension by nutritional status. By focusing on these local community-level indicators, the health and quality of life may be greatly improved in the Ahwa region with a collective sense of awareness and public health action in reducing BMI to help lower the burden of hypertension.

## **Bacteria Unearthed**

**Vijay Patel**

Halmos College of Arts and Science

**Aysha Patel**

Halmos College of Arts and Science

Faculty Sponsor: **Dr. Aarti Raja**

Halmos College of Arts and Science

### **Abstract**

With the era of antibiotics coming to a close, new sources of antibiotics need to be found to combat antibiotic resistance. The rise of infectious bacteria resistant to our drugs is creating an uphill battle in the fight against disease. In the search for new antibiotics, bacteria remain an effective and viable source. Programs, like Tiny Earth, aid researchers in looking for new strains of bacteria to determine if they can be harnessed for antibiotic discovery. A global community of researchers collaborate to collect and study bacteria from local soil samples. Our collegiate group obtained a soil sample from local areas that houses many horses and other farm animals. The team was able to isolate 5 strains of bacteria of interest. These strains produce an antibiotic compound against relevant tester strains of bacteria. They have been sequenced to identify the genus of the organism. The bacterial genomes were then analyzed through anti-SMASH (a secondary metabolite database) to determine the likely antibiotic compound the organism may be producing. The analysis yielded several different metabolites with varying levels of novelty. Further chemical analysis is being done to learn more about the structure of the compounds produced.

## **Bilingualism Enhances Inhibitory Control, But Not Other Components of Executive Functioning**

**Erika Cabrera Ranaldi**  
College of Psychology

**Maria Alejandra Chavez**  
College of Psychology

Faculty Sponsor: **Dr. Mercedes Fernandez**  
College of Psychology

### **Abstract**

Humans effortlessly modify their behaviors to meet the ongoing demands of the environment. For instance, you are in the library reading a textbook and you receive an alert on your phone. You stop reading your textbook and shift your attention to your phone to read the alert. You then shift your attention back to the textbook and pick up where you left off. You don't forget what you were doing or confuse the content of the alert with the content of the textbook. Similarly, people who speak more than one language switch between languages effortlessly and flawlessly to meet environmental linguistic demands. The ability to shift between languages and between other behaviors is believed to be carried out in the frontal lobes by inhibitory processes, and more generally, is associated with executive function (EF). Speculatively, because bilinguals engage inhibitory processes frequently (i.e., not only to modify behaviors, but also to control language) this frequent engagement leads to enhanced EF. To test this theory, we compared bilinguals and monolinguals on tests of EF. Indeed, results revealed stronger inhibitory control in bilinguals. Results also revealed greater shifting and updating performance in monolinguals. Additionally, second language proficiency was positively correlated with inhibition, but it was negatively correlated with shifting abilities. These findings suggest that bilingualism enhances some, but not all, components of executive functioning.

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## Characterizing the Mechanism of Inhibition Displayed by Imidocarb Dipropionate on *Yersinia pestis*

**Sukriti Prashar**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Julie Torruellas Garcia**

Halmos College of Arts and Sciences

### Abstract

With the growing antibiotic resistance crisis, there is a need for development of new antibiotics. Several antibiotic resistant, gram-negative bacteria employ a type III secretion system (T3SS) making it an attractive target for new drugs. The T3SS is a multi-protein complex organized in a needle-like structure used to inject host cells with effector proteins to cause infection. Imidocarb dipropionate is a known inhibitor of the T3SS of *Yersinia pestis*, the causative agent of the bubonic plague, however its mechanism of inhibition is unclear. The purpose of this research was to determine which protein of the T3SS of *Y. pestis* is being targeted by dipropionate. Various *Y. pestis* strains, each with different mutations in the T3SS, were evaluated, including  $\Delta yopNx$ , mini-pCD1, and YscF D46A. The effect of dipropionate on each mutant strain was tested using a disk diffusion assay on Magnesium Oxalate Agar, where *Y. pestis* T3SS inhibition is seen as growth around a dipropionate disk when incubated at 37°C for 48h. Dipropionate inhibited secretion in all three mutant strains, suggesting that dipropionate does not require effector Yop proteins or chaperones to inhibit T3S. *In vitro*, T3S can be inhibited by calcium. Interestingly, dipropionate was still able to inhibit mutant strains that can secrete in the presence of calcium, suggesting that it uses a different mechanism than calcium to inhibit secretion. Future studies will continue to evaluate whether a component of the T3SS apparatus of *Y. pestis* is impacted by the inhibitory component of dipropionate or whether gene expression is affected.

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## **Coral Cover and Colony Count of *Porites lobata* at Devil's Crown, Galápagos Islands, Ecuador**

**Bailey Daniels**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Joshua Feingold**

Halmos College of Arts and Sciences

### **Abstract**

The reef-building mounding coral (*Porites lobata*) forms structures throughout the Galápagos Islands that provide habitat for numerous benthic marine species. Galápagos corals are impacted by aperiodic El Niño-Southern Oscillation (ENSO) events that raise ambient water temperature and can cause mass-mortalities. This study focuses on an aggregation of *Porites lobata* located in Devil's Crown, Floreana Island using data collected from 1993-2019. Over the 26-year period, the aggregation was impacted by El Niño events in 1992-93 and 1997-98 both of which left most of the colonies bleached (loss of zooxanthellae) but without mortality. Colonies recovered over several years following each event. This study quantifies live tissue area, maximum diameters, and colony count of the *P. lobata* corals present at the site in 2019. An additional 10 colonies were observed in 2019 (compared to 17 in 2011), most of them small (<0.40 m<sup>2</sup> live tissue area, n=27). Colonies ranged in size from 0.02 m<sup>2</sup> to 1.21 m<sup>2</sup>, with an average size of 0.36 m<sup>2</sup>. Since 2011, live tissue area decreased from 6.92 m<sup>2</sup> to 4.91 m<sup>2</sup> in the 10 most studied colonies, primarily due to the death of one of these colonies. The results from this study, in addition to prior observations dating back to the late 1970s, document the long term (>44 y) resilience of this *Porites lobata* aggregation. *Porites*' persistence despite ENSO impacts suggests this species will continue to contribute to ecosystem complexity at Devil's Crown in the future.



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## **Demystifying hospital charges for hospital readmissions in 2017 in the United States for psychoses (DRG = 885)**

**Japjot Singh**

H. Wayne Huizenga College of Business and Entrepreneurship

**Faculty Sponsor: Dr. Ravi Chinta**

H. Wayne Huizenga College of Business and Entrepreneurship

### **Abstract**

Existing research on hospital charges is focused on hospital admissions, but not on hospital readmissions. Literature review on hospital charges identifies several patient-specific, disease-specific, and hospital-specific variables as determinants of hospital charges. Given that there is a relative dearth of similar research focused on hospital readmissions, a federal agency – The Agency for Healthcare Research and Quality (AHRQ) has recognized this gap and developed the Healthcare Cost and Utilization Project (HCUP) in 2015 which contains information on hospital readmissions data. “This database addresses a large gap in healthcare data - the lack of nationally representative information on hospital readmissions.” We utilize the 2017 Hospital Readmissions database to empirically study factors that impact hospital charges for hospital readmissions. The 2017 database has over 8 million records for the 999 Diagnoses Related Groups (DRGs), each code representing a disease code for each hospital visit. Our study focuses primarily on Psychoses (DRG=885) which is the fourth most expensive readmissions DRG in the AHRQ database for readmissions. Psychoses has 609,360 records which is the sample size for this research. We employ regression analyses using patient demographics, in-patient care variables and hospital characteristics to explain variance in hospital charges. In-patient care variables (number of diagnosis, number of procedures, LOS) are most dominant determinants of hospital charges. Hospital control/ownership and age of patient are minor determinants of hospital charges. Results show that in-patient care (diagnoses, procedures) length of stay, hospital private/public ownership and younger patients result in higher hospital charges.

## **Diet Analysis of Offshore Istiophorid Billfishes in the Western Atlantic**

**Emily Salonia**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. David Kerstetter**

Halmos College of Arts and Sciences

### **Abstract**

Istiophorid billfishes are apex predators found in epipelagic tropical and temperate waters worldwide. Managed internationally following population declines due to overfishing, these fishes continue to be targeted by recreational anglers and are caught as bycatch by offshore commercial fisheries targeting tunas, resulting in a slow population recovery. Despite their ecological importance, knowledge of Western Atlantic billfish diets is lacking; no information exists regarding roundscale spearfish (*Tetrapturus georgii*), for white marlin (*Kajikia albida*) information is extremely limited, and the last Western Atlantic sailfish (*Istiophorus platypterus*) diet study was in 1977. To address this knowledge gap, Istiophorid diets were analyzed using stomachs collected opportunistically from billfish found dead at gear retrieval by pelagic longline vessels fishing offshore of the Carolinas. To date, stomachs have been examined from white marlin, roundscale spearfish, and sailfish, as well as swordfish (*Xiphias gladius*). White marlin and roundscale spearfish consumed the greatest diversity of prey items, a mix of epipelagic and mesopelagic species. White marlin stomachs contents included teleost fishes, crustaceans, cephalopods, and urochordates. Roundscale spearfish stomachs contained teleost fishes, crustaceans, and cephalopods. Swordfish and sailfish stomachs examined revealed only cephalopods and teleosts. These results resemble past studies claiming the most abundant prey items to be teleosts then cephalopods and crustaceans, respectively. A novel finding was the presence of a urochordate in the white marlin stomachs. These results further knowledge of Istiophorid diets, facilitating the ongoing shift from single-species measures towards ecosystem-based management, and sets the stage for diet comparisons of billfishes caught coastally and offshore.

## **Differences in Frontonasal Anomalies in Children with and without an Autism**

**Matthew Arcona**  
College of Psychology

Faculty Sponsor: **Dr. Gesulla Cavanaugh**  
Ron & Kathy Assaf College of Nursing

### **Abstract**

Symptoms of Autism Spectrum Disorders can vary by case; however, the core features consist of social and communication deficits, and restrictive or repetitive behaviors. Most research on the etiology of ASD focus on genetic factors and how chromosomal copy number variants (CNVs) affect neurocognitive development. There is much less research on how developmental disturbances could play a role in neurocognitive disorders, such as ASD. Research suggests that due to the synchronous and adjacent development of the frontonasal features and anterior brain, disturbances in one of these pathways affect the other. Frontonasal anomalies such as ear formation, forehead prominence, and eye placement are currently being investigated in the hope to reveal a connection between early physical developments and the diagnosis of neurological disorders. In order to investigate the hypothesis that individuals with ASD are more likely to show a greater number of frontonasal anomalies than their unaffected siblings, data from the Simons Foundation were obtained and analyzed using Spearman correlation in SPSS. The results reveal that frontonasal anomalies were significantly associated with an autism diagnosis ( $r=0.301$ ;  $p= 0.003$ ). The results herein support future research to investigate ASD as a consequence to disturbance in embryonic development. Additionally, these findings can lead to a more efficient and accurate diagnosis of ASD if research continues to investigate its exact etiology related to specific embryonic development disturbances. Finally, more accurate explanations of the exact etiology of ASD can lead to improvements in both diagnostic and treatment protocols.

## **Dreaming in Reverse**

**Arleene Perez-Sifontes**

Halmos College of Arts and Sciences

**Graciela Quezada**

Halmos College of Arts and Sciences

**Schneider Campport Jean-Pierre**

Halmos College of Arts and Sciences

**Jacob Meshel**

Halmos College of Arts and Sciences

Faculty Sponsor: **Professor Eric Garner**

Halmos College of Arts and Sciences

### **Abstract**

“Dreaming in Reverse” is a short film about a young woman who is dealing with a recurring dream. In this dream, she sees a man whom she believes is in danger. Despite many efforts to forget the dream, she convinces herself that she must be the one to save him. Upon finding the man, she realizes that the dream wasn’t quite how she envisioned it. The film is directed and written by Arleene Perez-Sifontes, Graciela Quezada, Schneider Campport Jean-Pierre, and Jacob Meshel. The film is edited by Schneider Campport Jean-Pierre.

## **Drunken Parasites: Morphological Distortions Associated with Chemical Fixatives in Two Monogenetic Flatworms**

**Wamika Shoukat**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Christopher Blanar**

Halmos College of Arts and Sciences

### **Abstract**

Fixation is the first step in the identification of animal parasites: its primary purpose is to kill the parasite and prevent or delay decomposition via autolytic enzymes. In the lab, parasitologists typically use ethanol (primarily 70%), formalin, or combinations of the two (e.g. AFA: glacial acetic acid, formalin, and ethanol), but there is little consensus on which best preserves the morphological characters used for parasite identification. Furthermore, parasitologists working in the field and/or internationally are often constrained in their choice of fixative: for example, ethanol can be difficult to obtain in countries that prohibit the sale of alcohol. Instead, various ad hoc fixatives are substituted, including rubbing alcohol, vinegar, hand sanitizer, or commercially available spirits such as rum. Despite this widespread practice, the distortions of parasite anatomy associated with these unconventional fixatives have never been examined. Therefore, we assessed morphometric distortions associated with different fixatives in two monogenetic trematodes, *Protomicrocotyle mirabilis* and *Cemocotyle noveboracensis*. Parasites were recovered live from the gills of freshly-caught Crevalle Jacks (*Caranx hippos*) and fixed in 70% or 95% ethanol, AFA, glacial acetic acid, rum, hand sanitizer, or rubbing alcohol. Fixed parasites were mounted on slides and key morphometric measurements taken. The degree of distortion observed differed among fixatives. Parasites fixed in 95% ethanol were particularly distorted, and included morphometric changes in sclerotized structures (i.e. haptor clamps) generally assumed to be resistant to distortion by fixation. These results suggest that the choice of fixative can have profound effects on the ability to correctly identify parasites.

## **Ecological analyses of socio-economic food deserts in Broward County**

**Annie Goyanes**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. J. Matthew Hoch**

Halmos College of Arts and Sciences

### **Abstract**

“Food desert” refers to an area where citizens lack access to fresh, affordable, nutritious food. Food deserts are generally in low-income urban neighborhoods or rural towns and can be considered environmental or economic injustice. South Florida and Broward County have been documented as having a high food insecurity rate, indicative of households having difficulty putting food on the table. Given the high rate of food insecurity, it was hypothesized that a lack of access to food and the presence of socio-economic food deserts was at least partially responsible. Data was collected by visiting three supermarkets in each of the 13 State House Districts in Broward County. In each district both major chain supermarkets and small, independent markets were explored. For each supermarket the unpackaged, refrigerated produce was photographed, counted, and logged. Demographic statistics including measures of income, racial/ethnic makeup and educational attainment were collected from the U.S. Census and American Community Survey. Median income was positively correlated to produce diversity and the proportion of minorities was negatively correlated with diversity at all stores. Although diversity varied, analysis of similarity showed there were no consistent produce items that were more or less available in the different communities. Therefore, it is concluded that there may be fewer choices in some neighborhoods, but the differences vary from place to place and store to store.

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## **Effect of HDAC Inhibitor on Mesenchymal to Epithelial Transition (MET) in Non-small Lung Cancer Cells (NSCLC)**

**Sanjana Mody**

College of Psychology

**Grace Waldron**

Halmos College of Natural Sciences & Oceanography

Faculty Sponsor: **Dr. Umamaheswari Natarajan**

HPD General Expense, Rumbaugh-Goodwin Institute for Cancer Research

Faculty Sponsor: **Dr. Thiagarajan Venkatesan**

HPD General Expense, Rumbaugh-Goodwin Institute for Cancer Research

Faculty Sponsor: **Dr. Mir Saleem**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Appu Rathinavelu**

HPD-College of Pharmacy, Rumbaugh-Goodwin Institute for Cancer Research

### **Abstract**

The epithelial to mesenchymal transition (EMT) is a highly dynamic process. It is also involved in enhancing the tumor invasiveness and metastasis of the cancer cells. Therefore, the generation of tumor cells with stem cell properties plays a significant role in developing resistance to cancer treatment. The reversal of EMT to MET (mesenchymal to epithelial transition) is poorly understood at the present time. Increased mesenchymal marker levels have been associated with increased lung cancer risk. We hypothesized that suberoyl-anilide hydroxamic acid (SAHA, also known as Vorinostat) might promote MET through epigenetic modification such as acetylation and methylation. We analyzed both EMT and epigenetic marker expressions in H460 and HCC827 lung cell lines. Our microarray data revealed that SAHA treatment reduced the methylation of DNA and histones. We confirmed the decrease in DNMT3A, SUV39H1, and PRMT1 levels in lung cancer cells. Furthermore, we analyzed the stable overexpression of E-cadherin and acetylated histones in both lung cancer cells following SAHA treatment. The results showed that the reversal of EMT to MET process did correlate with epigenetic alterations induced by SAHA. We further demonstrated that hyperacetylation and hypomethylations were associated with significant induction of MET indicated by higher E-cadherin levels and lower vimentin levels when compared to control cells. Further studies are underway to fully determine the intracellular interplay of these mechanisms. (This project was supported by The Royal Dames of Cancer Research Inc., Ft. Lauderdale, Florida).

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## **Effect of SAHA and UC2288 on Epithelial to Mesenchymal Transition in p53 wild/mutant types of Lung Cancer Cells**

**Tanha Rahman**

Halmos College of Arts and Sciences

**Naziba Akther Nuha**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Umamaheswari Natarajan**

Rumbaugh-Goodwin Institute for Cancer Research

Faculty Sponsor: **Dr. Thiagarajan Venkatesan**

Rumbaugh-Goodwin Institute for Cancer Research

Faculty Sponsor: **Dr. Appu Rathinavelu**

Rumbaugh Goodwin Institute for Cancer Research

### **Abstract**

Lung cancer is one of the most lethal cancers and encompasses over 30% of cancer-related deaths among men and women globally. Cancer progression is marked by the downregulation of epithelial markers and upregulation of mesenchymal markers, which causes solid tumors to become malignant and increase their invasiveness and metastatic properties. The epithelial-mesenchymal transition (EMT) is facilitated through complex molecular pathways that include epigenetic and posttranslational modifications. In this regard, DNA as well as Histone methyltransferases are suspected to be involved within the EMT process. In our study, we analyzed the markers of EMT in H460 and HCC827 lung cancer cells using Histone Deacetylase inhibitor (HDACi) SAHA (Suberoylanilide Hydroxamic Acid) and p21 inhibitor (UC2288). The cells were treated with SAHA, UC2288, and combination for 24 hrs. Our western blot results have shown that SAHA treatment was able to increase E-cadherin, p21, p27 levels along with SNAIL protein levels while decreasing the Aurora Kinase B and Vimentin expression levels. Our results provide a valuable information regarding the correlation between acetylation and methylation mechanisms, leading to the suppression of EMT following HDAC inhibition by SAHA. (This project was supported by The Royal Dames of Cancer Research Inc., Ft. Lauderdale, Florida).



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## **English Language Proficiency and Overall Verbal Ability: A Comparison between Bilingual and Monolingual College Students**

**Samruddhi Ayachit**

Halmos College of Arts and Sciences

**Erika Cabrera Ranaldi**

Department of Psychology and Neuroscience

Faculty Sponsor: **Dr. Joanne Pol Urrechaga**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Mercedes Fernandez**

College of Psychology

### **Abstract**

Assessment of linguistic abilities of non-native English speakers reveals that Spanish/English bilinguals do not perform as well as English monolinguals on tests that require naming of common objects. Similarly, tests of English language proficiency reveal weaker performance in Spanish/English bilingual groups relative to monolinguals. One important limitation of some of these studies is that the language groups are different on educational attainment, which impacts linguistic abilities. Moreover, there are few studies evaluating overall verbal ability in these linguistically diverse groups. To fill these gaps in the research, we tested English monolingual (n=109) and Spanish/English bilingual (n=152) college students with similar educational attainment on the Bilingual Verbal Ability Test (BVAT). This battery contains three subtests and generates an index of second language proficiency and of general verbal ability. In bilinguals, items failed in English are administered in the person's native language (Spanish in our sample) and scores are combined to determine overall language ability. In monolinguals, performance on the English subtests is used to determine overall language ability. We hypothesize that overall verbal ability will be similar between groups while English language proficiency will be stronger in the monolingual group.

## **Evaluation of Linguistic Demand in Multitasking Assessments**

**Aisha Gaziani**

Dr. Pallavi Patel College of Health Care Sciences

**Angela Merlino**

Dr. Pallavi Patel College of Health Care Sciences

Faculty Sponsor: **Dr. Jacqueline Hinckley**

Dr. Pallavi Patel College of Health Care Sciences

Faculty Sponsor: **Dr. Rita Lenhardt**

Gannon University

### **Abstract**

Multi-tasking is a daily functional ability, and people who have language impairments along with cognitive impairments deserve to be appropriately assessed in a way that accommodates their linguistic impairment. Linguistic demand is how much the performance of any task is dependent on linguistic ability for successful completion of the task. This study was conducted to evaluate the linguistic demands of seven validated multitasking assessments and to discuss clinical implications and recommendations for clinical use. A linguistic analysis of the task instructions and materials was conducted. We analyzed the number of polysyllabic words, number of simple sentences, number of complex sentences, total number of words, total number of sentences, total number of different words, total number of syllables, and cohesion. Principal component analysis with varimax rotation showed that a component consisting of total number of words, total number of sentences, total number of different words, total number of syllables, and complex (not-simple) sentences explained 66.34% of the variance. We found that it is possible to objectively evaluate linguistic demand in functional tests, such as these multi-tasking assessments. Our results are consistent with previous work that shows that simple linguistic measures and analysis of task instructions and materials can be conducted to assess linguistic demand to more fairly assess individuals with language impairments or differences.

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## **Forces Affecting Genital Morphology of Eastern Mosquitofish in the Everglades**

**Dyane Oliva**

Halmos College of Arts and Sciences

**Rose Leeger**

Halmos College of Arts and Sciences

**Camila Guzman Nunez**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. J. Matthew Hoch**

Halmos College of Arts and Sciences

### **Abstract**

Eastern Mosquitofish are abundant fish in the Everglades. Some of their populations make annual, long distance migrations into temporary wetlands that dry out every year. Past work indicates differences in migration ability among fish from wetlands of different hydroperiod. Eastern Mosquitofish internally fertilize with a modified fin that acts as a penis-like “gonopodium,” which has been shown in other mosquitofish species to respond to the presence or absence of predators via altered size and shape. Data collected in 2019 reveals variation in gonopodium size and shape for Eastern Mosquitofish in Everglades wetlands that dry annually when compared to those from permanent water bodies (Lake Okeechobee and Gold Circle Lake). Our initial findings suggest that fish from permanent water bodies such as Lake Okeechobee possess shorter gonopodia that are blunter in shape than those from temporary wetlands. We hypothesize that these differences may result from differing predator densities in the different habitats or different migration regimes that the fish exist within. This work can be applied to Everglades restoration because Eastern Mosquitofish are an important food source for birds whose populations are explicit restoration targets. Understanding how their populations change, move across the landscape, and respond to predators is critical to maintaining high numbers in the preferred foraging areas of birds. Genitals are among the most rapidly evolving anatomical features of animals. Our work suggests that multiple environmental factors affect Mosquitofish genitalia, which contributes to understanding the combined influence of natural selection and sexual selection on these structures.

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## **Gotta Go Right Now: Assessing and Educating College Women about UTIs**

**Nabiha Atiquzzaman**

Kiran C. Patel College of Osteopathic Medicine

Faculty Sponsor: **Dr. Nicole Cook**

Kiran C. Patel College of Osteopathic Medicine

### **Abstract**

Urinary tract infections (UTIs) affect 50% of women in their lifetime (Hhs.gov). The prevalence of UTIs increases with age, except for a spike seen in women aged 18-39 (Medina, 2019). UTIs cause significant psychological distress, financial impact, and scientific implications (Richtel, 2019). Previous studies have found support of UTI education enhancement interventions changing participants behavioral intention; a positive association between UTI knowledge and prevention practices was demonstrated. However, there are no studies investigating impact of educational programs on health behavior of university students and their knowledge of UTIs. The purpose of this study is to assess knowledge of UTIs among college-aged women, provide UTI prevention education, and investigate intention to practice UTI prevention behaviors following education. Using cross-sectional methodology, an online survey was administered via email to a convenience sample of non-pregnant female NSU post-secondary students aged 18-30. The survey was completed by 42 respondents, of which 38 met the inclusion criteria. Survey questions were based on constructs of the health belief model to assess participants' risk, knowledge, and behavioral intention. Results showed that over half of respondents had learned something from the education provided. Self-efficacy was found to be higher among participants after education. A high intent to adopt health prevention behaviors was also seen after education. The findings suggest that participants gained knowledge on UTI prevention and that education that was provided may be effective in promoting UTI preventative behaviors.

## **Great Plains Prehistoric Megadrought Findings as Potential Indicators for Impending Climate Change-Related Catastrophes**

**Melanie Vasquez**

Halmos College of Arts and Sciences

**Madelyn Rinka**

Halmos College of Arts and Sciences

**Emma Hoffstein**

Halmos College of Arts and Sciences

**Drew Tozer**

Halmos College of Arts and Sciences

**Elena Kampian**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Paul Baldauf**

Halmos College of Arts and Sciences

### **Abstract**

Determining details of extreme climate events on the environment is necessary to predict the future effects of global climate change. Researchers studying the northern Great Plains dune systems have found evidence of prolonged prehistoric droughts (megadroughts) that occurred due to climate anomalies. However, the timing, severity, and regional extent of these megadroughts remain controversial. Our previous work supports the interpretation that the White River Badlands (WRB) and the Nebraska Sand Hills (NSH) dune systems reactivated three times in the past 10,000 years in response to global climate change. This study investigates the hypothesis that these dune systems are linked, that sand from the WRB is transported by wind to the NSH, located 60 km southeast of the WRB. To test the hypothesis that these systems are related, we used point-counting methodology to determine modal mineral compositions of 25 samples from the WRB. We compared these results to NSH dune system mineral composition findings from previous studies. Additionally, we compared the geochemical composition of 15 WRB sand samples to data sets from the NSH system using energy dispersive x-ray fluorescence analysis. Our results falsify our hypothesis that the systems are linked geologically, and instead suggest that the systems have distinct geologic histories. Nonetheless, our previous work indicates that these systems are linked climatologically, implying that global climate change could cause these dune systems to reactivate in the future. Should this occur, it could potentially trigger the onset of catastrophic climate-related events across the Great Plains.

## **Healthy Happens Here - a wellness program to support oral health, nutrition and physical activity, in an elementary school**

**Matthew Calaigian**

Dr. Kiran C. Patel College of Osteopathic Medicine

**Faculty Sponsor: Dr. Claudia Serna**

Dr. Kiran C. Patel College of Osteopathic Medicine

### **Abstract**

Dental caries and childhood obesity remain a national public health concern in the United States. Poor dietary practices, including low consumption of fruits and vegetables and high consumption of sugary drinks increase the risk of dental caries and obesity in children. Healthy Happens Here is a cultural competence wellness program to support oral health, nutrition and physical activity, in an elementary school in Miami, FL. The three-month educational program was a collaboration between Nova Southeastern University, and the Horeb Christian School. Parents/Guardians were notified of the study via flyers posted at the school and with an informational letter sent via email. Those interested were asked to sign an informed consent form to participate in the study. Fifty parents participated in the program that included a one-hour face to face education on healthy lifestyle practices during scheduled afternoon school meetings. The topics included: sugary drinks and oral health, nutrition and oral health, and oral health and physical activity. Parents/Guardians of school-aged children (Kindergarten through 6th grade) participated in focus groups after the three sections. Parents' attitudes have a positive impact on the state of children's oral health; because the parents control tooth brushing and sugar consumption. Parents/ Guardians help children develop positive oral health habits.

## **How maternal education impacts child health in food-insecure households in Peru.**

**Sydney Sansone**

Dr. Kiran C. Patel College of Osteopathic Medicine

Faculty Sponsor: **Dr. Oyindamola Soremekun**

Dr. Kiran C. Patel College of Osteopathic Medicine

### **Abstract**

Children living in food-insecure homes in poor areas of Peru experience poor health outcomes at greater rates than their counterparts with higher socioeconomic status. The factors that contribute to poor health outcomes can be viewed through the levels of the Socioecological Model. At the interpersonal level, mothers play a unique role in determining the health outcomes of their child(ren). This systematic review aims to synthesize findings from mixed methods studies conducted in poor areas of Peru to determine how maternal education impacts child health. Using data from ten exemplar studies, the level of education of mothers, child health, resources readily available, and the success of nutrition education interventions are analyzed. The overall interpretation of the findings will be used to offer possible solutions and recommendations for interventions to increase child health in Peru.

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## **Improving Health Communication about Recognizing Pediatric Obstructive Sleep Apnea Associated with Down Syndrome**

**Mahima Dave**

Dr. Kiran C. Patel College of Osteopathic Medicine

Faculty Sponsor: **Dr. Maria Montoya**

Dr. Kiran C. Patel College of Osteopathic Medicine

### **Abstract**

Down syndrome (DS) is the most prevalent chromosomal disorder in which an extra copy of chromosome 21 disrupts the development of intellectual abilities. Every year, 6,000 babies in the United States are born with DS, which is approximately 1 in every 700 babies (Agarwal et al., 2019). Their unique physical manifestations place them at high risk for obstructive sleep apnea (OSA), a condition in which repeated blockage of the upper airway causes difficulty breathing during sleep (Olson et al., 2011). Nearly 80% of children with DS are afflicted with OSA compared to only 2-5% of the general pediatric population (Chamseddin et al., 2019). The behavioral effects of DS, such as irritability and poor concentration, may show undiagnosed OSA (Ehsan et al., 2018). The strong correlation between OSA and cardiovascular complications increases the likelihood of nocturnal sudden cardiac arrest by 2.57-fold compared to the general population (Adabag et al., 2019). Common signs of OSA include snoring, restlessness during sleep, night waking, and daytime tiredness. Manifestations of OSA, such as cognitive impairment and cardiovascular disease, are common in the DS population, and this can obscure the diagnosis of OSA. Because signs of OSA are often correlated with sleep behaviors, caregivers must communicate all behavioral changes to their child's clinician. In collaboration with the Sudden Cardiac-death Awareness Research Foundation (SCARF), the scope of this project is to identify the barriers to effective health communication between caregivers and clinicians regarding OSA symptoms. Effective health communication can mitigate risk factors associated with pediatric OSA.



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## **Influence of Growth Efficiency, Bacterial Density, and Metabolism on Antibiotic Resistance Across Different Drug Classes**

**Gabriela Diaz Tang**

Halmos College of Arts and Sciences

**Estefania Marin Meneses**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Allison Lopatkin**

Barnard College of Columbia University

Faculty Sponsor: **Dr. Robert Smith**

Halmos College of Arts and Sciences

### **Abstract**

Antibiotic resistance has become a prevailing issue in the health care system due to increased hospital costs and mortality. Moreover, the discovery of new antibiotics has slowed significantly. Thus, there is a dire need to understand the general mechanisms by which bacteria resist antibiotics towards extending the usefulness of existing drugs. Recently, the effect of metabolism on drug efficiency has revealed that when bacterial metabolism is more active, antibiotics become more lethal. Accordingly, we chose to study how the inoculum effect, where the initial density of bacteria determines the minimum inhibitory concentration (MIC) of drug required, is impacted by bacterial metabolism. To address this question, we grew bacteria in medium containing different metabolites in various concentrations of casamino acids. Together this served to alter both growth and metabolic rate, the intersection of which we call growth efficiency. We observed that, as predicted by flux balance analysis, growth efficiency of a given metabolite determined the difference MIC needed to inhibit bacterial growth. If growth efficiency was sufficiently high, the difference in MIC between high- and low-density populations was effectively zero indicating that inoculum effect was abolished. Our work demonstrates that growth efficiency dictates MIC due to inoculum effect across different drug classes. It serves to establish a new mechanism that can account for antibiotic resistance and may lead to novel treatment approaches in the clinic.

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## **Interlimb and Intralimb Coordination during Speed Running in American Football Players Training for the NFL Draft**

**Emily Udvardy**

Dr. Pallavi Patel College of Health Care Sciences

**Madison Allen**

Dr. Pallavi Patel College of Health Care Sciences

Faculty Sponsor: **Dr. Monique Mokha**

Dr. Pallavi Patel College of Health Care Sciences

### **Abstract**

Speed is integral to players seeking to be drafted into the National Football League (NFL). To increase speed, coaches promote running symmetry and coordination. Coordination during running is assessed by graphing the relative temporal and spatial patterns of the hip, knee, and ankle, and visually inspecting the resulting angle-angle plots for linearity (in-phase, anti-phase, decoupled). Though qualitative, this method is sophisticated as it examines movement patterns versus discrete points. Therefore, we sought to describe intralimb and interlimb coordination during speed running in elite American football players undergoing a 6-week NFL draft preparation camp. Twelve participants (age,  $21.8 \pm 0.8$  yrs; ht,  $1.8 \pm 0.05$  m; mass,  $106.9 \pm 15.9$  kg) volunteered for this study. Pre and post angular kinematics were collected using a 10-camera motion capture system during a 5 sec treadmill run at 6.5 m/s. Five steps from each limb were analysed. Angle-angle plots of relative sagittal plane hip-knee, knee-ankle and hip-ankle motion were inspected for linearity. Hip-knee was in-phase from initial contact (IC) to midstance (MS), anti-phase from MS to push-off (PO) and decoupled from PO to IC. Knee-ankle was in-phase IC to MS, turning point in-phase MS to PO and decoupled PO to IC. Hip-ankle was in-phase IC to MS, turning point decoupled MS to PO and in-phase PO to IC. While intralimb linearity was generally symmetrical, interlimb knee-ankle and hip-ankle patterns were different indicating that impaired ankle motion may constrain hip and knee motion. These constraints were reduced after 6 weeks. Interlimb coordination may contribute to improving running performance.

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## **Investigating Differences in Eye-Movement between Children with ASD and Children with Neurotypical Development**

**Sruthi Kundur**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Gesulla Cavanaugh**

Ron & Kathy Assaf College of Nursing

### **Abstract**

Children with Autism Spectrum Disorders (ASD) have deficits in social skills; nonetheless, research suggests that a pet can help reduce stress and negative outcomes. Evidence from the literature suggests that there is a correlation between the ability to demonstrate emotion and the ability to understand other's intentions in order to make the correct assumptions. However, children with ASD lack the ability to understand social cues and make better predictions. This study investigates the eye movement of children with ASD in comparison to children with neurotypical development. Eye-tracking data, including heat maps and eye-movement time-lapses were collected from children with ASD and age matched controls using the Tobii Pro Nano eye-tracker. A tennis ball and a frisbee were presented to the participants via a 50 second video in which a person interacted with a friendly dog. The children were prompted to make three choices during the video stimulus. The collected eye-tracking results show that children with ASD responded positively to the dog, the human, and their interaction. The data revealed the children's purposeful eye movement while watching the dog and its human companion; there was no significant difference in eye movement between the two groups of children  $F(2, 10) = 1.65, p = 0.296$ . These results suggest that children with ASD may be able to hold personal interactions when a companion animal is present; as a whole, improving their social interaction abilities similarly to children without ASD. Although the data results are preliminary, they can inform eye-tracking studies designed for children with ASD.

## **Mantequilla**

**Julian Glasthal**

Halmos College of Arts and Sciences

Faculty Sponsor: **Adam DeRoss**

### **Abstract**

“Mantequilla” is a short film about two construction workers stumbling across their strange coworker. One worker forgets his car keys, and so the men trail back to the construction site to find them. They stumble across this peculiar fellow who comes off as weird and maybe even a threat; however, as the saying goes, “Never judge a book by its cover.” This is a story about an outcast of outcasts, a young man who is looked at negatively and never given the time of day, who in reality is a man of heart and kindness. This film aims to destroy stereotypes and give stereotypical roles real stories and real feelings. This piece is directed by Julian Glasthal, and written by Glasthal and Nico Raimont. The film stars Hansel Porrás Garcia as Mantequilla, Matthew Parr-Alvarado as Xavier, and Brandon Baez as Gonzales. The sound design was done by David Cuervo, and Nico Raimont did the score. The film was produced by Joshua Miller. Inspiration for this piece is credited to Spike Lee, Steven Sondheim, the director’s parents and Donald Glover’s FX television show “Atlanta”.

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## **Mindfulness training during a pandemic: Can online mindfulness training reduce distress?**

**Aysha D Patel**

College of Psychology

**Catherine Weber**

College of Psychology

**Mamiko Swanson**

College of Psychology

**Sharan Sankar**

College of Health Science

Faculty Sponsor: **Dr. Jonathan B Banks**

College of Psychology

Faculty Sponsor: **Dr. James Pann**

Abraham S. Fischler College of Education and School of Criminal Justice

### **Abstract**

The COVID-19 pandemic has resulted in a number of negative outcomes, including economic, psychological, and physical health concerns (Gruber et al., 2020; Fine, Reichle, & Lord, 2020). Levels of depressive symptoms and anxiety have appeared to be higher during the pandemic than they were prior to the pandemic (O'Connor et al. 2020). Mindfulness meditation training has been shown to reduce the impact of stress on cognitive functioning and anxiety. Reductions in depressive symptomatology have also been shown to occur following mindfulness training. Although mindfulness-based interventions often consist of eight weeks of training with one weekly in-person session, the current study examined a six-week mindfulness training conducted in a university setting. The six-week mindfulness training contained weekly one-hour online meetings with a mindfulness instructor, daily practice sessions, and text messages to support practice. Participants completed measures of perceived stress, self-reported mind wandering, mindfulness, self-reported cognitive failures, and COVID related distress. Additionally, a subset of the participants completed a measure of sustained attention. We hypothesized that levels of perceived stress, COVID related distress, cognitive failures, and self-reported mind wandering would decrease while measures of mindfulness and sustained attention would increase following the six-week mindfulness program. The results suggested a significant decrease in perceived stress, COVID related distress, and self-reported mind wandering, while indicating increases in sustained attention and self-reported cognitive failures. The results provide initial evidence that mindfulness training can be delivered in an online format and are consistent with in-person mindfulness training interventions.

## **Minor Changes with Large Implications: Modeling Amino Acid Mutations in SARS-CoV Monoclonal Antibodies (80R and 362) Towards the Design of More Universal Antibodies**

**Christo Manikkuttiyl, Carolina Alzamora, Carol Manikkuttiyl**

College of Psychology

**Feza Abbas, Lyla Abbas, Matthew Hunt, Pujita Julakanti, Sanjana Likki**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Emily Schmitt Lavin**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Arthur Sikora**

Halmos College of Arts and Sciences

### **Abstract**

SARS-CoV-2, the causative agent of COVID-19, has led to over 100 million cases and over 2 million deaths worldwide. Two anti-SARS-CoV monoclonal antibodies (MAbs) 80R and 362 are known to bind to epitopes on the spike protein receptor-binding domain (RBD), with 80R binding to SARS-CoV-1 and 362 binding to both SARS-CoV-1 and SARS-CoV-2. To investigate this further and hypothesize structures for a potentially more effective antibody, undergraduate students participated in the CREST (Connecting Researchers, Educators, and STudents) Program and studied the binding interactions between the antibodies and their respective spike proteins. At the binding interface between these antibodies and the SARS spike protein, MAb362 mutations trend smaller and less polar than those in 80R: Arg149Ser, Asn151Ser, Asp170Gly, and Trp213Ser. Due to the trend of smaller amino acids appearing in the MAb362 binding interface, it was hypothesized that more space in this area could allow antibodies to be more resistant to future SARS-CoV spike protein variants. A hypothetical antibody (NSU1) was modeled using MAb362 with four additional mutations: Asp103Gly, Trp104Leu, Gly170Ser, and Arg211Val. Except for Gly170, these mutations within the binding interface exhibit decreased size and polarity. Position 170 is Asp on the 80R structure, so a mutation to Ser was still expected to maintain the trend of smaller residues. These models allowed for deeper understanding of the impact of mutations on binding interactions between antibodies and viral proteins. The modeling process also provided insight into the molecular structure of a potentially more universal antibody against variations in SARS-CoV.

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## **Navigating COVID-19-based Challenges to Global Education, Research, and Management in Healthcare and STEM**

**Stephanie Autore**

Halmos College of Arts and Sciences

**Jessica Hallett**

Halmos College of Arts and Sciences

**Michelle Hoang**

Halmos College of Arts and Sciences

**Faculty Sponsor: Dr. Santanu De**

Halmos College of Arts and Sciences

### **Abstract**

The Coronavirus Infectious Disease 2019 (COVID-19) has affected most nations at all levels of functioning, individual to governmental. This study provides a comprehensive review of the global consequences of the pandemic on key socioeconomic sectors – healthcare management, and education and research in healthcare as well as science, technology, education, and mathematics (STEM). COVID-19 halted face-to-face classes and meetings in schools and colleges worldwide, necessitating virtual instruction as academic institutions sought to continue education safely, yet effectively. This adversely impacted every field of learning, especially STEM and healthcare education since STEM degrees entail rigorous curricula integrating lectures and laboratory exercises whereas healthcare education involves hands-on, clinical lab activities and residencies that require working with patients. Research in high-needs STEM disciplines has been prioritized in the fight against COVID-19. Computational scientists, artificial intelligence experts, engineers, virologists, and mathematicians have been contributing with strategies to optimize patient care, enhance public understanding of the disease, track reported cases, and improve physical-distancing measures. Healthcare management facilities have implemented various operational changes geared towards reducing non-emergency patient visits and preventing infection transmission; these include shifting appointments to online modalities, altering procedures, and developing personal protective equipment (PPE). Multifaceted research endeavors have been undertaken to develop treatments or a potential cure for COVID-19; vaccines and antiviral drugs are being designed or undergoing clinical trials, while symptom-management approaches are being employed along with evaluation of pre-existing conditions. The analysis will help better understand and address complex COVID-19-induced challenges facing education, research, and management in global healthcare and STEM.

## **Numerical Representation of Amino Acid Sequences**

**Naziba Akther Nuha**

Halmos College of Natural Science & Oceanography

Faculty Sponsor: **Dr. Radleigh Santos**

Halmos College of Natural Sciences & Oceanography

### **Abstract**

Amino acid substitution matrices attempt to quantify the rates at which the different amino acid residues in proteins are functionally substituted by other amino acid residues with similar biochemical properties. Currently, the most widely utilized substitution matrices comprise BLOSUM-62, PAM-120 and PAM-250 among others. Percent recognized mutation (PAM) matrices list the probability of transition from one amino acid to another during evolution of homologous protein sequences and are therefore based on monitoring protein evolutionary origins. In comparison, the amino acid substitution matrices of the blocks (BLOSUM) are based on scoring substitutions observed over a number of cycles of evolution. Traditionally, amino acids have been represented by single letter alphabetic codes but in this study, we will be using Principal Component Analysis (PCA) applied to amino acid physiochemical properties in order to assign numerical values to the various amino acid residues. Then we will compare the result with existing substitution matrices to learn how this method may quantify the physiochemical basis for functional substitution in proteins.



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## **Online Social Environment Impacts Feelings of Social Connection in Older Adults During the COVID-19 Pandemic**

**Jade Kushner**

Dr. Kiran C. Patel College of Osteopathic Medicine

**Brittany Derynda**

Dr. Kiran C. Patel College of Osteopathic Medicine

**Mary Goodyear**

Dr. Kiran C. Patel College of Osteopathic Medicine

Faculty Sponsor: **Dr. Nicole Cook**

Dr. Kiran C. Patel College of Osteopathic Medicine

### **Abstract**

Evidence suggests that nearly one-third of older adults' experience loneliness and/or social isolation; an increase in these rates during the current pandemic is anticipated. The Lifelong Learning Institute (LLI) at Nova Southeastern University (NSU) in South Florida has worked to engage seniors in fun learning activities and social opportunities since 1977. When "stay at home" orders went into effect in March 2020 the LLI moved to online program delivery via Zoom. To understand the implementation of zoom among LLI members, NSU students, researchers and LLI member advisory committee developed a cross-sectional research study using an online survey that was administered to LLI members three months post-zoom implementation in May 2020. Results among the 127 responders demonstrated that most members were not comfortable using zoom (57%) especially the chat, reactions or camera features. More than 80% of responders did report that zoom helped them keep their spirits up. Respondents had specific feedback to improve Zoom programming including YouTube videos on use, retraining, training on features (e.g. chat, camera, reaction), closed captioning, program reminders and links sent out more frequently and within 30 minutes of start time. There were also several comments about internet connectivity, identifying opportunities for router and internet plan education. Finally, respondents noted new opportunities to enhance virtual programming including engaging speakers from across the nation and world. In summary, direct feedback from seniors on how to improve the online social and learning environment is pivotal to improving experience, programming and social connection during COVID-19.

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**Periodically Disturbing the Spatial Structure of a Microbial Community Composed of  
*Pseudomonas aeruginosa* and *Staphylococcus aureus* Determines its Composition**

**Camryn Pajon**

Halmos College of Arts and Sciences

**Brandon Toscan**

Halmos College of Arts and Sciences

**Taniya Mariah**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Omar T. Eldakar**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Robert Smith**

Halmos College of Arts and Sciences

**Abstract**

*Pseudomonas aeruginosa* and *Staphylococcus aureus* can co-occur in chronic and hard-to-treat infections. They interact through several small diffusible molecules and enzymes which increase their virulence, growth rates, and antibiotic resistance. Previous work has shown that the spatial structure of microbial communities in continuously mixed environments and completely undisturbed environments affects bacterial interactions. These extreme cases fail to fully represent a natural environment where the spatial structures developed by the microbes are periodically disturbed. The objective of this study is to determine how periodic perturbations to spatial structures affects the interaction and co-existence of *P. aeruginosa* and *S. aureus* in co-culture. We found that in two extreme cases of disturbance, a continuously disturbed environment and a completely undisturbed environment, the microbial community was dominated by *P. aeruginosa*. Periodically disturbing the spatial structure of the population shifted dominance to *S. aureus*, which was consistent when the initial density of the populations were changed. Moreover, we found that the initial ratio of *P. aeruginosa* and *S. aureus* determines the ability of the latter to dominate the population. Agent based modeling suggests that interactions between competition for nutrition and antagonistic small diffusible molecules can explain this trend. Our results highlight how periodic changes to spatial structure can affect microbial community composition and may lead to new approaches to treat infections.

## **Propofol and the Renin-Angiotensin System**

**Giovanna Gnozzo**

College of Psychology

Faculty Sponsor: **Dr. Robert Speth**

College of Pharmacy

### **Abstract**

The renin-angiotensin system (RAS) has become a more popular subject of research due to its role in regulating homeostasis within the body as a whole, and regulation of cerebral blood flow, memory consolidation, and etiology of various neurological diseases within the local nervous system RAS. The main effector of the system is Angiotensin (Ang) II, through the activation of the AT1 or AT2 receptor subtypes. Overactivation of the AT1 subtype leads to inflammation and hypertension within the body and an increase in neuronal apoptosis and oxidative stress within the nervous system. Propofol, a commonly used anesthetic in general surgery, has been found to exhibit hypotensive effects and attenuate the results of overactivation of the AT1 receptor by Ang II. A series of competition binding assays have been completed in order to determine if propofol is binding to the AT1 receptor (AT1R) subtype at clinically relevant concentrations in order to exhibit its hypotensive effects and influence AT1R activation by Ang II. This ongoing study has found that propofol does inhibit Ang II binding to the AT1R, however this competition only occurs at high concentrations. This finding implies that the interaction between propofol and the RAS is likely not due to the blocking of the AT1R, rather through another unknown mechanism.

## **Restricted**

**Caitlyn Khan**

Halmos College of Arts and Sciences

Faculty Sponsor: **Professor Eric Garner**

### **Abstract**

“Restricted” is a short film about a daughter who is struggling through her daily life due to the acts of overbearing parents. Trying her best to keep all the pieces of her life together, the daughter succumbs to the pressures surrounding her. The film is directed by Caitlyn Khan. Other crew members and actors include Sebastian Stam, Chantal Nosievici, Lisa Arneaud, and Marcus Arneaud.

## **She Had a Dream: Eula Johnson's Fight to Desegregate Broward County**

**Janay Joseph**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. George Nelson Bass**

Halmos College of Arts and Sciences

### **Abstract**

“She Had a Dream” is a historical documentary about Eula Johnson, a Civil Rights Activist in South Florida, and her involvement in a series of protests called the “Wade-Ins”. With the upcoming 60<sup>th</sup> Anniversary of the Wade-Ins, this short documentary follows Johnson’s planning and execution of the protests as well as the racial backlash she received due to her actions. The documentary is narrated by Johnson in her own words using archived audio from one of her talks to the community in 1988. This is paired with images from historical archives, and interviews from local historians. This film is written and directed by Janay Joseph, as well as produced in collaboration with History Fort Lauderdale.

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**Summer to autumn population of wild *Eumaeus atala* on the Ft. Lauderdale campus of Nova Southeastern University**

**Alexandra Lens**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Joshua Feingold**

Halmos College of Arts and Sciences

**Abstract**

*Eumaeus atala* is an endangered tropical butterfly native to the Caribbean and some parts of Florida, USA. Following population reductions primarily due to habitat loss, *Eumaeus* populations are now increasing due to conservation efforts of its cycad host plants, especially *Zamia integrifolia* (coontie). The purpose of this study was to observe, document, and measure the population of wild *Eumaeus* on the Ft. Lauderdale, Florida campus of Nova Southeastern University where landscaping use of host plants supports a natural population of *Eumaeus*. Forty-four host plants located in two different sites were observed for 14 weeks. One site (Baseball Field) possessed most of the host plants (n=40) that were packed closely together in direct sunlight, while the other (Mesozoic Garden) had smaller plants (n=4) that were spread out in a shaded environment. On each survey date each plant was inspected to quantify the number of larvae (caterpillars), hatched and unhatched pupae, and butterflies. Butterflies were observed on 8 of 14 observation dates. Most had recently emerged from chrysalis, and some were observed laying eggs. Plants ranged in hemispheric area from 2.3cm<sup>2</sup> to 2,776.5cm<sup>2</sup>. Larval densities ranged from 0 to 0.14 larvae cm<sup>-2</sup>, and 77.3% of the plants hosted larvae at some point during the observation period. This study documents the importance of native plant landscaping at NSU to support an endangered species, and these data can be used as a baseline for future studies.

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**Survival and Development of Zebra Longwing, *Heliconius charithonia*, on Native and Non-native Passion Vines, *Passiflora* sp., in South Florida**

**Madelyn Rinka**

Halmos College of Arts and Sciences

**Cassidy Loucks**

Halmos College of Arts and Sciences

**Celina Nelson-Jordan**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Paul Arena**

Halmos College of Arts and Sciences

**Abstract**

Zebra longwing butterflies (*Heliconius charithonia*) are distributed throughout the southernmost regions of the United States to South America and are abundant across Florida. These heliconian butterflies not only consume nectar, but are also known to feed on pollen, resulting in a longer lifespan than most butterflies. In their larval stage, *H. charithonia* feed exclusively on *Passiflora* sp., however larval performance and survival across the diversity of Passion vine species is not well documented. We examined these criteria of zebra longwings from egg to adulthood on two passion vines native to Florida, corky stem (*Passiflora suberosa*) and maypop (*Passiflora incarnata*), as well as one non-native species, bluecrown (*Passiflora caerulea*). Zebra longwing females were caught in the wild and kept in enclosures to lay their eggs. The eggs from one female were distributed evenly into enclosures, each containing one *Passiflora* sp. Percent survival from egg to larvae, larvae to chrysalis, chrysalis to adult, and egg to adult was determined, as well as forewing length of adults for each *Passiflora* sp. Preliminary results indicated a potential incompatibility between *H. charithonia* larvae and *Passiflora caerulea*, while the greatest survival occurred with larvae reared on *Passiflora suberosa*.

## **Synthesis of metal-binding polymers for water purification via RAFT**

**Blanch Khouri Sader**

Halmos College of Arts and Sciences

**Sneha Polam**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Patricia Calvo**

Halmos College of Arts and Sciences

### **Abstract**

Water, one of the most precious resources on our planet, makes up roughly two thirds of the earth's surface. Despite the abundance of water, access to clean water has become increasingly difficult. Decades of neglect for the environment have contributed to water pollution. Common pollutants include heavy metals, which are toxic and carcinogenic to humans and to aquatic life. Removal of heavy metal contaminants is a critical part of water purification. While several methods exist, the use of polymers to bind heavy metals offers many advantages over comparable methods, such as improved efficiency and elimination of harmful byproducts. The goal of this project is to synthesize a series of metal chelating polymers to determine which type of polymer results in the most efficient binding to a series of metals. By altering the structure of the polymers and the identity of the chelating group, this research will help elucidate the importance of polymer structure and functionality on metal binding efficiency. The polymers will be synthesized via a "modular" approach, where a single polymer can be functionalized with a variety of metal binding groups, creating a "library" of metal binding polymers for detailed binding studies. Metals of interest include common heavy metal water contaminants, such as Zn, Ni, Pb, V, Cu, Cr, and Cd. While the ability to remove metal ions from solution is the primary goal of the project, evaluating the recovery of the bound metal from the polymers is also of interest.



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## **The Impact of the COVID-19 Pandemic on the Healthcare Utilization of Diverse, Low-Income Populations**

**Isha Pasumarthi**

Dr. Kiran C. Patel College of Osteopathic Medicine

**Neha Alety**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. T. Lucas Hollar**

Dr. Kiran C. Patel College of Osteopathic Medicine

### **Abstract**

The COVID-19 pandemic has exacerbated existing barriers to care for diverse, low-income individuals; however, there has been little research done to assess the scope of this issue. This study aims to 1) determine if there has been a shift in the healthcare utilization of low-income, diverse populations and 2) identify potential barriers that could impede access to care during the COVID-19 pandemic. Around 154 respondents residing in Broward County Housing Authority homes were asked whether they were more or less likely to see their doctor, if they were afraid of getting COVID-19 at the doctor's office should they have gone in person, if they were afraid of getting COVID-19 on the way to the doctor's office should they have gone in person, and if they would have preferred to see their doctor in-person or through telemedicine. Secondary data analysis was performed on responses to accurately assess the impact of COVID-19 on healthcare utilization. The results indicate that 65% of Broward County Housing Authority respondents claimed to be more likely to visit their doctor during the COVID-19 pandemic, 76% of respondents were not concerned about contracting COVID-19 at the doctor's office, 74% were not concerned with contracting COVID-19 on the way to the doctor's office, and 74% would prefer to visit their doctor in person rather than virtually. These findings will guide future interventions to improve access to care amongst diverse, low-income, diverse populations, both during pandemics and in general.

## **The Relationship Between COVID-19 Social Distancing and Feelings of Anxiety and Depression in the United States**

**Rahul Gorijavolu**

Dr. Kiran C. Patel College of Osteopathic Medicine

**Shivanie Ramdin, MPH, OSM-III**

Dr. Kiran C. Patel College of Osteopathic Medicine

Faculty Sponsor: **Dr. Nicole Cook**

Dr. Kiran C. Patel College of Osteopathic Medicine

### **Abstract**

Efforts to control the spread of COVID-19 has included mandatory curfews, quarantine, and social distancing policies enacted by government officials across the United States. These changes can result in feelings of loneliness, fear, and isolation. Healthcare workers and individuals with a history of psychiatric illness are more likely to develop anxiety and PTSD during quarantine due to COVID-19 (Brooks, 2020). Research conducted during the Middle East Respiratory Syndrome (MERS) outbreak of 2015 found that people forced to quarantine experienced increased anxiety and feelings of anger, which subsequently decreased four to six months after the period of isolation ended (Jeong, 2016). Research conducted during the Severe Acute Respiratory Syndrome (SARS) outbreak of 2003, discovered an additional source of stress was the lack of clear guidelines provided by the government (Robertson, 2004). With rising COVID-19 cases in the United States and fluctuating restrictions for the public, evaluating the mental health effects of these policies is necessary to determine populations at risk for the most detrimental mental health effects, and what kind of mental health aid needs to be provided. The objectives of this study are to understand the effect of social distancing due to COVID-19 on mental health and to determine feasible ways to provide mental health relief to people who are social distancing or in quarantine. A pre-screening tool and a mental health questionnaire were developed using the Patient Health Questionnaire (PHQ-9) to screen for depression and the Generalized Anxiety Disorder Assessment (GAD-7) to screen for anxiety, which also included additional items regarding demographics, social distancing practices, state of residence, essential or healthcare worker status, current mental health status, and several other variables. These instruments were delivered to adults 18 years and older across the United States via social media, email, and through various participating organizations as an anonymous, cross-sectional questionnaire. Responses were analyzed using descriptive and inferential statistics in SPSS. Of 202 survey respondents, 92% (n=185) reported practicing social distancing for the past two weeks, and 52% (n=97) of those 185 participants completed the questionnaire. The average PHQ-9 score was 8.91, and the average GAD-7 score was 8.04, indicating mild feelings of depression and mild feelings of anxiety among the overall sample. Within the last 2 weeks of completing the survey, 67% (n=65) of participants were classified as having either mild, moderate, moderately severe, or severe depressive symptoms, 58% (n=56) were classified as having either mild, moderate, or severe anxiety symptoms, and 56% (n=54) screened positive for symptoms of both depression and anxiety. However, only 29% (n=28) of respondents reported a prior history of mental health disorders. Respondents who identified as essential workers were more likely to report difficulty sleeping and uncontrollable worrying than non-essential workers ( $p<0.05$ ).

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**Uncovering family themes through the generations: A journey through genealogical and genetic records to document my family history narrative.**

**Feza Abbas**

Halmos College of Science and Arts

Faculty Sponsors: **Dr. Emily Schmitt Lavin**

Halmos College of Science and Arts

Faculty Sponsors: **Dr. James Doan**

Halmos College of Science and Arts

Faculty Sponsors: **Dr. Kathleen Waites**

Halmos College of Science and Arts

**Abstract**

This research weaves together genetics, genealogy, and ethnographic memoir writing. Having begun genealogical and genetics research in Winter 2019 and studied the conventions of memoir writing in Fall 2019, I further developed my previous genealogical research with additional DNA testing that included mtDNA analysis of myself and my father, as well as that of my father's Y-DNA ancestry. I also conducted detailed interviews with family members. Tracing my ancestry through DNA and family stories allowed me to better understand my origins. As a result, I developed a deep connection with my culture and my parents' homeland of Pakistan that often feels distant to me, as a Florida native. Genetic results indicated my ancestry is 86% Northern Indian, 11% Southern Indian, 2% Northern African, and 1% unassigned. These results reflect the ancient human migration from Africa through the Indian subcontinent. In accordance with known human migration patterns, my mtDNA revealed my oldest human ancestor belongs to the L1 haplogroup, followed by the L3 branch from about 67,000 years ago in East Africa. My mtDNA display that I belong to haplogroup H2 reflecting more recent migration patterns. In the ethnographic interviews I conducted with family members, I focused on three major themes: love, migration history, and refuge from sectarian violence. I reflected on the contribution of these themes in building my own identity. In sharing my genealogical and genetic journey, my aim is that this project may serve as a guide to others who are looking to do the same.

## **Understanding Metabolic Activity during the Inoculum effect**

**Kavish Patel**

Halmos College of Arts and Sciences

**Vijay Patel**

Halmos College of Arts and Sciences

**David Singh**

Halmos College of Arts and Sciences

**Abhishek Venkataramnan**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Robert Smith**

Halmos College of Arts and Sciences

Faculty Sponsor: **Dr. Allison Lopatkin**

Barnard College of Columbia University

### **Abstract**

With the post antibiotic era upon us, new techniques are required to treat bacterial infections. While the mechanisms of acquired resistance to antibiotics are well studied, mechanisms by which bacteria can resist antibiotics in the absence of acquired resistance are less studied. This is called phenotypic resistance. One form of phenotypic resistance is the inoculum effect (IE) where the initial density of a bacterial population determines the minimum inhibitory concentration (MIC) of an antibiotic. Given recent findings showing that the metabolic rate of bacteria determines its susceptibility to antibiotics, we sought to understand how changes to metabolism and growth determined IE. We grew *Escherichia coli* in different metabolites and quantities of casamino acids, which allowed for a variety of metabolic and growth rates to be tested. We then quantified the difference in MIC between high density and low-density populations. Interestingly, we found that one nucleotide metabolite, uracil, was able to reduce the difference in MIC between both populations to zero, effectively removing IE. Alternatively, growth in the nucleotide adenine increases the inoculum effect. Interestingly, our study has shown that uracil increases the production of adenine to maintain an equal AT/GC ratio. This, in turn, increases metabolic rate via increased flux through nucleotide synthesis pathways. Overall, our work suggests a unique role of nucleotide synthesis in potentiating IE. Our results may reduce the concentration of antibiotics required to eliminate an infection and may lead to the identification of novel druggable targets.

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**Use of social media in non-profit organizations: Objectives, key predominance indicators and metrics**

**Cassidy Campanella**

Dr. Kiran C. Patel College of Osteopathic Medicine

Faculty Sponsor: **Dr. Claudia A. Serna**

Dr. Kiran C. Patel College of Osteopathic Medicine

**Abstract**

Although social media is a universal, accessible social networking application, there's little evidence regarding the role of nonprofit and public health organizations on how to measure successes, challenges and outcomes. Broward Regional Health Planning Council (BRHPC) located in Hollywood, Florida, identified how social media and public health can structure community engagement, education and awareness. BRHPC's social media journey began with Facebook and Twitter and adopting Instagram and LinkedIn during their 2018/2019 fiscal year. BRHPC's social media key performance indicators (KPI's) are evaluated monthly to identify a diverse audience and foster a public health presence. BRHPC evaluates its social media channels by analyzing likes/followers who are users that opted into following BRHPC's social media pages. Additionally, engaged users represent unique visitors that have interacted with the pages by liking, commenting or sharing a post. Finally, reach/impressions are the number of unique users that have viewed BRHPC's pages. In comparison to the 2017/2018 fiscal year to the 2018/2019 fiscal year, the total number of engagements for Facebook increased from 5,671 to 5,762 and the total number of engagements for Twitter increased from 2,506 to 3,372. In regard to reach, Twitter experienced an increase from 15,134 to 22,541, while Facebook had a decrease from 72,715 to 67,776 due to changes with Facebook's newsfeed algorithm. By now understanding and measuring the continuous trends occurring with social media, BRHPC can set the framework for nonprofit and public health organizations that are working towards improving their social media presence.

## **Utilitarian Perspective on Genetic Enhancement**

**Varun Kota**

Halmos College of Arts and Science

Faculty Sponsor: **Dr. Vicki Toscano**

Halmos College of Arts and Science

### **Abstract**

The invention of CRISPR-CAS9 allows one to edit the genome easily. As a result, many are excited by the potential breakthroughs in medical applications. Others worry that the development of this technology will lead to genetic enhancement, the modification of a set of genes toward a non-therapeutic end goal. After reviewing the philosophical and ethical literature regarding genetic enhancement it became apparent that there was a lack of specificity. Often, the arguments portrayed genetic enhancement as a fantastical process. In reality, the effects of genetic enhancement are far tamer. The folly in these discussions lies in the notion that traits are tied to one gene when, in fact, these attributes manifest due to a variety of genes that play upon each other. To demonstrate, rather than discussing the morality of enhancing human intelligence in some ambiguous method, it is far likely that we will instead enhance a specific feature of the cognitive ability; akin to manipulating genes for long-term memory retrieval to increase intelligence. This thought experiment results in a different analysis than prior arguments by ethicists. This talk will explore the multitude of issues implicated by the question of whether genetic enhancement of humans is moral. Furthermore, it will present that the consequences of human genetic enhancement are deemed moral on a utilitarian ethical framework. Utilitarianism places an importance on the aggregate individual happiness to determine the overall good. Enhancement of individuals leads to increased happiness due to a better lifestyle therefore genetic enhancement is permissible under utilitarianism.



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**VIRTUAL UNDERGRADUATE STUDENT SYMPOSIUM**  
**2021 Program Schedule**

DATE	EVENT SCHEDULE
<b>Tuesday, April 6, 2021</b>	<p><b><u><a href="#">Visit the 2021 Virtual Undergraduate Student Symposium</a></u></b></p> <p><b>Virtual Welcome and Introduction</b></p> <p><b>Keynote Speaker - Nancy Klimas, M.D.</b>            Director, Institute for Neuro-Immune Medicine, Nova Southeastern University            Director, Clinical Immunology Research, Miami VAMC            Professor of Medicine, Department of Clinical Immunology, Dr. Kiran C. Patel College of Osteopathic Medicine, Nova Southeastern University            Chair, Department of Clinical Immunology, Dr. Kiran C. Patel College of Osteopathic Medicine, Nova Southeastern University</p>
<b>Wednesday, April 7, 2021</b>	<p><b>Virtual Presentations (Posters, Oral, and Film)</b>  <b>Presenters will respond to comments and questions</b></p>
<b>Thursday, April 8, 2021</b>	<p><b>Final Judging Submissions</b>  <b>Symposium will Close</b></p>
<b>Friday, April 9, 2021</b>	<p><b>USS Winners Announced</b></p>

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