



Barry University

13<sup>th</sup> ANNUAL

S.T.E.M.

13

RESEARCH SYMPOSIUM

April 9, 2021



## **13<sup>th</sup> Annual S.T.E.M. Research Symposium**

This research symposium is aimed at engaging the Barry community in learning about and sharing in the excitement of ongoing discoveries and research within the Science, Technology, Engineering, and Math disciplines (S.T.E.M.), Medicine, Humanities and Social Sciences. Undergraduate and graduate students will present posters related to their past and current research in biology, chemistry, computer science, sports and exercise science, health science, humanities, mathematics, music, medicine, social sciences, psychology, and physics.

**Friday, April 9, 2021**

- 9:30 - 10:00 am    Opening Session
- 10:00 - 11:00 am    STEM Poster Presentations Session 1    Graduate and Professional Schools Fair
- 11:00 am - Noon    STEM Poster Presentations Session 2    Graduate and Professional Schools Fair
- Noon - 12:45 pm    Keynote seminar
- 12:45 -1:15 pm    Award Ceremony

Organized by Members of Barry University's STEM Committee:

Sabrina Des Rosiers Ph.D., Maurizio Giannotti Ph.D., Christoph Hengartner Ph.D.,  
Ricardo Jimenez Ph.D., Peter Lin Ph.D., Zacharias Papadakis, Ph.D., Michael Robinson, Ph.D.,  
Zuzana Zajickova, Ph.D., Anita Zavodska, Ph.D. and Sanja Zivanovic, Ph.D.

We gratefully acknowledge:

The dedication of research mentors, support staff, and  
undergraduate and graduate student researchers.

Special thanks for assisting with the Symposium to:  
Department of Marketing and Communications, Ms. Nina Escalante,  
Shaunelle Marshall, Guillermo Dopico, and Keva Boone

## Plenary Session

### Come talk trash with Barry's resident garbologist

Presented by

#### **Dr. Anita Závodská**

Associate Professor of Environmental Sciences  
College of Arts and Sciences: Biology Department



Dr. Anita Závodská is an Associate Professor of environmental sciences in the Biology Department of the College of Arts and Sciences at Barry University. She has been at Barry University since 2002 and teaches courses in environmental science and climate change. She is a trained garbologist and conducts international municipal solid waste research. Her other research interests include waste management, recycling, sustainability, and environmental and adult education.

**Abstract:** Let's talk trash! Learn about garbology, how we study waste and what we learn from it about ourselves, our society and humanity as a whole. We will discuss ecological footprints, chasing arrows and wish-cycling. Hear the garbologist's view on the detrimental societal costs that are created by our disposable economy and personal habits, and learn how we can reverse the trends through recycling and educated personal choices.

# Barry University College of Arts and Sciences

## Department of Biology

### 1. Where are the genes? Annotating a genome sequence from *Drosophila bipectinata*'s F element

Franziska-Marie Ahrend<sup>1</sup>, and Christoph J. Hengartner<sup>1</sup> (<sup>1</sup>Department of Biology, Barry University, Miami Shores, FL)

More than a century after Thomas Morgan used the fruit fly *Drosophila melanogaster* to demonstrate chromosomes contain the genetic material, *Drosophila* remains a vital research tool and model organism to investigate chromosome structure, genetics, development, and evolution. In 2000, its entire DNA was sequenced and ~60 percent of *Drosophila* genes are shared with humans. The *Drosophila* genome consists of four chromosomes that underwent rearrangements in some *Drosophila* species. According to the Muller nomenclature, each separate chromosome arm is labeled from A to F. The F element (aka dot chromosome) is usually the smallest chromosome; however, in some *Drosophila* species, the F element grew longer through expansion of repeated sequences. We have joined the Genome Education Partnership (GEP), an association of over 150 research institutions that aims to integrate undergraduate students in original genetic and bioinformatics research projects. We join other GEP students and faculty in a crowd-sourcing approach to annotate the genes (coding region and transcription start site) in the F elements of *D. ananassae*, *D. bipectinata*, *D. kikkawai*, and *D. takahashii*. Our DNA annotation will use both experimental data (e.g. gene expression and conservation) and computational evidence (e.g. gene prediction algorithms) to identify gene elements such as exon and intron boundaries. The data of this comparative genome analysis will help us better understand the consequences of radical evolutionary changes in chromosome and gene structure. Studying the evolutionary forces that maintain and modify the chromosomes of these fruit flies may help us better understand how eukaryotic genomes grew so much larger than bacteria. For our project, we have chosen to examine a 650 kb region of *D. bipectinata*'s F element. We present here our methodology and approach for locating genes and critical gene elements within this DNA sequence, and we present any preliminary data we have accumulated.

### 2. An investigation of potential correlations between vaccine safety profiles and recipient characteristics/pre-existing conditions

Taylor Checkley<sup>1</sup>, and Stephanie Bingham<sup>1</sup> (<sup>1</sup>Department of Biology, Barry University, Miami Shores, FL)

In the midst of the COVID-19 pandemic, information surrounding treatment of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is constantly evolving. Currently, the leading COVID-19 vaccines, created by Moderna and Pfizer, have been granted Emergency Use Authorization (EUA) by the Federal Drug Administration (FDA) and are being administered throughout the US. A third vaccine, this time from the manufacturer Johnson & Johnson, is on the brink of approval as well. While both the Pfizer and Moderna vaccines have been confirmed to have at least 94% efficacy, a limited number of reports have outlined the possible benefits and disadvantages of taking a particular company's vaccine for specific groups of people, such as those of different ages, and those with particular medical conditions. This research will compile data derived from trials and databases to identify trends of the effects that each vaccine has had on individuals with different profiles. An understanding of whether there is a correlation between specific conditions and a higher likelihood of adverse events with one vaccine vs. another can help to inform individuals and healthcare

providers. For example, it can suggest whether it is safe to administer either of the two approved vaccines regardless of the specific health circumstances of the recipients or if they would be better served receiving one over the other. This analysis is important because it will provide information that will increase the chances that individuals receive the vaccine that best meets their specific needs while limiting potentially harmful side effects.

*Funded by Department of Biology*

### **3. An examination of the correlation between sars-cov-2 infection and mortality rates in a developed vs. developing nation**

Jahempress Gillard<sup>1</sup>, and Stephanie Bingham<sup>1</sup> (<sup>1</sup>Department of Biology, Barry University, Miami Shores, FL)

The outbreak of the Sars-CoV-2 virus, the causative agent of COVID-19, which had its first documented case in Wuhan, China in December of 2019, was declared a pandemic as of March 2020 by the World Health Organization. Many challenges have been encountered amidst efforts to determine causes for increased susceptibility to severe infection and death. Already published studies have addressed the role of comorbidities, in terms of biological factors. While many studies have focused on reporting factors that contribute to the prevalence of infection, most have not addressed why the mortality rates differ from country to country, including factors such as socioeconomic impacts within communities. Here we seek to understand how factors such as social structure and resource allocation play roles in the infection and mortality rates in developed countries (case study: the United States) compared to developing countries (case study: India). Surprisingly, as a developed nation, the US has considerably higher infection and mortality rates than India: with infections reaching 28,390,327 cases in a population of 328 million and a mortality rate of 1.79% in the U.S. compared to India's 11,046,705 cases in a population of 1.36 billion and a mortality rate of 1.42% as of the date of this abstract. Computer-based research was used to draw correlations between the infection and mortality rates in these two countries and take a deeper look at the underlying issues that have driven infection and differences in outcomes.

*Funded by Department of Biology*

### **4. Effect of local raw Florida honey on the proliferation of *Lactobacillus plantarum* derived from the human gut**

Michelle Gonzalez<sup>1</sup>, Jovelyne Charles<sup>2</sup>, Emily Hernandez<sup>1</sup>, Melissa Rigueros<sup>1</sup>, and Poincyane Assis-Nascimento<sup>1</sup> (<sup>1</sup>Department of Biology, Barry University, Miami Shores, FL, <sup>2</sup>Department of Clinical Biology, Barry University, Miami Shores, FL)

The gut microbiota consists of trillions of microorganisms that together are often referred to as the body's second brain. One of the most common *Lactobacillus* species from this diverse population of mostly bacteria that inhabit our intestines is *Lactobacillus plantarum* (ATCC 8014). Studies have shown that this species demonstrates inhibitory behavior against pathogens and is thus an important component of our immune system from a young age through adulthood. Honey is well-known as a prebiotic food, which are substances that can influence the proliferation of probiotic species within the gut. In these studies, the effects of local raw Florida honey on the proliferation of *L. plantarum* was tested at different concentrations compared to broth only treated controls. *L. plantarum* was treated with different concentrations of honey ranging from 0% to 1.25% under anaerobic conditions at 37°C. Proliferation was quantified by measuring the sample absorbances at OD<sub>600</sub> across different conditions, approximately 24 hours following honey treatment. Preliminary results show a linear increase in *L. plantarum* proliferation with increasing honey concentrations compared to control. With the exception of the 0.25% honey treated group, a significant growth increase was observed across

all other concentrations; with the 1.25% group revealing a dramatic six-fold (6.3) increase compared to control. These results are consistent with previous findings and reveal that local raw Florida honey is a potent prebiotic for *L. plantarum*. These findings suggest that consumption of local raw honey may contribute to enhancing the immune system via pathogen inhibition in the gut.

## 5. Prebiotic effects of local raw Florida honey on the human gut bacteria *Lactobacillus acidophilus*

*Anastasia Kotsanis*<sup>1</sup>, *Oscar Gonzalez*<sup>1</sup>, *Celia Burgos*<sup>1</sup>, *Raquel Castillo*<sup>1</sup>, *Jenson Feys*<sup>1</sup>, *Victoria Martinez*<sup>1</sup>, *Zachary Money*<sup>1</sup>, *Carmen Nieves*<sup>1</sup>, and *Poincyane Assis-Nascimento*<sup>1</sup> (<sup>1</sup>Department of Biology, Barry University, Miami Shores, FL)

Human health is directly correlated with the condition of its digestive system; more specifically, with the complex network of microorganisms residing in the gut that constitute the gut microbiota. Lactic acid bacteria (LAB) have been linked to health and nutritional benefits for several years. Substances produced by these microorganisms exert many beneficial effects in the gastrointestinal tract, including aiding in digestion and food absorption, supporting the immune system, as well as contributing to physical and emotional health. *Lactobacillus*, though present in the distal human gut in small amounts, are often correlated with human disease and chronic conditions. Studies show that increasing the numbers of *Lactobacillus* in the gut help to treat infections and prevent certain chronic illnesses. In this study, we tested the prebiotic effects of local raw Florida honey on *Lactobacillus acidophilus* (ATCC 4356) derived from the human gut. Bacterial samples were treated with different concentrations of honey and cultured under anaerobic conditions at 37°C. Optical densities were measured to assess proliferation using a spectrophotometer (OD<sub>600</sub>) 24 hours following honey treatment. Preliminary results demonstrated a significant increase in *L. acidophilus* proliferation in samples treated with increasing honey concentrations compared to control. The greatest proliferation peak was observed in samples treated with 1% honey solutions, which is consistent with previous findings. These findings reveal a strong prebiotic effect of local raw Florida honey on *L. acidophilus* from the human gut and suggest that honey consumption may be used as preventive treatment against certain infections and chronic illnesses.

*Funded by Barry University ROADS*

## 6. Physicochemical differences in filtered versus unfiltered honey

*Doreen Noel*<sup>1</sup>, *Joanna Meyer*<sup>2</sup>, *Melissa Castillo*<sup>1</sup>, *Horicia Kinglocke*<sup>1</sup>, and *Poincyane Assis-Nascimento*<sup>1</sup> (<sup>1</sup>Department of Biology, Barry University, Miami Shores, FL, <sup>2</sup>Department of Biomedical Sciences, Barry University, Miami Shores, FL)

Honey is an ancient food rich in oligosaccharides and enzymes which are beneficial for the growth of probiotic species that constitute the human gut microbiota and contribute to an array of health benefits. In an effort to maximize its commercial use, honey adulteration has been an increasing concern as a result of its high demand and market value as a superfood. The use of heat to filter honey often changes its chemical composition, subsequently diminishing many of the beneficial enzymes found within unfiltered honey. Studies have shown that out-of-range honey values of pH and moisture content may indicate fermentation or adulteration. In this study, we examined differences in physicochemical properties of an organic Greenwise honey brand available in both filtered and unfiltered options. We measured pH using a PAL-pH meter and assessed differences in moisture content and BRIX index using a honey refractometer. Our results indicated a significantly lower pH average for the unfiltered honey compared to the filtered samples. No differences were observed in moisture content or BRIX index, and both readings fell within the expected ranges deemed safe for consumption and considered unadulterated, as per the literature. The lower pH average found in our

unfiltered honey samples is consistent with the expected presence of acidic compounds such as enzymes and pollen, that would otherwise get filtered out. These compounds are known to have a positive effect on the gut flora. Thus, our results suggest that the health benefits attributed to honey, may be specific to the unfiltered form.

*Funded by Barry ROADS*

## **7. Microscopic visualization of phenotypic plasticity in free-living amoeba**

*Erika Pierre*<sup>1</sup>, and *Brenda Schoffstall*<sup>1</sup> (<sup>1</sup>*Department of Biology, Barry University, Miami Shores, FL*)

Several species of free-living amoeba (FLA) are found living in local freshwater lakes and ponds. Likewise, some of these FLA have been detected in treated tap water systems. Under specific conditions, some can cause serious pathology in humans even leading to death. Species of *Acanthamoeba* can lead to chronic encephalitis or keratitis. *Naegleria fowleri* can cause primary amoebic meningoencephalitis (PAM) which is a serious acute pathological state that leads to rapid death due to deterioration of brain tissue. It is known that warm freshwater pond conditions contribute to the phenotypic plasticity of *N. fowleri*, potentially resulting in a deadly parasitic infection. Our current research aim is to develop and optimize various microscopy methods to visualize morphological changes in amoeba, with an eventual goal of specifically studying the phenotypic plasticity of *N. fowleri*. FLA isolated from local ponds, canals, and well water are being utilized to develop step-by-step visualization protocols for our research. We are also visualizing *Amoeba proteus* pure cultures as a starting model organism. An additional aim of the current study is to publish simplified step-by-step protocols specifically to be adapted by other researchers to utilize as they work with microscopy of other types of cells using fluorescence, DIC, and confocal options available in our departments research labs. We anticipate that this current investigation will lay the groundwork for our in-depth study of the phenotypic plasticity of *N. fowleri* and the mechanisms surrounding initiation of PAM.

## Barry University D. Inez Andreas School of Business

### 8. Who cares to complete surveys? Exploring consumers attitudes toward post-consumer service satisfaction surveys

*Janeisha Cambridge*<sup>1</sup> (*<sup>1</sup>School of Business, Barry University, Miami Shores, FL*)

Customer service representatives rely on the completion of surveys to substantiate the high quality of their work and communicate this to supervisors. Past studies have revealed that survey response rates are on the decline (Baruch & Holtom 2008; Leeper 2019). In the past decade, representatives have been well known to send surveys through email, text, conduct them via live phone chat, or use an automated phone system. This study uses a series of T-tests and ANOVA-tests to analyze data collected from a survey including 225 participants grouped into two categories: age group (18-24 and 25+) and lifestyle (busy, leisurely, and a combination of both). The findings of this research indicate that consumers differ in their willingness to complete surveys whether the service was excellent or terrible based on their lifestyle. Additionally, the study shows evidence that different methods of survey deployment (and the time in which they are sent) should be adjusted depending on the consumers lifestyle category. The data also reveals a statistically significant difference between the age group category on the following question: As a consumer, do you feel your feedback is valuable? Using this information, marketers can determine how to best communicate with these groups encouraging them to complete more surveys, providing insight into their perspectives. References: Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human Relations*, 61(8), 1139-1160. <https://doi.org/10.1177/0018726708094863> Leeper, T. (2019). Where Have the Respondents Gone? Perhaps We Ate Them All. *Public Opinion Quarterly*, 83, 280-288.

# Barry University College of Arts and Sciences

## Department of Fine Arts

### 9. **Music therapy, the deceptive cadence within the rehabilitation process for stroke survivors combatting aphasia and other neurological disorders.**

*Ashley Badaraco*<sup>1</sup> (<sup>1</sup>*Department of Fine Arts, Barry University, Miami Shores, FL*)

The power of music has been implemented to show the multidisciplinary interconnections to neuroscience, in correspondence to harmonic nuances found throughout music. The correlation between the brain and motor functions as well as the complex layering of neurobiological and neurophysiological responses via musical stimuli, have demonstrated quality improvements of life for survivors of stroke suffering aphasia and other neurological disorders. Reports will be presented of increased activation in sensorimotor, cognitive processes, and social learning skills as a result of music therapy. Based upon prior research and patient testimonials, it may be possible to modulate these rehabilitative designs and strategies to provide support toward furthering new brain plasticity. I aim to accentuate the significance of musical intervention in the rehabilitation process, for those who strive to change their chords in life.

### 10. **Mathematics in music. temperament, modes & aleatoricism**

*Reinaldo Diaz*<sup>1</sup> (<sup>1</sup>*Department of Fine Arts, Barry University, Miami Shores, FL*)

The essence of the sound is explained; the scales produced through methodology of tuning and temperament, just and equal being historical examples the latter, the modern system. Having described the tuning and temperament in a historic approach, the applications through composition are seen through modes of limited transposition and aleatoricism. A touch of music from Penderecki and Michael Trotta make the final presentation of this approach.

# Barry University College of Arts and Sciences

## Honors Program

### 11. A literature review on effect of humans on the spread of zoological diseases

Erica Cruz<sup>1</sup> (*1Honors Program, Barry University, Miami Shores, FL*)

In light of recent events, speculation on the spread of diseases has become very prevalent in everyday society. It has been shown that the things that were previously theorized to have the potential to start a worldwide pandemic, can very much become a reality as shown through the spread of COVID-19 throughout the world. Humans are imposing on the environment to a degree where a lot of consequences are starting to take place. They have imposed on animal territory through deforestation which has resulted in the spread of many infectious diseases throughout the world. It has been shown that humankind's influence on ecosystems has allowed for crossing points where there is the potential for new zoonotic diseases to spread on a local and global level. Of the 335 emerging infectious diseases recognized from 1940 to 2004, more than 60% have been from zoonotic animals. This paper attempts to examine current literature on the actions that humans have taken that make it easier and more efficient for infectious diseases to spread with an emphasis on Coronaviruses. It will make a systematic review of recent research regarding humans and the methods in which they have exacerbated the spread of different zoonotic diseases with an emphasis on deforestation, human population growth and urbanization.

### 12. How academic identity is linked to first-year students' ability to effectively write academic discourse

Brianna Lopez<sup>1</sup> (*1Honors Program, Barry University, Miami Shores, FL*) **UG-LR Session I**

In a 2018 study, Kevin Cheung examines the authorial identity of student academic writers. A psychology student he studies, Naomi, asks: Am I an author or do I just write papers? Is that an author? Naomi's question accurately conveys the difficulty of first-year students to develop an academic identity and their uptake of written academic discourse. This struggle is especially prevalent in the time of synchronous participation in virtual instruction, where students may not apply themselves to their coursework as much as they would in in-person environments. First-year English courses aim to teach students composition skills that are necessary in their college career. Depending on students' various degrees of identification as academics, and therefore the degree to which they apply themselves in developing composition skills, the academic papers they write in their college years may fall below the standards of an average first-year English professor. As first-year English professors are some of the first teachers of academic discourse that first-year students will have, guiding students in first-year English is crucial to helping students develop an academic identity. This research examines composition techniques and mentalities that can be taught to encourage students to identify as academics, specifically aiming to discover techniques that will prove effective in a synchronous virtual instruction space. The frameworks and guiding ideas which will be used in the study are the concept of students finding themselves within the academic text they write (Bartholomae), the need for change in the power dynamic amongst professors and students in order for students to write better academically (Elbow), and the concept of identification as it applies to students identifying within an academic setting (Burke). This study hopes to demonstrate a need for change in the first-year English course and design a new course which will afford students and professors the opportunity to practice identification in an academic environment. In developing the confidence to identify themselves as aspiring experts in academia, students will undoubtedly be able to put their academic writing skills into practice, joining the realm of composers of academic writing and boosting their college-level writing skills.

### **13. The right to privacy in a modern America**

Walter MacWaters<sup>1</sup> (*1Honors Program, Barry University, Miami Shores, FL*)

The right to privacy is one of the most crucial and fundamental protections that is afforded to the citizens of the United States of America. Defining the legal right to privacy, then, is paramount. I hold that it means the right of an individual or group to act without scrutiny or regulation from any governing body or outside individual unless they are reasonably suspected of committing a crime or acting in a setting where there can be no reasonable expectation of privacy. Simply put, I believe the right to privacy to be the right of a person to be left well enough alone. This right has been gradually diminished and infringed upon throughout our nation's history as the Government has appropriated more power, but never has it been so quickly eroded as the advent of the computer age. More and more, especially during the time of the COVID-19 pandemic, social media platforms have taken the place of the public square becoming vital aspects of maintaining communication when face-to-face interaction fell out of favor. This clearly must have an impact on the meaning and value of privacy. Legislation, however, always lags behind technological progress and people have been subjected to largely unregulated media censorship and datamining by giant tech corporations. In this project, I will explore the legal meaning of the right to privacy, its origins, and its potential future in order to answer the following questions. What is the legal right to privacy and what does it cover? Can a person reasonably expect privacy online, particularly on privately owned media platforms? If so, in what ways if any does the legal definition need to be updated in order to ensure our rights are protected? And finally, what can be done to avoid further infringement on the right to privacy as technology continues to develop?

### **14. The neglected bridge between the medical community and essential workers**

Anaya Ruiz<sup>1</sup> (*1Honors Program, Barry University, Miami Shores, FL*)

During the pandemic, the need for essential workers has dramatically increased. When most people think of essential workers, they tend to think about nurses and doctors. This paper advocates for the other groups of essential workers (e.g., sanitation workers, meat packaging workers, grocery store clerks, garbage workers, cleaners, warehouse workers, and bus drivers). These everyday essential workers are needed to have a functioning society. Many of these workers are often people of color. Prior to the pandemic, these workers were essential for society, yet they were also overworked, underpaid, under protected, and underappreciated. People of color are overrepresented in most occupations within the frontline industries. While this is common knowledge for members within the medical community, there appears to be a disconnect between the doctors and essential workers as patients. Medical personnel have many obligations and duties, and their lives are often centered around their daily routines. This paper argues that inquiry related to racial equality when receiving proper medical treatment becomes part of the medical personnel's daily routines (e.g., during the patient interview, diagnostic interview, or medical examination). Furthermore, the paper argues that the essential workers stories (about their medical visit and treatment experiences) are told so that their voices are no longer the neglected voices. These stories will act as a bridge between essential workers and the medical community. The goal of this research is to also encourage the medical community to advocate for these essential workers. Finally, the paper will propose multiple solutions to improve the overall well-being of the essential workers (e.g., proposing a sector within the medical community to act as an advocate to the essential workers within the hospital setting, mandated governmental policy to regulate fair treatment to essential workers, and other policy changes within hospitals).

## **Barry University College of Arts and Sciences**

### **Department of Math and Computer Sciences**

#### **15. A data analytic investigation on demographically segmented visitors' behaviors on a websites subsection of academic programs**

*Franziska-Marie Ahrend<sup>1</sup>, Jessica Garcia<sup>1</sup>, and James Haralambides<sup>1</sup> (<sup>1</sup>Department of Math & Computer Science, Barry University, Miami Shores, FL)*

We are introducing data analytics components for the Department of Mathematics and Computer Science website at Barry University. The purpose of the design is to get feedback on redesigned academic programs and newly established minors and specializations within the department. Data collection focuses on page visit counts and durations, page scrolls, link clicks, and types of downloads. Code added to various webpages within the website also allows for an in-depth study of visitor behavior and leads to better-designed structures and a more efficient, more successful academic program. Information collection related to geographic location, device type (mobile, laptop, desktop), and access time during the day helps identify visitor demographics and monitor user retention. We are presently utilizing Google Analytics as the web tracking tool of choice. Additionally, Google Tag Manager is used to manage and fine-tune HTML tags, variables, and user-initiated events. Google Analytics JavaScript snippets are added to all webpages we are monitoring. Tracking data that monitors page activity (length of page visitations, identification of popular webpages, form submissions, link clicks, etc.) is uploaded dynamically to the Google Analytics website. A free user account allows access to all monitored activities. For security purposes, the website for the department has been initially designed as a mirror site of the original on the university's intranet. This has allowed for verification of functionality and uninterrupted access. Data collection at the initial stage is limited to students and faculty visitors with access rights to the intranet and will be used for predictive analysis purposes.

#### **16. A python utilization for visualization of neighborhood crime**

*Jessica Garcia<sup>1</sup> and Sanja Zivanovic<sup>1</sup> (<sup>1</sup>Department of Math & Computer Science, Barry University, Miami Shores, FL)*

Barry University is located in Miami Shores, Florida near several distinct neighborhoods. In this paper, we are looking to collect existing crime data near the University to create neighborhood map labeling different types of crime that occurs and using this information to project it on the neighborhood around it. Specifically, to collect the data we will set Barry University as the center point of circles with distinct radii and collect, clean, and store crime information located within these circles. We will utilize python programming language for automatic processing of data. Further, we will create multiple maps that highlight transgression areas with aim to bring awareness of regions of potential hazard for students, employees, and visitors of the University as well as safe areas. Generated well-defined tiers will result from implementation of a machine learning algorithm.

#### **17. How many inmates are eligible for release and they don't know it?**

*Carlo Jacques<sup>1</sup> and Sandra Armstrong<sup>1</sup> (<sup>1</sup>Department of Math & Computer Science, Barry University, Miami Shores, FL)*

People in the penitentiary system are forgotten. The prison population has risen from 196,426 in 1970 to ~2,000,000 in 2021. Only half of that populations records are digitized and less than 20% are text searchable. That creates an issue because laws are constantly changing, and charges are

decriminalized. It is labor-intensive and high cost to have someone manually go through the files to see if someone's charges are decriminalized. OCR, optical character recognition, is a tool that takes 2-dimensional images with some depth and goes through multi-layer compression to extract valuable information. In images the text is depth. I downloaded two of the oldest record (dated 1988) from the Miami Dade Clerk database. With a histogram, the images are converted to black and white. Through the process of binarization, the image is turned into 0s and 1s values, white and black respectively. A binary matrix was formed over each character in the text. By using the distance formula,  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ , I found the center of the matrix to the farthest point. The character was then broken up into more granular sections then a meta-algorithm matched with characters that had the highest statistical probability deep learning neural network. All that with 3 lines of python code and completed one second. With the ability to search records 231 times faster than before more people can benefit from this while saving tax-payer money. This project has the potential to lower the prison population for good.

## 18. Virtual personal trainer

*Kevin Valladares<sup>1</sup>, Alejandro Perez<sup>1</sup>, and James Haralambides<sup>1</sup> (<sup>1</sup>Department of Math & Computer Science, Barry University, Miami Shores, FL)*

We have developed an application which delivers an exercise regimen curtailed to the individual user. The app acquires the user's fitness data through Fitbit devices such as smartwatches and digital scales and their corresponding embedded software. Extrapolated data is fed into an AI algorithmic component which produces a workout plan and meal recommendations to help the user achieve a higher level of fitness. This trainer is auto-configured to the users' personal and health parameters some of which are specified during user registration to the system. These parameters include underlying health conditions and physical characteristics and are updated at regular intervals. The user reaps the benefits of the application by gaining awareness of the positive impact that a healthier lifestyle can have on his or her physical and mental capacity. The data collection and exporting process involves an understanding of data structures stored in JSON form by the manufacturer of the smart devices. This is followed by the development of a generalized workout plan based on well-established health parameters that can be fine-tuned to reach targeted levels of fitness. Device-generated values currently include average heart rates and Body to Mass Index (BMI). A functioning prototype that tests the system has been developed using HTML, CSS, and JavaScript. This work is continued in the direction of enhanced Graphical User Interfaces and an expanded AI component for more detailed workouts through the use of additional user characteristics and hardware features. Smart devices that provide additional features such as heart pulse rates are explored.

*Research equipment was funded by the Department of Mathematics and Computer Science, Barry University*

# Barry University College of Arts and Sciences

## Department of Physical Sciences

### 19. Synthesis of absolute gi/o-biased muscarinic agonists: a potential therapeutic alternative to opioid analgesics

*Jose B. Hurtado de Mendoza*<sup>1</sup>, and *John Boulos*<sup>1</sup> (<sup>1</sup>Department of Physical Sciences, Barry University, Miami Shores, FL)

Opioids are used as effective painkillers but also carry adverse side effects and addictive properties. The central goal of this research is to develop a novel and effective class of analgesics for effective pain management that do not exhibit the addictive or adverse properties of the opioids currently prescribed. It is well documented that activation of M2 and M4 muscarinic receptors control pain and selective M2/M4 agonists may have the ability to act as analgesics. Binding of muscarinic agonists triggers the coupling Gi/o G-proteins to M2 and M4 receptors. Gi/o G-proteins are known for transmitting molecular signals leading to the inhibition cAMP, similar to opioid receptors. It is also well documented that the affinity of novel muscarinic agonists is higher when the molecules contain a methylated nitrogen and a thiophene at the 5-position. The goal of this experiment is to synthesize 5-bromo-(1-(thiophen-2-ylmethyl)-3-methyl carboxylate-3,6-dihydro-2H-pyridinium and the methylated analog, 5-bromo-1-(thiophen-2-ylmethyl)-1-methyl-3-methyl carboxylate -3,6-dihydro-2H-pyridinium, through multi-step reaction routes involving the reduction of 5-bromo-2-thiophene carboxaldehyde, followed by chlorination of corresponding alcohol and eventually nucleophilic substitution with methyl nicotinate. The main modification to attach a bromine atom to the thiophene group is to potentially increase receptor affinity and drug efficacy.

*Funded by Department of Physical Sciences*

### 20. Taming COVID-19: solid phase-assisted synthesis of peptide aldehydes as potent antiviral drugs against SARS-CoV-2.

*Chevel Johnson*<sup>1</sup> and *Conrad Fischer*<sup>1</sup> (<sup>1</sup>Department of Physical Sciences, Barry University, Miami Shores, FL)

The lives of humans worldwide have been significantly impacted by COVID-19 which resulted in a global pandemic due to coronavirus 2 (SARS-CoV-2). The outbreak of the virus urges scientist and medical authorities to come together and develop a treatment for the virus. Two proteases, main protease (Mpro) and papain-like protease (PLpro), have been identified as ideal drug targets due to their role in cleaving vital virus polypeptides. Inspired by a potent feline coronavirus drug (GC376), novel peptide aldehydes have been recently developed that bind with nanomolar concentrations to Mpro. The synthesis of these aldehydes involves elaborate cyclization and oxidation reactions connected with sophisticated column purification and yield limitations. The purpose of this study is the development of a solid-phase based peptide aldehyde synthesis incorporating amino acid surrogates that facilitate target purification and increase yield. Respective target aldehydes will be analyzed and purified by HPLC and ultimately tested for their inhibition potential towards Mpro. If successful and further developed, this method will lead to an alternative treatment option for coronavirus 2.

## 21. The effect of cross-linkers on the properties of hybrid organic-silica monoliths

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Column is an essential component of any chromatographic instrument as this is where separation of a mixture of compounds takes place. In the last three decades monolithic columns have been introduced as an alternative to particle-packed columns. The advantage of monolithic stationary phases is high permeability allowing for fast analysis at high flow rates, and low back pressure. There are two main categories of monoliths: silica- and organic-based. This research project was conducted to prepare hybrid organo-silica based monoliths and to evaluate the effect of different cross-linkers on structure stability. To accomplish this, the starting material 3-(trimethoxysilyl)propyl methacrylate (MPTMS) was stirred for 30 minutes with an aqueous solution of 0.15 M hydrochloric acid. In a separate vial a cross-linker ethylene glycol dimethacrylate (EDMA), and an initiator azobisisobutyronitrile (AIBN) were dissolved in a porogen toluene. Afterwards, these two mixtures were combined to form 1:1 ratio of MPTMS:EDMA and thermally polymerized at 60 degrees Celsius. In addition, in some trials EDMA was substituted with pentaerythritol tetrakis (3-mercaptopropionate) (PTM), to further examine the effect of the cross-linker. A sturdy, white monolith was formed with EDMA, however, a soft and transparent monolith with PTM. For the sustained stability and long lifetime of the monolithic organo-silica hybrid column the presence of a cross-linker, such as EDMA is necessary. The substitution with PTM was not effective, and a change of the amount as well as different type of a cross-linker should be further examined.

*Funded by Department of Physical Sciences*

## 22. Teaching science in the pandemic through online resources. An AMP club outreach initiative

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We are designing new digital/online tools to bring real science to elementary school students. We show how using Power Point presentations and Jupyter/Python applications, can help enable young students to learn difficult concepts in science and mathematics, for example about gravity, Newton's laws, or fractals. We underline the importance of students' participation and of sharing with them some available kid-friendly online resources, such as the NASA website. We comment on explicit experiences we had with elementary schools in 2021.

## 23. Pegylated elabela analogues as cardio-protective drugs

*Andrea Torrecilla*<sup>1</sup> and *Conrad Fischer*<sup>1</sup> (<sup>1</sup>Department of Physical Sciences, Barry University, Miami Shores, FL)

Elabela peptides (ELA) are a body-own peptide hormone class that bind to the APJ receptor, a class A G-protein coupled receptor (GPCR). APJ receptor activation triggers physiological functions such as cardiovascular development and output, water metabolism and cell signaling. ELA peptides originate from a 54-amino acid prepropeptide that is processed in shorter isoforms such as ELA-32, ELA-21, and ELA-11. The C-terminal 10 amino acids are the minimum consensus structures to activate the receptor. The shortest ELA-10/ELA-11 isoforms display a biased response towards the activation of downstream pathways which is beneficial in prolonging physiological effects of this peptide and suppressing unwanted pathways. ELA-isoforms possess a short plasma half-life

estimated to be <1.4min. PEGylation can successfully extend the plasma half-life up to three orders of magnitude. The goal of this project is the solid-phase assisted synthesis of two ELA-10 analogues with an N-terminal PEG6 chain to see whether: 1. Spatial elongation improves plasma stability and binding features to the receptor. 2. A PEG6 tail can serve as a tether to attach a fluorophore, to allow fluorescent labeling of ELA for global detection in biological samples potentially enabling the elucidation of other GPCRs targeting ELA.

## Barry University College of Arts and Sciences

### Department of Psychology

#### 24. Public perception of young adolescents who commit violent crimes: A comparison of those with or without a diagnosis of conduct disorder

*Erica Ackerman<sup>1</sup> and Linda Bacheller<sup>1</sup> (<sup>1</sup>Department of Psychology, Barry University, Miami Shores, FL)*

Young adolescents who commit violent crimes are perceived as a danger to society. This threat to society is evident through the implementation of public policy that supports treating juvenile offenders harshly. Furthermore, adolescents with conduct disorder are perceived as harmful and delinquent. It is common for individuals with conduct disorder to come into contact with the criminal justice system for engaging in illegal behavior (5th ed.; DSM-5; American Psychiatric Association). It has been concluded by prior research that adolescents who commit violent crimes are perceived as dangerous and less amenable to treatment (Prasad & Kimonis, 2018). Prior research has also concluded that a conduct disorder diagnosis relates to criminality (Frick, 2016). However, it is undetermined if the presence of a conduct disorder diagnosis elicits attitudes of pro-punishment itself or if the socially undesirable characteristics associated with the disorder negatively influence the public's perception. Independent samples t-tests will be conducted to assess whether the presence of a conduct disorder diagnosis will elicit feelings of pro-punishment or pro-rehabilitation for young adolescents who commit violent crimes. Results and implications will be discussed.

#### 25. Beyond the big five: Academic entitlement and school dropout

*Amy Alfonso<sup>1</sup>, Guillermo Wated<sup>1</sup>, and Sabrina Des Rosiers<sup>1</sup> (<sup>1</sup>Department of Psychology, Barry University, Miami Shores, FL)*

College education has been underscored as the gateway to the career market (Bustamante, 2020). Employers typically expect a college degree from applicants particularly for higher paying jobs (Abel & Deitz, 2014). Despite the prominent role that higher education plays in employment prospects, the rates of completion for college in the United States are low. In fact, nearly a third of students who enroll in college withdraw without earning a degree (College Atlas, 2018). According to Tinto's theory of college student persistence and departure, the decision to drop out arises from a combination of student characteristics and the extent of their academic, environmental, and social integration in an institution (Tinto, 1993). Furthermore, personality traits also play a significant role in the departure decision (Tinto, 2017). In particular, agreeableness, conscientiousness, emotional stability, and extraversion have been documented to be significantly related to intentions to quit school (Truta, et al., 2018). Nevertheless, there are other less researched individual characteristics that may be also relevant in the prediction of intentions to quit school such as academic entitlement. Academic entitlement is defined as the tendency to possess an expectation of academic success without taking personal responsibility for achieving that success (Chowning & Cambell, 2009, p.982). Yet, there is lack of empirical evidence documenting the predictive power of academic entitlement above and beyond more established predictors of intention to quit school. Therefore, the purpose of the present study was to examine the relationship between academic entitlement and intentions to quit school beyond the contribution of academic performance and personality traits as defined by the Big Five model of personality. Participants (N = 280) were predominantly women (n = 225) and ranged in age from 18 to 27 years (M = 19.78, SD = 1.99). A three-item scale developed by Studsrod and Bru (2009) was used to gauge participants intentions to quit school ( $\alpha = .81$ ). To evaluate academic entitlement, the Academic Entitlement Questionnaire (Kopp et al., 2011) was used ( $\alpha = .87$ ). Finally, the Big Five Inventory (John & Srivastava, 1999) was used to gauge the Big Five: agreeableness ( $\alpha = .82$ ),

conscientiousness ( $\alpha = .79$ ), neuroticism ( $\alpha = .82$ ), extroversion ( $\alpha = .82$ ) and openness ( $\alpha = .74$ ). Hierarchical regression analysis was used to test the study's hypothesis. GPA and average hours per week worked were entered in Step 1,  $F(2, 277) = 6.39$ ,  $p = .002$ ,  $R^2 = .04$ ,  $\text{Adj. } R^2 = .04$ . Personality variables were entered in Step 2,  $F \text{ Change}(4, 273) = 6.34$ ,  $p < .001$ ,  $R^2 = .12$ ,  $\text{Adj. } R^2 = .11$ ,  $R^2 \text{ Change} = .08$ . Finally, academic entitlement was entered in step 3. Academic entitlement predicted intention to quit school above and beyond all other predictors,  $F \text{ Change}(1, 272) = 5.51$ ,  $p = .020$ ,  $R^2 = .14$ ,  $\text{Adj. } R^2 = .12$ ,  $R^2 \text{ Change} = .02$ . These findings can have important implications for school administrators and faculty alike who may need to pay closer attention to academic entitlement behaviors college students display in the school environment.

## 26. Self-perceived employability and psychological well-being in minority college students

*Janika Koelblin<sup>1</sup>, Guillermo Wated<sup>1</sup>, and Sabrina Des Rosiers<sup>1</sup> (<sup>1</sup>Department of Psychology, Barry University, Miami Shores, FL)*

According to United States Census Bureau (2015), 76.3% of the population in the US are white only while about 24% belong to a minority group. Nevertheless, it is expected that 57.40% of the total population and 67.10% of the population under 18 will belong to a minority group by 2060. Minority groups in the US have a long history of experiencing multiple disadvantages in society (De Jong & Madamba, 2001). In particular, minority college students employability rates after graduating from college are notably lower than the majority group (Johnson, 2019). For instance, the number of black students that is unemployed after graduation is almost twice as high (5.5%) as the number of white students (2.8%) (Morrison, 2020). One factor that has been often used to gain insight into college students employment prospects is perceived employability (Cheung et al., 2018). Rothwell et al. (2008) defined self-perceived employability as the perceived ability to obtain sustainable employment appropriate to one's qualification level (p. 2). There are several predictors that have been established to contribute towards our understanding of self-perceptions of employability such as acculturative hassles and income level (Cheung et al., 2018). Yet only few studies have focused on the relevance of psychological well-being in predicting perceptions of employability. Psychological well-being is a multidimensional model consisting of six dimensions (Ryff, 1989). It is potentially relevant when it comes to gaining insight into the perceptions of employability among minority groups. Previous research has documented that psychological well-being is a consistent predictor of long-term positive adjustment suggesting that those with higher levels of overall psychological well-being are least likely to succumb to environmental demands and more likely to experience positive outcomes (Ryff, 2017; Zhou & Xu 2013). Therefore, the purpose of the present study was to explore whether psychological well-being predicts self-perceptions of employability in minority college students. Participants were 61 African American (45.20%) and 74 Hispanic/Latinx (54.80%) college students (112 women). Their age ranged from 18 to 27 years ( $M = 19.53$ ,  $SD = 2.03$ ). Perceptions of employability ( $\alpha = .88$ ) was measured using Rothwells et al. (2008) scale, and psychological well-being was gauged using Ryff's (1989) scale: autonomy ( $\alpha = .71$ ), environmental mastery ( $\alpha = .76$ ), personal growth ( $\alpha = .81$ ), positive relations ( $\alpha = .74$ ), purpose in life ( $\alpha = .81$ ) and self-acceptance ( $\alpha = .81$ ). The study's hypothesis was tested using hierarchical regression analysis. Control variables were entered first accounting for 14% ( $\text{Adj. } R^2 = .11$ ) of the variance,  $F(4, 130) = 5.28$ ,  $p = .001$ . Then, all dimensions of psychological well-being were added to the model significantly explaining an additional 16% of the variance ( $\text{Adj. } R^2 = .24$ ),  $F(6, 124) = 4.66$ ,  $p < .001$ . However, only purpose in life ( $\beta = .28$ ,  $p = .020$ ) and self-acceptance ( $\beta = .26$ ,  $p = .030$ ) significantly contributed to the prediction of perceived employability. These findings can aid in the creation of interventions that target specific components of well-being in minority students to address gaps in their future employment prospects.

**27. Association between dimensions of acculturative stress, social relationships, and anti-social behavior in Hispanic youth.**

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Hispanic youth represent a rapidly growing population in the United States (Flores et al., 2018; Flores et al., 2019; Schaeffer, 2019). Notably, Hispanic youth are more likely to be at higher risk for antisocial behaviors. According to the Social Development Model, specific mechanisms interact with risk and protective factors in the development of antisocial behavior (Catalano et al., 1996). The Social Development Model proposes that risk factors contribute to the development of antisocial behaviors while protective factors mediate or buffer the effects of risk exposure. Acculturative stress has been found to be a consistent positive predictor of both internalizing problems and externalizing outcomes (e.g., Hurwich-Reiss & Gudiño, 2016). However, few studies have examined the association between acculturative stress and antisocial behaviors among Hispanic emerging adults of diverse national origin. Given the cursory of research on Hispanic Youth, the present study used a Social Development Models conceptualization of antisocial behavior, to examine the relationship between dimensions of acculturative stress, social relationships, and antisocial behavior in Hispanic Youth. Participants consisted of 1340 Hispanic college students (988 women). Multiple linear regression analysis showed social relationships was a negative predictor ( $\beta = -.098$ ,  $p = .001$ ) whereas acculturative stress dimensions native language competency pressures ( $\beta = .134$ ,  $p < .001$ ), and English language competency pressures ( $\beta = .179$ ,  $p < .001$ ) as well as pressures to acculturate ( $\beta = .127$ ,  $p < .05$ ), were found to be positive predictors of antisocial behaviors. These findings have important implications for devising culturally appropriate clinical interventions for Hispanic youth who report acculturative stress and antisocial behaviors.

**Barry University College of Nursing and Health Sciences**  
**Department of Sport and Exercise Sciences**

**28. Do race, physical activity, body mass index, and sleep quality affect mental toughness?**

*Krystal Grant<sup>1</sup>, Quinn Astrachan<sup>1</sup>, Alexander Anderson<sup>1</sup>, Courtnie Moodie<sup>1</sup>, Andreas Stamatis<sup>2</sup>, Zacharias Papadakis<sup>1</sup> (<sup>1</sup>Department of Sport and Exercise Sciences, Barry University, Miami Shores, FL and <sup>2</sup>SUNY Plattsburgh, Plattsburgh, NY)*

BACKGROUND: Physical activity (PA) has been linked to health and quality of life benefits. Differences in race and body mass index (BMI) may contribute to health-related disparities. Sleep quality (SQ) has been associated with both PA and health, influencing each other in a two-way interaction. Variations in PA are linked to differences in mental toughness (MT). MT is linked to lower SQ and increased PA, but the influence of race and BMI on MT is still under investigation. The purpose of this study was to characterize the association and the effects of PA, race, BMI, and SQ on MT. METHODS: Sixty-two participants (age 25.4 ± 6.0 SD) completed surveys related to PA, race, BMI, SQ, and MT. Main and interaction effects of the responses analyzed using factorial ANOVA. Significance was set at  $p < 0.05$ . All analyses were performed using SPSS. RESULTS: PA was positive correlated ( $r = .246, p = .027$ ) and SQ was negatively associated with MT ( $r = -.470, p = .000$ ). Race was negatively associated with MT ( $r = -.234, p = .033$ ). SQ had a main effect on MT ( $F_{31,1} = 18.568, p = .000, \eta^2 = .382$ ). PA and BMI interaction had an effect on MT ( $F_{31,2} = 5.572, p = .009, \eta^2 = .271$ ). The interaction of race and BMI had an effect on MT ( $F_{31,4} = 2.805, p = .043, \eta^2 = .272$ ). CONCLUSION: As previously reported, poor quality sleepers are mentally tougher compared to good quality sleepers. When PA and BMI are combined, PA and overweight individuals are mentally tougher, followed by the non-PA and underweight ones. When race and BMI are combined, White-overweight and other-normal BMI individuals are the mentally toughest. Followed by Hispanic-overweight, and Asian underweight and obese I, II, III, with African Americans underweight and overweight having similar values. Health care professionals may find this information valuable when they are trying to address health-related issues that pertain to race, PA, BMI, SQ, and MT.

**29. College basketball recreational & club level power and agility scores vs. 2019 NBA draft**

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BACKGROUND: During COVID-19, university campus recreation and wellness centers (CRW) keep encouraging the remaining-on-campus students to live active and healthy lifestyles through exercise/competition events. A common activity is the NBA Draft edition combine test, which students have a brief experience of the NBA draft. Results are usually compared to the actual NBA-ones to encourage participants to stay fit. This study investigated differences among recreational (R), club (C) level basketball experience, and NBA draftees (NBA). METHODS: A CRW, while adhering to university-related pandemic policies, organized an NBA combine test for 10 male college students ( $75.57\text{kg} \pm 10.55\text{SD}$ ;  $1.81\text{m} \pm 13\text{SD}$ ; R=5; C=5). Due to unforeseen complications, only the Standing Vertical Jump (m), Lane Agility (s), Shuttle Run (s) and  $\frac{3}{4}$  Sprint (s) tests were performed following NBAs related protocols. R and C power and agility scores were compared with the respective scores from 58 athletes (controls), who participated in the 2019 NBA Draft Combine (Weight:  $96.36\text{kg} \pm 11.39\text{SD}$ ; Height:  $2.01\text{m} \pm 09\text{SD}$ ). NBA-related data were obtained from <https://www.nba.com/stats/draft/combine-strength-agility/?sort=POSITION&dir=1>. A multivariate analysis of covariance (MANCOVA) based on the experience level with weight (kg), height (m),

wingspan (m), and standing reach (m) as covariates was performed in SPSS (v.27) to examine differences between variables on R, C, and NBA. RESULTS: Using Pillais trace, there was a significant effect of experience on the examined variables ( $V=1.13$ ,  $F_{8,118}=19.25$ ,  $p<.001$ ,  $\eta^2=.57$ ). Pairwise comparisons revealed that R jumped higher than the C ( $p=.16$ ) and lower than NBA ( $p=.75$ ), while C jumped lower than NBA ( $p=.01$ ). R in lane agility were faster than C ( $p<.001$ ) and slower than NBA ( $p=.001$ ), while C were slower than NBA ( $p<.001$ ). In shuttle run, R were faster both than C ( $p<.001$ ) and NBA ( $p<.001$ ), while C were similar with NBA ( $p=.68$ ). R were faster on  $\frac{3}{4}$  sprint from C ( $p=.07$ ) and NBA ( $p=1$ ), while C were slower than NBA ( $p=.07$ ). CONCLUSION: Due to small R and C sample size, we cannot determine whether or not these estimates are significant. However, the results describe the relationship in the sample. This preliminary evidence provides support for the continuation of data collection. Such power and agility score differences may encourage students to stay fit, therefore CRW administrators should continue organizing similar events.

### 30. Evaluating a fire departments conditioning programs ability to predict tactical performance from physical fitness testing

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Firefighters (FF) physical fitness (PF) levels affect their ability to carry out daily tasks and meet unforeseen emergencies. Fire departments (FD) design simulations via the physical ability test (PAT) as an occupational-specific metric of PF. PAT is used both in recruitment and as an indicator of FFs on-going PF. However, PATs are labor-/time-/cost-sensitive. Could PF tests reveal recruits level of conditioning and predict PAT scores in frugality? PURPOSE: Identify relationships between selected PF components scores and PAT performance on City of Hialeah's Fire Departments (HFD) specific PAT. METHODS: Forty-five FF (age  $26\pm 5SD$ ) performed a battery of PF tests assessing body composition (BF%), cardiorespiratory endurance (1½ mile run), upper-body muscular endurance (pullups, pushups, situps). A timed PAT of nine consecutive events (stair climb, hoist evolution, forcible entry, hose advance, victim-mannequin drag, ladder carry/climb, extrication exercise, confined space crawl) performed to assess tactical performance. Same PF tests repeated following a non-customized 8-week conditioning program. Linear regressions for PAT (Y) and PF tests (Xs) at pre- and post-conditioning period performed to explore relationships and create the pre-/post-prediction models. T-test performed on unstandardized coefficients to compare the pre-post models (SPSS,  $p < 0.05$ ). RESULTS: Pre-PAT significantly correlated with pre-PF: BF% ( $r=.4$ ,  $p=.004$ ), 1½ mile ( $r=.54$ ,  $p<.001$ ), pullups ( $r=-.4$ ,  $p=.009$ ), pushups ( $r=-.5$ ,  $p<.001$ ). Post-PAT significantly correlated with post-PF: BF% ( $r=.31$ ,  $p=.02$ ), pullups ( $r=-.4$ ,  $p=.002$ ), pushups ( $r=-.4$ ,  $p=.003$ ). PF tests significantly predicted Pre- ( $R^2=.45$ ,  $F_{5,39}=6.4$ ,  $p<.001$ ) and Post-PAT ( $R^2=.26$ ,  $F_{5,39}=2.7$ ,  $p=.03$ ). Pre-PAT model was significantly higher than the Post-PAT regression model ( $t_{44}=4.5$ ,  $p<.001$ ). CONCLUSION: HFDs selected PF tests are significantly correlated with PAT and contributed to the models predictive power. Identifying PF components that, not only condition individuals for the PAT, but also predict performance, could be useful for recruits/FFs and officers, respectively. Administrators need to re-evaluate current conditioning practices to better serve the FFs. Future modeling may need to include skilled-related PF tests.

**31. COVID-19 adherence to physical activity guidelines moderates the mental health/toughness relationship on Black/Hispanic females.**

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Physical activity (PA) improves mental health (MH). Mental toughness (MT) positively correlates to MH. Only 45% of Hispanics and Blacks over 18 years and less than 40% of US females meet the ACSM PA guidelines. PA has been decreasing during the COVID-19. PURPOSE: Investigate during the pandemic the effect of PA adherence on the MT-MH relationship on previously physically active, Black and Hispanic females. METHODS: Fifteen females (age 21.3±3.6 yr), six Hispanic and nine Black, who met the ACSM guidelines before the pandemic, completed the Mental Health Continuum and Mental Toughness Index inventories, while reporting their PA habits during the pandemic. Data analyzed with double moderation model-2 (MH=Y; MT=X). PA habits and race were the moderators. MT centered for product construction and heteroscedasticity consistent error. Moderation and conditioning significance set at  $p < 0.05$ . Analyses performed using SPSS, PROCESS v.3 by Hayes. RESULTS: Model significantly predicted MH ( $F_{5,9} = 8.9$ ,  $p = .003$ ,  $R^2 = .7$ ). MT significantly predicted MH ( $b = 11.0$ ,  $t_9 = 3.3$ ,  $p = .009$ ). Significant MTxPA interaction ( $F_{1,9} = 19.0$ ,  $p = .002$ ,  $R^2 = .3$ ). PA, race, and MTxRace interaction did not predict MH. Hispanics and Blacks, who met the PA guidelines before but not during, presented significant positive relationship between MT and MH ( $b = 2.9$ ,  $t_9 = 3.7$ ,  $p = .005$ ;  $b = 3.5$ ,  $t_9 = 5.4$ ,  $p = .0004$ , respectively), with Blacks to better predict MH. Hispanics, who met the PA guidelines both before and during the pandemic, presented non-significant negative relationship between MT and MH ( $b = -.3$ ,  $t_9 = -.3$ ,  $p = .8$ ) having the worst prediction for MH. Blacks retained a positive non-significant relationship between MT and MH ( $b = .4$ ,  $t_9 = .6$ ,  $p = .6$ ) with a weak MH prediction. CONCLUSION: Results infer a buffering (Black) and an antagonistic (Hispanic) moderating effect on the MT-MH relationship on previously physically-active females. This preliminary evidence suggests that adhering to PA guidelines during the pandemic would decrease the effect of MT on MH (less positive) in Black females and reverse the effect of MT on MH (becomes negative) in Hispanic females. Possible explanations include different response to the additional stress of PA due to cultural differences. Larger-scale studies are needed to examine the mechanistic explanation of this observation.

**32. The prevalence of musculoskeletal injuries and burn out in undergraduate nursing students at Barry University**

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Musculoskeletal disorders (MSDs) affect the muscles, nerves, blood vessels, ligaments and tendons. Work related MSDs are among the most frequently reported causes of lost or restricted work time. Moreover, MSDs caused 33% of all workers injury and illness cases. In addition, burnout is another consequence of the high stress and increased incidence of MSDs. Burnout is a term that describe the reactions of workers to a chronic stress in occupations that have direct interactions with people. Typically, it is conceptualized as a syndrome characterized by emotional exhaustion (EE), depersonalization (DP), and reduced personal accomplishment (PA). The purpose of this study was to measure the risk factors of MSD and the level of burnout in Barry University nursing students during their clinical rotation. Sixteen college students participated in the study, 13 females and 3 males (29.5±4.4 years, 165.6±6.8 cm, 68.7±11.8 kg). All students have completed seven clinical rotations by the time of the data collection. The students were required to complete two questionnaires to assess the prevalence of MSD and burnout. The results of the Survey for Work-Related Musculoskeletal

Disorders (WMSD) found that the students experienced pain/discomfort at the neck (50%), shoulder (44%), upper back (31%), and lower back (44%) in the last year, which lasted two days or more. In addition, 38% of the students experiencing neck and lower back pain/discomfort stated that the pain/discomfort increased during their shifts. The results of the Maslach Burnout Inventory questionnaire suggested that 75% of participants experienced moderate to high levels of EE, 38% showed moderate to high levels of DP, and 63% experienced low levels of PA. These findings suggested that Barry University nursing students are susceptible to MSDs and burnout. Future studies need to investigate the influence of physical activity and relaxation techniques interventions on MSDs and burnout among nursing students.

*CNHS Project and Professional Development Scholarship, Project ADVICE*

### **33. Physical inactivity during COVID-19 moderates body fat percentage - relative handgrip strength relationship on Black females**

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Metabolic syndrome (MetS) prevalence is high in Blacks. Physical inactivity is among the contributing factors of MetS development. Relative handgrip strength (HSR), divided by body mass index, is negatively linked to MetS. Increased body fat percentage (BF%) worsens HSR and contributes to MetS. Physical activity (PA) improves related-MetS risk factors. Only 45% of Blacks over 18 years and less than 40% of US females are meeting the ACSM PA guidelines. During COVID-19 PA levels have been decreasing, while stress has been increasing. Such a phenomenon may contribute to MetS due to a change in BF%-HSR dynamics. PURPOSE: To explore associations between BF% and HSR and to investigate the effect of being physically active during the pandemic on the BF%-HSR relationship. METHODS: Anthropometrics, HS (dynamometer), and BF% (bioelectrical analysis) measurements performed on nine black female college students (age 21.3±4.0 yr). PROCESSÓ v.3 by Hayes moderation analysis performed using SPSSÓ. BF% centered for product construction and heteroscedasticity consistent error. Moderation and conditioning significance set at  $p < 0.05$ . RESULTS: Model significantly predicted HSR ( $F_{3,5} = 503.1$ ,  $p < .001$ ,  $R^2 = .73$ ). BF% and PA significantly predicted HSR ( $b = -.1$ ,  $t_5 = -5.0$ ,  $p = .004$  and  $b = -1.2$ ,  $t_5 = -8.3$ ,  $p = .0004$  respectively). BF% x PA interaction significantly moderated HSR ( $F_{1,5} = 57.9$ ,  $p = .0006$ ,  $R^2 = .2$ ). Black females, who met the PA guidelines before but not during the pandemic, presented significant positive relationship between BF% and HSR ( $b = 0.07$ ,  $t_5 = 38.1$ ,  $p < .001$ ). CONCLUSION: Results support the negative clinical relationship of BF% and HSR for previously physically active Black females that kept exercising during the stressful pandemic period. For those who did not remain physically active during the pandemic, BF% and HSR relationship was adversely (positive) moderated by their choice. No causal inferences can be drawn due to the cross-sectional design and small sample size. However, based on Bjorntrop hypothesis, the combined effect of physical inactivity and additional stress during COVID-19 may have altered the hypothalamic-pituitary-adrenal axis and increased cortisol levels that led to an increase in fat accumulation. Larger-scale studies are needed to examine the mechanistic explanation of this observation.

### **34. Exercise prescription for and outcomes of a cardiovascular and cerebral dysfunction case**

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Abstract Type- Case Study HISTORY: A Caucasian 62 -year-old male was admitted in the emergency room with complaints of chest discomfort. Patient was experiencing weakness on the left side of his body and was considered medically paralyzed. Patient was experiencing seizures that occurred 1 month ago due to heart conditions and in the last two weeks he experienced another stroke. History consisted of cardiovascular disease, cancer and coronary artery disease and smoking for 25 years. In 2011, patient had a defibrillator and pacemaker put in. August of 2016, patient had gone through ventricular fibrillation and resulted in a stent placement. In 2017, patient experienced a stroke that affected his left side. In 2018, patient had a left ventricular assist device (LVAD) placed, which is currently still present. PHYSICAL EXAMINATION: Patient weights 65.1 kg, is 170 cm tall, blood pressure is 230/112. DIFFERENTIAL DIAGNOSES LIST: Patient has diagnosed of coronary artery disease, heart failure, and non-Hodgkin lymphoma. DATA: Patient had a 24% ejection fraction. FINAL WORKING DIAGNOSIS & TREATMENT: Coronary artery disease and stroke with a left side deficit. Patient enrolled in Resolution Cardiovascular Rehabilitation for seven months and he is following the cardiac rehab program three times a week. Patients' goals were to improve balance, walk longer distances and increase strength. Programs main rehabilitation was to improve patients balance and bilateral strength in addition to strengthen his heart in order to perform a heart transplant. Cardiac rehab team is focused to strengthen the muscles of the right (unaffected) side of his body in order to compensate for the left (affected) side. The exercise prescription focuses on cardiovascular and weight bearing exercises. He has been working on 6-minute walks, Nu-step for 20 minutes, lower and upper body exercises. During weight bearing exercises patient performs with heavier weight on his right side. During exercises like the leg extension machine, patient exerts and controls weight with right leg but uses left leg to the best of his ability. In order to assess improvements between the left and right side strengths, unilateral exercises are performed. Cardiovascular exercises are done to increase patients' endurance and promote improvement in posture. Patients LVAD placement elicits pain due to involved muscle tissue in the abdomen and due to unstable posture while walking. Patient is to be walking and attempting to be independent at home for a continuation of what is learned in rehab. OUTCOME: Patient has increased weight bearing abilities for left and right side. Patient is able to walk 90ft continuously, is experiencing less pain from LVAD and maintains better posture. Continuation of improvements are predicted if patient continues to attend and put effort in exercising that will promote strengthening of his heart for future heart transplantation.

### **35. Fear of COVID-19 and adherence to lockdown deteriorated police cadets handgrip strength relative to BMI**

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Due to COVID-19 pandemic, police academies enforced lockdowns to protect cadets' well-being. Fear of health issues (e.g., perceived severity) influences ones adherence (e.g., readiness to act) to changes in exercise behavior. According to WHO, modifications in exercise behavior during the pandemic influence health status. A well-established clinical health marker is the handgrip strength relative to body mass index (HSR). The relationship between fear and physical well-being during COVID-19 is still under investigation. The mediating effect of adherence to COVID-19 restrictions on

the fear-health status relationship in police cadets is unknown. PURPOSE: To explore a) the fear-HSR relationship and b) the mediating effect of adherence to COVID-19 restrictions on the fear-HSR relationship. METHODS: Cadets of both sexes, 98 males and 77 females, performed a bilateral HSR test and answered a) to what degree (i.e., no, partial, yes) they apply the recommended anti-COVID-19 measures; b) a five-item Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) Fear of COVID-19 (FCV-19S) survey. HSR, adherence to COVID-19 restrictions, and composite sum mean FCV-19S score (higher score indicates higher fear) were used as outcome, predictor, and mediating variables respectively. PROCESS v.3 by Hayes mediation analysis model 4 performed using SPSS with significance set at  $p < 0.05$ . RESULTS: Fear was a significant predictor of HSR (the c pathway) ( $b = -.34$ ,  $t_{173} = -2.6$ ,  $p = .01$ ): more fear, less HSR. FCV-19S was positively related to adherence (the a pathway) ( $b = .23$ ,  $t_{173} = 2.6$ ,  $p = .009$ ): more FCV-19S, more adherence. Adherence was negatively related to HSR, (the b pathway) ( $b = -.27$ ,  $t_{172} = -2.4$ ,  $p = .02$ ): more adherence, less HSR, with fear as an adjustor. The relationship between FCV-19S and HSR was lessened with adherence as an adjustor (the c pathway) ( $b = -.27$ ,  $t_{172} = -2.1$ ,  $p = .04$ ). The indirect effect indicated that mediation occurred: indirect =  $-.07$ , 95% CI  $[-.13, -.01]$ . CONCLUSION: In this case, nor the lockdown nor fear were related to higher scores in the HSR index, although adherence to restrictions lessened the effect of fear alone. Administrators may need to find ways to not only decrease fear of COVID-19, but also avoid blanket measures as those may end up not protecting their cadet wellbeing.

### 36. Open reduction and internal fixation of three displaced malleoli.

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CASE HISTORY: A 20-year-old, white/Hispanic, female visited Emergency Room with severe inflammation, lateral ecchymosis, tenderness, and displacement of the left ankle due to a fall. Patient was unable to move foot, remained non-weight bearing, and had 10/10 pain levels with palpation to ankle and foot. PHYSICAL EXAM: Upon orthopedics physical examination, pain on palpation was noted on the left hallux. Her pedal pulses were readily palpable. There was moderate nonpitting edema to the left lower extremity. DIFFERENTIAL DIAGNOSES: Grade 3 lateral ankle sprain. TESTS & RESULTS: General radiology (GR) on ankle, tibia, fibula, and a computerized tomography (CT) on left ankle were ordered. GR found acute displaced angulated trimalleolar fracture with soft tissue swelling and ankle joint malalignment. CT indicated displacement of distal medial malleolar fragment, minimal posterior displacement of both the distal lateral and posterior malleolar fragment. No damage was found to the tendons and ligaments. FINAL DIAGNOSIS: Three displaced malleoli. DISCUSSION: Open reduction and internal fixation of lateral malleolus with 1/3 tubular internal fixation systems (IFS) plate and six locking and nonlocking screws across the plate. Medial malleolar displacement was reduced with a 1.25 K-wire then internally fixated with one 4.0 partially threaded cancellous IFS screw measuring 45mm in length. Fluoroscopy was used to confirm medial and lateral malleolar alignment and proper screw length. Reduction of the lateral and medial malleoli caused accidental reduction to posterior malleolar displacement and no internal fixation was needed. Patient was placed in a controlled ankle movement (CAM) walker and transferred from operating room to post-anesthesia care unit. Vital signs were stable and neurovascular status was intact in left lower extremity. She was readmitted to the floor for postoperative management and discharged two days postop. Patient was instructed to be strict non-weight bearing to her left lower extremity. She was instructed to keep the CAM walker on with ankle at 90° dorsiflexion and she ambulated with crutches. X-rays were taken during follow up with podiatrist to rule out hallux fracture, in which case there was no fracture. Patient was to be non-weight bearing with left lower extremity elevated for 3 months postop. Physical therapists were asked to evaluate and gait train the patient. OUTCOME OF THE CASE: Patient received 1-3 hour physical therapy sessions, tri-weekly, for three months in an outpatient facility. Therapist provided scar massages to remove scar tissue and help gain range of motion (ROM). Patient was weaned into applying full body weight to left lower extremity with CAM walker. Once patient was full weight-bearing she was permitted to cease need for CAM walker. RETURN TO ACTIVITY AND

FURTHER FOLLOW-UP: Patients goal was to gain the strength to run and the flexibility to wear heels again. Therapist focused on building muscle, gaining balance and stability, increasing ROM, and decreasing pain. After three months, patient was able to run and wear heels without issues. Patient fully recovered from injury and now lives comfortably with the IFS plate and screws.

## **Barry University College of Nursing and Health Sciences**

### **Department of Occupational Therapy**

#### **37. Investigating the effectiveness of occupational therapy sleep interventions in clients with schizophrenia: a scoping review**

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In our review of the literature, we found limited information regarding effective OT treatment strategies for clients with schizophrenia affected by sleep disturbances. Our scoping review aims to bridge gaps in knowledge regarding effective, non-pharmaceutical, and occupational therapy focused sleep interventions for adults with schizophrenia. The information may then be used as a precursor to systematic reviews. Sleep is an occupation for the achievement of rest and restoration and a supportive foundation for other daily occupations. Following the guidelines for interpreting data by Peters et al. (2015), we utilized search engines (PubMed, CINAHL Complete (EBSCO), Oxford, and ScienceDirect) and search terms (schizophrenia, plasticity, psychosis, sleep, sleep intervention, occupational therapy, sleep management, sleep deprivation, and cognitive control) for our methodology. We included articles available in English with free full text, with a publication date in the last 10 years (2010-2020), that investigated mental health in OT practice, examined sleep in schizophrenia, and analyzed sleep treatments. We excluded studies published before 2010 and studies involving participants younger than age 18. Additionally, studies involving participants without diagnosed schizophrenia/mental illness or not involving interventions for this population were excluded. This scoping review contributes insights into current practice and future research in OT regarding sleep dysfunction in clients with schizophrenia. We suggest further research to assess the effectiveness of occupational therapy-specific interventions for non-pharmaceutical management of sleep disturbances in clients with schizophrenia. Furthermore, additional research may guide practitioners, students, and healthcare professionals with intervention planning and their understanding of the relationship between sleep and schizophrenia.

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