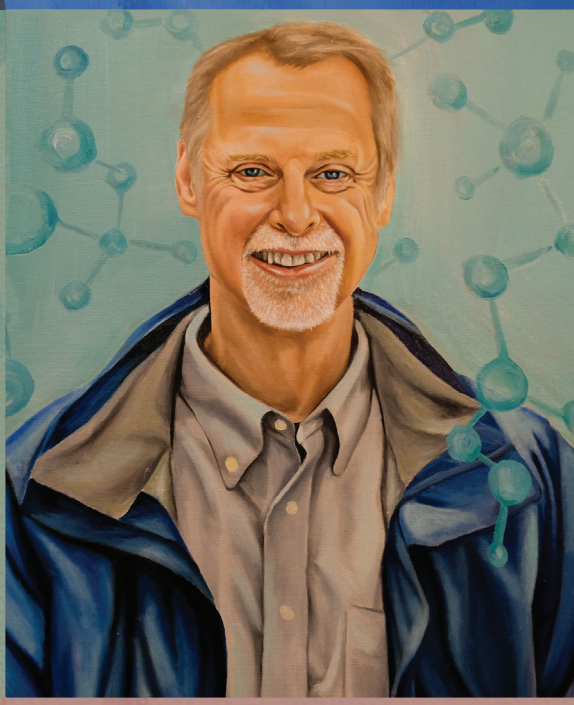
2021 CELEBRATION OF STUDENT RESEARCH + CREATIVITY



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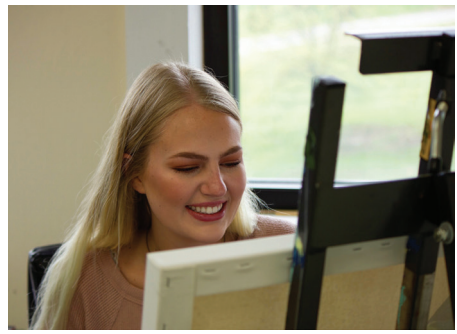

BECVAR ARTIST IN RESIDENCE: ANNIKA YESKE

About the BecVar Artist in Residence Program

The Lansing School of Nursing and Health Sciences established the Artist-in-Residence program in the 2002-2003 academic year. This program examines the art and science of Nursing and Health Sciences through the eyes of an undergraduate student working in the fine and creative art mediums. Endowed by Mrs. Arthur N. BecVar in 2006 in honor of her husband, this program exemplifies the diverse and many creative and artistic talents of the BecVar family. Having earlier established an endowed nursing scholarship fund during Art's lifetime, with this endowment Jayne BecVar further connects her desire to support and provide to our community caring, ethical graduates. It is our mutual desire that the students' experiences in this program, as viewed through the arts, will give them new ways of thinking to inform their clinical practice, the health care profession, and patient contact and care.

Artist Statement

Earning a degree in both Psychology and Art, I have always had a strong interest in the interdependent relationship between science and art. Although the methods and approaches are considerably different, art and science both serve as attempts for humans to describe and make sense of our experience within the universe. In my art, I seek to understand all the elements that my subject is comprised of, similar to how a scientist will put an object under a microscope to learn intensely about that object and how each part of it functions. For my BecVar Artist In-Residency, I wanted to portray the connection between science and art by highlighting some of the most influential science and healthcare educators at Bellarmine. Educators play a prominent role in every individual's life, and they have guided me through every stage of my life. I do not think that educators are given enough credit for the impact they have on our lives, so I wanted to bring some attention to those that have impacted students the most.

Cover from top to bottom: Dr. Paul Kiser, Dr. Patrick Holt and Professor Sarah Pelke

2021 CELEBRATION OF STUDENT RESEARCH + CREATIVITY VIRTUAL POSTER SESSIONS

Click to view posters on Kaltura.

UNDERGRADUATE STUDENTS

GRADUATE STUDENTS

SPECIAL THANKS TO

Dr. Susan Donovan, President
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Ms. Connie Smith, Director Office of Sponsored Projects
Mr. Adam Elias, Director of Innovative Learning Systems
Mrs. Kathleen Kelty, Director of Stratgic Communication

ACCOUNTING

The Financial Impact of Gender Diversity on Corporate Boards

Lizzie Hamilton / ehamilton@bellarmine.edu / Faculty Advisor: Brad Stevenson

The purpose of this study is to investigate the relationship between gender diversity and firm financial performance, using a data set of 50 S&P 500 companies during 2015-2019. Financial performance data (ROA and ROE) and demographic data of board composition were collected. Gender diversity was measured through the percentage of women on the board and whether the board has a "critical mass" (of at least three women). In the results of the regression analyses, some significant relationships between variables were found. The regression between ROA and the percentage of women indicated that there was a positive correlation between the percentage of women, average age, and firm size and ROA. These results were statistically significant at a 95% confidence level. For the regression between ROA and the critical mass variable, average age and firm size were again statistically significant. For both regressions with ROE, average age and firm size were statistically significant at a 95% confidence level. The results indicate that a critical mass may not be necessary for women to have a positive impact on a firm's ROA. They also imply that ROE is not correlated with board gender diversity.

IT Usage in Auditing and the Impact of COVID-19

Olivia Beechem / obeechem@bellarmine.edu / Faculty Advisor: Elizabeth Payne

The COVID-19 pandemic has drastically changed the world as we know it, and the audit field is no exception. The transition for a majority of public accounting firms and their clients to remote work amidst a global pandemic sparked my interest in the already rapidly evolving field of audit IT usage, which continually impacts audit quality and efficiency. My research expands on existing studies that have been completed on this topic prior to COVID-19 and includes three main research objectives. First, my research examines the usage and perceived importance of common types of IT audit applications, such as CAATs and data analytics, as well as productivity tools used by auditors, including video conferences and email. Furthermore, I analyze the potential impacts of COVID-19 on this usage among audit professionals of varying ages, firms, and area of work. Finally, I investigate the perceptions of the future of IT assurance departments in public accounting firms and their collaboration with financial auditors. A questionnaire was utilized to collect data from 99 auditors representing a Big 4 and large regional firm in the Midwest. My results indicate that the most used IT audit applications include Dashboards, Knowledge Management Systems, and Audit Planning/Management Software. Furthermore, all forms of technology communication tools increased in usage due to COVID-19, and auditors were equally split on whether the pandemic has positively or negatively impacted work-life balance. Finally, my results indicated that nearly all auditors believe the IT assurance field will increase in size and importance in the future.

ACTUARIAL SCIENCE AND ECONOMICS

Markov Chains in the Game of Life

Rachael Rahe / rrahe@bellarmine.edu / Faculty Advisor: Susan White

A Markov chain is a special type of stochastic process that can be used to model certain board games. Applying this idea to the Game of Life, we find that many of the probabilities associated with the game can be explained using Markov chains. This project uses Markov chains to evaluate strategies for optimal gameplay in the Game of Life.

Duration and Convexity

Natalie Snyder / nsnyder@bellarmine.edu / Faculty Advisor: William Fenton

Duration and convexity are two important tools to analyze investments. The origins of duration came from Fredrick Macaulay. Duration is a way to measure and manage interest rate risk, giving it the name Macaulay Duration. When making any financial investment, such as a bond, it will have a certain lifetime. During that lifetime, you are exposed to risk. Types of risk include a crash in the economy, which may decrease the value of the bond or increase your interest rates. Increasing interest is not good for your investments, as you will receive less money on your remaining payments. Modified duration is another method used to measure the life of a bond, which can be computed using the Macaulay Duration formula. Convexity, on the other hand, is a little different. Mathematicians may think of convexity as the degree of a curve, but in this case, it is the relationship between bond prices and bond yields. Convexity is an investment tool that measures and manages portfolio and bond durations and how those durations change as interest rates change. In this paper, I will discuss in depth the ideas, formulas, and functions of duration and convexity.

BIOCHEMISTRY & MOLECULAR BIOLOGY

Individual Differences in College Students' Approach to Health-Related Decision Making

Katie Vogel / kvogel@bellarmine.edu / Faculty Advisor: Joy Jacobs-Lawson

Undergraduate students possess a unique set of health statuses such as high rates of COVID-19, STI infections, and mental health issues that are unseen in other age groups of the population. Students frequently use on-campus health services for diagnosis and treatment of illnesses, but many students still involve their parents/guardians in their health decisions. One important aspect of health decision making is how involved the person is in making their health decisions, referred to as shared decision making. Levinson et al. showed that younger people, women, and individuals with higher education have higher preferences for shared decision making (2005). This research, completed as an Honors Thesis, focused on understanding undergraduate health-related shared decision making preferences. Specifically, it examined how health locus of control, personality, and gender impacted preferences toward shared decision making. In addition, undergraduate students' preferred healthcare providers

for six illness states and the likelihood of sharing health information with their parents/guardians for these illness states was assessed. Data is being collected using an anonymous survey. The results are anticipated to reveal that personality and illness type influence preferences for shared decision making and undergraduate students' willingness to share health related information with their parents will vary based on illness type. By better understanding how involved undergraduate students prefer to be in shared decision making, their preferred healthcare providers, and what health information they share with their parents/guardians, colleges and universities can improve the health services they provide for their students and promote long-term healthy lifestyle behaviors.

Antibacterial and Antioxidant Potential of a novel plant, Eriodictyon californicum and its Healing Abilities

Allie Richards / arichards@bellarmine.edu / Faculty Advisor: Savita Chaurasia

Oxidative stress (OS) is a crucial factor in diseases such as stroke, cancer, and Alzheimer's disease. The main cause of OS is free radicals, which are continuously generated in our body. Antioxidants, which are abundant in plants, combat OS by neutralizing free radicals. This research focuses on finding novel antioxidants in the plant Eriodictyon californicum, also known as yerba santa or "holy herb." Yerba santa was used by early settlers and Native Americans to treat coughs, colds, and asthma. Thus, this study of antioxidant potential bridges the gap between herbal remedies and current pharmacological research. In this study, ethanol extract of E. californicum was screened for bioactive molecules. Total phenolic and flavonoid contents were quantified. Antioxidant capacity was evaluated by 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay and ferric reducing/antioxidant power (FRAP) assay. To explore the mechanism of action for antioxidant activity, the extract was studied for efficacy against superoxide and hydroxyl radicals. Qualitative studies determined the presence of saponins, phlobatannins, phenols, tannins, terpenoids, cardiac glycosides, steroids, and flavonoids in yerba santa. The leaves were found to be rich in phenol content (78.58 3 0.016 Qg GAE/mg) and flavonoid content (6.76 3 0.003 Qg QE/mg). At a concentration of 1.0 mg/mL, the extract showed 93.39 % inhibition of DPPH radicals, 57.36% inhibition of superoxide radicals, and 80.89% inhibition of hydroxyl radicals. This study reveals that E. californicum is a rich source of antioxidants and can be used to fight against oxidative stress. Antibacterial studies are currently in place.

Accepted for presentation at the SRHC: Southern Honors Regional Conference, April 2021
Recipient of the Student Government Association Research Grant Award

Exploration into the Cellular Target of 4-Trifluoromethoxy Chalcone via DARTS Method

Jordan Stacy, Trevor Stantliff / jstacy@bellarmine.edu / Faculty Advisor: Amanda Krzysiak

Cellular drug target discovery is an important step in any drugs journey from bench to bedside. This is true for our labs molecule of interest, the Chalcone. The Chalcone molecule and its derivatives have been identified as small, plant-derived secondary metabolites that, when interacting with human cancer cell lines, trigger apoptotic pathways leading to varying levels of cell death. One derivative in particular, 4-Trifluoromethoxy Chalcone (4TFM), was identified through screenings as inducing the highest death rate in A549 cancer cells, in conjunction with having the lowest IC50, making it a good candidate to use in searching for the currently unknown cellular target of the Chalcone. Using Drug Affinity Response Target Stability (DARTS) Method, we have begun that process, leveraging the fact that a protein's ligand is able to shield its

target from proteolysis at a specific concentration. Incubation with and without drug can produce conserved bands observable via gel electrophoresis, providing potential targeted and protected proteins that can be identified through Mass Spectrometry. For 4TMF, we are currently narrowing in on a library of potential protein targets in the hope to ultimately establish the cellular component the small molecule is interacting with, creating its signature anti-cancer effects.

Accepted for presentation at the American Society of Biochemistry and Molecular Biology Conference, April 2021.

The Effect of Cadmium on Ovarian Adenocarcinoma Cell Lines: An Investigation of the Possible Mechanism of Action

Haley Todd / htodd@bellarmine.edu / Faculty Advisor: Mary Huff

Cadmium, a heavy metal and carcinogen, is an environmental and workplace contaminate. As a known endocrine disruptor, it can mimic the proliferative effects of estrogen and is classified as a metalloestrogen. While the proliferative effect of estrogen on cancerous cell growth has been well established, the effects of cadmium have not been fully examined. To determine if cadmium stimulates growth in two human ovarian adenocarcinoma cell lines, OVCAR-3 and SKOV-3, cells were treated for 48 hours with varying concentrations of cadmium, 0.001 QM – 10 QM, and growth was measured using a cell proliferation assay. Both cell lines showed a peak in cellular proliferation at 0.1 QM and cell death was induced at a 10 QM. Further, cadmium was shown to activate phosphorylation of ERK1/2, a key protein involved in estrogen signaling. To determine if cadmium-induced phosphorylation of ERK1/2 uses a similar signaling pathway as estrogen, inhibitors were used to block four key proteins in the estrogen signaling pathway including the estrogen receptor (α and ß), Src, EGFR, and MEK. Following treatment with each inhibitor, cells were treated with cadmium for five minutes and immunoblot analysis was used to measure the level of ERK1/2 phosphorylation. Preliminary results suggest that inhibiting the estrogen receptors α and ß does not inhibit phosphorylation of MAPK, suggesting cadmium induces cellular changes using a different pathway than estrogen. Inhibition studies that target other key proteins in the activation of ERK1/2 are still being investigated.

BIOLOGY

Changes in Fecal Glucocorticoid Levels and Microbiome Profile during Positive Enrichment in a Captive Population of Tigers (Panthera tigris)

Sylvia Ramsey / sramsey@bellarmine.edu / Faculty Advisor: Carrie Doyle

Cortisol is a hormone that is released in response to stress. Cortisol can be damaging in high amounts and it is ideal to maintain at a low level. Captive animals can experience high levels of cortisol during their captivity. Enrichment is offered to captive animals to allow the animal to exhibit natural behavior and hopefully lower stress levels. This experiment analyzes if exposure to a positive enrichment significantly impacts an animal's cortisol levels and microbiome characteristics. A population of ten captive female tigers was monitored over the course of ten days. Ethograms - behavioral observations - were conducted daily to monitor the cohort of tigers during the entirety of the study. A positive enrichment, a hollowed-out pumpkin filled with meat, was given by the keepers to five of the tigers. Feces was collected daily and enzyme immunoassays performed to determine each of the individuals' cortisol levels. A

variety of different growth media was used to characterize the microbiome at two time points, one pre-enrichment and one post-enrichment. Approximately 50% of the individuals that received the positive enrichment had a drop-in cortisol the following day. This leads to a recommendation that animals in captivity should receive positive enrichment to attempt to lower cortisol levels. The positive enrichment was not found to produce a change in the microbiome.

Recipient of the Student Government Association Research Grant Award

Exploring Oscillatory Dynamics through Extension of Cross Protection Mutualism to a Susceptible Bacterial Colony

Evelyn Brown / ebrown3@bellarmine.edu / Faculty Advisor: Caroline Doyle

Understanding how bacterial populations survive antibiotic exposure has clinical and ecological relevance, yet the implications of cooperative antibiotic deactivation on the population and evolutionary dynamics, particularly in the presence of more than one antibiotic, remain poorly understood. Our study evaluates the preservation of a susceptible bacterial species in the presence of two Escherichia coli strains that have been shown to form successful cross-protection mutualism in the presence of ampicillin and chloramphenicol. The ampicillin resistant strain is a result of a plasmid constructed utilizing a modular multi-part DNA assembly technique in which start and stop codons were exploited as fusion sites (promoter J23116, RBS (RBSc42), and terminator L3s2p55 were cloned into a start-stop plasmid pStA0::eyfp). The ampicillin plasmid caries a gene that encodes the β-lactamase enzyme which allows for deactivation of the extracellular space and in theory could extend that protection to allow a sensitive species to survive. The chloramphenicol resistant strain is a result of a plasmid that encodes for the chloramphenicol acetyltransferase enzyme which deactivates chloramphenicol within the cell. Although the enzymatic deactivation of chloramphenicol occurs internally, perhaps diffusion between the medium and the cell interior may decrease the extracellular concentration of chloramphenicol so that a susceptible species can survive. Given that each strain has the capability of conferring protection to the other species in a multidrug environment, it is hypothesized that a vulnerable species could also reap the benefits of enzymatic deactivation.

Recipient of the Student Government Association Research Grant Award

Testing Cortisol Levels in dogs and handlers: Pre and Post Reactive Dog Intervention

Lucy Hunt / lhunt2@bellarmine.edu / Faculty Advisor: Jennifer Sinski

Companion dogs who develop reactivity to people or other pets are at an extremely high risk of euthanasia due to their problem behaviors. Dog training classes specifically tailored to address problem behaviors have been frequently suggested by animal behaviorists as a method to reduce aggressive or reactive behaviors. Previous research has utilized cortisol testing to measure stress levels in both canines and humans, and this research tested and developed the best practices to employ cortisol testing as a pre- and post-test for the training classes. After an extensive literature review, saliva cortisol testing via sponge collection was chosen over blood cortisol collection in order to reduce further stress on the companion animal and handler. This efficient and stress-free testing method was developed and utilized to gather samples from 12 dog/handler pairs and centrifuged on site. This method of collection will be used to collect six sets of six week classes once the COVID 19 restrictions are lifted.

The Expression of Palladin in the Retinal Pigmented Epithelium and its Possible Role in Epithelial-Mesenchymal Transition

Katrina Powell / kpowell2@bellarmine.edu / Faculty Advisor: Steven Wilt

This study investigates the expression of Palladin, a phosphoprotein product of the PALLD gene, in the retinal pigmented epithelium (RPE). Palladin is an actin cross-linking protein and plays a role in cell adhesion and motility. Published reports have demonstrated that a down regulation of Palladin in colon cancer cells results in a reorganization of the actin cytoskeleton, causing the cells to lose their typical shape, become proliferative and migratory. This process is otherwise known as epithelial-mesenchymal transition (EMT). A similar EMT phenomenon is observed when the RPE is exposed to the vitreous humor in patients with proliferative vitreoretinopathy (PVR). In this study, the expression of Palladin is investigated in primary cultures of pig retinal pigmented epithelium in both normal and vitreous exposed cells. Reverse transcription polymerase chain reaction (RT-PCR) and western blotting were performed to demonstrate mRNA and protein expression, respectively. Palladin was seen expressed in the RPE cells; however, there was no notable difference in the expression of Palladin mRNA in vitreous exposed cells versus the control cells. The immunoblotting analysis was inconclusive. More research will be necessary to see if Palladin plays a role in the RPE.

Accepted for presentation at the Kentucky Honors Roundtable, February 28, 2021.

Possible changes in mental health struggles during the menstrual cycle in college age women – with a focus on pandemic stress

Shelby Stanley / sstanley@bellarmine.edu / Faculty Advisor: Caroline Doyle

A female's monthly menstrual cycle involves a balance of hormones with impacts that can manifest in both mental and physical ways. Understanding the interactions between reproductive hormones and other hormones, and between reproductive hormones and other body systems is critical in understanding hormonal effects on various mental health conditions such as depression and generalized anxiety disorder. During times of stress, mental health concerns can be exacerbated. Given that many of the same conditions are impacted by the menstrual cycle, it would be important to evaluate how cycling effects pandemic stress. This study looks at the possible correlation between an increase in stress-related mental illness, specifically the unique stress of the 2020 Coronavirus pandemic, and how this stress impacts the already increased changes in anxiety and depression associated with the menstrual cycle. College-aged females, who reported normal menstrual cycles and struggles with mental health were recruited to complete a daily diary for 30 days to track their menstrual cycle, mental health symptoms and perceived stress. Seven women were enrolled, and daily diary scores were analyzed every 5 days from the initiation of the study. The study population was divided between the follicular phase and the luteal phase to evaluate any changes in mental health symptoms associated with the menstrual cycle. Diary ratings were tabulated and summed, and each subject was scored based on that day of the study. T-tests were performed on the scores to determine differences between the two groups. An analysis between mood changes and the phase of the menstrual cycle 5-day periods was completed. The data showed no statistically significant difference between mood symptoms and the luteal and follicular phases of the menstrual cycle. This research points to the need for further study on the correlations between menstrual cycles, mental health and perceptions of stress, specifically pandemic stress.

CHEMISTRY

Analysis and Characterization of Unknown Tris (bypyridine) ruthenium (II) Chloride Derivative

Patrick Murphy / pmurphy@bellarmine.edu / Faculty Advisor: Patrick Holt

While performing a fluorescence experiment on an existing solution of RuBpy Tris (bypyridine) ruthenium (II) chloride the sample was found to have different spectroscopic properties than expected. After further characterization it was shown that the old sample had degraded into one or more unknown compounds that exhibit similar but different properties. To discover the identity of the unknown, various spectroscopic methods have been employed to obtain a broad picture of the sample's physical behavior. These findings were paired with research from existing to literature to increasingly narrow down the identity of the unknown. Methods of characterization employed so far on the sample include fluorescence, UV-Vis spectroscopy, IR spectroscopy, thermal lensing, and exposure to an ultraviolet reactor.

COMPUTER SCIENCE

RSA Algorithm Technique in Asymmetry Encryption

Elena Milan Lopez / emilanlopez@bellarmine.edu / Faculty Advisor: Gregory Kelsey

In the contemporary world, technology is being applied in all day-to-day activities. The most influenced sector by technological evolution is the communication sector. Currently, the transfer of information from one person to another has been made efficient with the use of technology. Different geographical areas of the world have been brought together with the increased use of technology. Different platforms have been developed for the social interaction of people. However, with the increased use of technology, especially in communication, data privacy has been adversely affected, and this is the main problem that is contributing to an immense debate on how to manage it. As a result, it has been discovered that Asymmetry Encryption is effective in curbing the problem. An individual can decide to use Asymmetric Encryption for purposes of secure communication. However, different techniques can be applied in the encryption, among which is the RSA algorithm. Therefore, the main focus of the research is how this technique is helpful in Asymmetry Encryption. The research methodology involved a literature review and the engagement of the experts on data security. They explained the different security measures and strategies applied to protect any type of information. According to the research findings, the RSA algorithm uses two mathematically linked keys in data security effectiveness. It creates and publishes a public key on two large prime numbers alongside auxiliary values. The numbers are secretly kept, whereby anybody can encrypt a message through the public key, but only those who know the prime numbers can decode it.

A Serverless Framework for Transaction-Based Games

Wade Muncy / wmuncy@bellarmine.edu / Faculty Advisor: Nathan P. Johnson

Serverless computing, a cloud-based service, is becoming a widespread, popular way to provide scalable low-cost software functionality. The result of this research is a serverless framework for event-driven, turn-based transactions. This project uses AWS Lambda to create a framework for a turn-based online game. The project is built within the Amazon Web Services ecosystem of services and will

allow game states to be stored as easily identified and managed generic game files using S3 cloud storage. Connections will be handled using ASP.Net Core Web API. The game implemented in this project is a checkers game. Each turn is executed and data, including game creation, matchmaking and board position, is sent to each client as needed by software running in the cloud without the overhead of purchasing and provisioning a server. The local client manages the graphics, sending and connecting to the cloud, and basic game logic. The framework developed for this project could be applied in many different applications that manage online connectivity and data in a transactional, turn-based manner. Other simple use cases might include chat programs, change logs or history data.

A Neural Network to Recognize Cause and Effect in Game Events

Cole Hille / chille@bellarmine.edu / Faculty Advisor: Nathan P. Johnson

Neural networks are often implemented for the purpose of prediction, everything from future movement of stock prices to sunspot activity; it is less common for a neural network design to extract the cause of a given event from a domain of possible causes. It is, in fact, considered to be an extremely difficult, contemporary problem in the field of Artificial Intelligence where neural networks succeed at this task a relatively small percentage of the time. This software project is an attempt to determine the correct cause in a restricted domain of possible causes given a well-defined effect. A legal gameboard acts as the input to a neural network, which was built using Google's TensorFlow libraries and the Python programming language, and the game input commands that caused the move make up the output of the neural net.

ECONOMICS

Why I Won't 'Go Back to Where I Came From': An Economic Analysis of Illegal Migration

Mary Daniels / mdaniels@bellarmine.edu / Faculty Advisor: Frank Raymond

The United States has witnessed a declining yet still significant number of illegal migrants crossing the southern border over the past decade while the European Union experienced a rapid increase in illegal migrants, hosting over two million illegal migrants at the height of their migrant crisis in 2015. This paper seeks to provide guidance to European and United States lawmakers on creating effective immigration policy by identifying significant push and pull factors that are driving illegal migration from West and North Africa to Europe and from Latin America to the United States. This empirical analysis indicates that, in both the United States and European Union, per capita GDP and migrant acceptance rates were identified as strong pull factors for illegal migrants. Furthermore, low employment was identified as a significant push factor for migrants in West Africa and Latin America, reinforcing the need to address chronic structural problems that exacerbate unemployment in these countries.

EDUCATION

Science and Writing and Apes, Oh My!: An Iterative Interdisciplinary Approach to Argumentative Writing and Forensic Science in the Secondary English Classroom

Lexi Cox / lcox2@bellarmine.edu / Faculty Advisor: Jessica Ivy

This hybrid thesis consists of a research base that informs the creation of an interdisciplinary English Language Arts and forensic science unit for tenth grade students. Using "The Murders in the Rue Morgue" by Edgar Allan Poe as an anchor text, students explore argumentative writing, the nature of science, and various technologies as they construct their own experiments and write an argument identifying the criminal of the story. This unit went through three iterations in its evolution, receiving feedback from university professors and high school English teachers. Emerging themes from this feedback included modeling expectations, emphasizing interdisciplinarity, and alternative schedules for differentiation, which led to a final product that is feasible, engaging, and covers a variety of content standards.

Accepted for presentation at the 2020 National Council of Teachers of English Virtual Annual Convention, November 2020.

EXERCISE SCIENCE

Physical Activity & Mental Health of College Females during COVID-19: A Longitudinal Analysis of Mood, Body Image, and Physical Activity

Tyler Satterfield / tsatterfield@bellarmine.edu / Faculty Advisor: Andrew Carnes

The beneficial effects of physical activity on numerous elements of mental health is well-established. While there is a high prevalence of mental health disturbance along university students, the onset of the COVID-19 pandemic has introduced additional unique stressors, which include an upheaval in traditional academic learning and strict social distancing regulations. Such stressors have disrupted regular routines and physical activity habits within the college population, and evidence is already available to show heightened anxiety and stress-related symptoms. The purpose of the proposed study was to identify and characterize relationships between mental health constructs and physical activity habits during the first unprecedented full college semester impacted by COVID-19 within the college female population. The longitudinal survey study evaluated the mental condition of college females during the coronavirus pandemic by assessing worry, general health perception, body image, perceived stress, fear of COVID-19, and physical activity habits. Previously validated questionnaires were administered online via Survey Monkey during three time points of the academic school year: prior to departure for Thanksgiving break, prior to final exam week, and prior to the start of the spring 2021 semester. To take the survey, participants were at least 18 years of age, female, and enrolled at Bellarmine University. The collected survey data aided in the evaluation of factors influencing numerous mental health constructs and physical activity behavior amidst an unprecedented population wide stressor, which expanded the available knowledge of the ramifications of the pandemic on mental health issues and physical activity engagement within the female college population.

Recipient of the Student Government Association Research Grant Award

Fruit and Vegetable Intake Influenced by Self-Efficacy Levels Among Ultra-Endurance Athletes

Bayley Wade, Lauren S. Masden, Allison M. Tripure / bwade@bellarmine.edu / Faculty Advisor: Sara E. Mahoney

As ultramarathon events grow in popularity, research is only beginning to elucidate the impact of dietary intake on these extreme endurance athletes. Previous studies have measured whether these athletes are consuming adequate daily carbohydrates, however little information is available regarding dietary intake of fruits and vegetables in this population. The purpose of this study was to describe the habitual fruit and vegetable intake of ultramarathon runners and determine whether sources of nutrition information and self-efficacy predicted intake. METHODS: Participants (N=224) accessed, responded to, and submitted the survey via a secure, study-specific web-based link. The survey battery included demographic information, a Food Frequency Questionnaire (FFQ), the General Nutrition Knowledge Questionnaire (GNKQ), the Self-Efficacy for healthy diet scale (8-SeED), and the Sources of Nutrition Information (SONI) questionnaire. Multiple regression analysis was used to predict fruit and vegetable intake (alpha = 0.05). RESULTS: Overall, the athletes consumed 5.0533.6 servings of fruits and vegetables daily. The model significantly predicted intake (R2= 0.118, p <0.001), however the only significant covariate was self-efficacy (t = 4.75, p<0.001). Regarding sources of nutrition information, there was a modest, but significant correlation between intake and use of peer-reviewed literature (r= 0.191, p=0.008). CONCLUSION: Overall, these athletes have relatively high fruit and vegetable intake, and this is influenced by dietary self-efficacy rather than nutrition knowledge.

Accepted for presentation at the Southeast ACSM Regional Chapter (SEACSM) Conference, February 19, 2021.

MATHEMATICS

Optimizing Math Learning

Jack Clines / cclines@bellarmine.edu / Faculty Advisor: Anne Raymond

It has been said that mathematics is a language, but it is clear that not every student today is fluent. This project sought to answer the question, how do we construct and decode mathematical knowledge, in order to examine why some students can “speak” math while students cannot. Specifically, aspects of the Common Core math curriculum were studied to assess its validity and to discern whether the curriculum’s structure could be hindering student learning or is actually structured well and follows relevant theory proven to be affective in practice. Aspects of learning theory, psychology, and pedagogical theory were used to form an understanding of mathematical learning. The main theory used as a contrast to the Common Core standards is constructivism. Relevant teaching strategies were discussed in relation to specific math concepts covered by the standards in order to identify whether appropriate theory could be put into practice effectively in this set of standards.

Financial Derivatives

Haylee Wright / hwright3@bellarmine.edu / Faculty Advisor: William Fenton

This project is a mixture of mathematical studies and financing studies. I will be delving into the four types of financial derivatives: futures, options, forwards, and swaps. I plan to discuss each of these derivatives in much detail and explain how they affect the

economy. I will then provide examples of how to apply these derivatives to specific situations and what it means to the customer and/or the company. My project will give insight to one of the many correlations between mathematics and finance.

Optimizing Speedrunning Routes using the Shortest Path Problem

Brian Johnston / bjohnston2@bellamine.edu / Faculty Advisor: William Fenton

Completing a task as quickly as possible can be modeled by the shortest path problem. When attempting to complete a game as fast as possible, known as speedrunning, applying the shortest path problem will come up with an optimal solution. Based on criteria set out before the algorithm begins, we will create a route and estimation of time for a given speedrun based on a graph of a given game. Using multiple criteria as the weights of each edge can give multiple optimal routes for any given graph, depending on what kind of player is attempting to speedrun the game in question, varying the degrees of skill and how much random chance actions are desired. The algorithm is also built to handle changes to the graph, whether weights are changed or new edges and nodes are created or are destroyed. Overall, the algorithm will produce a route and estimated time of completion that will give a player a route to follow for the graph provided.

The Lotka-Volterra Model: Its History and Applications

Sheridan Payne / spayne@bellarmine.edu / Faculty Advisor: Jen Miller

Informally known as the predator-prey model, the Lotka-Volterra model is a system of two ordinary differential equations that describe the interactions between two populations, one being the predator population and the other being the prey population. The model has countless applications to several areas including ecology and social sciences. To further understand the model, the Lotka-Volterra equations, the history of the contributors of the Lotka-Volterra model – Alfred Lotka and Vito Volterra – and their reasonings behind developing the model are stated and the importance of the model is discussed. Using the Lotka-Volterra model, a phase portrait is defined and analyzed, and its results are interpreted in terms of applications to mathematical sciences, such as mathematical biology and ecology. Specifically, the phase portrait of the Lotka-Volterra model is discussed alongside a modified Lotka-Volterra model that incorporates a disease that is spread between the two species of the model. To formulate the phase portraits of the two models, R and Maple, mathematical computer software that includes packages that specifically plots phase portraits, are used. The comparison and analysis of the two models further illustrates the applications of the Lotka-Volterra model and how it is currently utilized in mathematical research.

Can Working Less Pay Dividends?

Evan Bottorff / ebottorff@bellarmine.edu / Faculty Advisor: Michael Ackerman

Imagine working as little as you can, as fast as you can, and still being at the top of the world. Many professional tennis players do this every day and achieve a living most people dream about obtaining. Professional tennis players spend their life working on technique and strength to perform at the highest level. Their job is to win every point as fast as they can while exerting as little effort as possible. The question is, “Is this a winning strategy?” Can math demonstrate that this is a good game plan? In this paper, we dive deeper into the highest level of tennis and see if there is evidence to demonstrate that working less than your competitors can pay dividends.

Exploring the Development of Calculus Notation and its Educational Implications

Haley Mussler / hmussler@bellarmine.edu / Faculty Advisor: Frank Raymond

This research looks at the founding questions that led mathematicians to develop calculus and explores the development of calculus notation by evaluating the works of Isaac Newton and Gottfried Leibniz. This exploration compares and contrasts the notation each mathematician developed and discusses the benefits and drawbacks of each notation. It also discusses the different thought processes which led Newton and Leibniz to develop their calculus notations. These evaluations inform which types of notation should be implemented into a high school calculus curriculum. They also impact how the curriculum should be structured and taught to students. This research explores these implications and provides didactic and pedagogical suggestions to enhance a high school calculus curriculum.

The Factorization of Polynomials in the Secondary Classroom and Ring Theory

Megan Justice / mjustice@bellarmine.edu / Faculty Advisor: Gregory Kelsey

The purpose of this research is to explain the importance of polynomials in the secondary school setting and the connection it has to college math courses, like abstract algebra. First, this research explores the history of polynomials to give an understanding of how they were discovered and how the concept has evolved. Many essential standards have been identified in the local core mathematics curriculum for high school students involving polynomials. These learning goals connect to key ideas that appear in college math courses. Examples of possible questions are provided to explicitly identify the expectations of high school student responses that demonstrate mastery of the given learning targets. These examples demonstrate the lesson planning techniques educators use to assist students in developing skills that are necessary for mathematics. Students build off prior knowledge to learn ideas about polynomials and these ideas are crucial to move forward in college level mathematics. Specifically, this project makes a connection between long division of polynomials in the secondary classroom and the division algorithm polynomial rings in abstract algebra at the college level.

MEDICAL LABORATORY SCIENCE

Bacterial Infection Among Radiation Therapy Department

Ahmad Nono / anono@bellarmine.edu / Faculty Advisor: Karen Golemboski

The healthcare sector faces the problem of equipment contamination, and the situation has become a real issue in the contemporary setting. The healthcare personnel have to follow all the procedures that are provided from the department to keep all the patients safe. The goal of this experiment to make a standard procedure to clean the equipment, since there are no standards among hospitals. Many hospital pieces of equipment still remain contaminated with microorganisms. Since the instruments are shared among different patients with different health conditions, there is a high probability of transmission of nosocomial infections and other hospital-acquired diseases. Meanwhile, the system aspires to provide quality healthcare and the most affordable costs. This study will compare cleaning protocols for equipment used in the

radiation therapy department. One way the healthcare system has responded to the problem of possible contamination is by using water to clean the equipment, which has made the situation worse since most of the patients are visiting this department are immunosuppressed, and the bacteria would not be decontaminated. Therefore, they are still facing the challenge of possible contamination and pathogen transfer through equipment. In this experiment, some selective bacteria will be inoculated onto the bite block. Survival of bacteria after cleaning with deionized water and hydrogen peroxide will be compared.

The Increasing Incidence of Congenital Syphilis in the United States

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There has been an increasing incidence of congenital syphilis (CS) in the U.S. within the past two decades. Recently, three neonates were born prematurely in 2020 with CS in Louisville hospitals to mothers who were screened postpartum for syphilitic infections using a combination of treponemal and non-treponemal testing to screen and confirm the results. The neonates displayed a variety of symptoms and were screened similarly to the mothers. All the mothers and neonates had positive antibodies and reactive antigen titers to T. pallidum and were treated for the infection before discharge. CS is a chronic infectious disease caused by the spirochete Treponema pallidum subsp. pallidum that is transmitted from the infected mother during the pregnancy or birth through mucous membranes. CS can cause serious complications if the child survives past infancy. CS can be categorized as early, in which symptoms like mucocutaneous lesions, anemia, hepatosplenomegaly appears within the first two years of life; or late, in which symptoms like Hutchinson's Triad (notched teeth, deafness, and interstitial keratitis of the eyes) appear after the first two years of life. Even with symptoms, syphilitic infections are difficult to diagnose without appropriate serological testing as symptoms can closely resemble other diseases – even being called "the Great Imitator". If undiagnosed, syphilitic infections are highly contagious and spread easily among the population. Original testing algorithms for T. pallidum were time-consuming, labor-intensive, and expensive for routine screening but with increasing automation in the laboratory, new testing algorithms have made it more accessible. While detection has become more accessible, there has still been an alarming increase of syphilitic infection in the U.S. It is crucial to make syphilis screening routine for all populations to reduce the spread of syphilis and CS.

COVID-19 in a Patient with Comorbidities

Sydney Roach, Shayna Allen / sroach@bellarmine.edu / Faculty Advisor: Karen Golemboski

SARS-CoV2 is a new virus that has spread all over the world, causing a pandemic of the disease COVID-19. Some recover relatively quickly with no lasting effects, while others end up fighting for their lives. Patients with comorbidities are more likely to have greater complications when contracting the virus. This case evaluates a patient with a history of multiple myeloma, diabetes, and a recent diagnosis of COVID-19. Multiple myeloma is one of the pre-existing conditions of this patient. It is an incurable cancer that is characterized by the accumulation of plasma cells in the bone marrow. Diabetes mellitus is a relatively common disorder of carbohydrate metabolism. If not properly treated, diabetes can cause renal failure, nerve damage, and other complications. Laboratory testing is used to diagnose and monitor both multiple myeloma and diabetes. The patient's test results from different laboratory disciplines will show the progression of the patient from a relatively stable state to a quick decline after

contracting COVID-19. Evaluating these test results will give a clearer picture into how physicians monitor progression of the corona virus and how the virus can cause a sharp decline of patients with previously diagnosed diseases.

PSYCHOLOGY

How Has the COVID-19 Pandemic Affected Organizational Trust?

Hannah Ferriell / hferriell@bellarmine.edu / Faculty Advisor: Courtney Keim

Organizational trust is vital to the psychological health of employees and is related to a myriad of benefits (job satisfaction, work engagement; Chughtai, Byrne, & Flood, 2015; Shockley-Zalabak, Ellis, & Winograd, 2000). Unfortunately, many employees do not trust their employers, which implies that the organizations for which those employees work may be missing out on the positive effects associated with trust (American Psychological Association, 2018). Organizational change can exacerbate feelings of distrust (Morgan & Zeffane, 2003). Due to the COVID-19 pandemic, organizations across the world are now instituting major organizational changes. Many employees may not be happy with the way their employers have responded to the pandemic, and organizational trust may have been affected by the massive changes that the pandemic has created. The aim of the current study is to determine if organizational trust has been affected as a result of the pandemic, as well as what specific actions taken by organizations caused trust levels to change. Data was collected via an online survey taken by employees from a variety of organizations. The survey measured trust, changes in the use of psychologically healthy workplace practices during the pandemic, and employee demographics. The results of this study have shown that overall, most employees have high levels of organizational trust during the pandemic. Additionally, this study showed that increased use of psychologically healthy workplace practices (except for health and safety) are related to increased levels of trust. The results of this project will add to the growing knowledge on how COVID-19 has affected society and will also help us gain a better understanding of how organizational trust can be changed—not only in times of distress but also in other times of major organizational change.

The Political Pandemic: Investigating the Relationship between Political Ideology and COVID-19 Compliance

Allie Moore / amoore7@bellarmine.edu / Faculty Advisor: Hank Rothgerber

One key to curtailing the health costs to COVID-19 is adherence to social distancing measures. Despite their importance, distancing measures seem to have proved divisive. The present research sought to identify ideological differences in behavioral compliance to distancing measures and to account for the psychological underpinnings of behavioral differences. A first study (April, 2020; n=610) using Amazon's Mechanical Turk revealed conservatives to be significantly less likely to obey social distancing recommendations than liberals. Differences among conservatives and liberals in adherence to self-reported social distancing practices were significantly mediated by perceived COVID-19 health risk and perceived media accuracy in covering the virus. A second MTurk study (November, 2020; n=537) replicated the previous finding that conservatives are significantly less like to follow (and attitudinally support) COVID-mitigating measures than liberals. Differences in compliance and attitudes between liberals and conservatives were significantly mediated by perceived health risk, prioritization of the economy, perceived media accuracy, belief in biased science, moral

foundations (harm), and support for President Trump. Results from these studies have implications for responding to political polarization during the COVID-19 pandemic and beyond.

Recipient of the Student Government Association Research Grant Award

Motivated Moral Outrage Among Meat-Eaters

Annika Yeske / ayeske@bellarmine.edu / Faculty Advisor: Hank Rothgerber

Many meat-eaters experience negative arousal from recognizing that their eating behaviors contradict their moral values, such as desires to protect the environment or animals from harm. The present research tested whether expressing moral outrage at third-party transgressors reduces meat-related dissonance and preserves moral identity. When participants considered their responsibility for factory farming's negative impact (Study 1: N = 399) or read about factory farming's animal harms (Study 3: N = 800), expressing moral outrage reduced their feelings of guilt and elevated self-rated moral character. Reflecting on the morally troublesome nature of their eating behavior led meat-eaters to express more moral outrage at a third-party responsible for animal abuse, an effect eliminated by self-affirmation (Study 2: N = 302). These findings substantiate moral outrage as a new mechanism to justify meat consumption, offering insights into moral cognition and dissonance processes related to a pressing health and environmental concern.

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SOCIOLOGY

Introducing Restorative Justice

Grace Michels / gmichels@bellarmine.edu / Faculty Advisor: Heather Pruss

Legislative activity and public opinion polling, among other indicators, suggests there is growing support for change in how our justice system functions. As the country begins to look for other tools and more knowledge of different practices, a key challenge will be bridging the gap between the public's general support for a new path moving forward and a clear picture of what that path could look like. The goal of this project was to help propel this movement toward exploring justice alternatives by making this knowledge accessible and persuasive. As such, this project involved the creation of a material presentation that was used to introduce the principles, practice, and potential of restorative justice, an alternative approach to addressing harm that involves the people who harm agreeing to take accountability for their behavior then offering amends to the persons who were harmed by their behavior, to a generalist audience – in this case, to an audience of first-year undergraduate students. The presentation consisted of a PowerPoint Presentation, video example, and discussion aspect. To measure the effectiveness of this, pre and post tests were implemented as a quantitative measure and quotes were pulled from the discussion aspect as a qualitative measure. The preliminary findings suggest that students saw the potential of restorative justice and began to engage with this philosophy.

Recipient of the Student Government Association Research Grant Award

SPORTS ADMINISTRATION

Evaluating the Effectiveness of the NCAA Playing Rules Oversight Committee's Decision to Extend the Three-Point Line

Harry Moberly / hmoberly@bellarmine.edu / Faculty Advisor: Dan Bauer

In 2019, The NCAA Playing Rules Oversight Committee approved moving the three-point line back to the international distance of 22 feet and 1.75 inches for men's basketball. This rule became effective immediately for the 2020 D-I season. The committee cited the rationale of "making the lane more available for dribble/drive plays from the perimeter, and assisting in offensive spacing by requiring the defense to cover more of the court." The committee also was interested in "slowing the trend of the three-point shot becoming too prevalent in men's college basketball by making the shot a bit more challenging, while at the same time, keeping the shot an integral part of the game." In order to effectively assess the recent rules change, I analyzed various statistics from the 2020 season and compared them to prior seasons. I note that last season was the first in years in which three-point attempts per game actually decreased from the previous year. The 2020 season marked the lowest three-point shooting percentage in college basketball history. During the 2019 season, 28 teams shot 38% or better from behind the arc, but in 2020, only 14 teams were able to shoot in the upper echelon range of 38% or better, a significant 50% decrease in teams reaching this lofty benchmark. In addition, other statistics such as offensive rebound percentage and block percentage saw a notable downtick. Thus, while there have been some unanticipated and unsought side effects of the decision to extend the three-point line back, the committee was successful in decreasing the prevalence of the three-point shot by making it more difficult.

GRADUATE STUDENTS

ATHLETIC TRAINING

The Relationship between Sports-related Concussions and a College Athlete's Mental and Physical Health; evidence for early exercise in rehabilitation

Hannah Gittli / hgittli@bellarmine.edu / Faculty Advisor: Chelsey Franz

Background: Sports-related concussions (SRCs) commonly occur in contact sports and affect the athletes holistically: mentally, behaviorally, and physically. Purpose: To identify the prevalence of wellness and training markers (sleep, stress, muscles soreness, fatigue, Duration, Rate of Perceived Exertion (RPEs), Total Duration (TD), High Speed (HS), and Very High Speed (VHS)) in Division 1 (DI) athletes following an SRC and those without an SRC. Methods: Researchers utilized a case-study design. A major DI women's lacrosse team tracks a variety of athlete health outcomes via the Catapult AMS app. Each morning, via the app, athletes self-report aspects of mental, behavioral, and physical health. Information gathered is tabulated and stored, by an athletic statistician, in a database. Researchers utilized de-identified data from this database to examine differences in wellness and fitness between a concussed athlete and her non-concussed teammates. Results: Researchers identified potential differences in wellness and training measures in the concussed athlete when compared to her non-concussed teammates. Conclusion: The concussed athlete had lower wellness and training measurements when compared to her non-concussed teammates. The Wellness finding supports the SRC, noting the importance of considering the athletes' mental, behavior and emotional health during rehabilitation and return to play following a concussion. Additionally, the training markers finding provides evidence to support the need for early exercise in SRC rehabilitation, a newly studied area of SRC rehabilitation.

Recipient of Provost Research Grant Award

COMMUNICATION

'The Only Disability in Life Is A Bad Attitude': So-Called 'Inspirational' Media in The Age of Trump

Eve B. Lee / Faculty Advisor: Kyle Barnett

This study explores the reactions of ideologically divergent social media users to so-called "inspiration porn," or mediated images of physically disabled persons doing ordinary--or extraordinary--activities, relegating those depicted to vehicles for the emotional or spiritual gratification of nondisabled or typically able (or, among disabled observers, differently so) persons. This is important because although a quarter of American adults identify as living with a disability themselves, ableism remains very internalized; others' experience is still very voyeuristic when presented in this medium. The objective of this study is to describe an approximate correlation--either positive or negative--between the popularity of inspiration porn and the social identities of those adults who consume it. The goal is to understand, through the lenses of Erving Goffman's framing theory and Leon Festinger's theory of cognitive dissonance, how inspiration porn not only confirms but also contradicts concepts of what it means to

be a political conservative or a political liberal in America. These theories are discussed with a view to define the efficacy of inspiration porn's intended function on social media users, even threatening their most inviolable identities of political ideology, religion, education, and disability. Results suggest that, despite the majority of respondents skewing liberal, agnostic or atheist, college educated, and having no personal disability experience, those who consistently interacted with inspiration porn media the most exhibited a tendency to favor conservative politics, espouse evangelical Christianity, lack college education, and have an experience of disability—either in themselves, someone close to them, or both.

EDUCATION AND SOCIAL CHANGE

Mask Off: Students of Color Traumatic Experiences in K-12 a Why Historically Black Colleges and Universities Make a Differences

Diane Courington / dcourington@bellarmine.edu / Faculty Advisor: Winn Wheeler

This qualitative study explored the lived experiences of 11 participants who had four or more adverse childhood experiences (ACEs). The theoretical frameworks guiding this study are Culturally Responsive Teaching (Crt) (Hammond 2014; Gay 2000), Critical Race Theory (CRT) (Crenshaw, 1988; Ansley, 1989), and Abolitionist teaching (Love, 2019). This study's data collection is based on semi-structured and conversational interviews via Microsoft Teams with SOC who graduated from Historically Black Colleges and Universities (HBCU) and had an ACEs score over 4. ACEs include one or more events such as growing up in a household with an absence (divorce, separation, incarcerated), a parent (physical or mental) illness or death of a parent, physical, sexual, or emotional abuse, natural disasters, or witness to a violent crime. Phenomenology was utilized to explore the traumatic (racial) experiences of SOC in K-12 educational settings and their subsequent experiences at an HBCU. Racism is traumatic, painful, shameful, anger-producing, and stops the growth and success of communities and folx (Adams, 1990; Pierce, 1995). Racial trauma has been defined as a stressful effect or emotional pain that results from a person's experience with discrimination and racism (National Child Traumatic Stress Network, 2017). Finally, this study exploring unspoken or spoken practices at HBCU supports Students of Color. The guiding research questions are as followed: 1. What are the lived experiences of Students of Color (SOC) who have experienced racial trauma during their K-12 education? 2. How might attending Historically Black Colleges and Universities (HBCU) impact SOC with racial trauma exposure during their K-12 experiences?

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The Time Is Now: Race-based dialogue with White student affairs professionals

Imari Hazelwood / imari.hazelwood@wku.edu / Faculty Advisor: Elizabeth Dinkins

In fall of 2018 over 2 million African Americans enrolled in college or university (Hussar et al., 2020). From 2000 to 2016 enrollment of Black students increased from 31% to 36% with the largest increase in 2010 when enrollment hit 38% (de Brey et al., 2019). Since 2010, the percentage of Black students enrolling in higher education has remained between 33% and 38% (Snyder, de Brey, & Dillow, 2019). This steady enrollment of African Americans and other students of color (SOC) has called on student affairs professionals to design and implement programs and policies focused on diversity and inclusion (Mueller & Pope, 200, 2003; Ellertson, Moore, & Marsh, 2007; Pope, Mueller, & Reynolds, 2009). The need for White Student Affairs to develop cultural competencies about race is crucial for students of color at Predominantly White Institutions (PWI) (Mueller & Pope, 2001). Book clubs are one way to facilitate conversations about race and identity (Polleck & Epstein, 2015). The White Racial Identity Development theory (WRID), which is a 6-step identity scale, can be used to bring awareness about race and racism to White people so they learn to accept their Whiteness as an important part of their identity and consider what it means to be White and opposed to racism (Helms, 1990). The purpose of this qualitative study was to understand the experiences of White student affairs professionals engaged in difficult dialogue (Sue & Constantine, 2007) on race through the forum of a book club with the application of the White Racial Identity Development theory (Helm, 1992). This study hoped to shape participants understanding of SOCs, the challenges they face, and the experiences they have at a PWI.

Recipient of Provost Research Grant Award

LEADERSHIP IN HIGHER EDUCATION

Navigating the Murky Middle: Understanding How Career Aspirations and Experiences Influence the Career Progression of Women Identifying, Student Affairs, Middle Managers

Lindsey Gilmore / lgilmore@bellarmine.edu / Faculty Advisor: Mike Vetter

Even though women have made tremendous strides in many facets of education, ascending the administrative and leadership ranks within universities at a proportionate ratio to the number of women who peak as middle managers is not one of them. In the past 40 years, the number of women serving as presidents of universities across the nation has increased less than 10% from 21.1% in 1975 to 30.1% in 2016 (ACE, 2018). If a woman does find herself serving at the helm of an institution, it is more than likely at a "private, liberal arts schools rather than at doctoral granting, research, and comprehensive institution" due to the perceived male characteristics required for successful leading such institutions (Collins, 2009, p. 6). Therefore, an examination of those women serving in middle manager roles must be conducted. The purpose of this dissertation research is to dive into the lived experiences of women identifying, student affairs, middle managers in the hopes of gaining an enhanced understanding of their career aspirations and experiences. This phenomenological study is grounded in a modern feminist approach as well as motivational theory related to industrial

organizational psychology. The study consists of 15 women identifying, student affairs, middle managers with terminal degrees. One interview lasting from one to two hours was conducted with each participant via Zoom. The interviews were recorded with permission and then transcribed. Two phases of coding emerged from the transcription data in order for themes to emerge. The hope is for this study to assist universities as well as senior level administrators in creating a more supportive environment and individually encouraging middle manager women, especially those with such aspirations, to seek advancement within the field.

Hidden Identity: A Constructivist Grounded Theory of Black Male Identity Development at Historically Black Colleges and Universities

Therron Rogers / trogers03@bellarmine.edu / Faculty Advisor: Donald Mitchell, Jr.

This qualitative study used constructivist grounded theory to create an identity development theory for Black males who attended an historically Black college or university (HBCU). Cross's (1991) Black identity development theory was used as the theoretical framework for this study. Guiding this study were two research questions which were: 1) how do the experiences at a historically Black college and university influence the identity development for Black males; and, 2) what external factors influence the identity development for Black males who attended a historically Black college and university? Eight Black males participated in this study. Criterion sampling was used to qualify participants as participants had to meet the following criterion: (a) self-identify as Black or African American; (b) self-identify as male; (c) completed all their undergraduate coursework and graduated from an HBCU. Data were gathered through two rounds of semi-structured interviews in which participants shared their story of their experiences at HBCUs. From the data, a four-phase identity development theory for Black males who attended HBCUs emerged. The four phases of Black male identity development at an HBCU are: 1) acknowledgment of being a Black male; 2) understanding that not all Black males are the same; 3) creation of an authentic professional identity; and 4) transition into a Black male role model. How this study advances the literature involving Black males and recommendations for future research are provided within the discussion.

First-Generation Students and Academic Advising

Xavia Harrington / xharringtonchate01@bellarmine.edu / Faculty Advisor: Michael Vetter

This study examines whether there is a statistically significant difference between the academic success of first-time, full-time first-generation students with multiple self-reported academic advising experiences and those students with little to no academic advising experiences. Further, the study explores what additional factors influenced academic advising's role on first-generation students' academic success. Online survey results, which collected self-reported quantitative data from all first-time students during the 2017-2018 academic school year at a mid-sized, four-year public university in the Midwestern United States, examined the role of academic advising experiences of first-time full-time, first-generation undergraduate students enrolled at the university. Thus, this secondary data analysis study utilized regression analysis to examine variables associated with participants' retention from year one to year two and academic advising in order to suggest enhancements for this historically vulnerable student population's student success.

Recipient of Provost Research Grant Award

MEDICAL LABORATORY SCIENCE

Reducing cancellation of samples due to hemolysis with the use of a hemoglobin removal procedure

Alex Laliberty / alaliberty@bellarmine.edu / Faculty Advisor: Karen Golemboski

Hemolysis is one of the most significant causes of error in the clinical laboratory. When red blood cells lyse, hemoglobin released into the plasma interferes spectrophotometrically with the measurement of many common analytes with overlapping absorption wavelengths. One such analyte is conjugated, or direct, bilirubin; this analyte is frequently measured in jaundiced neonates to evaluate the need for phototherapy. Direct bilirubin results are falsely decreased in the presence of hemoglobin, particularly when the concentration of bilirubin is high and test results are most relevant to treatment. Levels of hemolysis which are commonly seen in pediatric specimens introduce unacceptable amounts of bias to the measurement of direct bilirubin. This necessarily leads to specimen rejection, and recollection in turn distresses patients, parents, and providers. HemogloBind, a product created by Biotech Support Group, utilizes a polymer with a series of charges specific for hemoglobin to selectively bind and remove hemoglobin from solution. With a relatively simple protocol for use, this product could readily be implemented in the clinical laboratory to reduce sample rejection. This study evaluated the ability of HemogloBind to eliminate spectral interference caused by hemoglobin without itself introducing significant bias in the measurement of direct bilirubin. While the product successfully cleared hemolysis from clinical samples, direct bilirubin results remained altered following treatment with HemogloBind.

PHYSICAL THERAPY

Determining the Discharge in Acute Care

Nikki Thiede, John Paz, Logan Rauck / nthiede@bellarmine.edu / Faculty Advisor: Beth Quinn

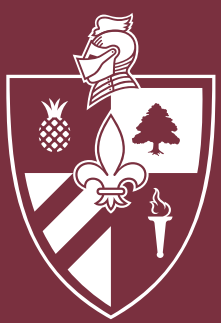
Acute care physical therapists play an important role in discharge planning which impacts the success of the patient following discharge from the acute care setting. Physical therapists and physical therapist assistants have the same goal when determining discharge recommendations; ensuring that the patient is discharged to the appropriate level of care. These discharge recommendations are an important step in providing continuity of care when transitioning from the acute care setting, however, there is little evidence available which outlines specific factors or considerations taken into account by physical therapists during the discharge planning process. The purpose of our study was to develop a survey to identify and understand important factors influencing discharge recommendations as well as to study the clinical-decision making process involved in the discharge planning process. A survey was created based on interviews conducted with physical therapists at Baptist Floyd Hospital which identified important factors in the discharge planning process. The survey was then disseminated to acute care therapists in the greater Louisville area and the data gathered was analyzed to determine common themes among therapists. The survey results showed that current mobility status, caregiver support, home environment, cognition and prior level of function were the most important factors when determining discharge recommendations. The most common outcome measures used by therapists included

the AM-PAC 6-Click, 5 Time Sit to Stand, Tinetti, BERG Balance and the 6 Minute Walk Test. The results from this survey revealed that discharge planning is a complex and multi-factorial process, however, therapists had similar decision-making processes.

Determining the Association Between Traditional and Functional Tests to Predict Rock Climbing Ability: A Pilot Study

Brandi Miller, Taylor Pelton, Bridget Stewart, Nelson Baker / bmiller8@bellarmine.edu / Faculty Advisor: Norman Ayotte

The purpose was to determine the relationship between rock climber skill level and sport specific physical performance tests. Furthermore, to determine the correlation between a novel assessment test, the Climber's Reach Assessment Tool (CRAT) versus the unilateral power slap test (PST), arm jump test (AJT), and Upper Quadrant Y Balance test (UQYBT). Twenty climbers (16 male) participated in the study, average age 26 3 6.7. Participants self-reported their bouldering skill level on a scale of V2-V8+. The CRAT was designed to assess upper extremity reach while maintaining three points of contact on a vertical wall. The relationship between the CRAT and UQYBT, the Arm Jump test and Power Slap test were assessed, along with their relationships to the climber's skill level. Statistically significant associations were found between the AJT, PST and CRAT but not with the UQYBT. Statistically significant associations were also seen between skill level and all performance tests except the UQYBT. A strong association was found between the AJT and skill level and also the PST and skill level. A strong association was found between the CRAT and skill level. The PST and AJT had a strong association with the CRAT. The AJT also had a very strong association with the UPS. There was not a statistically significant association between the UQYBT and skill level. There was not a statistically significant association between the UQYBT and the CRAT. In conclusion, sport specific performance measures occurring in a vertical plane demonstrate moderate to strong correlation with climber skill level. However, performance measures that occur in a horizontal plane do not correlate with skill level. The CRAT demonstrates moderate to strong correlation to skill level and measures of upper extremity power while assessing grip strength and core and shoulder stability.



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