SYMPOSIUM

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ART

Why Art Therapy is Beneficial for Those with Autism Spectrum Disorder

Student Scholarship: Sydney Isbell
Faculty Advisor: Haelim Allen

Socialization, communication, and imagination are all important aspects of everyday life. However, individuals suffering from autism spectrum disorder (ASD) can find it very difficult to perform in these areas. Art therapy is one way of engaging clients in order to foster each of those areas through the use of art making. Using art as a way to activate the senses allows the client to visualize himself/herself in a social situation without the added fear of interacting with another person. Communication can also be expressed by the use of images or movements in the place of words, such as comics or pointing. This strategy is a constructive way of communicating with clients because verbal conversation can become intimidating for those with communication impairments. By encouraging the client to try new methods of expression, he or she can be given the ability to use his or her inherent art-making abilities in a way that is enjoyable. Studies show that those on the autism spectrum are often visual and concrete thinkers and that "art therapy as a component to social skills training may increase the willingness of children to participate because art is an activity that they find acceptable" (Epp, 2008, p 29). By using a form of therapy that appeals to the client, it is much easier for that person to progress in therapy and improve their overall way of life.

Scene by Scene: The Origin, Purposes, and Impact of the Movie Poster

Student Scholarship: Eli Creasy
Faculty Advisor: Haelim Allen

This research explores the history of the movie poster from its beginning designs and purposes to its current state and impact. The movie poster is a marketing tactic that informs movie-goers with minimal, yet enticing information about a particular film. Since its early stages of production, the movie poster was utilized as a promotional tool for film companies, as well as theaters, to engage with a potential customer. The movie poster's usage in the later 19th century evolved from general advertisement of the theater itself to a marketing tactic for specific picture shows. It was vital for the movie poster to communicate effectively in a way that gathered an audience to see a film. Artistic movements, cultural preferences, and technological advancements contributed to the progression of stylistic choices of the movie poster's design. With the rise of the digital age since the late 20th century, the design, functionality, and influence of the movie poster has expanded its impact as mere advertisement towards an item of popularity for the public and collectors alike.

Winged Beings: Influences on the Christian Depiction of Angels on the Sarigüzel Sarcophagus

Student Scholarship: Callie Wright
Faculty Advisor: Haelim Allen

Angels, depicted as human beings with bird-like wings, are highly recognizable in centuries of Christian art. As ubiquitous as this visual motif has been, it was not always present in Christian art. In fact, this winged type of figure is not necessarily biblical or even unique to Christianity. Winged deities and demons appear frequently in pagan art created before Rome's embrace of Christianity, and they present a case for cross-cultural influences within religious art. This study centered on the 4th Century Sarigüzel sarcophagus, the earliest known depiction of Christian angels with wings, as a key to exploring the history and development of the winged-being motif in various cultures. How early Christian artists came to appropriate various visual influences and perhaps recontextualize the motif for use for the Christian faith was explored.

Raku and Primitive Firing: Affordable Options to Manufactured Kilns

Student Scholarship: Camille Wehrman
Faculty Advisor: Haelim Allen

Firing ceramics using manufactured electric kilns requires a significant amount of materials and labor, falling outside of the price range of many artists. However, firing using alternative methods such as pit and raku firing are much more feasible than pursuing traditional options. Pit firing, or primitive firing, can create a variety of earthy colors and imprints of organic materials. Only requiring a simple pit in the earth, primitive firing is an economically feasible and environmentally friendly firing option. Raku firing allows a greater variety of colors and lusters due to the presence of glaze and an emphasis on reduction techniques, but requires more labor and materials than pit firing. Even so, raku firing is a more financially feasible option than firing using manufactured kilns. Both pit firing and raku firing can produce gallery-quality ceramics, giving artists without access to manufactured kilns an opportunity to produce quality works of ceramic art.

ART

Effects That Affect

Student Scholarship: Nikki Grim
Faculty Advisor: Haelim Allen

The Photoshop Effect is the influence of unrealistic body expectations on the public as a result of photographic manipulations, most often created with the use of the program Photoshop. The influences on photographic images based on such enhancements, specifically focusing on images of fashion models and celebrities in magazines and advertisements will be explored. There are different types of manipulations that are ethically acceptable to make to an image, such as color correcting and lighting enhancements, which will be compared to the types of manipulations that are unethical, like drastic changes to one's bodily or facial features. Overall, the goal of this study is to contrast both the harmful and helpful effects of Photoshop on society, discussing which enhancements are acceptable and which are not.

A Human Mark: Richard Long's Two-dimensional Art

Student Scholarship: Neil Cole
Faculty Advisor: Haelim Allen

This research explores British artist Richard Long's mudworks, drawings, and prints and how his two-dimensional art fits into his larger body of work as a whole. Long's drawings and mudworks are not as well-known as his world-famous sculptures, but both bodies of work are strongly related because of their similar concern with the relationship between human beings and the earth where we live. Long's two-dimensional working processes and his interests in materiality and the idea of place will be explored. Long's work will be reviewed by drawing from books, journal articles, and especially, interviews with the artist.

Monumental Clay Sculptures: Revolutionizing the Ceramic Tradition

Student Scholarship: Lynn Tucker
Faculty Advisor: Haelim Allen

Clay as a medium has incredibly broad and unique possibilities due to its moldability and permanence. For centuries, potters have been making intimate, functional ceramic ware and that tradition continues today. However, in the 1950's, artists such as Peter Voulkos began applying the principles of Abstract Expressionism to clay. This initiated a movement that allowed artists to move past the boundaries of functional ceramics and begin making large-scale ceramic sculptures. A few of these artists are Viola Frey, Stephen De Staebler, and Jun Kaneko. These three artists are incredibly unique and have differing aesthetics, but they all make monumental ceramic sculptures. The use of scale is a vital element in each of their ceramic work, and it requires full dedication to the material. Clay has several unpredictable qualities and one of the primary obstacles when constructing ceramic sculpture is its probability to crack at some point during the drying or firing process. Due to this common issue of cracking, artists who work in a large-scale are required to experiment and develop skills that allow them to use clay in a monumental way. When comparing the work of Viola Frey, Stephen De Staebler, and Jun Kaneko, it becomes clear that their making of large-scale ceramic sculpture was highly ambitious, and it made a significant impact on the art world.

Cuerda Seca: A Decorative Technique for Tile

Student Scholarship: Jennifer Hatch
Faculty Advisor: Haelim Allen

Cuerda seca is an ancient technique used for decorating pottery. A design is laid out in black or colored lines made of a substance that resists glaze. A colored glaze is then applied to the spaces between the lines, resulting in colors beautifully separated like cloisonné, rather than colors that run together and become muddy. This study also explains the process and traces the history of cuerda seca from the earliest documented examples to the present. The goal is to spotlight this little-known technique and to emphasize its importance in history and in the art tile world of today.

Chinese Censorship and Chinese Artists and Cartoonists Who Speak Out

Student Scholarship: Jessica Ferrari
Faculty Advisor: Haelim Allen

This study will look at the Chinese government's censorship of art and ideas by such artists as Ai Weiwei, Zhao Zhao, Badiucao, and Jiang Yefei. Their work will be studied in contrast to communist propaganda posters. These men are fine artists and cartoon artists who make work that criticizes the actions of the Chinese government, for which they have received repercussions from the government. The repercussions come in the form of hefty fines, removal from the internet, and even imprisonment. Despite these threats, the four artists continue to make work that challenges the regime and advocates for freedom of speech and thought.

Anagama Kilns: From Early Japanese Tradition to Contemporary Ceramics

Student Scholarship: Jessa Potts
Faculty Advisor: Haelim Allen

As Asian ceramics became popular in the west through artists like British potter Bernard Leach studying in Japan, the tradition of Anagama kilns have been adapted into contemporary ceramics, and are still a popular method of firing. Anagama kilns are a form of wood firing that dates back to early Japan. This type of firing allows for wares to be fired at a temperature that makes them fully useable. The early structures of these kilns were long tunnels dug into hillsides with chimneys further up the hill. This design creates higher temperatures by forming a directional path for the flame, allowing the clay to mature and wood ash to travel throughout the kiln. Wood firing in general has existed for many centuries in different capacities, but it became an ingrained part of Japan's spiritual culture through their regard of natural beauty. This research presents an overview of the Anagama kiln, and its history in addition to showing how it is impacting contemporary ceramics.

The Art of Rebranding

Student Scholarship: Giovanna de Souza
Faculty Advisor: Haelim Allen

With the never-ending evolution in technology and graphics, branding has become a critical aspect of a successful business. A modern, consistent brand can affect a larger audience, resulting in greater achievements and development. This study explores the success of re-branding in a contemporary world. Existing work in the sociology of branding asks "To what extent does re-branding affect the success of a business?" This research involves an analysis of two companies: GAP and Mastercard. GAP's re-branding was a major failure, whereas Mastercard's re-branding expanded their public outreach. This research concludes that re-branding can improve response rates, boosts sales, market shares, and revenue. However, re-branding, if done incorrectly, can severely damage customer interest and create a serious loss in revenue. This study showcases the potential growth following a successful re-branding campaign, in contrast to the negative impact of a failed one. ■

BIOLOGY

Chemical Factors Promoting *Pseudomonas fluorescence* Pf0-1 Biofilm Formation

Student Scholarship: Kristen Holley
Faculty Advisor: Esther Choi

Biofilms consists of bacteria that use a self-produced extracellular polymeric substance (EPS) to adhere to a surface and communicate with each other. EPS provides extremely efficient protection against toxins and phagocytes, permitting bacteria in biofilms to survive antimicrobial treatments and host cell immune responses. *Pseudomonas aeruginosa* biofilms are known to cause nosocomial infections and increase mortality rates of cystic fibrosis patients. This experiment investigated chemical factors promoting biofilm formation by using *Pseudomonas fluorescence* Pf0-1. Pf0-1 displayed increased biofilm levels in minimal media supplemented with glucose versus complex media, but this effect was negated with additions of amino acids and zinc chloride. Taken together, it is concluded that Pf0-1 differentially regulates its amino acid metabolism pathways from *P. aeruginosa*, but they have similar metal ion uptake. Therefore, zinc could be a preventative agent for *P. fluorescence* biofilm accumulation in food industries.

Constructing a Transgenic Line of Zebrafish that Express GFP when Clusterin is Expressed

Student Scholarship: Olivia Coffman Cooper
Faculty Advisor: Hannah Henson

Clusterin is an important glycoprotein linked with many diseases and chronic injuries. Further research on *clusterin* may reveal pathways to diagnose or cure diseases like Alzheimer's or Parkinson's. Zebrafish *(Danio rerio)* are an excellent model organism and their translucent nature allow the green fluorescent protein (GFP) to be visualized inside the zebrafish during development. This experiment attempted to create a transgenic line of zebrafish that express GFP when *clusterin* is expressed. Tracking *clusterin* using GFP as a marker for its expression would provide a better understanding of *clusterin's* normal function and its role in disease, especially in neurogenic diseases. A Tol2kit was used to create the DNA constructs for this transgenic zebrafish line. A polymerase chain reaction (PCR) was used to amplify zebrafish *clusterin* promoter, which was then ligated into the Tol2 DNA construct. Results are pending on this method's success and creation of the transgenic zebrafish line.

The Effect of a Ketogenic Diet on an Induced Mouse Model of Plaque Psoriasis

Student Scholarship: Parker Lewis
Faculty Advisor: William Thierfelder

Psoriasis is an inflammatory condition which presents with dry, itchy plaques across the patient's epithelia. In this experiment, an induced mouse model of psoriasis using topical Imiquimod cream was employed. After 1 week of treatment resulting in plaque formation, mice were given a ketogenic diet for 1 additional week. To determine the level of systemic inflammation, spleen cells were isolated from the mice. The erythrocytes were lysed, followed by incubation of the lymphocytes with anti-CD3. The RNA was then isolated from the lymphocytes, followed by DNase treatment of the nucleic acid to destroy residual DNA. To quantify systemic inflammation, RT-PCR was carried out to measure expression of the pro- and anti-inflammatory cytokines IL-23, IL-17, TGF-β, and IL-10. These data implied that the ketogenic diet increased systemic inflammation through an increase in transcription of IL-23 and IL-17, along with a decrease in transcription of TGF-β and IL-10.

Inhibition of Biofilm Formation of *Staphylococcus epidermidis* and Differential Gene Expression of THP-1 Macrophages

Student Scholarship: Emily Ebert
Faculty Advisor: Esther Choi

Staphylococcus epidermidis is a human skin commensal that limits the colonization of other pathogens. Adversely, they can form biofilms or aggregation of microorganisms to evade phagocytic cells and become resistant to many antibiotics. In order to combat nosocomial infection associated with *S. epidermidis biofilm*, this research aimed to determine factors contributing to biofilm formation of *S. epidermidis* and investigate how the biofilm forming bacteria changes the profiles of pro-inflammatory cytokines of macrophages. The results showed that the biofilm formation was inhibited in the presence of Pseudomonas quorum sensing molecules. It is currently under investigation how differently THP-1 macrophage-like cells react against bacteria when challenged with biofilm forming verse biofilm negative mutant *S. epidermidis*. Taken together, the results suggest biofilm formation and immune evasion of *S. epidermidis* can be prevented with small inhibitory molecules that interfere inter-species bacterial communication.

Innate Color Preference in the Blue Bottle Fly

Student Scholarship: Alexis Enriquez-Jones
Faculty Advisor: Jeremy Blaschke

Blue bottle flies *(Calliphora vomitoria)* are well-known for their contribution to forensic science and as household pests. These flies use both olfactory and visual cues to locate mates, food, and oviposition sites. In this experiment, the innate color preference and associative learning ability of blue bottle flies was tested using a sucrose/yeast solution as bait and yellow, black, white, or blue colored discs as landing platforms. The results indicate that when looking for food, blue bottle flies are strongly attracted to blue and white and almost completely ignore black. Regardless of food/color association, the innate attraction of the flies to the blue and white discs overshadowed any possible associative learning. Their preference for white and their apparent inability to learn may indicate that, in contrast to honeybees, associative learning may not provide a selective advantage for these short-lived insects.

BIOLOGY

Mechanical Antibiotic Effect of Blue Dasher Dragonfly *(Pachydiplax longipennis)* Wings on Fluorescently Transformed *E. Coli*

Student Scholarship: Claire Hamblen
Faculty Advisor: Jeremy Blaschke

Bacterial antibiotic resistance is a growing concern in the healthcare community, resulting in increased research into the development of novel chemical and mechanical bactericides. This research examined the mechanical antibiotic effects of blue dasher dragonfly *(Pachydiplax longipennis)* wings on fluorescently transformed E. coli. Wings were cut into 6 mm circles and placed in nutrient broth with transformed bacteria in a 96-well plate. Growth of bacteria was monitored for 24 hours using a fluorescence microplate reader. Dragonfly wings as a substrate for bacterial growth were compared to wells containing either no substrate, glue only, polypropylene plastic, or contact lenses. Wings inhibited bacteria growth compared to wells with no substrate, glue only, and polypropylene plastic, but there was not a significant difference between the bacterial growth in wells containing dragonfly wings versus contacts. More trials are needed before blue dasher dragonfly wings can serve as a model for mechanical bactericidal surfaces.

Investigating Anuran Species Composition in Madison County

Student Scholarship: Madison Morris
Faculty Advisor: James Kerfoot

Nearly 60% of amphibian species worldwide are either threatened with extinction or species data is lacking. Eighteen anuran species are reported in Madison County, Tennessee, however, studies on the link between microhabitats and anuran community structure are lacking. The objective of this study was to investigate anuran populations in Madison County and to determine how environmental factors play a role in structuring their communities. To determine species presence/absence at four sites in Madison County, manual calling surveys were conducted during peak calling times from May 2019-March 2020. Calls were recorded for all but one reported species, the pickerel frog *(Lithobates palustris)*. Preliminary results of a principle components analysis indicate two sites have wider species breadth, whereas the other two have a smaller species composition. This variation in species composition may be related to slow moving water and this microhabitat characteristic may confer success of all life history stages for species.

Evaluation of Growth Regulator Concentrations Necessary for Monkey Puzzle Tree Regeneration by Plant Tissue Culture

Student Scholarship: Jordan Meadors
Faculty Advisor: Mark Bolyard

The purpose of this study was to use plant tissue culture to induce callus of *Araucaria araucana* leaves and observe possible shooting after auxin removal from regeneration media. Concentrations of phytohormones 6-Benzyladenine (BA) and 1-Naphthaleneacetic acid (NAA) in the media were 0.1 mM and 1 mM, respectively, and induced callus production. In the second part of this project, NAA was eliminated from 6 groups at different time periods. All leaves were originally plated on basal media and then regeneration media containing both NAA and BA. A new group was transferred to BA-only media every 2 weeks until the end of the study. Calluses were evaluated according to color and size. Results showed that removal of auxin did not effectively allow for shoot morphogenesis or further callus growth.

The Efficacy of *Santalum album* as a Natural Preservative in Cosmetic and Dermatological Applications

Student Scholarship: Steven A. Hutcherson
Faculty Advisor: Esther Choi

Atopic dermatitis, a growing condition in both medical and veterinary fields, is often caused by opportunistic pathogens from the *Staphylococcus* genus of bacteria. Due to consumer demand, product ingredients are rapidly shifting from synthetic chemicals to natural sources. This study aimed to determine the efficacy of Sandalwood Essential Oil (SAO) as an antibacterial preservative against *Staphylococcus epidermidis 1457*, one of the normal skin microbiotas. SAO showed strong growth inhibition at low concentrations (<0.2% by volume). The interactions between SAO and human cells such as a non-cancerous epithelial cell line (A-431) and a cancerous breast cell line (MCF-7) are under investigation. The interesting results of these studies indicate that SAO can be an effective natural product not only as a preservative, but as a medicinal component in treating more serious skin-related illnesses outside of the cosmetic profession.

Survey of Mammal Biodiversity in Urbanized Areas in West Tennessee

Student Scholarship: Elizabeth Gibson
Faculty Advisor: Andy Madison

Urbanization is globally increasing at a rapid rate. Habitat fragmentation, vehicle and animal collisions, and habitat destruction are all leading to a decline in mammalian populations. Examining the biodiversity in mammals

in West Tennessee will provide important data about how mammal populations differ across varying levels of urbanization. This study was conducted January-May 2019. Two cameras were placed at nine study sites: three were in downtown Jackson, three were on the edge of Jackson, and three were in rural areas of Jackson, Tennessee. Species and numbers were recorded. Results are pending.

Scent Preference in Bobcats *(Lynx rufus)*

Student Scholarship: Sophie Ledes
Faculty Advisor: Andy Madison

Surveying animal populations in their natural habitats is one of the most important first steps in wildlife conservation and management. Estimating numbers of cryptic animals, such as the bobcat *(Lynx rufus)* can be difficult. The objective of this study was to test different baits for assessing bobcat numbers. Twenty trail cameras were distributed at the Milan Army Ammunition Plant near Milan, Tennessee, five cameras for each of the four treatments: wet cat food, dry cat food, sardines, and the control. New treatments were put out every week for five weeks and recorded the species that visited. Wet and dry cat foods attract the most bobcats. ■

BUSINESS

A Shell Firm Anti-Corruption Proposal: The Case for an International OECD-Enforced, Corporate Financial Registry, Requiring Automatic Information Exchange

Student Scholarship: Kathleen Balon
Faculty Advisor: Colene Trent

In the international system, there exists an increasing dilemma regarding the usage of anonymous shell firms through tax haven states. Previous academia has largely focused on the political and societal implications of shell company usage. What is needed, and what this study addressed, is the lens of economic implications for shell firm usage, as this area lacks substantive academic research and addresses long-term implications both societally and politically. Addressing the economic implications, with rooted economic theory on regional trade agreements, allows for the creation of economic anti-corruption initiatives for the future. Previously proposed solutions have seen little success or means of enforcement, creating the call for an international OECD-enforced, corporate financial registry, requiring automatic information exchange. ■

CHEMISTRY

Development of a Microwave-Assisted Synthesis of N,N′-bis(salicylaldehyde)ethylenediamine and Metal-Salen Complexes Experiment +

Student Scholarship: Breanna Johnson
Faculty Advisor: Sally Henrie

The importance of green chemistry is implemented in developing an experiment for an undergraduate organic laboratory. Domestic and commercial microwaves were employed to green up an experiment that synthesizes salen H2 and Co(salen) by refluxing. The research also includes expanding the experiment to include the synthesis of additional salens and metal salens. The microwave aids in reducing waste, the consumption of energy, reaction time, and expenses. Additionally, the use of other solvents was attempted to "green up" this experiment. The experiment introduces students to structures and fundamental concepts of metal-salen complexes and green principles in the laboratory.

Optimizing a Poly(Lactic acid) Polymer Experiment for an Organic Chemistry Laboratory

Student Scholarship: Naomi Dalton
Faculty Advisor: Sally Henrie

Polymer and green chemistry are two of the fastest emerging subdivisions of chemistry and the focus of very important biochemical and chemical research. The importance of these areas is emphasized in a two-step experiment for the undergraduate organic laboratory where the biodegradable and biosourced polymer, poly-L-lactic acid (PLLA), is synthesized. In this experiment, the first reflux reaction forms an L-lactide intermediate from L-lactic acid. The second reaction forms the final PLLA polymer via a reflux ring opening polymerization (ROP). The project goals of this research were to optimize and adjust this previously developed experimental laboratory procedure for synthesizing and analyzing PLLA in order to increase percent yields. Also, to be developed, was a more time and energy efficient microwave ROP procedure to replace the currently existing reflux ROP procedure. An end group analysis procedure of the final poly-L-lactic acid polymer was also developed to further introduce students to the fundamental concepts of polymer chemistry. ■

COMPUTER SCIENCE

Computer Science SharePoint Website

Student Scholarship: Laura Hailey
Faculty Advisor: G. Jan Wilms

The Department of Computer Science does not have a central source of information. Though the current Union University webpage includes information for incoming students and advertises the department very well, the information for current majors is not frequently updated. Therefore, this project is aimed at giving current students enrolled in these fields a space to collaborate, receive support, ask questions, find resources, and be informed on current news and happenings both on campus and in the world. This will be done through SharePoint, a Microsoft online service that creates the bones of a website to allow creators the ability to focus more on creating content. It creates templates for different website functions such as calendars, lists, contacts, discussion boards, and offers space for collaboration between teams. Future approved students can continue to maintain and update this site as often as needed.

Innovative Sports and Tennis Viewing for the Jackson Country Club

Student Scholarship: Ciara Pride
Faculty Advisor: G. Jan Wilms

The goal of this project is to develop a website for a real-world client with a working need. The website will be made with the tools of HTML, JavaScript, and React. The client is the Jackson Country Club and their business and services will be displayed and showcased throughout the website. The Jackson Country Club is a place that serves food, provides access to various sports, and hosts sporting events. Their services and products include a court reservation system, tennis specialties and instruction, and a place for events. This project will give the company a fresh new website that can be used to handle all of their users and guests alike. All users visiting the site can interact with videos, photos, and other media to really see a glimpse at what goes on at the Jackson Country Club.

Open Pay: A Simple, Open-Source Payroll Application for Small Nonprofits

Student Scholarship: David Cooper
Faculty Advisor: G. Jan Wilms

For many small businesses and non-profits, managing payroll is a hassle that can be quite expensive. Most existing payroll applications require high monthly payments and are convoluted with complex features that are unnecessary for a small operation, causing many business administrators to resort to using a spreadsheet for their payroll needs. Open Pay is a payroll management application that stores a list of employees, calculates payments, and generates reports. It has a simple, user-friendly interface, and it is completely free to the user. This desktop application will empower non-profit organizations to simplify their payroll system, while reserving more funds to accomplish their mission statement.

A Practical Mobile App for the Union University Student Government Association

Student Scholarship: Daniel Clegg, Jackson Cottrell, and Andrew Mayo
Faculty Advisor: G. Jan Wilms

Ease of use. That is the core reason for creating a mobile app that helps Union's Student Government Association (SGA) have a better experience while performing their duties. Currently, SGA does not have a tool that includes everything they need in one location. This app will streamline all their procedures and processes in one place. The app will allow them to submit documents, stay up-to-date on current committee events, vote on current bills/resolutions, record attendance, etc. Microsoft's Azure and Xamarin resources will be utilized to allow data to be stored in the cloud in order to make our app function with mobile devices.

Wood's Landscaping Online Redesign

Student Scholarship: Robby Goette and Tristan Wood
Faculty Advisor: G. Jan Wilms

This project is an overhaul of Wood's Landscaping's online presence. The website is based in React, which is a cutting-edge framework in Javascript for website development. The React website was then transferred to a Wordpress template. Wordpress allows easy access to a website's content such as pictures, text, contact information, and more. Through these changes, Wood's Landscaping will receive a higher priority on search engine queries.

Adopting CARE

Student Scholarship: Tylman Michael
Faculty Advisor: G. Jan Wilms

In fluorescence microscopy, sometimes gathering clear images of living materials is impossible without damaging the subject. In order to ensure the survival of the image material, blurry or undersampled images must be taken. This project's goal is to test the applicability of a machine-learning based image deconvolution software called Content-Aware Image Restoration (CARE: https://tinyurl.com/rspvebm) at St. Jude Children's Research Hospital. The hope for this project is to supply another tool for their toolbox that might give clearer images to those who are directly working to end childhood cancer.

E-Bulletin

Student Scholarship: Noah Franck and Micah Pinkley
Faculty Advisor: G. Jan Wilms

E-Bulletin is a web application that allows users to both manage events for student official organizations and allows users to subscribe to the organizations they want to hear about. Organizations will be able to push notifications with event information directly to their followers and create polls to collect the opinions of those who attend their events. Allowing for the use of either an internet browser or using the E-Bulletin app available on any smartphone, users can look at their personalized bulletin board wherever they are. Flutter was used to create the app and Firebase and React were used to handle the website.

Professional Development for Non-Profit Financial Software

Student Scholarship: David Parks
Faculty Advisor: G. Jan Wilms

For more than two million children, Compassion International works to release them from poverty in the name of Jesus. Like many organizations, Compassion International hires software developers to further its cause by creating reliable solutions that supporters can trust. With the responsibility of supporter and beneficiary information, Compassion International does its best to protect that information and hold itself to the highest standard in code development. Using test driven development, Agile, and many of the other latest development methodologies, a payment solution will be developed to help increase the scope of Compassion International's ability to carry out payment actions. ■

EDUCATION [GRADUATE]

School Components that Create College-Ready Graduates

Student Scholarship: Patrick Carneal
Faculty Advisor: Carla Cushman

This study attempted to identify common components of effective instructional programs that produced high school graduates with the skills necessary to succeed in college. The researcher analyzed student course enrollment, schedule type, TNReady Algebra II End-of-Course (EOC) scores, TNReady English III EOC scores, ACT Math, ACT English, and ACT Reading scores to determine their impact on college readiness. The researcher used one-way Analysis of Variance (ANOVA) tests to identify differences in TNReady EOC scores based upon whether students were enrolled in block or traditional period schedules. The researcher also conducted correlations to determine if a relationship existed between TNReady EOC scores and associated ACT subtest scores. The research revealed that students in standard block-scheduled English III and Algebra II courses outperformed students on period schedules in the same courses in the district. The differences were not present for Honors English III and Honors Algebra II revealed a small effect size for those on block schedules over period schedules, suggesting that schedule type had limited impact on the strongest students in the sample. The correlations conducted between TNReady EOC scores and associated ACT subtest scores revealed strong positive relationships. The implications are that focusing resources towards improving student achievement on one testing suite would likely result in improved scores on both. The ACT is a recognized measure for college readiness used to determine college entrance and scholarship awards. The TNReady EOCs are used to assess teacher, school, and student performance. They also take significant instruction time away while the ACT takes one school day. Focusing resources on improving student success on the ACT may work improve college readiness in high school graduates. Expanding this research to more school districts may produce similar results and lead to discussions as to the efficacy of maintaining two separate testing systems in high school.

Academic Achievement of African-American Students at Extended-Time Schools in One Urban District

Student Scholarship: Robyn Beard
Faculty Advisor: Carla Cushman

An educational achievement gap has existed between minority subgroups and their non-minority counterparts for many years. There are tests to measure achievement and others that measure growth. In order to close the achievement gap, students that fall behind academically must often grow at a faster rate than schools that maintain or exceed national norms. This can prove to be a challenge for struggling subgroups due to many extenuating factors including decreased educational access and a lack of adequate instruction often related to low socioeconomic status and other educational inconsistencies. Over the years, educational systems have searched for remedies to address the deficit areas and close the achievement gap. One such practice includes providing increased educational instruction by extending the school year by a set number of days or longer instructional days. This study looked at the effectiveness of this practice in one large urban district. ■

ENGINEERING

Benchmarking 3D Printed Prototypes: A Fractional Factorial Design of Experiment

Student Scholarship: Emory Craft, John Mayer, and Reagan Oliver

Faculty Advisor: Don Van

Prototyping can be an expensive task, especially for custom-made components. The purpose of this project is to determine how companies are able to prototype products in a less expensive manner using 3D-printed models to test compressive strength. The ultimate compressive strength of various samples, which is the stress required to rupture a specimen, will be examined. Using a 3D printer, a specimen can be produced and tested in hopes of finding a proportional compressive strength scale factor between the 3D-printed part and a real specimen. With this inexpensive technique, engineers can use the data to appropriately select material, infill pattern, and percentage infill.

Gerdau Autonomous Printer Head Project

Student Scholarship: Ainsley Duncan and Jared Lavelle

Faculty Advisor: Georg Pingen

The purpose of this project was to design an apparatus capable of autonomously printing labels on different size stacks of steel as they roll down a conveyor. This system has to adjust the height of the printer head automatically to accommodate for the individual heights of the stacks of steel as they move underneath the printer head, as well as rotate the printer head to be able to print on the angled bars. This project was proposed by Gerdau, a company that manufactures four different types of molded steel: flat bars, right angle bars, U-shaped bars, and rebar. This system only needs to work for the flat bars, right angle bars, and U-shaped bars.

ENGINEERING

Factor Effects on Acidity and TDS in the Coffee Brewing Process

Student Scholarship: Ben Marsch and Tobey Taylor
Faculty Advisor: Don Van

Coffee is a bold and complicated drink, conferring the same boldness to those millions who drink it daily. Acidity and TDS (Total Dissolved Solids) are key factors that affect how enjoyable this complicated drink is to the drinker, and therefore, these factors are of interest in a coffee study. Acidity can affect how the subtle flavors in coffee emerge, and TDS is a measure of the strength of coffee. While nominative claims about these measures for coffee quality cannot be made, we can predict how factors in the coffee-making process affect them, so that aficionados can make their own decisions. A 2-level factor analysis over 4 factors of interest--water temperature, Aeropress pressure, grind type, and water type--will be used. A quarter-fraction reduction for ease will also be used. With a normal probability plot, the interaction of each factor on acidity and TDS will be determined.

Experimental Water Filter Design and its Effect on pH

Student Scholarship: Michael Drury, Davina Norris, and Luis Larrinaga
Faculty Advisor: Don Van

The pH values of water can signal high levels of chemical contaminants such as lead. Effective and affordable water filtration is crucial for the development of many countries. The effect of different components in a homemade water filter on the pH levels of contaminated water will be examined. Although pH is not a perfect indicator of the purity of water, because of the possibility of biological contaminants, it provides quantitative value of the chemical impurities that we can analyze. According to the EPA the acceptable pH range for safe drinking water is 6.5-8.5; this gives a range of values in which to compare our filtered water. To develop our filters, a plastic bottle, activated charcoal, gravel, sand, and a washcloth or coffee filter will be used. The half fractional factorial method was implemented to create eight different experimental runs, using high and low values for each variable. Using this technique will allow a test of the effectiveness of each variable without building 16 different filters. The same amount of water, from the same source, will be run through each filter three times. To test the pH of the water before and after filtration, a digital pH meter will be utilized. The values from this experiment will be recorded and analyzed using Excel. Using these results, the most effective water filter and the variable that effects the PH the most will be examined.

AIR 2.0: Testing the Winds

Student Scholarship: Andrew Dougan, Adam Lynn, and Stuart Milam
Faculty Advisors: Georg Pingen and Jay Bernheisel

Have you ever wondered how the airplane wing allows the airplane to lift off the ground? Fluid pressure is the answer! In this project, the team will experimentally study said pressure distribution around a 3D printed NACA0012 airfoil. This will be accomplished through a PLC-driven data acquisition system and student-designed mounting provisions inside of the test section. The focus of this study will be seeing how these pressures change as a function of the angle of attack. The project team's data acquisition system and setup can be used by future students in the highly anticipated Union MakerSpace to enable future studies of aerodynamics. ■

INTERCULTURAL STUDIES

Places, Spaces, and Faces: The Function of Place in Identity

Student Scholarship: David Banister
Faculty Advisor: Phillip Ryan

Using an interdisciplinary, intercultural framework, the function of place in identity development through J.R.R. Tolkien's *The Fellowship of the Ring* is explored. *Identity* is the phenomenon which individuals negotiate by interacting with self, other, and world. *Place*, as it relates to identify, takes on anthropomorphic qualities. *Function* captures the active nature of place within identity negotiation. Such complexity calls for an interdisciplinary approach that explores the relationship between place and self in this text, with implications for reconciling engagement with self and other. This framework integrates physical and cultural geography as well as intercultural communication, literary criticism, and narrative theology to analyze what place *does* to the characters of *Fellowship*. It begins with a rationale for an intercultural and interdisciplinary approach, describes the relationship of place and identity in *Fellowship*, and offers implications for further scholarship and intercultural community-building.

Possibilities and Implications of Interfaith Dialogue

Student Scholarship: David Kagaruki
Faculty Advisor: Phillip Ryan

This research project explores the framework and implications of interfaith dialogue between Evangelical Christians and members of the Church of Jesus Christ of Latter-day Saints. Interfaith dialog is a complex phenomenon given that identity, worldview, and communication are highly interpretive and contextual. As a major in the School of Theology and Missions and a minor in the Department of Intercultural Studies, my desire is to explore whether there is room for dialogue between these two religious backgrounds, and to better understand the subsequent implications. The integration of multiple disciplines within this research has provided a wide pool of information to draw from. An additional aim is to aid individuals in the future who seek to participate in structured interfaith dialogue with people from different religious backgrounds. To this end, qualitative research provides humanizing data to better understand the challenges and successes that accompany the pursuit of interfaith communication.

The Role of NGOs in Refugee Resettlement

Student Scholarship: Rachel Kangas
Faculty Advisor: Phillip Ryan

This study examined the role of nongovernmental organizations in the resettlement process of refugees in the United States; it will focus on the relationship between

the culture of the organization and the manifestation of services they offer. This research seeks to aid in understanding the extent of the support NGOs offer for refugees and their new communities by integrating multidisciplinary research and qualitative intercultural research of one such NGO. Phenomenon in the context of one such NGO in the southeastern United States will be observed. The aim is for this research to offer a new perspective within the context of previous research such that it can be replicated and further aid NGOs in this field to find procedures that increase their effectiveness.

Inside, Outside, Upside, Downside

Student Scholarship: Molly Carman
Faculty Advisor: Phillip Ryan

This project is based on integrative intercultural field research exploring American students' experiences in a month-long study abroad program in France. Students' identity negotiation, cross-cultural navigation, and their experiences with other American students will be analyzed. Integrating perspectives of multidisciplinary theory and research with qualitative data collected on site will give insight for future language study abroad experiences; how individuals might learn more about their identity; and have a positive experience by setting appropriate expectations while also learning to communicate frustrations. ■

LANGUAGE

Interpersonal Aspects of English as a Second Language Tutoring: Relationship, Interaction, and Motivation

Student Scholarship: Alissa Harris
Faculty Advisor: Phillip Ryan

Inspired by my own experience as a tutor, this research examines the interpersonal aspects of English as a Second Language (ESL) tutoring. Tutoring is primarily academic, but it is also a relationship which should be based on mutual goals and respect. Power dynamics, cultural stereotyping, and friendship will be examined as factors in each tutoring session. Along with pragmatics, such as gestures and teacher talk, the tutor's effect on the student's motivation in second language acquisition, especially the lasting effect of academic and linguistic sponsorship on the student will be explored. According to this research, if a tutor intentionally attends to these issues, a tutoring relationship should provide the student with accountability in second language learning, personal attention to needs, and a positive relationship with a native speaker.

Vulnerability and Humanity, as Revealed through Immigration (La vulnerabilidad y la humanidad a través de la inmigración)

Student Scholarship: Margot Weslee Cronk
Faculty Advisor: Karen Martin

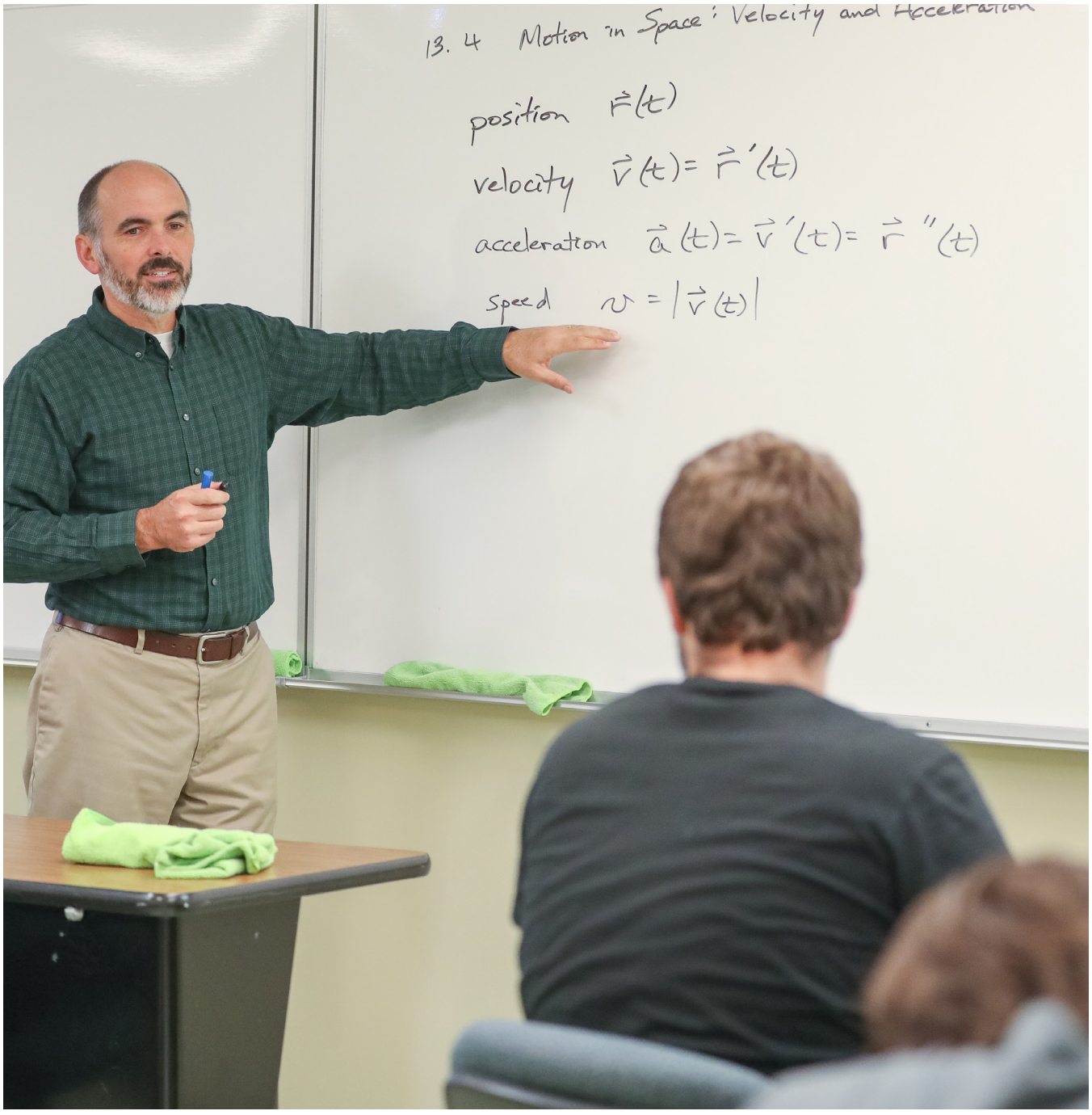
Vulnerability is a large part of what it means to be human, and nowhere is this reality seen more clearly than in the process and history of immigration. This research focuses on three key aspects of vulnerability as they are revealed through immigration, specifically the ways in which immigrants are at risk physically, emotionally and legally. The dangers of the journey prevent many from reaching their goal, while the emotional trauma of the journey and life as an immigrant can negatively affect them and their families for a lifetime. Even those who arrive safely sometimes find themselves facing a hostile and unsympathetic government. Immigrant narratives, such as Valeria Luiselli's *Los niños perdidos* and Mario Bencastro's *Odisea del norte*, which document these struggles, serve as the primary texts for this project. ■

MATHEMATICS

Math and Marriage: How Graphs Can Model Polygamy

Student Scholarship: Josephine Carrier
Faculty Advisor: Matt Lunsford

With plenty of men and women in the world who are searching for the perfect spouse, is there a way to know if everyone can be paired with someone they like? Hall's Marriage Theorem is an important graph theory result that addresses this very question. A proof will be sketched of a generalization of Hall's Theorem, which creates the polygamous case by increasing the capacities of the nodes in the second set of a bipartite graph, analogous to the number of women a man can marry. Using the Ford-Fulkerson Maximum Flow Minimum Cut Theorem, one can show why the generalized Hall condition is not only necessary, but also sufficient for ensuring a matching in which all the women are matched with a man whom they like. ■



NURSING [GRADUATE]

Comparison of International Health Care Systems: United Kingdom

Student Scholarship: Amy Howell, Jennifer Neyman, and William Spratlin
Faculty Advisor: Shari Wherry

The United Kingdom (UK), comprised of Scotland, England, Northern Ireland, and Wales, is a publicly funded National Health Service (NHS) working to shift the focus of healthcare from increased outputs to improved outcomes. Historically, inconsistencies existed between the regions previously mentioned, causing healthcare disparities among citizens and decreased national productivity (Cylus et al., 2015). Efforts to standardize healthcare throughout the UK have resulted in better national health today than ever before. However, with 16% of government spending going to healthcare costs, there are concerns regarding the long-term sustainability of this system in a booming population (Charlesworth, 2019). The purpose of this study is to outline the challenges faced by the UK healthcare system, and compare it to healthcare in the United States of America (USA). Areas of evaluation will include payer systems, methods of finance, reimbursement, provider choice, challenges, world ranking, and gross domestic product spent on health care.

Comparison of International Health Care Systems: Germany

Student Scholarship: Matt Bell and John Adam Miller
Faculty Advisor: Shari Wherry

Germany's health care is structured on a universal multi-payer system. All permanent residents of Germany are required to carry health insurance and coverage is provided by two systems: publicly financed and privately financed. Mandatory enrollment of public funded insurance is determined by annual income with the ability for individuals making higher earnings to opt into the private insurance sector. Germany is often praised for the shared governance of healthcare decision making that occurs amongst the federal level, state level, payers, and providers (Blümel & Busse, 2016). However, concerns exist over possible disparities of healthcare delivered between the two payer systems. The purpose of this project is to analyze and present the different measurements of Germany's healthcare system as it pertains to the type of payer system, financing, reimbursement, production, provider choice, challenges, world ranking, and GDP spent on health care.

Comparison of International Health Care Systems: Israel

Student Scholarship: Alan Bowles, John Shields, and Stacy Stahl

Faculty Advisor: Shari Wherry

The country of Israel has eight million citizens who participate in a modern market-based economy with a gross domestic product similar to the average of the European Union (Rosen, Waitzberg, and Merkur, 2015). The Israeli universal health care system, introduced in 1995, is financed by government sources and supplemented by private insurance (Rosen, Waitzberg, and Merkur, 2015). Citizens have their choice between four health plans that provide a wide array of benefits specified by the government (Rosen, Waitzberg, and Merkur, 2015). Israel's healthcare system ranking is 28th globally and the average lifespan of an Israeli citizen is 82.6 years compared to 78.6 in the United States (World Health Organization, 2000). The purpose of this study is to provide an overview of the following areas of the Israeli healthcare system: payer system, financing, reimbursements, providers choice, challenges, world ranking.

Comparison of International Health Care Systems: Egypt

Student Scholarship: Christy Davis, Kristina Michaud, and Megan Pittman

Faculty Advisor: Shari Wherry

According to the World Health Organization (WHO), Egypt spent 6.5% of its GDP on health in 2016 (2019). The burden of disease attributable to communicable diseases is 10.7%, noncommunicable diseases 84.7%, and injuries 4.6% (WHO, 2016). Egypt has attempted to initiate universal healthcare for many years but has not yet been successful (Ismail, 2018). About 58% of the population has healthcare coverage via private insurance (Ismail, 2018). Private and public healthcare facilities are available to the citizens, but there is a great divide between the wealthy and the impoverished. As part of the DNP class, Health Policy and Economics, an examination was made of the strengths and weaknesses of Egypt's healthcare system and how specific factors affect the system in contrast to the United States healthcare system. Points of comparison include varied financial, political, and personal variations in healthcare choices and spending.

NURSING [GRADUATE]

Comparison of International Health Care Systems: Canada

Student Scholarship: Roger Brewer, Shelby Darnell, and Joel Jose
Faculty Advisor: Shari Wherry

Canada's National Health Insurance system operates as a single-payer system funded at the federal and provincial levels. Each province has its own health plan, but all health plans provide transferability among provinces, are governmentally managed, and cover all medically necessary services. Healthcare funding comes from provincial grants provided by the federal government and provincial taxation with supplements from private insurance coverage and out of-pocket costs. Since Canada's healthcare system is publicly funded, cost control methods are strictly enforced (Henderson, 2018). This study examines information regarding elements in the delivery of healthcare in Canada and discusses the influence of geography, demographics, and culture on its healthcare system so that Canada's healthcare system can be compared to that of other developed countries.

Mexico Health Care System

Student Scholarship: Jayme Jarvis, Ellouise Knox, and Jason Winston
Faculty Advisor: Shari Wherry

The Mexican healthcare system relies heavily on the government to initiate healthcare changes. Garcia-Garcia and Chavez-Íñiguez (2018) feel that Mexico's health system is quite inefficient because it fails to give over half of its citizens universal health coverage. Mexico faces many challenges, such as universal health coverage as previously mentioned. Having less access to inpatient hospital treatments, as compared to the United States, creates the challenge of affordable and value-based care for Mexican citizens. Diabetes was declared a national epidemiological emergency in Mexico, making chronic disease management another challenge to their healthcare system (PwC, 2017). This study addresses these issues, along with other healthcare systems elements, including payer system, financing and supply, reimbursement, production, provider choice, challenges, World Ranking (WHO), and Gross Domestic Product spent on health care.

Comparison of International Health Care Systems: China

Student Scholarship: Morgan Grones, George Sciple, and Reni Valimattathil
Faculty Advisor: Shari Wherry and Cathy Ammerman

Healthcare access is a global dilemma faced by many countries. The Institute for Health Metrics and Evaluation (2020) reported that only 20% of China's population had healthcare coverage in 2000. However, China has made drastic improvements over the last several decades. Li et al. (2017) revealed that quality outcomes and access to care improved following the implementation of universal healthcare coverage and regulation of drug costs. In the course, Health Care Policy and Economics, the economic and political aspects of the health care of the United States were analyzed. The health care system in the United States will be compared to China's healthcare system; comparisons will include payer system, financing and supply, reimbursement, production, provider choice, challenges, World Ranking according to WHO, and gross domestic product spent on health care.

Comparison of International Health Care Systems: India

Student Scholarship: Ruben Dettman, Jaspa Kungu, and Brenda Ramirez-Lopez
Faculty Advisor: Shari Wherry

With 1.3 billion people and growing, India is poised to have the world's largest population within the next five years (Reddy, 2018). Despite nominally having universal healthcare, India's national health system has major limitations in resource accessibility and quality, leading many to seek care from privately funded sources (Gupta & Bhatia, 2017). Unlike the United States, private health insurance does not play a major role in India and most health-related costs are paid out-of-pocket (Gupta & Bhatia, 2017). The purpose of this study is to provide a basic overview of Indian healthcare, including its payer system, financing, reimbursement model, provider choice, current challenges, World Health Organization ranking, and GDP spent on health care.

Comparison of International Health Care Systems: Finland

Student Scholarship: Lekeisha Carter, Aaron Davis, and Rebecca Woods
Faculty Advisor: Shari Wherry

Finland is known to have one of the leading healthcare systems in the world. This country provides universal access to healthcare to all permanent residents regardless of socioeconomic status, gender or race. Finland's main healthcare system is organized by municipalities responsible for financing primary care and specialized services. Their healthcare financing is generated from tax revenues that are partially municipal and state taxes (Keskimäki et al., 2019). The core of Finland's healthcare system focuses on improved quality of life resulting in a reduction of communicable diseases while extending life expectancy. As with many industrialized health systems, there is opportunity for improvement. This project aims to discover the advantages and disadvantages of universal healthcare coverage related to the economic and political factors associated with Finland's healthcare delivery system.

Comparison of International Health Care Systems: Australia

Student Scholarship: Holden McCall, Joel Palmer, and Abe Rummell
Faculty Advisor: Shari Wherry

The Australian health care system is considered a universal system. The federal government is ultimately responsible for providing funds and support to the states. The states supplement the federal funding they receive to provide many of the primary care amenities such as dental care, ambulance, and other services. Given the large and remote nature of Australia, the government faces many challenges in providing adequate care to their indigenous population. Australia is currently taking steps to increase expenditure to more remote populations to reduce disparity among socioeconomic classes (The Commonwealth Fund, 2016). According to the World Health Organization (2020), Australia's healthcare expenditure in 2014 was $4,357 per capita, which ranked 22nd among the world's countries.

Healthcare System of the Russian Federation

Student Scholarship: Will Cobb, Meagan Seratt, and Brittney Wright
Faculty Advisor: Shari Wherry

The Russian Federation utilizes a universal healthcare system with an infrastructure that was designed by the Soviet Union (Popovich et al., 2011). Although free healthcare for all is the goal, Russia lacks the necessary funds and government foundation for this system to be fully successful. With only 5.27% of their GDP being spent on healthcare, they are unable to adequately fund the high magnitude of healthcare services that are needed (World Health Organization, 2017). Ultimately, the deficiencies in the system have led to inefficient and inadequate healthcare. In comparison to other countries, they are consistently low in healthcare statistics and rankings. While this is an issue in all areas of Russia, it is especially important in rural, underserved communities. The goal of this study is to provide an analysis and comparison of Russia's healthcare system, including the framework, financial aspects, challenges, and benefits of the system.

Quality Improvement: Development of an Evidenced Based Policy and Procedure Manual to Provide Systematic Methods and Consistency for Faculty within a BSN Program

Student Scholarship: Jennifer Delk
Faculty Advisor: Cynthia Powers

Policies and procedures provide not only guidance, but also standardization and consistency in clinical and academic practices. Failure to comply to designated policies and procedures place the nurse, faculty member, and institution at risk. Development of a policy and procedure manual for nursing faculty provides the resource needed to comply with standards across the program while not hindering academic freedom The objective of this query is to determine the use of policy and procedure manuals within baccalaureate programs across the southeast. In addition, this query attempts to identify critical themes included in policy and procedure manuals currently in use within undergraduate nursing programs in an effort to develop a manual for adoption within Union University's undergraduate nursing program.

NURSING [GRADUATE]

Identifying Barriers That Impact Nursing School Success of Ethnic Minorities and Socio-Demographic Disadvantaged Nursing Students

Student Scholarship: Marida Pace-Newbern
Faculty Advisor: Cynthia Powers

Nursing faculty recognize the need for diversity in nursing and has set forth initiatives to recruit and retain potential candidates that are reflective of diverse ethnic backgrounds and inclusive, without distinction to socio-economic or socio-demographic barriers. Despite efforts, nursing programs struggle to attract and maintain interest due to negative role stereotypes, lack of direction from early authority figures, and misconceptions about nursing practice (Stacciarini & McDaniel, 2019, p. 26). Greater degrees of socioeconomic inequality and social stratification correlates with negative educational outcomes (Thiele, Singleton, Pope, & Stanistreet, 2016, p. 1425). There is also an increasing demand in being inclusive to socio-demographic disadvantaged students, identifying barriers, and seek solutions that promote nursing school success (Thiele et al., 2016, p. 1426). Barriers, risk factors, statistical data reflective of these populations, challenges, and solutions that impact nursing school success will be examined.

Determining What Nursing Informatics Competencies Are Included in the Curriculum of a Baccalaureate Nursing Program, and if there are none, What Are the Perceived Barrier?

Student Scholarship: Delecia Parker
Faculty Advisor: Cynthia Powers

The use of informatics in healthcare has been shown to enhance the provision of high quality, safe, and cost-efficient patient care. Adoption of informatics in healthcare has resulted in a reduction of medical errors, improved workflow, and collection of data that can be utilized to improve organizational and system processes, thus enhancing patient outcomes. Today's healthcare environment has become highly technological, and the expectation is that new nursing graduates possess the necessary skills and demonstrate the ability to function efficiently in such an environment. However, the integration of informatics into undergraduate baccalaureate nursing education has been inconsistent in the United States and throughout the world. This study was conducted to determine what informatics competencies are included in the curriculum of an undergraduate baccalaureate nursing program, and if there are none, what are the perceived barriers to integration.

An Analysis of Recent Legislation and Strategies Impacting the Opioid Crisis: A Case Study of Tennessee

Student Scholarship: Haley McCoy
Faculty Advisors: Laurie Bagwell

Objective: To analyze the impact recent Tennessee legislative changes have had on the opioid crisis and the role nurse practitioners play in upholding and implementing these policies through their prescribing habits. Setting: The state of Tennessee ranks among one of the highest states in opioid prescribing rates. In 2017, according to the CDC, the opioid prescribing rate per 100 persons in Tennessee was 94.4. *Results*: Since the adoption of the Prescription Safety Act of 2012, Prescription Safety Act of 2016, and Public Chapter 1039 between the years 2012-2018, the number of opioid prescriptions declined by over two million. *Conclusion*: The state of Tennessee has enacted legislative changes to reduce the number of opioid prescriptions in an effort to combat the opioid crisis. Nurse practitioners play a pivotal role in identifying those at risk and promote safe prescribing practices.

Attitudes and Perspectives Regarding Narcotic Prescribing in a Tertiary Care Facility Located in Northeast Tennessee

Student Scholarship: Greta L. Robinette
Faculty Advisor: Cynthia Powers

Several studies in the United States evaluating emergency department (ED) provider prescribing of narcotics have shown that there is a need for more training and education in order to combat the opioid crises. "Given the increasing frequency of drug-related ED visits and opioid overdose deaths, the ED provides an important opportunity for addiction treatment referral and implementation of evidence- based, opioid harm reduction (OHR) practices to reduce opioid overdose deaths (Samuels et al., 2016, p. 456)." The 2017 Drug Enforcement Agency most recent statistics ranked Tennessee first in the nation in opioid sales and Northeast Tennessee one of the most affected regions (Paykamian, 2018, p. 1). Understanding provider's perceptions and attitudes can contribute to how the health care organizations formulate changes to decrease patient opioid prescriptions in the ED. This project, conducted in a tertiary care facility in Northeast Tennessee, assessed ED providers' perspectives and attitudes in regard to opiate prescribing. A 28-question anonymous electronic survey was completed by 46 participants to assess training, practices, and awareness in regard to the opioid crisis in Northeast Tennessee. The ED providers included in the study were medical doctors (MD), doctors of osteopathic medicine (DOM), physicians' assistants (PA), and nurse practitioners (NP), both male and female and ranging in age 25- 65 years old.

Evaluation of Emergency Department Provider Job Satisfaction and Years of Experience Among Nurse Practitioners

Student Scholarship: Holly Jones
Faculty Advisor: Joyce Snyder

Nurse practitioners (NPs) have overcome numerous hurdles over the years in practice. Now, literature shows they are falling victim to high turnover rates. Review of literature revealed research has been done on nurse practitioner (NP) job satisfaction without application of practice improvements and NP turnover rates continue to rise. To evaluate potential causes of high turnover rates for nurse practitioners, this study focused on correlations between job satisfaction and the years of work experience of NPs. This project utilized a quantitative, descriptive, cross sectional design using survey methodology to gather data from demographics and responses to the Misener Nurse Practitioner Job Satisfaction Scale (MNPJSS). Results showed nurse practitioners that were surveyed reported being minimally satisfied with their current employment. Results showed a positive correlation between job satisfaction and years of work experience among nurse practitioners, however, it was not statistically significant ($p = 0.772$). Future research is warranted to explore these findings further.

Root Cause Analysis Retrospective Audit Quality Improvement Project)

Student Scholarship: Alicia Hickman
Faculty Advisor: Cynthia Powers

The purpose of this quality improvement project is to conduct a retrospective audit to identify whether there is a need to create a standardized policy for which type of events require a Root Cause Analysis (RCA) in the ambulatory physician practice setting. Literature suggests patient safety events can cause serious harm or death. The IOM noted "as many as 98,000 people die in hospitals each year as a result of medical error that could have been prevented". Additionally, "medical errors are the third leading cause of death in the United States." The report suggests, "preventable medical errors have been estimated to result in total costs of between $17-$29 billion per year in hospitals nationwide." Accordingly, RCA is a process that has a meaningful effect on outcomes. This quality improvement project was used to identify whether there is a need to create a standardized policy for Root Cause Analysis (RCA) for patient safety events in the ambulatory physician practice setting.

NURSING [GRADUATE]

The Use of Ketamine in Premature Infants and Neonates in the Treatment of Intraoperative Acute Pain in Comparison to Opioids

Student Scholarship: Samantha Walker
Faculty Advisor: Melissa Lefave

Objective: To examine current evidence and assess the outcomes of premature infants and neonates following anesthesia care, specifically the response to ketamine decreasing intraoperative pain in comparison to opioids. *Background:* A recent study has revealed anesthetic drugs such as ketamine may suppress brain development and function via ketamine-induced apoptosis. *Design*: The research was an integrative research review. *Methods*: Searched databases included ScienceDirect, CINAHL, Ovid MEDLINE, and PubMed. Inclusion criteria included publication within the last ten years (2009-2019); the population being premature infants and neonates undergoing anesthetic care with general anesthesia; and outcomes following anesthetic care including apoptosis. Ketamine has adverse effects on aspects of brain development and function in newborn rodents. *Results*: The results indicate that ketamine may negatively affect outcomes through ketamine-induced cortical apoptosis in a dose-dependent manner. *Conclusion*: This review revealed that more research is needed before practice can be decisively changed. This study needs to be conducted on newborn humans to understand if the same ketamine-induced effects are noted as they were in rodents and primates. *Relevance to clinical practice*: Clinical practice should focus on optimizing brain development and function, maintaining patient comfort, and pain control while further study is being performed.

The Safety and Efficacy of Sugammadex Compared to Neostigmine in Preventing Postoperative Complications in Adult Patients Undergoing Surgical Procedures that Require Neuromuscular Blockade: A Systematic Literature Review

Student Scholarship: David Anderson
Faculty Advisors: Ethan Simpson and Molly Wright

Neuromuscular blocking agents are some of the most commonly used drugs in anesthesia. Although there are benefits associated with paralyzing agents, evidence shows that residual neuromuscular blockade is one of the most common reasons for postoperative adverse events. For decades, anesthesia providers have relied upon the combination of neostigmine and glycopyrrolate to reverse the effects of steroidal neuromuscular blockers such as rocuronium and vecuronium; however, a newer pharmacological agent called sugammadex is revolutionizing anesthesia, despite its lofty price. The primary objective of this systematic literature review is to compare the safety and efficacy of sugammadex to the combination of neostigmine and glycopyrrolate in order to determine which reversal decreases postoperative adverse events. A secondary goal is to determine if the cost difference between these two drugs is an appropriate justification for utilizing neostigmine over sugammadex. Overall, sugammadex decreases postoperative adverse events more effectively than neostigmine making it the superior choice. Future practice implications for anesthesia providers include the increased use of sugammadex due to its more efficacious and safe profile compared to neostigmine in preventing postoperative adverse events.

Examining Nurse Practitioners' Awareness, Knowledge, and Perceptions for Hepatitis C Virus (HCV) Screening and Treatment in Adults Aged 18-75

Student Scholarship: Richard Christian
Faculty Advisor: Laurie Bagwell

Objective: To explore nurse practitioners' (NPs) current awareness, knowledge, and perceptions for HCV screening and treatment. Setting: A 33-item survey was distributed to NPs in Arkansas, Tennessee, Mississippi. A link was posted to the Doctors of Nursing Practice, Inc. website. *Results*: Almost 95% of NPs were aware of the Center for Disease Control and Prevention's (CDCs) HCV screening recommendation. NPs (53.8%) reported the utilization of an electronic medical record (EMR) to prompt HCV screening as a helpful tool. NPs were neutral or agreed (38.5%) that access to HCV specialists was a significant need and 38.4% believe HCV treatment should be provided primarily by specialists. *Conclusion*: In the era of interferon-free direct-acting antivirals (DAAs), NPs can contribute to HCV screening and treatment. A campaign focused on ensuring NPs know the feasibility of treating HCV in a non-specialist setting might improve HCV screening rates and ease the burden on specialists.

A Business Proposal for an Executive Nurse Fellowship Program

Student Scholarship: Erica Walker
Faculty Advisors: Cynthia Powers and Denise Thornton-Orr

There is currently a practice gap for new graduate advance practice nurses who specialize in nurse administration without experience, and the role transition into nurse executive leadership positions. The research compiled shows that preparing novice nurse leaders with a transition program leads to bridging generational diversity, encourages collaboration and accountability, work-life balance, and formalized leadership development (Sherman, & Saifman, 2018). A nurse executive fellowship will improve patient safety outcomes and support an organizations succession plan in nursing leadership. There is currently a shortage in executive leadership advanced practice registered nurse training programs. This is usually attributed to lack of funding and program standardization (Kells, Dunn, Melchiono, & Burke, 2015). This proposal outlines the benefits of an organization financially investing in the program and the return received on their investment. Healthcare facilities should consider a nurse executive leadership program because it presents an opportunity to prepare nurses for future leadership roles.

Provider Education Training: A Quality Improvement Project

Student Scholarship: Gloria Michelle P. Edacheril-Moore
Faculty Advisor: Shari Wherry

When considering primary prevention, diet and exercise are major components to a healthy lifestyle; inflammation has also been noted to have an effect on multiple disease processes. The Dietary Inflammatory Index (DII®) combines these ideas and is an evidence-based tool that can be used by providers and patients to monitor the inflammatory effect from dietary intake. Additionally, the DII® can be used with dietary indices that are more familiar to the public, such as DASH, AHEI, and the Mediterranean diet. Providing education to healthcare providers to introduce the DII®, is an important aspect to improve the health of patients. This study implemented a Quasi-experimental design utilizing a one group pretest-posttest design. A paired samples t-test was used to evaluate the impact of the education (intervention) on the participant scores. Results indicate that the provider knowledge was improved regarding teaching patients about proper diet choices.

Examining the National Comprehensive Cancer An Do Regional Blocks Increase the Potential for Cardiac Ischemia in Adults with Cardiovascular Disease Undergoing Lower Extremity Surgery when Compared to General Anesthesia or a Combined Technique?

Student Scholarship: Brianna Moultrie and Malasy Vichathep
Faculty Advisor: Brian Foster

Anesthetics can be very difficult to manage at times for patients with cardiovascular disease. The objective of this study is to examine the current evidence and assess the outcomes of cardiovascular patients undergoing lower extremity surgery following anesthesia care. Specifically, the response to regional blockade when compared to a general anesthetic or combined anesthetic technique. Data sources researched include CINAHL, Medline, PubMed, and Science Direct. Eligibility criteria include randomized and non-randomized studies ranging from 2010-2019 of adults with cardiovascular diseases undergoing lower-extremity surgeries receiving a general anesthetic, regional blocks alone, or as a combined technique. There were initially 1,420 studies; however, after applying the inclusion and exclusion criteria, a total of 9 studies were included in the final literature review. The PRISMA guideline was used to assist with the organization of data collected from the studies.

NURSING [GRADUATE]

Evidence-Based Education Initiative for Electronic Cigarettes and Airway Reactivity in Adolescents and Young Adults

Student Scholarship: Emily Poppelreiter and Ashley Riesberg
Faculty Advisor: Brian Foster

Objectives: The purpose of this study is to conduct an integrative research review (IRR) on the effects of electronic cigarettes and their components in comparison to traditional cigarettes on airway reactivity. Once the IRR is completed, an educational program for certified registered nurse anesthetists (CRNAs) on the risks of electronic cigarettes and effects on the patient's anesthetic plan for surgery will be developed. *Background:* There is an urgent need to understand the safety of e-cigarettes with adolescents. The researchers sought to identify the effects of electronic cigarettes, e-liquids, and flavors on the adolescent airway. *Design*: The study was an integrative research review. Research Question: In adolescents and young adults, do electronic cigarettes increase airway reactivity in a similar fashion as traditional cigarettes? *Methods*: After performing a review of literature, a curriculum was developed for CRNAs on the risks of electronic cigarettes and effects on the patient's anesthetic plan for surgery. *Results*: E-cigarette users exhibited significant increases in aldehyde-detoxification and oxidative stress–related proteins associated with cigarette smoke compared with nonsmokers. *Conclusions*: Together, the results indicate that e-cigarette use alters the profile of innate defense proteins in airway secretions, inducing similar and unique changes relative to cigarette smoking. This data challenges the concept that e-cigarettes are a healthier alternative to cigarettes

The Effectiveness of Ketamine as a Bronchodilator in Asthmatics

Student Scholarship: Lindsay Brewer
Faculty Advisor: Ethan Simpson

Asthma is a common disease, and there are many medications on the market to treat asthma; however, the treatment must be efficient in order to be successful in controlling or preventing asthma attacks. Despite the multitude of medications on the market for treatment, asthma continues to contribute to numerous emergency room visits. Asthma attacks have dangerous complications including hypoxia, respiratory failure, and even death; therefore, exploring different avenues of treating asthma attacks is warranted. The objective of this DNP project was to analyze the evidence regarding the use of ketamine as an effective treatment during an asthma attack. Relevant searches were conducted using CINAHL, Medline, PubMed, and ScienceDirect databases from years 2014-2019. Eligibility criteria included studies peer-reviewed journal articles ranging from years 2014-2019. From an initial return of 169 studies, after study appraisal and application of inclusion and exclusion criteria, a total of ten studies were included in the final review. Overall results of the compilation of studies demonstrated improvement of asthma symptoms, measured by peak expiratory flow rate (PEFR), improvement in arterial blood gases, and improved vital signs. Notable limitations were related to small study populations, limited amount of studies surrounding ketamine for this purpose, and the inclusion of non-randomized studies in this review. Overall, the conclusions were favorable in regard to the administration of ketamine during an asthma exacerbation. Future practice implications for anesthesia providers and their asthmatic patients include the safety and efficacy of the utilization of ketamine to improve asthma symptoms and promote better patient outcomes.

Laboring Parturients Reporting Postdural Puncture Headaches: An Integrated Research Review of the Advantages and Disadvantages of Sphenopalatine Ganglion Blockade Versus Epidural Blood Patch)

Student Scholarship: Nilap Patel
Faculty Advisor: Melissa Lefave

This integrative research review serves the purpose of examining the advantages and disadvantages of sphenopalatine ganglion blockade (SPGB) versus epidural blood patch (EBP) in the treatment of postdural puncture headaches in laboring parturients who receive epidural anesthesia. The gold standard treatment for PDPH is epidural blood patch. However, there has been an increase in available evidence for an alternative to EBP: sphenopalatine ganglion block, a non-invasive intervention has fewer reports of side effects and higher efficacy for treatment of PDPH. An extensive database search with specific inclusion criteria was completed in order to conclude whether there is sufficient qualitative and quantitative evidence to implement SPG block into practice.

Network (NCCN) Guidelines Version 2.2013 Distress Management Tool's Effectiveness in Identifying Emotional Distress in Patients with Malignant Hematologic Disorders

Student Scholarship: Clesheree Stepter
Faculty Advisor: Laurie Bagwell

Purpose: The aim of this investigation was to explore whether emotional distress was being adequately captured and intervention being implemented with use of the National Comprehensive Cancer Network (NCCN) Distress Management Screening tool (Version 2.2013). *Methods*: A retrospective chart audit was conducted of patients who had completed the NCCN Distress tool within one year of diagnosis of cancer. *Results*: Forty-five percent of 100 patients noted some form of distress (scored >1 on distress tool) on their initial visit. Twenty-eight percent denoted a score of 4 or greater. However, only 18% of the 100 patients indicated they were experiencing emotional distress. Emotional distress was not addressed in 87% of the charts during the initial visit. *Conclusion*: The study revealed that there was a moderate amount of ambiguity in isolating emotional distress from the other elements found on the NCCN distress screening tool. The findings support the need for further research.

Remote Ischemic Preconditioning in Reducing Reperfusion Injury in Coronary Artery Bypass Graft Surgery: An Integrative Research Review

Student Scholarship: Heather Middleton
Faculty Advisor: Molly Wright

An integrative research review was conducted to examine current evidence and assess the outcomes of cardiac patients who have undergone remote ischemic preconditioning (RIPC) prior to and/or during CABG. Recent study has shown that remote ischemic preconditioning may prove beneficial in protecting the heart against myocardial infarction post coronary artery bypass grafting (CABG). Searched databases included ScienceDirect, CINAHL, and PubMed. Inclusion criteria were publications within the last five years (2015-2019), with populations consisting of cardiac patients undergoing cardiac surgery with implementation of remote ischemic preconditioning, and outcomes following remote ischemic preconditioning as it applies to reperfusion myocardial injury postoperatively. The results indicate remote ischemic preconditioning may not prove to be a definitive measure that protects against myocardial infarction post CABG.

NURSING [GRADUATE]

A Quality Improvement Project to Provide a Benchmark Ultrasound Image of the Cricothyroid Membrane for Use in Emergency Airway Cannulation

Student Scholarship: Tyler Cox
Faculty Advisor: Brian Foster

Cricothyroid membrane (CTM) cannulation is an emergency airway technique used when patients cannot be intubated, nor ventilated (Pardo & Miller, 2018). With many important anatomical structures in the vicinity of the CTM, practitioners are tasked with cannulating the membrane while maintaining the integrity of the surrounding structures such as nerves, vessels, and muscles. In the event that these structures are injured, the patient can experience further airway problems such as hoarseness, laryngospasm, vocal paralysis, bleeding, and hematoma (Pardo & Miller, 2018). Patients with unidentifiable anatomical landmarks can present a difficult environment for locating the CTM and increase the risk of damaging the surrounding structures (Pardo & Miller, 2018). The use of ultrasound can help identify these structures, prevent adverse events, and provide a safe procedure (Siddiqui, Yu, Boulis, & You-Ten, 2018). The objective of this evidence-based research project is to provide a benchmark ultrasound image of the cricothyroid membrane for rapid identification. A systematic review, following the PRISMA diagram of articles from Medline, Ovid, CINAHL, and PubMed (2008-2019) were utilized to obtain pertinent data. After a thorough search of the literature, the researcher was able to gain valuable knowledge of the current practice standards and different alternatives to consider in emergency airway scenarios and then to incorporate this knowledge into a quality improvement project to identifying the CTM. The quality improvement study was conducted with volunteers from the senior cohort of student nurse anesthetists at Union University. The study was conducted in 2019 and consisted of 5 students. The study involved the use of ultrasound to identify the CTM among the volunteers, where two ultrasound images were obtained from each volunteer. The results of the quality improvement project consisted of successful identification of the CTM using ultrasound. Limitations of the study were participants not presenting with abnormal airway anatomy and/or extreme body compositions. All participants were of adequate health status. The researcher also performed a dissection and plastination of an airway from a cadaver. The dissection and plastination was done in cooperation with the researcher's faculty advisor. A physical airway specimen was thought to be a valuable teaching tool. When teaching the proper methods of using the ultrasound, the physical airway allowed learners to visualize the proper structure being cannulated.

Anesthesia Consideration for the Patient with Hemophilia A or B Undergoing Cardiopulmonary Bypass Surgery

Student Scholarship: Brian Bougard
Faculty Advisors: Ethan Simpson and Molly Wright

With growing advancements in treatment, the life expectancy of a patient with hemophilia is now near normal. As life expectancy increases for the patient with hemophilia, an increasing occurrence of cardiac disease may also present itself. Cardiac surgery constitutes a major hemostatic challenge due to sternotomy, the need for heparinization, extracorporeal circulation, mild hypothermia, hemodilution, and cardiac arrest. Typically, the cardiac operation requires the use of a cardiopulmonary bypass machine (CPB). The use of CPB causes a reduction in coagulation factors and blood elements. Individuals with either Hemophilia A or B are deficient in a specific coagulation factor increasing the complexity of anesthetic management. The objective of the research review was to peruse the latest evidence, in order to discuss anesthetic management for the patient with Hemophilia A or B undergoing cardiopulmonary bypass surgery. Data sources included a search of CINAHL and Medline from 2014-2019. Eligibility criteria included case studies and retrospective studies covering individuals with hemophilia requiring cardiopulmonary surgery. From an initial return of 40 studies, and after application of inclusion and exclusion criteria, a total of 10 studies were included in the final review. Two methods of treating the population emerged from the research. The individuals either received intermittent boluses of Factor VIII/IX or continuous therapy of Factor VIII/IX titrated to the desired patient's plasma factor level VIII and IX. Notable limitations were related to a small study size and inability to provide randomization in the study. Overall, the review suggested that the use of continuous therapy provided tighter control of clotting factor plasma levels Factor VIII/IX, prevented significant bleeding episodes, and decreased the amount of clotting factor replacement. The review of the literature highlighted considerations for future studies. Case reporting has served as a guideline for the patient with hemophilia undergoing CPB. Randomized control trials are necessary to improve decision making in the future. These future studies might possibly assist in determining factor dosage (Factor VIII/IX) needed for the patient with mild, moderate, and severe Hemophilia A and B Also, anesthesia providers may be better equipped to devise a treatment plan for an individual with inhibitors to clotting Factors VIII/IX. For these reasons, future studies will be valuable to organize an effective treatment plan.

Survey of Patient Knowledge of Palliative Care

Student Scholarship: Brad Creekmore
Faculty Advisor: Cathy Ammerman

Older Americans often have chronic, life-limiting illnesses that could benefit from Palliative Care (PC) through their primary care provider. Data suggests a barrier to PC is lack of knowledge by patients and their families (Kozlov, McDarby, Reid & Carpenter, 2018). This study focused on the knowledge of patients about PC in a primary care setting in rural West Tennessee. Utilizing the Palliative Care Knowledge Scale (PaCKS), patients were surveyed and results analyzed via simple descriptive statistics. The survey included 13 questions. Participants scored well (69.1%) on understanding of services offered via PC, but lacked knowledge of criteria for services (63.4%) and the purpose/goals of PC (58.8 %). It is clear that these patients lack sufficient knowledge to make informed decisions about PC. The findings can aid other primary care practitioners in their attempts to offer PC information/ services in their practices.

The Overall Effect of the Use of Intrathecal Midazolam as an Adjunct in Subarachnoid Blocks in Patients Undergoing Cesarean Section: An Integrated Research Review

Student Scholarship: Chinoyerem Oji
Faculty Advisor: Melissa Lefave

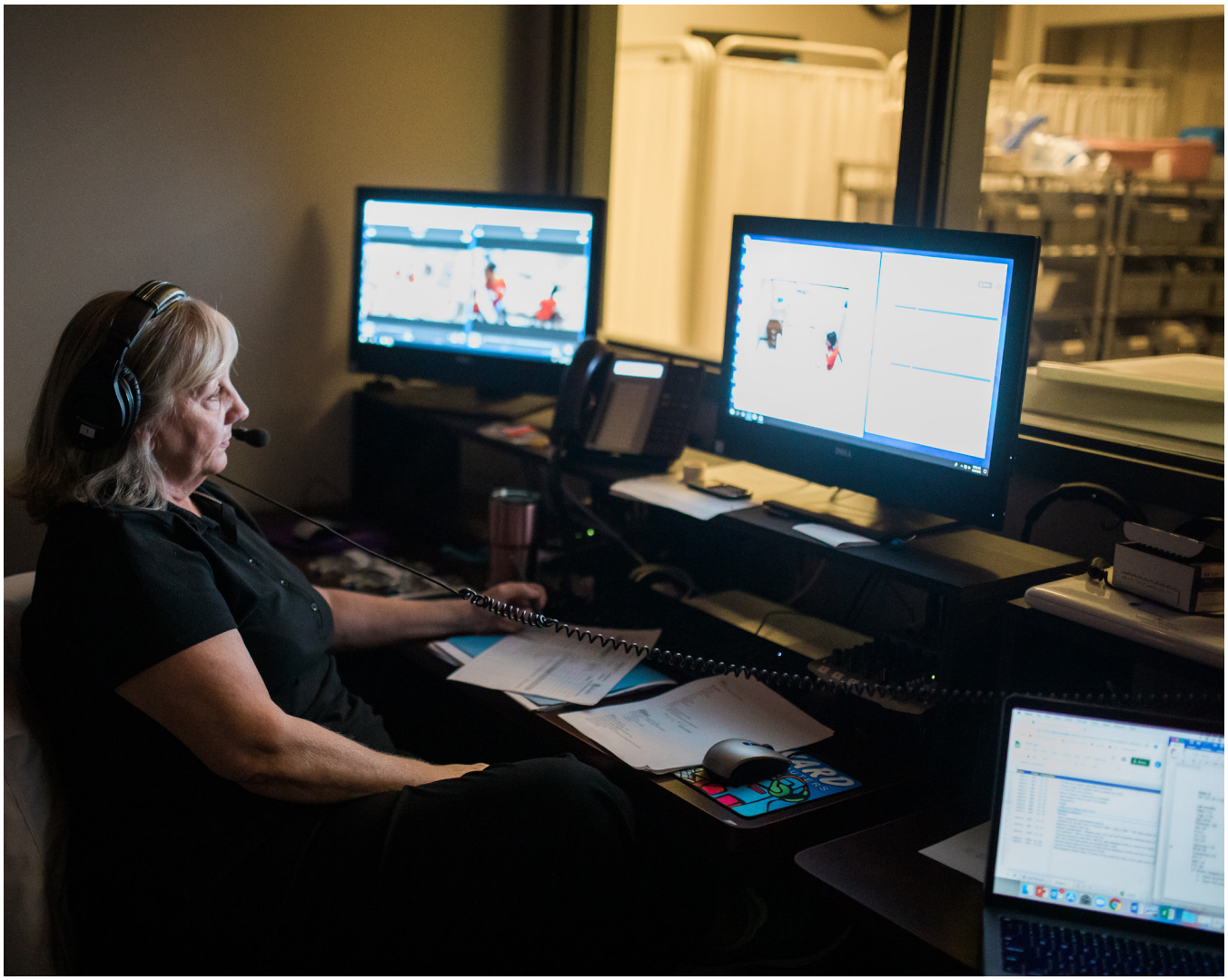
Objective: To examine the current research and assess the overall effect of the use of intrathecal midazolam as an adjunct in subarachnoid blocks in patients undergoing cesarean section. *Background:* Recent study has revealed that midazolam, as an adjunct in subarachnoid block, is effective in managing postoperative pain after cesarean section. *Design*: The research was an integrative research review (IRR). *Methods*: Search databases included: Science Direct, CINAHL, MEDLINE (EBSCO), and PubMed. Inclusion criteria: publication within the last fifteen years (2004-2019); the population studied will be patients requiring cesarean section with the need for a subarachnoid block, and the study must discuss the outcomes following intervention. *Results*: There are several ways that intrathecal midazolam can be used safely as an adjunct for women undergoing cesarean section. *Conclusion*: The most evident conclusion of this integrated research review is the fact that more extensive study is needed on a large scale to determine the overall efficacy and safety of this subject. Furthermore, study is required to make a practice change with available information. The lack of a treatment algorithm and administration dosage serves as evidence that practice cannot be changed at this present time. The implementation of intrathecal midazolam is at the discretion of the practitioner. *Relevance to clinical practice:* Clinical practice should focus on planning spinal anesthesia techniques that promote favorable outcomes for the mother and child. Reduction of pain is a great consequence because it accelerates early ambulation, decreases maternal morbidity, improves patient outcomes, decreases cost, and most importantly it helps the quality of mother-baby relationship from the moment of birth. When providers are planning spinal anesthesia for cesarean section there are different local anesthetics and various adjuncts that enhance the technique. The choice of adjunct drugs must be effective and safe.

Comparing the Efficacy of Bupivacaine vs. Ropivacaine in Spinal Anesthesia for Patients Undergoing Cesarean Section: A Systematic Literature Review

Student Scholarship: Wade Lomax
Faculty Advisor: Ethan Simpson

Spinal anesthesia is the most popular route of anesthesia worldwide for parturients scheduled to undergo cesarean section. Evidence has emerged in favor of intrathecal Ropivacaine over Bupivacaine for cesarean section. Obstetrical patients present a unique challenge to the anesthetist concerning the pharmacodynamics of local anesthetic agents. Increased incidence of maternal hypotension, nausea, vomiting, impaired uteroplacental blood flow, and prolonged recovery times have been observed with the use of intrathecal Bupivacaine during cesarean section. The objective of this literature review was to compare the efficacy between intrathecal Ropivacaine and Bupivacaine in parturients scheduled to undergo cesarean sections. Database searches included: CINHAL, Medline, PubMed, EBSCO, and Science Direct from the years 2014 to 2019. Eligibility criteria included randomized and non-randomized studies that ranged from 2014 to 2019 with parturients undergoing cesarean section after receiving either intrathecal Ropivacaine or Bupivacaine. After an initial return of 1,120 results, a total of 10 studies were included in the final review of literature for this project. Overall, the synthesis of evidence revealed a favorable recommendation for the use of intrathecal Ropivacaine over Bupivacaine. Results were favorable for reasons such as improved maternal hemodynamics, better motor-sparing effects, faster recovery times, improved discharge times, and improved efficacy of analgesia of Ropivacaine. Notable limitations were the inclusion of several small heterogeneous sample sizes, and the appraisal method used to determine success and failure of the sensory blockade which varied regarding spinal level. Overall, a consensus was reached that Ropivacaine is superior to Bupivacaine in cesarean section. Establishing a better safety margin, maternal-fetal bonding, and recovery times from anesthesia should serve as motivators for change in obstetrical anesthesia.

NURSING [GRADUATE]



Understand the Benefits of Apneic Oxygenation to Prevent Desaturation during the Apneic Period

Student Scholarship: Beunica McDowell
Faculty Advisor: Melissa Lefave

Objective: To examine the current research and assess the outcomes of Apneic Oxygenation to prolong time to desaturation during intubation. *Background*: Endotracheal intubation is a common life-saving procedure. Hypoxemia is a potential complication associated with intubations. Hypoxemia is a severe condition in the critically ill and can precipitate conditions such as cardiac arrest and death. Apneic oxygenation is the passive flow of oxygen into the alveoli during apnea. The use of apneic oxygenation can prolong safe apnea time and increase first-pass success during intubation. *Design*: The research was an integrative research review (IRR). *Methods*: Searched databases included: CINAHL, MEDLINE, PubMed, and ScienceDirect. Inclusion criteria: each study should be published within the last five years (2014-2019); the population studied will be patients undergoing endotracheal intubation, in which apneic oxygenation was used as part of the intubation procedure. *Results*: The results indicate that apneic oxygenation is beneficial in patients with an increased risk of desaturation during the apneic period. The use of nasal oxygen during pre-oxygenation and continued during apnea can prevent hypoxemia before and during intubation further extending safe apnea time and intubation success. *Conclusions*. This research review revealed that while apneic oxygenation is beneficial in preventing desaturation during the apneic period, but more study is needed. *Relevance to clinical practice*: Clinical practice should focus on identifying those with pulmonary complications and at risk for desaturation, optimizing pulmonary function, and proper airway management while study continues, and an algorithm is developed.

The Effectiveness of Tranexamic Acid (TXA) Administration in Patients Experiencing Postpartum Hemorrhage: A Systematic Review

Student Scholarship: Ashlea L. Sledge
Faculty Advisors: Ethan Simpson and Molly Wright

With postpartum hemorrhage being described as one of three largest causes of obstetric mortality, the search for a way to decrease this rate has been ongoing among healthcare providers. More recently, the use of the antifibrinolytic drug tranexamic acid (TXA) in preventing or decreasing postpartum hemorrhage (PPH) has been a topic in question. This systematic review is designed to evaluate how effective the current literature demonstrates TXA's effectiveness in decreasing or preventing blood loss in women undergoing vaginal deliveries and Cesarean sections. A total of 13 randomized control trials and reviews evaluating the use of TXA for PPH treatment and prevention were selected for inclusion within this study. After the research was disseminated, the majority of the results indicated that the use of TXA was related to a decrease in bleeding and PPH. Six of the trials showed a decrease in incidence of PPH, blood loss, and decreased need for blood transfusion when TXA was given prophylactically and before the onset of bleeding during the third stage of labor. Likewise, two additional reviews showed that the use of TXA was as effective as using uterotonics such as, oxytocin and prostaglandin analogue. The effect of TXA on patients related to safety and side effects must be investigated further. Likewise, three of the reviews evaluated literature of low to moderate quality. Consequently, the need for more research without methodological deficiencies is warranted.

The Effects of Continued Spiritual Development on Salivary Cortisol Levels in Second Year Student Registered Nurse Anesthetists

Student Scholarship: Amber Craven and Yolande Alexandre
Faculty Advisors: Brian Foster

The purpose of this study was to determine if continued spiritual development has an effect on stress levels of second year Student Registered Nurse Anesthetists (SRNAs) as measured by salivary cortisol levels. Participants (n=10) were recruited from Union University's Nurse Anesthesia program. Three sets of salivary cortisol samples (baseline, pre-intervention, and post-intervention) were obtained from the 10 students on three different occasions. The Eagle Biosciences Cortisol Saliva ELISA Assay kit was used for the quantitative determination of human cortisol levels in these students. Five the 10 students were randomly selected to serve as the control group. These five students did not participate in the spiritual intervention. The spiritual intervention consisted of weekly 30-minute bible study sessions that took place for four weeks. Custom five-point Likert Scale surveys created by the researchers were used pre-intervention and post-intervention asking a series of questions related to stress and spirituality. Statistical Package for Social Sciences (SPSS) version 21 was used to analyze this data Overall, the average post-intervention cortisol results were lower than the pre-intervention cortisol results.

The Effectiveness of Methylene Blue in the Treatment for Vasoplegic Syndrome in Patients Undergoing Cardiac Surgery: A Systematic Review

Student Scholarship: Holly M. Hardy
Faculty Advisors: Ethan Simpson and Molly Wright

Vasoplegic syndrome in patients who are undergoing cardiac surgery can be life threatening. Vasoplegic syndrome can be characterized as a mean arterial pressure of less than 50 mmHg with a cardiac index of greater than 2.5L/min x m2 and a low systemic vascular resistance, despite adrenergic vasopressor administration. Because adrenergic vasopressor administration in vasoplegic syndrome is ineffective, it is essential to explore other methods to increase mean arterial pressure. The purpose of this systematic review was to search the literature in order to assess the use of methylene blue as a treatment for vasoplegic syndrome in patients undergoing cardiac surgery. Researched data sources included Medline, CINAHL, Science Direct, and PubMed. Eligibility criteria included peer reviewed studies from 2014 to 2019 with studies conducted specifically on patients undergoing cardiac surgery. The interventions in these studies included the treatment of vasoplegic syndrome with adrenergic vasopressors, as compared to those treated with methylene blue. The initial result of 130 studies was narrowed down to 11 studies after applying inclusion and exclusion criteria. Largely, the systematic review concluded that methylene blue was effective in increasing MAP and SVR in patients experiencing vasoplegic syndrome. Common limitations were observed during this literature review which included finding a general consensus regarding the definition of vasoplegic syndrome. There are implications for future research specific to determining precise hemodynamic parameters that would describe it. The findings in this literature review include implications for the use of methylene blue in future practice for patients experiencing vasoplegic syndrome during cardiac surgery.

NURSING [GRADUATE]

Restrictive Versus Liberal Red Blood Cell Transfusion Practices: A Literature Review of Outcomes of Cardiac Surgical Patients

Student Scholarship: Jessica Raebel
Faculty Advisor: Melissa Lefave

Objectives: To determine whether restrictive or liberal RBC transfusion practices produce better outcomes in cardiac surgical patients. *Background*: Anemia in the perioperative period has been associated with adverse outcomes, such as stroke, renal failure, and even death (Shehata et al., 2018). Anemia often results in the transfusion of red blood cells (RBCs) to correct hemoglobin levels. Cardiac surgical patients consume 10% to 15% of the 15 million units of RBCs transfused every year in surgical patients in the United States (Dhir & Tempe, 2018). RBC transfusion is expensive and not without its own risks (Shehata et al., 2018). There is a need for a RBC transfusion guideline that is based on high level, unbiased evidence that is specific to cardiac surgical patients. *Design*: The research was a literature review. *Methods*: Searched databases included ScienceDirect, Academic Onefile, and CINAHL. Inclusion criteria were publication within the last ten years (2009-2019); with population being adult (> 18 years old) cardiac surgical patients; and the intervention to be studied was RBC transfusion practices. *Results*: A restrictive transfusion trigger of hemoglobin 7.5-8.0 g/dL has shown no significant difference in morbidity and mortality from the groups that were transfused at a higher hemoglobin level. *Conclusions*: This review revealed that a restrictive transfusion trigger would be beneficial in the adult cardiac surgical population. R*elevance to clinical practice:* Clinical practice should focus on decreasing blood loss and using a restrictive transfusion trigger while further study is being performed.

Implementation of a Standardized Anesthesia Orientation for Operating Room Nurses to Improve Patient Outcomes in Difficult Airway Situations: A Systematic Research Review and Recommendation for Practice

Student Scholarship: Kayla Goins
Faculty Advisors: Ethan Simpson and Molly Wright

Difficult airway crises can be detrimental to a patient's surgical experience. These situations can lead to lasting adverse effects, and even death, if not handled properly. The anesthetist is the primary person managing a crisis of this nature, but management cannot be successful without the support of other perioperative personnel. Circulators play an integral role in assisting anesthesia providers in many situations, including during a difficult airway event. The objective of this systematic review was to examine the need for implementation of a standardized anesthesia orientation for operating room nurses in order to improve patient outcomes in difficult airway situations. Articles from the years 2014-2019 were researched from EBSCO, ScienceDirect, CINAHL, and Academic OneFile databases. To be eligible for inclusion, the studies had to focus on difficult airway events in the operating room and the interaction of anesthetists and circulators during their management. Studies were narrowed down from 452 to eight studies that met inclusion criteria. The review of these eight studies noted gaps in circulator competency in regard to difficult airway carts and how to adequately assist anesthesia providers during these situations. Limitations of the studies included examining only one surgical site, the need for repeated observation of participants, and the inability to extrapolate to other facilities. Despite the noted limitations, the results of the systematic review point towards refining circulator training regarding how to adequately assist anesthesia personnel during difficult airway events. Practice implications include the need for simulation training, standardization of difficult airway carts, and overall circulator education on difficult airway terminology and their role during a crisis situation. Improving circulator competency will promote better patient outcomes and more effective management of airway crises.

The Evaluation of a Triple Therapy: Hydrocortisone, Ascorbic Acid, and Thiamine (HAT) for the Treatment of Septic Shock in Patients Undergoing Surgery: A Systematic Research Review

Student Scholarship: Nerlie Pierre
Faculty Advisors: Ethan Simpson and Molly Wright

The effects of hydrocortisone, ascorbic acid, and thiamine (HAT) as an adjunct therapy to stabilize septic shock patients before, during, and/or after surgery have not been fully developed. The objective of this systematic research review is to investigate the efficacy of HAT triple therapy in order to decrease hemodynamic complications and mortality in septic shock adult patients who undergoing surgery. Full text articles published from 2014 to 2019 were chosen and found in databases such as, CINAHL, Medline EBSCO, PubMed, and Science Direct. Eligibility criteria included, published English language randomized control trials, non-randomized studies, cohort studies, systemic reviews, and adult (>17 years) participants who were being treated with hydrocortisone, ascorbic acid, and/or thiamine for septic shock in a critical care setting. Using preset inclusion and exclusion criteria, one investigator extrapolated data from the studies. The following primary and secondary outcomes were predominantly measured in the studies: hospital stay, intensive care unit (ICU) stay, mortality rates, lab values, and vasopressor usage. Six studies showed advantageous effects of HAT therapy in septic shock patients and two studies did not prove to be beneficial for the study population. Ultimately, there is quality evidence to substantiate the application of HAT therapy in septic shock surgical patients in order to decrease hemodynamic complications and reduce the risk of mortality. Although certain studies did not validate all of the proposed assumptions, there were no deleterious effects reported as a result of using hydrocortisone, ascorbic acid, and thiamine in septic shock patients. Essentially, the overall benefit of ascorbic acid, thiamine, and hydrocortisone is likely due to their overlapping pathways and their interaction with each other in the body.

Neuromuscular Blockade Monitoring: Does the Use of Acceleromyography Reduce Residual Paralysis and Respiratory Depression?

Student Scholarship: Stewart Jeter
Faculty Advisors: Ethan Simpson and Molly Wright

Residual paralysis can occur in the postoperative period after paralytics have been given. There are many consequences of residual paralysis including low oxygen levels and the possibility of postoperative reintubation. The goal of this research is to assess if acceleromyography is beneficial to patient safety in reducing postoperative residual paralysis. A systematic literature review was completed to determine if the use of quantitative assessment using acceleromyography reduces residual paralysis in the postoperative period. Inclusion criteria included adults over the age of 18 years old and articles that assessed the use of acceleromyography and its effects on neuromuscular blockade assessment and residual paralysis postoperatively. A literature search was completed using the Gale, CINAHL, PubMed, Academic Search Complete, and Google Scholar databases. There were initially 1,145 articles that resulted, and after title and abstracts were examined, a final of 10 articles were selected for review. The articles used for analysis included randomized control trials, a literature review, prospective observations, and a double-blind control trial. The results demonstrated that the use of acceleromyography is beneficial in reducing residual paralysis. This should be considered in order to monitor neuromuscular blockade because the results have shown that clinical assessment, including a five second head lift, is not accurate in determining the level of paralysis. The research results also suggested that reversing paralysis should occur even if the patient has all four of their twitches (Bhananker et al., 2014). It is suggested that further research into this topic be completed, as well as research focused on reducing the limitations of the acceleromyography device.

Pre-emptive Analgesia: Decreasing Intra-operative and Post-operative Analgesic Administration Through the Timing of Pre-operative Intravenous Ibuprofen and Acetaminophen

Student Scholarship: Vincent Cagungun
Faculty Advisors: Melissa Lefave

This integrative review will examine different studies that evaluate the use of a single dose of intravenous Acetaminophen dose of 1000 mg or intravenous Ibuprofen 800 mg use prior to the starting incision of the surgery. There is currently no gold standard. Many anesthesia providers use either or both drugs in combination. However, this review will evaluate the effects of pre-emptive timing of each drug and how it will affect the intra-operative or post-operative narcotic use. An extensive database search with specific inclusion criteria was completed in order to conclude whether there is sufficient qualitative and quantitative evidence to determine optimal timing and drug choice to decrease post and intra-operative pain management. ■

POLITICAL SCIENCE

Targeted Sanctions: The Role of Targeted Sanctions in US Foreign Policy (UG)

Student Scholarship: John David Logan
Faculty Advisor: Gregory Ryan

This study examines the United States' use of targeted sanctions as an effective form of economic statecraft. Using existing literature and the case studies of Libya, Burma, and Iran, the purpose of targeted sanctions will be analyzed, as well as the role that goal-setting has in determining the efficacy of a sanction regime, with special emphasis given to the ongoing case of Iran. Variables considered range from actors, goal-setting, and target countries; including economic, social, and cultural factors to determine when targeted sanctions are appropriate and the expected impacts on civilian populations. Finally, the role of targeted sanctions in the broader scheme of US foreign policy is examined to determine if current enforcement enhances US interests abroad. The results suggest that targeted sanctions are currently being overused and misapplied beyond their intended function, and thus their scope and application should be narrowed to ensure their efficacy. ■

PSYCHOLOGY

Grit as a Function of Conscientiousness

Student Scholarship: Caroline Adcock, Kaitlyn Moore, Gabrielle Morocco, Ansley Ross, Zachary Tyler, and Luke Walden

Faculty Advisor: Jinni Leigh Blalack

Few studies of traditional undergraduate students have examined grit, defined as persistence adhering to long-term dreams and objectives. Recent studies have linked grit with factors such as conscientiousness, coping strategies, sleep, exercise, and academic achievement. The current study proposed a path model from conscientiousness to grit with coping strategies as a mediator. The study examined relationships between grit and conscientiousness along with demographic and lifestyle behaviors, such as sleep and exercise. Correlations, independent samples t-tests, one-way analyses of variance (ANOVAs), and mediation paths were analyzed in SPSS. Results showed a positive correlation between conscientiousness and grit. Positive correlations were also found between conscientiousness and sleep as well as between grit and exercise. Only the problem-focused engagement coping strategy significantly mediated the path from conscientiousness to grit, suggesting that college students who are more organized and goal-oriented are more likely to stay committed to long-term aspirations. ■

SOCIOLOGY

Loneliness: A Risk Factor for Opioid Use Among People Living with HIV and Serious Mental Illness

Student Scholarship: Josephine Carrier

Faculty Advisor: Matthew Henderson

Background: The opioid crisis has devastated much of America, costing the lives of nearly 50,000 Americans in 2017 alone according to the CDC. Philadelphia is a hotbed of the crisis, with over 1,000 opioid-related overdose deaths in 2017. People living with HIV are at particular risk for substance use disorders, including opioid use disorder. The relationship between loneliness and substance use has been well-documented in qualitative studies, but the dearth of quantitative work on loneliness and opioid use warrants further research. Data: This data is from a study titled "Nursing Intervention for HIV Regimen Adherence Among SMI," completed by Dr. Michael Blank, et al, at the University of Pennsylvania. *Results*: Controlling for race, class, gender, mental health, and lifetime opioid use, loneliness was a significant predictor of current use. Every increase in baseline loneliness led to a 49% increase in the chances of using opioids during the study. Future research and policy should work to study and build social capital among at-risk populations. ■

THEOLOGY AND MISSIONS

Paul's Reimagination of Jewish Resurrection

Student Scholarship: Jacob Collins
Faculty Advisor: Mark Dubis

In his first epistle to the Corinthians, Paul suggests that the resurrection is the central doctrine of the Christian faith. But belief in the resurrection of the body has come under attack in the past 200 years from various sources, fueled in part by the accusations of some theologians. They suggested that Paul read into the Hebrew Bible something foreign to the Jewish faith, as the Hebrews had no concept of rising from the dead. But is this assessment true? Do the Jewish Scriptures teach resurrection? Important Second Temple period Jewish and Greco-Roman texts will be used to argue that the Pauline theology of bodily resurrection is unlike the Greco-Roman idea of disembodied bliss. Instead, the resurrection story presented in 1 Corinthians 15 is fundamentally grounded in Paul's beliefs as a Jew and reimagined around the person of Jesus.

Accidental Translation Mistake or Intentional Wordplay? The Septuagint Psalter and the New Testament

Student Scholarship: Nathan Maroney
Faculty Advisor: Mark Dubis

Since the Old Testament was written in a Hebrew script without vowels, there are times when the LXX reads a different vocalization than the traditional MT. Variant readings in two Psalms will be examined. Psalm 2:9 MT reads "break your enemies;" the LXX has "shepherd your enemies." Psalm 18:5-6 has "cords of death;" the LXX reads "birth pangs of death." Aren't these clear mistakes? Allusions to these LXX readings in the New Testament force modern readers to think otherwise and to take seriously the wordplay these alternate readings create. This wordplay also finds resonances in the OT Pseudepigrapha and Qumran Texts. Through an analysis of Micah 5 and Hosea 13, it will be suggested that other OT texts influenced the LXX translator of the Psalms. Implications for our understanding of the LXX and the doctrine of inspiration will be examined.

The Doctrine of Divine Impassibility

Student Scholarship: Riley Boggs
Faculty Advisor: C. Ben Mitchell

The doctrine of divine impassibility is rarely discussed in the evangelical community, especially outside of academic circles. To say that God is impassible is to say that He does not suffer, and attributing this to God changes the way we view Him drastically. We see this specifically when thinking about God's love. It significantly changes the way we approach Him in worship and in prayer, both of these being essential to the Christian life. Furthermore, it would be of little help to appeal to the doctrine of impassibility and not discuss some of the other classical doctrines of God such as the immutability of God, the simplicity of God, and the aseity of God. These doctrines help lead us to see that God is indeed impassible and we should worship Him for it. Because of this, the evangelical community should strive to recover the doctrine of impassibility as a doctrine that we proclaim boldly.

An Apologetic for Mindfulness: A Dialogue Between the Church Fathers and Popular Psychology

Student Scholarship: Zachary Tyler
Faculty Advisor: C. Ben Mitchell

Mindfulness is a concept that has been heralded by many in the field of popular psychology. Through various practices, it seeks to bring the individual's attention to the present moment. Its use has been incorporated into a wide range of therapies with significant results. However, there are some individuals within the evangelical tradition who are hesitant to accept the practice due to its similarities to far Eastern spiritual practices. In order to properly discern whether these practices can, or should, be incorporated, it is crucial that the older traditions of Christianity be consulted. Examination of early Christian writers and ascetics reveals that concepts similar to that of mindfulness have been present within the Church for thousands of years. In light of these traditions, there are practices of mindfulness that are fruitful for the individual believer.

THEOLOGY AND MISSIONS

The Evangelical Setting in Modern-Day France

Student Scholarship: Mary Swisher
Faculty Advisor: C. Ben Mitchell

Western Europe is becoming increasingly secular, and the rest of the Western world is following suit. Despite a rich cultural history imbibed in Christianity, there is a push for Western European nations to abandon their Christian ideals in favor of worldly ones. One of these historically Christian countries leading this push towards secularism is France. Although Catholicism still remains the predominant religion in France, a large portion of French Catholics are non-practicing people from older generations, who believe that in order to be French, one must also be Catholic. However, in younger generations this is no longer the prevailing belief. The movement of the culture is towards a total rejection of organized religion. This rejection is not only affecting the souls of French citizens, but also causing long-term effects on the souls of the future Western world, whose cultures will follow suit. As Christians, it is our responsibility to follow through with the Great Commission and evangelize these souls. In order to evangelize well, one must observe French society's past and present attitudes towards Christianity in order to find a method for effective evangelism and change the culture for the better, creating a better future. French society has its own specific culture, therefore it is necessary to look at its religious history and current cultural structure to understand how to better evangelize within the framework of the increasingly secular French society.

A Biblical Theology of Mutual Dependency: Examining the Relationship Between Men and Women as it Relates to the Life of the Church

Student Scholarship: Madde Ely
Faculty Advisor: C. Ben Mitchell

In light of changing cultural approaches towards gender and sexuality, the question of women's role in ministry has come to the forefront of discussion again in Christian communities. Traditionally, the church has limited women from serving in leadership roles based on Paul's prohibition in 1 Timothy 2:12; however, resurfaced discussion has led many to abandon this traditional view, advocating for the inclusion of women in leadership roles. Is there Scriptural justification for this position? Based on the biblical theology, a convincing argument can be made for the inclusion of women in church leadership roles. The Creation Narrative establishes a relationship of equal responsibility to image God to the world. Traced throughout Scripture, this theme of Creation, appearing in relation to men and women, establishes a relationship of mutual dependency and mutual responsibility between men and women–a relationship which should be reflected in the life of the Church today. ■

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