**GSW**

**GEORGIA SOUTHWESTERN**
STATE UNIVERSITY

# Undergraduate Research Symposium

## Program

## April 19, 2024

# SYMPOSIUM SCHEDULE

| Time | Event | Location |
|------|-------|----------|
| 8:00-8:30 AM | Orientation for speakers, moderators, and judges. Refreshments | SSC Conference Rooms Hall |
| 8:30-10:45 | Oral Presentations | SSC 2410 & 2417 |
| 11:00-12:30 | Poster Presentations | SSC N.W. Hall, online |
| 12:30-1:30 | Lunch | Cafeteria/ Dining room |
| 1:30-2:00 | Awards Ceremony | Private Dining room |

The organizing committee would like to recognize the following individuals and organizations for their support:

Sigma Mu Pi Nursing Honor Society | The GSW Foundation

Cheri Paradise | Bob Slenker

Volunteer Judges

| | | |
|---|---|---|
| Susan Bragg | Chadwick Gugg | Yangil Park |
| Jonathan Carter | Kim Hasbach | Michele Ragsdale |
| Lauren DiPaula | Anne Jacobs | Jennifer Ryer |
| Gary Fisk | John LeJeune | Kaylyn Scanlon-Richards |
| Bonnie Gary | Brian Mallett | Anh-Hue Tu |
| Kailash Ghimire | Jessica Ouzts | Chuchu Wu |
| Elizabeth Gurnack | Brian Parkinson | |

Many thanks to everyone who has helped make this event a success! Sincerely,

| | | |
|---|---|---|
| Ian Brown | Michelle Dykes | Jill Drake |
| Nedialka Iordanova | Anne Jacobs, Chair | John LeJeune |
| Benjamin Meador | Yemisi Milledge | Sai Mukkavilli |

| Time | Talks in SSC 2410 |
|------|-------------------|
| 8:30 AM | Reels That Sparked Revolutions - Films That Changed the 1960s<br>Presenter: Connor Mathis                                1 |
| 8:45 AM | The Decline of the Labor Force Participation Rate<br>Presenters: Jacob Turner and Macy Taylor                                2 |
| 9:00 AM | C.H.O.I.C.E<br>Presenters: Jaylyn Green and Tanner Powell                                3 |
| 9:15 AM | S.A.T. School (bus) Activity Tracker<br>Presenters: Dalton Holley and Binita Patel                                4 |
| | 15-Minute Intermission |
| 9:45 AM | Barack Obama and His Relationship with American Hip-Hop during His Presidential Campaign and Presidency<br>Presenter: Hunter Hockman                                5 |
| 10:00 AM | Beware The Chimera<br>Presenters: Zachary Turner and Michael Andrew Ellis     6 |
| 10:15 AM | Elvis Presley from Jailhouse Rock to GI Blues<br>Presenter: Megan Ogden                                7 |
| 10:30 AM | ResolveIT - Helpdesk with AI<br>Presenter: Kamal Floyd                                8 |
| 10:45 AM | Break Before Poster Session |

| Time | Talks in SSC 2417 |
|---|---|
| 8:30 AM | Sonic Filter<br>Presenters: Mustafa Furkhan and Nathaniel English     1 |
| 8:45 AM | The Interaction of *Staphylococcus epidermidis* and *Pseudomonas aeruginosa* in a Biofilm<br>Presenter: Joanna Myers     2 |
| 9:00 AM | Chemical, Bacterial, and Microplastic Analysis in the Kinchafoonee-Muckalee Watershed<br>Presenter: Devin Fincher     3 |
| 9:15 AM | Hardware Trojan Testing with Hierarchical Trojan Types Under Cognitive Biases<br>Presenter: Nathaniel English     4 |
| | 15-Minute Intermission |
| 9:45 AM | Taurocholic acid induces NRAS via YAP1 in Biliary Atresia<br>Presenter: Lum Fube     5 |
| 10:00 AM | Application of UV-Visible Scattering to Vapor Pressure Lowering<br>Presenters: Kenneth Daniels and Devin Fincher     6 |
| 10:15 AM | Abnormal proliferation of intrahepatic bile ducts with NOTCH signaling in Biliary Atresia<br>Presenter: Elizabeth Taliaferro     7 |
| 10:30 AM | Enhancing Network Security with Artificial Intelligence: A Deep Dive into Techniques and Applications<br>Presenter: Dhrumilkumar Patel     8 |
| 10:45 AM | Break Before Poster Session |

# Oral Presentation Abstracts

**Title:** Reels That Sparked Revolutions - Films That Changed the 1960s
**Presenter:** Connor Mathis
**Faculty Mentor:** Glenn Robins
**Abstract:** The 1960s marked a pivotal change in what was accepted and promoted compared to the previous decades. Notably, there are massive changes to what is allowed to be shown and addressed in the films of this era. There are so many different aspects that could have played a part into this change. However, I believe that through studying the 1960s films that address the youth countercultural movements, they can provide us the answer as to why so many pivotal changes occurred during this time. I research questions about specific elements that are brought up during this time, specifically about the youth revolting against their parental figures and their values. Films like "The Graduate" help us define not only the problems, but also the solutions that were presented to audiences of how the youth felt during this changing decade. Overall, these films provide us with incredible views of the changes of the 1960s and how they reflect the shifting views of the youth.

**Title:** Barack Obama and His Relationship with American Hip-Hop during His Presidential Campaign and Presidency
**Presenter:** Hunter Hockman
**Faculty Mentor:** Jason Berggren
**Abstract:** President Barack Obama maintained a close relationship with the American Hip-Hop scene during his campaigns in 2008 and 2012 and during his presidency. In regards to his campaigns, he utilized their music during his 2008 primary campaign and his campaign journey for the presidency by playing their music during rallies and fundraising events and he referenced lyrics that supported the issues he discussed. During his presidency, Obama met with well-known hip-hop artists such as J. Cole and Jay-Z in official Oval Office visits, held informal events such as luncheons or White House get-togethers for artists, and sponsored official events such as concerts at the White House. As a result, American Hip-Hop rallied around the politician from Chicago, Illinois from 2008 to 2016, supporting his campaign with endorsements, references in their songs, and public support for him.

**Title:** The Decline of the Labor Force Participation Rate
**Presenter:** Jacob Turner, Macy Taylor
**Faculty Mentor:** Mohammad Dehzooei
**Abstract:** Over the past twenty years, the United States has seen a steady drop in the labor force participation rate. Events such as the Great Resignation and Retirement of the Baby Boomers have shifted the age of our workforce, affecting the labor force participation rate. The change in the labor

demographic has profoundly impacted the labor force participation rate in the USA. Similarly, our current welfare system incentivizes people to stay on welfare instead of entering the labor force. The effects of Covid on the US economy are also not to be understated. Since the 2020 COVID-19 pandemic, the percentage of Americans involved in the labor force began declining faster than in previous years. The factors associated with the decline of the Labor force participation rate go beyond demographics, welfare, and COVID-19, but on the surface, these factors have a major impact on our labor force participation rate.

**Title:** C.H.O.I.C.E
**Presenter:** Jaylyn Green, Tanner Powell
**Faculty Mentor:** Sai Mukkavilli

**Abstract:** This paper presents the research and development of CHOICE (Campus Hub for Office Hours, Information, and Community Events), a digital platform designed to improve the university experience at Georgia Southwestern State University. The project integrates event management, personalized event recommendations, and features for faculty-student interaction, aiming to enhance campus connectivity and academic support. The study focuses on examining how users interact with the CHOICE platform. Through an interactive AI chatbot, users can discover and engage in campus events tailored to their interests, offering insights into user preferences and event participation patterns. Additionally, the platform's scheduling features provide valuable data on faculty availability and student meeting requests outside regular office hours, highlighting the demand for flexible academic support services. CHOICE's implementation introduces an innovative method to enriching campus experiences, with potential implications for improving student engagement, academic success, and overall campus community dynamics. By analyzing user interactions and feedback, this research aims to enhance the understanding of using digital platforms to develop a more connected and supportive university environment. This paper discusses the methodology, design considerations, and initial findings of the CHOICE project, highlighting its potential to serve as a model for enhancing campus engagement and academic support at universities.

**Title:** ResolveIT - Helpdesk with AI
**Presenter:** Kamal Floyd, Cameron Porter
**Faculty Mentor:** Sai Mukkavilli

**Abstract:** For helpdesk technicians, the need to address simple questions over and over or manually provide users with relevant documentation can delay tackling more complex and pressing queries. Could responses to these simple queries be automated by an artificial intelligence system, freeing up time and

resources for human technicians? This research project utilizes the power of AI and integrates it into a simple helpdesk system to automate low-level user queries and provide quick responses for users. This automation allows workers to focus on more high-level or time sensitive issues within their system. The AI reads the text of a user query and determines simple solutions to issues or provides documentation so that the user can solve the issue on their own. If there is no solution or documentation available, it will refer the user to the proper administrator and escalate their query so that the issue can be solved. To understand user queries, the AI uses a natural language processing model trained on publicly available data regarding common issues with technology such as computers and printers. Our research and implementation conclude that end users can be served much more efficiently with the assistance of AI, supporting technicians in their work.

**Title:** Sonic Filter
**Presenter:** Mustafa Furkhan, Nathaniel English
**Faculty Mentor:** Sai Mukkavilli
**Abstract:** As the technology era advances, the pros and cons of technology increase. A huge problem that the world faces during this era is that spams have increased rapidly and have been a target towards the people throughout the day and night. Spams can come in various forms such as text messages, emails or calls in our time. The objective of this research is to investigate or research artificial intelligence usage and its effectiveness to identify and prevent spam from increases. To let the people know if a voice is an actual human voice or its AI generated. This research will involve deep learning where neural networks are being used to implement the artificial intelligence algorithms. Using dummy data that involves mp3 files that will be used for training the AI and to increase the accuracy of the AI system. Dummy data will include a bunch of human voices and human-like robotic voices. Also, this project will include frontend where the website will be and the audio mp3 files will be stored on the server sider and the link will be stored in the database. Overtime, the more dummy data is fed, the better the results in identifying the spam.

**Title:** Taurocholic acid induces NRAS via YAP1 in Biliary Atresia
**Presenter:** Lum Fube
**Faculty Mentor:** Surya Amarachintha
**Abstract:** Biliary atresia is a neonatal cholangiopathy characterized by loss of the extrahepatic bile duct causing bile acid accumulation in liver and, subsequent fibro inflammation and abnormal proliferation of intrahepatic ducts. Further, liver develops fibrosis, progresses to cirrhosis, and ultimately causes liver failure. NRAS, an oncoprotein, acts as an effector in ductular

reaction. We hypothesize that elevated levels of Taurocholic acid (TCA), a conjugated bile acid, activates NRAS via YAP1, inducing cholangiocyte proliferation. Mouse intrahepatic cholangiocytes, bile duct epithelial cells treated with TCA showed significant increase in number of cells/mL at 100 uM (2.79x106±303) compared to control (1.8x106±432), 10 uM (2.35x106±551) and 1000 uM (1.57x106±250). Using immunofluorescence (IF), cells were stained with Cytokeratin 19 and Epcam antibodies to characterize cholangiocytes. Fluorescence images measured by Image-J showed elevated YAP1 expression with 100 uM (11.9±1.7FU) compared to control (11.5±0.8FU) and 1000 uM (7.9±.4FU). In addition, NRAS was also overexpressed at 100 uM (11±2.4FU; control, 7.6±1.6FU; 1000uM, 8.8±2.1). We conclude that TCA at 100 uM causes abnormal cholangiocyte cell proliferation with activation of YAP1 via NRAS, however, 1000 uM presumed lethal with reduced YAP1 and NRAS expression. Currently, we are testing PITX1 as the possible link between YAP1 and NRAS.

**Title:** Elvis Presley from Jailhouse Rock to GI Blues
**Presenter:** Megan Ogden
**Faculty Mentor:** Glenn Robins
**Abstract:** Elvis Aaron Presley is widely known as the King of Rock and Roll. Just after his career had begun to officially take off, Elvis was drafted into the United States Army. His advisors were concerned that this would ruin his career, but in fact Elvis's military service expanded his audience and fame. The questions that helped shape my research project focus on changing media portrayals during these years. How did the media portray Elvis as a soldier in these years? How did this shape popular views of Elvis as an American rockstar? Also how did Elvis's fame bring new attention to the American military in these years? These questions will help historians better understand the significance of Elvis's celebrity status in the American Cold War history.

**Title:** Application of UV-Visible Scattering to Vapor Pressure Lowering
**Presenter:** Kenneth Daniels, Devin Fincher
**Faculty Mentor:** Tzvetelin Iordanov
**Abstract:** The previously developed turbidimetric method, at GSW, was utilized to observe the effect of vapor pressure lowering over a series of aqueous solutions with varying concentrations of non-volatile solute. A single measurement consists of injecting and enclosing 5μL of analyte in a standard quartz cuvette and then increasing the temperature of this system from 25 °C to 60 °C at a constant rate, while irradiating with UV-Vis light at 600 nm. As temperature increases the water partial pressure increases resulting in a larger number of gaseous water molecules trapped in the closed cuvette. As the process continues the number of water molecules per unit volume increases

to a saturation point at which heterogeneous nucleation enables the formation of water droplets on the walls of the cuvette. The newly formed water droplets grow and scatter light in a process known as Mie scattering or aerosol particle scattering, which results in a decreased intensity of transmitted radiation. The rate of nucleation and particle growth is directly proportional to the partial pressure inside the cuvette. As the temperature increases these droplets agglomerate and then evaporate back to vapor. The relationship between the rate of nucleation and concentration of non-volatile solute was used to estimate the vapor pressure lowering of analyte solutions.

**Title:** Hardware Trojan Testing with Hierarchical Trojan Types Under Cognitive Biases
**Presenter:** Nathaniel English, Zachery Turner
**Faculty Mentor:** Satyaki Nan
**Abstract:** In this paper, we consider the problem of testing Integrated Circuits (ICs) to check for the presence of hardware Trojans while diligently accounting for the hierarchical classification structure of Trojans, the error-prone nature of testing processes, and the strategic mindsets and behavioral irrationalities (cognitive biases) of buyers and manufacturers of ICs. As shown in the paper, such factors greatly impact the design of Trojan insertion and testing strategies. Under a hierarchy of Trojan types and testing imperfections, the paper first analytically characterizes Trojan insertion-testing strategies at Nash Equilibrium (NE) considering a buyer (defender) and malicious manufacturer (attacker) to be strategic and rational in nature. Then, the paper analytically characterizes such strategies when the involved entities are strategic but irrational in nature. Among others, results presented in the paper emphasize the asymmetric nature of the impact of behavioral irrationalities on the defender's and attacker's utilities. The paper also presents numerous simulation results to gain important insights into our analytically characterized Trojan insertion-testing strategies.

**Title:** Beware The Chimera
**Presenter:** Zachary Turner, Michael Andrew Ellis
**Faculty Mentor:** Sai Mukkavilli
**Abstract:** This capstone is a collaborative effort between two students who both aspire to create and design video games utilizing AI. Our project centers around exploring the potentials of AI integration in game development. Using the Unity Machine Learning Agents Toolkit, we have begun our journey to develop an AI model capable of performing a variety of actions, such as movement, decision-making, and in-game navigation. Our research focuses around not only exploring how AI can be used to enhance gameplay, but also to broaden our understanding of how AI models are developed and trained.

The project work has been divided according to our respective strengths, with one focusing on the visuals, sounds, and story; the other focusing on the game physics, collision detection, game logic, and controls. Both team members are responsible for the development and training of the AI model. Our initial goal is to provide a working model showcasing the potential and possibilities of AI implementation in game design, with our long-term goal being to continue to develop the game and become more familiarized with game design and AI. We wish to both explore AI development and contribute to the game development industry through our research.

**Title:** S.A.T (School Activity Tracker)
**Presenter:** Dalton Holley, Binita Patel
**Faculty Mentor:** Sai Mukkavilli
**Abstract:** One of the major concerns for parents and educators today student's commute to school. A school bus tracker helps ease these concerns, giving them the real-time location of the buses the students are in, along with an updated estimated arrival time. This research project investigates the possibility and effectiveness of using artificial intelligence (AI) to predict school bus arrival times along a fixed route using coordinate values and random traffic variables. The research methodology involves using dummy data for traffic patterns, road conditions, and historical bus arrival times with a fixed path. In this project, Google API will be used to track the buses with specific longitudes and latitudes held in a database. AI is implemented through the use of Python and its libraries. The effectiveness of the project will be determined through the comparison of accurate arrival prediction time, and the adaptability to changing environmental factors such as road, traffic, and weather conditions. The results of this research have the potential for significant optimization of school transportation systems. These include the possibility of improving efficiency, decreasing wait times, and the improvement of overall quality of service.

**Title:** Enhancing Network Security with Artificial Intelligence: A Deep Dive into Techniques and Applications
**Presenter:** Dhrumilkumar Patel
**Faculty Mentor:** Satyaki Nan
**Abstract:** In an era where digital interactions are ubiquitous, network security stands as a paramount concern, given the relentless evolution of cyber threats. Conventional security measures have proven inadequate in thwarting sophisticated attacks, necessitating a paradigm shift towards innovative solutions. Artificial Intelligence (AI) has emerged as a potent ally in fortifying network defenses, presenting capabilities to discern and counter threats in real-time. This research endeavors to delve into the multifaceted realm of AI's

integration within network security, investigating diverse techniques and applications aimed at bolstering resilience against cyber adversaries. Through a comprehensive exploration of AI's role, this study aims to provide insights into the efficacy and potential of AI-driven approaches in fortifying network infrastructures against evolving cyber threats.

**Title:** Chemical, Bacterial, and Microplastic Analysis in the Kinchafoonee-Muckalee Watershed
**Presenter:** Devin Fincher
**Faculty Mentor:** Michele Smith
**Abstract:** Routine assessment of the local creeks, streams, and lakes is essential to monitor the condition of freshwater systems. In this study six different sites in the Kinchafoonee-Muckalee watershed underwent chemical and bacterial analysis multiple times throughout the span of this project. Utilizing various chemical analysis methods, levels of nitrates, orthophosphates, dissolved oxygen, alkalinity, conductivity, and pH were analyzed for each site. These analyses give insight into potential sources of pollution that lead to eutrophication of aquatic systems and health hazards for all forms of life. Bacterial analysis involved the use of 3M Petrifilm™ plating to quantify colonies of *E. coli*. Collected water samples were also analyzed for the presence of microplastics ($10^{-6}$ m). The breakdown of various polymers leads to the development of these microparticles which accumulate within the sediment and flow into other bodies of water. The analysis of microplastics utilized a method in which a fluorescent dye, Nile red, was used to stain the particles so they then can be quantified using a UV light and fluorescent microscopy. Over the course of this research project, the overall chemical and bacterial testing results indicate that the water from the selected sites in the Kinchafoonee-Muckalee watershed fall within the established EPA water quality standards. Microplastic analysis proved to be beneficial in providing insight into plastic pollution as multiple sites produced samples that contained particles. Further research and methodology targeting the qualitative identification of these particles could be indicative of their origin.

**Title:** Abnormal proliferation of intrahepatic bile ducts with NOTCH signaling in Biliary Atresia
**Presenter:** Elizabeth Taliaferro
**Faculty Mentor:** Surya Amarachintha
**Abstract:** Biliary atresia is characterized by loss of extrahepatic bile duct, accumulation of bile acids in liver, and intrahepatic ductular reaction progressing the disease to liver failure. NOTCH is a regenerative pathway found in development and repair of normal bile ducts, but in patients with biliary atresia it is abnormally increased in intrahepatic bile ducts. Using

transcriptome analysis of BA patient livers our lab identified elevated levels of BAAT enzyme resulting in increased production of conjugated bile acids. In this study, we aim to test if Taurochenodeoxycholic acid (TCDCA), a conjugated bile acid hyperactivates NOTCH pathway resulting in abnormal intrahepatic ductal cell proliferation. Mouse intrahepatic cholangiocytes, cells lining the duct when cultured with 10uM TCDCA significantly reduced the gap (0.08um ±0.04) in wound healing assay but not with 100uM (353um±119) when compared to untreated (241um±124) suggesting increased proliferation at low doses. Using immunofluorescence, we observed a significant increase in YAP1 expression at low doses of TCDCA (25FU±5.3) compared to untreated (18FU±2.6). Based on these results we are currently testing the hypothesis if the abnormal proliferation is because of the translocation of YAP1 to nucleus activating downstream genes SOX9 and HES1 and inducing NOTCH.

**Title:** The Interaction of *Staphylococcus epidermidis* and *Pseudomonas aeruginosa* in a Biofilm
**Presenter:** Joanna Myers
**Faculty Mentor:** Anh-Hue Tu
**Abstract:** Biofilm can be found on various surfaces such as medical implants and human tissues. Biofilm is composed of a community of bacteria that interact through cell-to-cell communication known as quorum sensing. The microorganisms associated with biofilm are difficult to eradicate and are resistant to chemical and antibiotic treatments. In this study, the interaction between *Staphylococcus epidermidis and Pseudomonas aeruginosa* in a biofilm was analyzed. Previous results have shown that *Staphylococcus epidermidis* inhibited biofilm formation by *Staphylococcus aureus* if *S. epidermidis* was the initial colonizer or was present at high number such as in log phase. The growth curves of these two strains also indicated that *S. epidermidis* grew much slower than *S. aureus*. Therefore, in this study, the goal is to analyze whether *S. epidermidis* could also inhibit the biofilm formation of other bacteria such as *Pseudomonas aeruginosa*. This study was carried out using viable plate count technique and crystal violet assay technique. It was discovered that *S. epidermidis* did not inhibit the growth of *P. aeruginosa* if *Pseudomonas aeruginosa* was the initial colonizer. However, when *S. epidermidis* was inoculated first, *S. epidermidis* inhibited biofilm formation by *P. aeruginosa*.

# Poster Abstracts

Posters will be available for early viewing by the morning of April 18<sup>th</sup>.

**Title:** Impact on Imagination On Creativity
**Presenter:**  Irma Moreles, Madelyn Dunston, Jaliyah Dawson  (1)
**Faculty Mentor:** Sally Merritt
**Abstract:** This experiment tests whether an individual's creativity is impacted when they imagine they are at home or in a foreign land. Then, the individuals will be asked to come up with as many ways to use a paper clip as they can. It will be tested by survey and each individual will be able to access it online through a website that is anonymous and randomly chooses whether a person imagines they are in a foreign land or at home. This survey will take about five to ten minutes. We assume that we will find that when participants imagine they are in a foreign land, they will be more creative than when they are imagining they are at home.

**Title:** The affect of color on individuals' perception of attractiveness
**Presenter:**  Jaelyn Flynn  (2)
**Faculty Mentor:** Sally Merritt
**Abstract:** The main purpose of this experimental research study is to explore the role that the color of one's clothing can play on their level of perceived attractiveness. In this study 51 colleges students will be randomly assigned to one of the three conditions. Depending on which condition they are assigned to they will be presented with an image of a women wearing that conditions assigned clothing color (green, red, or blue). Participants will then be asked to complete two different surveys, one being a self-report scale and the other being a color rating-scale. Using the results of the surveys, ratings and responses will be analyzed and compared to determine if color plays a distinct role on how attractive someone may be perceived. Data will be collected and results will be shared before symposium.

**Title:** Identifying potent drug candidate for kidney cancer
**Presenter:**  Makayla Lashley-Dorough, Aditya Kaushik  (3)
**Faculty Mentor:** Surya Amarchintha
**Abstract:** It is estimated that 81,610 new patients will be diagnosed with kidney cancer and 14,390 have fatalities during 2024 in the United States. In this study, we aim to identify an efficient antitumor drug to treat kidney cancer. 293T cells, a kidney tumor cell line was treated with widely used cancer drugs Bortezomib and Gefitinib. Immunofluorescence (IF) staining for Filamentous-actin and epidermal growth factor receptor (EGFR) was performed without and with treatments. Our results indicate that in a dosage response treatment for

3 days, both Bortezomib and Gefitinib had a significantly higher cell death at 100 nM compared to 10 nM and untreated. However, at 100 nM, Bortezomib had significantly fewer live cells/ml (2.05x105) compared to Gefitinib (1.14x106) and control (1.48x106). Fluorescence intensity of F-actin measured using Image J in cells treated for 24 hrs. showed significantly lower expressions with Bortezomib (7.7±4.8 FU) compared to untreated (17.8±3.8 FU) but not with Gefitinib (13.4±1.9 FU). Cells treated for 72 hrs. showed significance between Gefitinib (12.4±4.8 FU) and control (20.8±4.7 FU), while Bortezomib was lethal. We conclude that Bortezomib was more effective in treating kidney cancer as it induced apoptosis (programmed cell death), whereas Gefitinib was less effective because cells lack EGFR.

**Title:** The Effects of Journaling on Emotional Wellness
**Presenter:** Renata Woods, Tykeisha Ousley, Hannah Fox  (4)
**Faculty Mentor:** Sally Merritt
**Abstract:** In this research study we plan to send out surveys to around 150 participants, 75 in one condition and 75 in another condition. In each survey they will be asked to write about their pet peeves or what they're grateful for. The survey distribution will be randomized, and each participant will answer the same questions. We want to interview people 18 and older. This survey should take no more than 15 minutes or less. Of course, they will have the option to decline to take the survey and if they decide to take it, it will remain confidential (their identity). This study is to see how journaling improves the emotional wellness of adults as they go throughout their daily life. Most people don't really have the time or money to go to actual counseling, so journaling has been what some people turn to. We want to see how journaling helps a person's emotional well-being and how it makes them feel before and after they journal to see if there is a change.

**Title:** Addressing the Global Epidemic of Nursing Turnover?
**Presenter:** Alexis Medows, Carly Hearn, Will Sewell, Rachel Todd  (5)
**Faculty Mentor:** Laura Gosa
**Abstract:** Shortages among nursing staff and high nursing turnover are issues that are being experienced around the globe. With a projected shortfall of ten million nurses globally by 2030, healthcare administrators and leaders worldwide must begin to identify and address factors that directly relate to and cause nursing turnover. There are a variety of reasons why a nurse may leave their job, and the research consulted in this quality improvement project suggests that negative work cultures, inflexible schedules, and lack of administrator support are among the largest reasons nurses quit. Ultimately, employing strategies to counter these issues and attempting to increase the nursing workforce and nurse longevity and retention is essential to ensure both

the future of the nursing profession and healthcare. To define/uncover effective strategies, this qualitative work conducted a thorough literature review of recent research outlining why nurses leave their profession. In this review, thematic similarities among published works were identified. The themes found can be synthesized together to create/provide strategies for healthcare administrators to counter the factors of high attrition rates and increase nurse retention. In brief, the results of this study show that when administrators/leaders listen to nurses, understand nurses' work-related needs, create flexible work schedules, provide adequate social support systems, and create healthy work environments with reasonable nurse-to-patient ratios, there is a positive effect on nurse retention. When/if leaders employ these multiple approaches and various tactics to mitigate factors leading to turnover, results show that employees' mental health, morale, and ultimately patient care will benefit. While notably, there is not an identifiable singular "cure-al" solution to end turnover, there are key findings and actions that can be taken to retain nurses and slow the global nursing shortage epidemic.

**Title:** The Effects of Mindfulness on Test Anxiety
**Presenter:**  Yarielis Rodriguez, Bethany Burrell, Hannah Simons  (6)
**Faculty Mentor:** Sally Merritt
**Abstract:** Many students experiencing the stressful transition to adulthood struggle to adjust to the risks and rigorous nature associated with college. The level of importance placed on grades is much higher than what would have been experienced in high school, which can lead to high levels of testing anxiety. This experiment serves to study the effects of mindfulness intervention on the levels of anxiety and mood arousal after a test, with the intention that it will help in reducing emotional distress and lead to higher academic functioning. This study uses a between group design and an online survey/test, with the experimental group receiving a video about mindfulness before taking a test and recording their emotion responses, versus the control group who will be given a video about study skills. The sample is drawn from students attending Georgia Southwestern State University.

**Title:** Masked Psychological Refractory Period Effect
**Presenter:**  Aliyah Wilson  (7)
**Faculty Mentor:** Gary Fisk
**Abstract:** The relationship between perception and consciousness was examined. The main goal is to find better ways to measure awareness of stimuli with low visibility in unconscious perception experiments by using the psychological refractory period (PRP). The PRP is the delay in response time following a person's perception of a stimulus when two stimuli occur in short

proximity. This experiment works by showing a participant a briefly presented word or nonword that is difficult to see, followed by a second word or nonword that is easy to see. The participant's task is to quickly discriminate between words and nonwords by pressing buttons on the computer keyboard. Based upon the identification accuracy, the short presentation condition reduces visibility for the first stimulus in the sequence. When considering response times from the shorter to longer presentation conditions, the PRP effect ANOVA test shows that it creates a slower response to the second stimulus due to minimal reaction time allotted. Both the first and second word/nonword responses show significant priming effect differences for the short presentations. This suggests that perception is occurring in both conditions. These findings suggest that the human brain may unconsciously process visual information about word meaning.

**Title:** The effect of refuge complexity on refuge choice in the crayfish *Procambarus gibbus*
**Presenter:** Destiny Musgrove (8)
**Faculty Mentor:** Ian Brown
**Abstract:** *Procambarus gibbus,* like most crayfish species, is known for its characteristic predator evasion behavior. A two-part experiment was conducted in which *P. gibbus* was tested to determine whether this species showed a preference for simple or complex refuges (part 1) and whether this preference was determined by the need for security (part 2). Complexity was defined by the increasing number of entrances (1-4) possessed by a refuge. Solitary crayfish (10 replicates) were tested in part 1 and then two crayfish used in part 1 were placed together to complete 5 replicates of part 2. Using the common knowledge known about crayfish, it is highly likely that the crayfish will choose the more simple refuge with the least amount of entrances since these refuges would be easier to defend making the crayfish feel more secure. This will also cause less territorial aggression in part 2. The knowledge gained through this experimentation could be used to determine possible refuges when sampling creeks for crayfish.

**Title:** Mouse Cholangiocyte Liver Cell Exposure to UV Radiation
**Presenter:** Elizabeth Taliaferro (9)
**Faculty Mentor:** Ian Brown
**Abstract:** Cell exposure to ultraviolet (UV) radiation is the most prominent natural carcinogen. UVC occurs at wavelengths from 100-280nm causing protein denaturation, initiating DNA repair and cellular death. Mouse intrahepatic cholangiocyte cells were treated with UVC at 254nm with $LD_{50}$ at 4:15minutes: seconds and $LD_{90}$ at 14 minutes. To observe cell proliferation a wound assay was performed on a control group, $LD_{50}$ and $LD_{90}$ (lethal dosage

to 50 and 90% of cells). Results show that cellular proliferation occurs in untreated cells, whereas in the UV treated cells cellular proliferation is slowed or inhibited. Using immunoflourescence cells will be stained with phosphoH2AX antibody to observe the activity of DNA repair in each cell treatment. PhosphoH2AX is a cellular marker for DNA double strand breaks from phosphorylation of Ser-139 residue from the histone variant H2AX, initiating the assembly of DNA repair proteins. It is expected DNA repair will increase in the $LD_{50}$ treated cells since they are damaged, but not killed, whereas the expression will be the same in both untreated cells and $LD_{90}$.

**Title:** The Isolation of Entomopathogenic Nematodes (*Heterorhabditis* sp.) from Soil Using *Galleria* Baiting Technique and Pathogenicity Testing using Koch's Postulates
**Presenter:** Emily Garcia, Braylea Philips (10)
**Faculty Mentor:** Ian Brown
**Abstract:** A survey for Entomopathogenic nematodes (EPN) was conducted on the Georgia Southwestern State University campus, Americus, Georgia. Thirty soil samples were collected from the campus environs and baited with *Galleria mellonella* (Waxmoth larvae) to isolate EPN. After incubating for 7 days at 25°C the *Galleria* cadavers were assessed for nematode infection following Koch's Postulates. All potentially infected *Galleria* were placed into white traps. The nematodes recovered were used to reinfect *Galleria* to prove pathogenicity. The four EPNs isolated showed pathogenicity levels of 75.0%, 70.83%, 62.5%, and ~6%.

**Title:** The effects of college students' stress on educational attainment and engagement
**Presenter:** Grace O'shaughnessy (11)
**Faculty Mentor:** Sally Merritt
**Abstract:** The project I will be presenting is looking at college students experience of stress and this impact upon educational attainment and engagement on campus. I shall be researching this by using Google Surveys and the participants of this study will be students at Georgia Southwestern State University. All participants will have a variety of backgrounds including all those commuters, athletes and on- campus students. Having this variety of participation will allow us to see the variation in stressors dependent upon circumstance and then how this affects their college experience. The survey is completable within 10 minutes and there will be three sections to the survey hitting all the key aspects of the research question. The first part will be a questionnaire based on Stress. The second part will be based on engagement in campus life and the third aspect will be from educational attainment perspective. The research is ongoing and has not yet been completed. It will be

completed and displayed by the time of the Symposium.

**Title:** Fall Prevention in the Elderly Population
**Presenter:** Miranda Brannon, Brandon Carter, Kyira Dawson, Jennifer Latimer, Kassandra Prusko (12)
**Faculty Mentor:** Laura Gosa

**Abstract:** Falls are a common safety problem in hospitals, especially in older adults. Nurses play a crucial role in implementing fall precautions while they are caring for their patients. Older adult patients also play a role in preventing falls when they understand patient teaching and follow directions. This quality improvement project will review the literature to identify risk factors of falls in elderly patients and determine appropriate preventive measures, including evidence-based interventions and patient education. This study will also gather patient fall and injury data from Leapfrog Hospital Safety Grade to evaluate the effectiveness of fall prevention measures used in four hospitals.

**Title:** Interspecific Competition Between *Pseudomonas aeruginosa* and *Staphylococcus aureus*.
**Presenter:** Joanna Myers (13)
**Faculty Mentor:** Ian Brown

**Abstract:** Interspecific competition studies between two bacterial species, *Pseudomonas aeruginosa* and *Staphylococcus aureus*, were carried out under the same culture conditions in Luria both. Each bacterium (controls) was grown in separate cultures and in a mixture of the two bacteria (treatment) for a total of eight hours. A growth curve and a viable plate count were performed for each control and treatment. *P. aeruginosa* and *S. aureus* showed that whenever plated together in the same environment there were less CFUs/mL overall compared to when they were plated separately and that there were more *P. aeruginosa* CFUs/mL than *S. aureus* when they were plated together. Therefore, *P. aeruginosa* out-competed *S. aureus.*

**Title:** Hand Washing VS. Hand Sanitizing: The Fight Against C. Diff
**Presenter:** Josie Battaglia, Katie Hobbs, Quincy Mayer, Racine Hearns, Serenity Patterson (14)
**Faculty Mentor:** Laura Gosa

**Abstract:** The purpose of this quality improvement project is to discuss the importance of hand hygiene in reducing the spread/contraction of Clostridium difficile in hospital settings. Within this study, we review pertinent literature and compare the effectiveness of two different standard hand hygiene protocols that prevent Clostridium difficile infection (CDI). The focus of this quality improvement project is to compare how hand washing versus using alcohol based hand sanitizer affects the rate of infection in hospitalized

patients. Overall, the goal of this literature review is to equip healthcare workers with the best method to reduce the spread of C. difficile.

**Title:** The Bioremediation of Urea using Bacteria.
**Presenter:** Kylie Lawhorn (15)
**Faculty Mentor:** Ian Brown
**Abstract:** Urease-containing bacteria can break down urea. In this experiment, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Bacillus megaterium* were tested at two different urea concentrations: 20g/L is the standard concentration for Stuart's Urea Broth and 9.3g/L mimics mammalian urine. Serial dilutions were performed to determine the lowest bacterial concentration capable of decomposing urea. These values were quantified using a spectrophotometer and a pH meter. *Staphylococcus aureus* was found to be the most efficient at breaking down urea, while *Bacillus megaterium* was the least effective. Urease-positive bacteria could be used as a potential method for bioremediation within the environment by decontaminating aquatic environments polluted by nitrogenous wastes.

**Title:** Survey of White Tail Deer (*Odocoileus virginianus*) Populations on the Campus of Georgia Southwestern State University
**Presenter:** Rees Smith (16)
**Faculty Mentor:** Ian Brown
**Abstract:** The white tail deer (*Odocoileus virginianus*) inhabit many parts of the United States. The mating season ends in late December, with a separation of the bucks and does, and a decrease in land usage by does in order to prepare to give birth to their young. Population data was collected from January 26, 2024 to March 29, 2024, using five trail cameras that were set up along a one mile trail around the campus perimeter. The flushing count method was also used to collect additional data by walking the same trail, 3-4 times per week at dusk or dawn, to take pictures of family groups. The data was analyzed by identifying specific markings on the deer in order to identify family groups remaining on campus after the end of the mating season. Preliminary results appear to indicate that there are 5-6 family groups , with 3-5 deer per group, that remained on campus to prepare to give birth to their young.

**Title:** Presence or Absence of *Cimex lectularius* (Bedbugs) Across Georgia Counties
**Presenter:** Sydney McCord (17)
**Faculty Mentor:** Ian Brown
**Abstract:** The resurgence of Bedbugs, (*Cimex lectularius*), is a growing problem in the developed world. A survey of the presence and absence of *C. lectularius* in Georgia counties was conducted by requesting the number of infestations

per year and type of locality such as hospitals, medical offices, homeless shelters, hotels/motels, retirement/nursing homes, residential homes, apartment complexes, and schools from the county health departments and the Public Health Information Portal (PHIP). To date, 19.5% of possible responses have been received. In the last 12 months, Bibb, Cobb, DeKalb, and Fulton Counties exceeded 20 reports. Douglas, Troup, Chatham, Glynn, and Liberty Counties had 10-14 reports. Bartow, Clarke, Clayton, Floyd, Houston, Lowndes, Muscogee, and Richmond Counties had 5-9 reports, and 43 counties had 1-4 reports. Ninety-eight counties had no reports or have yet to respond to the survey. The majority of the reports were from hotels and motels followed by residential homes and then nursing or retirement homes.

**Title:** Athletic Perception of Others Based on Race and Ethnicity
**Presenter:** Ty'Ina Moore, Priscilla Hicks, Matthew Hilton (18)
**Faculty Mentor:** Sally Merritt
**Abstract:** In this study, we will ask participants to measure the likelihood that three presented male figures play a particular sport. The sport options are basketball, baseball, soccer, golf, tennis, and track/cross country. Participants will be told to use the male figures' physical statistics and facial structure to measure the likelihood that he plays the corresponding sport. We will be using the Chicago Face Database to gather images of three males from different ethnic backgrounds, including White/Caucasian, Black/African American, and Hispanic/Latino. This study will be conducted via a short online survey sent out via social media platforms: Instagram, Snapchat, Facebook, and GroupMe. We will be gathering responses from 150 participants in this study. The data from this study will be collected and analyzed before the Research Symposium.

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