The 25th Annual Closing Symposium

This year, the McNair Program is adapting to the Covid-19 Pandemic by hosting our Annual Closing Symposium in an online platform. Research presentations will be recorded and shared online.

Research posters will be shared through an online survey on Monday, July 20, 2020. This will allow for the submission of questions that may be asked of our presenters during their recorded presentations. Survey respondents will also have the opportunity to vote for our annual Bradley Cole Poster Board Competition. Students will be recognized for first, second and third place.

Symposium recordings will be available for viewing during the first week of August. Details will be available on our program web page at www.wichita.edu/mcnair. We hope that you will take time to view these presentations, which are the culmination of over 200 hours of research for each student. The transition to online learning and online research completion has presented challenges and we are immensely proud of the hard work and dedication of each student. Join us in celebrating their achievements.

<table>
<thead>
<tr>
<th>2020 Student Researchers</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Taj Allen</td>
<td>Autumn Minor</td>
<td>Ya-Aida Sillah</td>
</tr>
<tr>
<td>Jannet Balderrama</td>
<td>Kyla Morris</td>
<td>Abel Velasquez</td>
</tr>
<tr>
<td>Maira Banuelos-Galicia</td>
<td>Angela Portillo</td>
<td>Inneke Vargas</td>
</tr>
<tr>
<td>Stephon Edwards</td>
<td>Joseph Sekavec</td>
<td>Daniela Vega</td>
</tr>
<tr>
<td>Ana Barbara Hernandez</td>
<td>Kenya Sevilla</td>
<td>Crystal Zaccarias</td>
</tr>
</tbody>
</table>

First Annual Closing Symposium - 1995-1996
The Role of Domain Four in Protective Antigen Gene

Taj Allen • Mentor: James Bann, PhD • Department of Chemistry

The role of vaccines is to introduce the immune system to an imitated or impartial form of the microorganisms binding surface proteins or any antigens poisons it produces. The purpose of this study was to determine if there is any discernible difference between the protective antigen containing domains one through four and another protective antigen containing only domains one through three. This study was carried out by using an overlap extension PCR to cut the protective antigens gene that codes for domain four from the other domain coding genes. After getting a PCR product, it was then synthesized inside E. coli to grow a cell culture to compare the mutant strain of protective antigen versus the wild type protective antigen. The two separate protective antigens were then tested on which was the more stable type and the differences in the mechanism behind the forming of a heptamer on a cell surface. The results from the study were that the protective antigen only containing domains one through three did not elicit much of an antibody response, while the bind efficient protective antigen containing all four domains did have a strong antibody response. The information gained from this study will aid in understanding the best way to create efficient vaccines and the ability of certain domains in protective antigen to bind to the cell surface.

Isolated Dental Pulp Stem Cell Motility in a 3D Matrix

Jannet Balderrama • Mentor: Li Yao, PhD • Biological Sciences

The nucleus pulposus (NP) plays an essential role in the flexibility and stability of the intervertebral discs (IVD) of the spine. Degenerative changes to the interverbal disc results in biomechanical alterations of the spinal column, which leads to chronic back pain. Current treatments and rehabilitation are focused on surgical procedures, including discectomy, spinal fusion, and nucleotomy. However, the outcome of these methods results in restriction in flexibility of the spine. Stem cell therapy holds promise for potential solutions to this problem. As stem cell therapy advances as a treatment option for degenerative disc, it is imperative that the most appropriate methodology be used to assess possible in vivo responses to the cells. Our study focuses on dental pulp stem cell (DPSC) motility as examined by 3D chemotaxis assay using the μ-Slide chemotaxis chamber. This method allows for the observation of migrating cells using video microscopy. In this study we optimize the technique for insertion and assessment of the cells in the chamber. The dental pulp stem cell pellets were cultured with BMP13 or BMP14 growth factors to induce differentiation. These stained positive for aggrecan and type II collagen, two known chondrocyte markers for NP cells. This study contributes to the collective efforts of scientists and medical professionals who hope to provide improved treatment options for individuals with degenerative disc disease.
Effect of Lyrical Versus Nonlyrical Music on Reading Comprehension in College Students
Maira Banuelos-Galicia • Mentor: Raymond Hull, PhD, CCC-SLP/A •
Department of Communication Sciences and Disorders

The purpose of the present study is to attempt to understand the different effects lyrical versus nonlyrical music might have on reading comprehension among college students. Technology has entered everyone’s lives, including those in an academic setting, and it will keep advancing at a rapid speed. Students may choose to use the technology that they have at their disposal to help them study, but it may also be doing harm to their test results. Over the years, there have been several studies that claim that students’ performance on national standardized tests have been lower than previous years. There could be several reasons for the decline in scores. One of the perspectives researchers and educators have been focusing on is the way students are choosing to study. Students may be inclined to listen to music while studying or reading. In this study, two short fictional stories were presented to 12 participants (7 males and 5 females). One of the stories was presented with a song that contained lyrics, and the other was presented with a song that did not contain lyrics and was purely instrumental. After reading each short story, the participants were asked 7 simple questions regarding each story. The results from this study showed that on average participants answered more questions correctly while listening to music with lyrics. Results also showed that females were on average more likely to answer questions correctly when listening to lyrical and nonlyrical music. Research in this field may help educators understand how to better aid their students when learning reading skills. When student’s reading skills improve, they will be more prepared to continue to higher education and/or a work environment.

Understanding People and Technology: A Theoretical Analysis of Time Delay within NASA’s Autonomous Mission Operations
Stephon Edwards • Mentors: Laila Cure, PhD • Industrial and Manufacturing Engineering Department • Lisa Vangsness, PhD • Human Factors Psychology

During the evening of January 29, 1988, the Challenger space shuttle exploded, resulting in the deaths of seven crew members, including Dr. Ronald McNair. This disaster could be easily diagnosed as a mechanical failure, with the rocket’s rubber O-ring seal failing to properly seal due to extremely cold temperatures shortly after lift-off, allowing hot gas to reach the highly flammable oxygen tanks. Nevertheless, further research has shown that the inevitable wrong doings present within NASA’s management was the primary catalyst for the incident. The Challenger proceeded to take off despite obvious warnings. Through the destruction of the Challenger space shuttle, humanity learns a valuable lesson regarding the repressions that occur within the presence of a severe disconnection between people and technology within a complex system. Through this study, the possible ratifications from such an example of disconnection between people and technology within space exploration is analyzed. During a modern space mission, there is a prevalent communication delay present within NASA’s autonomous (AI-controlled, but independent from human influence) mission operations. This delay could negatively affect the communication either between the control center on Earth and the operators in space, or between the operators themselves during any type of mission, such as a maintenance operation on the International Space Station. If such a disconnection were to occur during the rectification of a serious incident within space, it could result in the spreading of misinformation throughout all parties within NASA and increase the chances of a catastrophic incident to occur. Within this study’s findings, there is a clear correlation present between communication delay and various psychological assessments, including human performance, perceived stress/workload, task criticality/level of emergency, and human error probability (HEP) during a space mission operation. Additionally, further autonomous technology implementation within future mission operations through NASA’s Autonomous Mission Operations (AMO) project will be discussed.
Using Young Adult Literature as a Mirror: Racial Representation in Morris Award Winners, 2009-2019
Ana Barbara Hernandez • Mentor: Katherine Mason Cramer, PhD • College of Applied Studies

The purpose of this research was to analyze racial representation in 11 award-winning young adult (YA) novels which were all winners of the Morris Award from 2009 to 2019. It was asked, what is the racial make-up of young adult literature (YAL) protagonists in recipients of the Morris Award in the last ten years (2009-2019)? The analytical framework was developed based on one created by Rudine Sims Bishop to analyze how African American identities are depicted in children’s literature. Utilizing content analysis, it was analyzed how and if race is analyzed in the targeted novels. Other factors that were also analyzed included author background (e.g., birthplace, education, life experience) and race as well as the physical characteristics of the protagonist. Through this research it was found that only 36% of the authors, from 2009-2019, are authors of color, and 36% of the novels address the race of characters of color. Hopefully from this research, the racial inequities in YA literature can be brought to the surface and addressed, changing the outlook and perspective of many young adults who would not have had it otherwise.

Assessing Substance Use and Misuse Among College Students and How to Promote Counseling
Autumn Minor • Mentor: Rhonda K. Lewis, PhD • Psychology Department

Substance abuse is a serious problem in the United States, particularly among the college student population. College students have several factors that put them at risk for using substances. Alcohol is the most common substance used by college students. An 80-item survey was used to assess the substance use behaviors of college students in the Midwest and their adverse childhood experiences (ACEs). The purpose of this study was to examine the relationship between these experiences and whether their substance use prompted them to seek professional help. A total of 115 participants completed the online survey, 25% percent of the participants were male and 73% of the participants were female. The results showed that the prevalence of substance use among college students was low with 39% reporting no alcohol use, 74% reporting no marijuana use and 84% reporting no tobacco use in the last 30 days, respectively. In regards to seeking help for substance abuse issues, the results varied from relying on professionals to peers, family, and friends. Future directions and limitations will be discussed.
An Evaluation of the Sisters and Brothers for Healthy Infants Initiative

Kyla Morris • Mentor: Sharla Smith, PhD • University of Kansas

African American women currently face significant disparities in maternal mortality. African American women are three to four times more likely to die from pregnancy-related complications than White women. Research suggests numerous factors are contributing to the disparities; these include race, genetics, health status, income, education, lifestyle, chronic stress, quality of healthcare services, racism, discrimination, and some environmental factors. The literature review discusses these factors in four categories which are a woman's experiences, patient-provider interaction, racism and discrimination, and higher rates of medical risk factors, and finally suggests a solution. In order to eliminate the disparities and achieve birth equity a collaborative effort is necessary to develop a Kansas Birth Equity Network (K-BEN). Through the network researchers, community and advocacy organizations, physicians, women's clinics, and other community stakeholders can work collaboratively to develop an intervention tailored specifically to African Americans. Then, the intervention can be replicated in communities across the United States to improve the poor birth outcomes for African Americans. This research aims to evaluate the efforts of the Sisters and Brothers for Healthy Infants Initiative.

Pilot Study: Vertical Jump Comparison Between Vertec, DARI Motion Capture, and My Jump 2 App

Angela Portillo • Mentor: Heidi VanRavenhorst- Bell, PhD • Human Performance Studies

The Vertec jump test is one of the most commonly used tools for measuring vertical jump. Vertec's lack of output such as force, velocity, and power may limit an athlete's overall performance capabilities. With advancing technologies, new methods of assessing vertical jump (e.g., DARI and My Jump 2 app) have been presented (Buscà, et al., 2016). This study explores whether there was a significant difference between three vertical jump assessments (Vertec, DARI, My Jump 2 app). The study included a total of 44 participants, age 18 and older. Prior to performing the vertical assessments, each subject completed a set warm up. Subjects then completed a familiarization and baseline trial for all three assessments. Vertec and My Jump 2 were performed in a field setting, and DARI in a clinical setting. To prevent learning affect and fatigue, assessments were introduced in a randomized order and each subject was provided a 5-minute rest between each assessment. Vertec maximal vertical jump was recorded as the highest height of two attempts. DARI and My Jump 2 vertical jump maximum height measures were recorded based on system output. A 3-way Repeated Measures ANOVA was administered to determine if there is a significant difference in vertical jump height between the three assessments. A follow-up pairwise comparison will be conducted to determine significance. Analysis is set at a critical alpha level of 0.05. Based on current literature, there is an expectation that there will be no significant difference in vertical jump. DARI and My Jump 2 may serve as more robust assessments due to the additional output they offer. My Jump 2 may present as the most useful based on its versatility in both testing settings along with the additional data output it offers. Utilizing a single robust assessment to capture multiple output measures simultaneously in a sport-specific setting, may provide useful insight for developing individualized performance-based training programs. In addition, this assessment may be a more time-efficient and cost-effective approach.
**Complex Analysis and Fluid Flow**  
*Joseph Sekavec • Mentor: Justin Ryan, PhD • Mathematics and Statistics*

In this study we modeled fluid flow and circulation over an airfoil. We started with the known solution in the circle domain, and used conformal maps to transform to the airfoil domain. We used tools from complex analysis and differential equations including Laplacians, the Joukowski transformation, and other conformal maps. The open source mathematical computing software sage was used to build this model and create all images.

**Food and Other Insecurities Amongst Students: An Assessment of the University’s Role in Meeting Student and Staff Needs**  
*Kenya Sevilla • Mentor: Amber Dean, PhD • Community Engagement Institute*

This study examines food insecurities among Wichita State students and faculty. This study also examines the resources that Wichita state offers to students and how their needs are being met. This study aimed to find out if students are being supported and to learn if the University needs to implement more resources in order for students to succeed. Based on the review of the literature those college students who experience food insecurities are 15 times more likely to fail a course (Patton-López, López-Cevallos, Cancel-Tirado, & Vazquez, 2014). A survey was made available to students and anyone who is affiliated with Wichita State University.

**Understanding Knowledge Of Fall Prevention In Care Homes**  
*Ya-Aida Sillah • Mentor: Nikki Keene-Woods, PhD • Department of Public Health Sciences*

Quality of care is one strategic feature administrators among nursing homes look upon to ensure safety among residents. One essential characteristic includes implementing efficient fall prevention. Fall prevention is utilized to protect residents, to prevent injuries. This research study investigates the effectiveness of fall prevention in a care home setting. In-person surveys were conducted with 26 participants recruited from the local Wichita Nursing Home communities during March 2020. Data were analyzed using Qualtrics online survey software. Results were similar between direct care providers staff and administration associates’ knowledge of fall prevention with residents. The results support fall prevention education for clinical staff that should be utilized in a care home facility to maintain effective fall prevention. Recommendations include allowing residents who experience a high risk of falls to take advantage of different fall interventions, such as incorporating an individualized care plan. Further research is needed to identify efficient and inclusive fall prevention strategies towards finding ways to preserve and recycle funds for other activities conducted in the care home facility.
The Psychology of Social Media Engagement
Abel Velasquez • Mentor: Robert Zettle, PhD • Psychology Department

Social media is becoming one of the most used forms of communication. It is used for entertainment, business, education, communication and much more. While it provides personal and professional benefits, recent studies focusing on the full effects of heavy usage of social media suggest there are potential psychological risks—especially if there is an over dependence on it. Experiential avoidance could also be contributing to the heavy usage of social media as a means to avoid stressful or uncomfortable situations. If experiential avoidance leads to extended usage, and people feel worse after being on social media, this could create a negative loop. This study focused on seeing if experiential avoidance is contributing to social media usage as well if there were any reported psychological risks with heavy usage of social media. This was done by implementing a 159-item survey that contained four different psychological assessments: the Marlowe Crowne Social Desirability Scale, Social Networking Time Use Scale, Depression Anxiety Stress Scale, Multidimensional Experiential Avoidance Questionnaire, as well as standard demographics questions. Two hundred and eightyseven college students from Wichita State University self-reported responses in this survey. The results showed that for some instances like during free periods, in academic related periods, in public spaces, or during stress periods some experiential avoidance tactics like behavioral avoidance, distraction, and procrastination were found to be statistically significant. The results of this study suggest there could be a potential link between experiential avoidance as a motivating factor of social media usage. If this relationship does exist, then there should be a focus on the risks that come with using social media as an avoidance tactic. This could support the idea that people should be more cautious of spending a significant amount of time on social media. Future studies can also see if these relationships exist for other mental health issues or different demographic audiences.

The Significance of Racial Categorizations on Mental Health Service Outcomes
Inneke Vargas • Mentor: C. Brendan Clark, PhD • Psychology Department

Mental health stigma is a long-standing problem within the African American community. Despite increasing social acceptance among younger generations, stigmatization dissuades patients from seeking mental health therapy. In addition to historical stigmas, minorities contend with unbalanced power differentials within cross-racial therapeutic settings. These factors reduce the chances of satisfactory treatment outcomes and may result in client disengagement. This study examines historical experiences in healthcare among African Americans in the United States, the effects of cross-racial dyads in therapeutic settings, and how these issues affect the current utilization of on-campus mental health services among minority college students. The study had a total participant pool of (n=100) with a majority being white (n=69) and female (n=80), with results indicating there is not a significant difference in mental health service outcomes between the two groups (M = 2.32, SD = 0.77).
College Student Perceptions of Integrated Behavioral Health (IBH) Care on Campus

Daniela Vega • Mentor: Rachel Petts, PhD • Psychology Department

The purpose of this study is to understand college student perceptions of integrated behavioral health (IBH) care on campus. Student health services (SHS) and Counseling and prevention services (CAPS) integrated into one model of care in a new Student Wellness center at the YMCA at Wichita State Campus. This study will help in understanding college students’ thoughts and perceptions towards this model of care, their intentions to seek health care there, and whether stigma and attitudes towards seeking psychological help relate to their intentions to seek help in an integrated setting. Two psychometrically validated questionnaires were included to explore self-stigma surrounding seeking psychological help and general help-seeking questionnaire. The self-stigma of seeking psychological help scale considers various problems a person may run into while seeking psychological help. The general help-seeking questionnaire (GHSQ) considers the likelihood of a person seeking help for a personal or emotional problem from another person.

Freedom of Speech: Effects of U.S. School Monolingual Practices on Hispanic Students

Crystal Zacarias • Mentors: Jennifer Pearson, PhD • Sociology Department • Jodie Simon • Sociology Department

The increase in the Hispanic population in United States public schools this past decade has resulted in a considerate number of bilingual students. With assimilation and loss of identity being a major concern in Hispanic communities, this study hopes to examine how U.S. public schools play a role on the development of bilingual students. Loss of language for bilingual children can take away their ability to speak with their elders from their hispanic community which can break their connections to their heritage. Language loss can also lead to psychological distress and cause identity issues. Interviews were conducted with six Hispanic students who are or have pursued college educations. This study provides insights into the students self-described educational experiences, unveiling the pressures they felt being Hispanic, how language impacts their identity, and how past K-12 experiences made them feel about themselves and their non-English language. The interviews focused on both past and present self-described attitudes towards Spanish and the importance of being bilingual. Participants were also asked to reflect on their past school experiences (kindergarten through 12th grade) and their impact.