

Ronald E. McNair Achievement Program

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Israel Levi Aispuro Galindo

Neuroscience and Cognitive Science at University of Arizona

Mentored by Dr. Robert Wilson (Neuroscience)



The "Mastermind" Game Show Project

ABSTRACT: Gameshows requiring decision making have been used in multiple studies to further understand the process of decision making. More specifically, response times in game shows have been used to study risk aversion and cognitive processing in humans.

Spontaneous eyeblink rates (EBR) have also been used to study cognitive processing in humans. In this study, we are attempting to determine how often participants blink while they are listening to questions, and if there is a correlation between EBR and response times. This study examines episodes of the British game show "Mastermind," where contestants go through a series of time limited rounds in which they attempt to answer as many questions as they can correctly. From viewing multiple episodes, participant behavior—such as listening, answering, and responding to feedback—was categorized alongside blinking. These spontaneous eye blink rates have been found to show dopamine-related cognitive function and shows us that they serve as being a non-invasive indirect marker of the function. By noting these participant behaviors, this project aims to supply neuro- and cognitive scientists with useful information on decision making.

Nicholas Armas

Biochemistry at University of Arizona

Mentored by Dr. John Purdy (Immunobiology)



HCMV and the Host Lipid Metabolism: A New Perspective

ABSTRACT: Human Cytomegalovirus (HCMV) is an indiscriminate, human herpesvirus that infects a significant portion of people around the world and can lead to detrimental symptoms in the immunocompromised. Alike other viruses, HCMV hijacks and utilizes the host lipid metabolism through its mechanism of replication. To further understand the role and significance of the host lipid metabolism is to understand the enzymes responsible for producing necessary metabolites for virion production. One such family of enzymes would be the fatty acid elongases, responsible for elongation of hydrocarbon tails. In understanding the elongases, there is a notable interaction between two specific elongases – fatty acid elongase 5 (ELOVL5) and fatty acid elongase 7 (ELOVL7) – on HCMV replication. This connection between ELOVL5 and ELOVL7 maintains an environment where HCMV is likely to replicate while avoiding cell death from the rise of saturated fatty acids produced by ELOVL7. Ultimately, this research will further the understanding of, and offer a different perspective into, the role of lipid metabolism on HCMV replication.

Alan Briceno

Physics at University of Arizona

Mentored by Dr. John Schaibley (Physics)



Observation of electronic band structure in atomically thin Indium selenide

ABSTRACT: The potential applications of atomically thin, two-dimensional materials such as indium selenide (InSe) in the field of conversion photovoltaic technology have shown promise in next-generation solar energy-efficient devices. To reach the goal of photovoltaic devices the quality of InSe monolayers needs to be considered depending on the type of processes that have been followed in its creation and subsequent annealing treatments that have been applied. Obtaining monolayers of InSe of the highest possible quality provide higher carrier mobility for a desired photovoltaic performance. Each atomically thin sheet of InSe is composed of four monatomic layers in the Se-In-In-Se sequence, in such a way that each two-dimensional sheet exhibits a hexagonal structure and the links between them are covalent which could lead to further investigation of transport properties and scattering mechanisms of high-mobility atomically thin, two-dimensional materials. Furthermore, InSe encapsulated by hexagonal boron nitride (hBN) addresses the issues of intrinsic doping in silicon dioxide (SiO₂) by exhibiting enhanced mobility and reduces the carrier inhomogeneity. The scarcity of experimental data suggests that features of InSe are limited due to degradation in ambient conditions, probably due to chemical reactions such as oxygen and water in the air which leads to the biggest obstacle in practical applications. In this study, we desire to create a photovoltaic device in an inherited atmosphere such as a glovebox to observe high carrier mobility in InSe, leading to potential applications in diverse areas such as photo-electricity and transistors.

Ashley Casarez

Mexican American Studies at University of Arizona

Mentored by Dr. Cindy Cruz (English)



Institutional Bullying: curriculum, campus climate, and peer victimization affecting LGBTQ+ students in Catholic school

ABSTRACT: A growing collection of research indicates that LGBTQ+ students are more likely to be bullied, teased, and/or victims of aggressive behavior at school. Limited research has considered institutional bullying as a fundamental factor, which simultaneously affects LGBTQ+ students on campus, through curriculum, and student socialization. This becomes alarming considering Catholic schools' religious policy on LGBTQ+ topics. LGBTQ+ students attending Catholic schools express that they feel distressed about institutional silence and bullying, worry about not receiving support from individuals within the school, and fear expressing their LGBTQ+ identities while on campus. In the study, an online GLSEN survey (the Gay, Lesbian, and Straight Education Network) will be distributed to Southern Arizona's Catholic high schools that measure the comfortability and positive representation LGBTQ+ students (14-18 years old) feel in class, campus, between students, and faculty/teachers. The questions will measure student satisfaction of curriculum, awareness of anti-bullying policies, and emphasis of faculty support. The anticipated findings will demonstrate the importance of educational leadership, policy, and practices in shaping positive experiences for LGBTQ+ students attending Catholic schools.

Desmond Chambers

Neuroscience and Cognitive Science at University of Arizona

Mentored by Dr. Joseph Sanguitti (Psychology)



Major Depressive Disorder: Modern Antidepressant Alternatives

ABSTRACT: Antidepressants are the typical treatment for major depression disorder (MDD) symptoms linked with decreased ability to control mood. Studies find that antidepressants relieve depression symptoms through mechanisms within dysfunctional resting-state network communication. Other reports follow the antidepressants' effects on circuits within the dysfunctional resting-state networks and the local circuits' biochemistry. Pills hardly work for those treated for MDD. Antidepressants target underlying psychological processes, except that the clinical drugs unnecessarily affect the wrong bodily systems, causing issues. Pharmacological models of major depression are inconsistent, so treatments need provisions. We explored the resting-state network functional connectivity down to local biochemistry alterations after non-invasive brain stimulation with a modernized focused ultrasound technique to address this issue. We captured seven volunteers' resting-state functional connectivity through functional MRI to contrast the Gamma amino-butyric acid and glutamate in local circuits with MR Spectroscopy before and after sonication. Functional imaging group analysis reveals decreased activation of the resting-state network, decreased glutamate, and no effective GABA feedback after sonication. We inferred that glutamate reduction corresponds to the decreased activation of the resting-state networks. Then, we reasoned from prior studies that GABA transmission increased after sonication because of a known inverse relationship between GABA and Glutamate. However, the MRS did not effectively measure GABA. We find that fTUS to the posterior cortex altered the resting-state network functional connectivity and balanced excitatory: inhibitory biochemistry of the prescribed network.

Eterniti Claggett

Family Studies and Human Development at University of Arizona

Mentored by Dr. Melissa A. Barnett (Family Studies and Human Development)



Marital Satisfaction during the Stay-at-Home Order

ABSTRACT: The Covid-19 pandemic has presented many challenges for individuals as well as for relationships. Current research shows that individuals experienced loneliness, financial worry, and anxiety in association during the stay-at-home order. The most current research indicates that stress caused by the pandemic increased conflict and lowered the marital satisfaction level of some couples, whereas couples with less conflict had higher levels of marital satisfaction (Lebow, 2020). A well-developed love map (all of the information one knows about their partner) allows couples to maintain satisfaction levels when experiencing pivotal life transitions (Gottman & Silver, 2015). Considering the Covid-19 pandemic a pivotal life transition, did the presence of a strong love map allow for couples to maintain their satisfaction levels specifically during the stay-at-home order? The purpose of this study is to test the association between love map strength and marital satisfaction during the stay-at-home order by expanding on the theory of love maps. For this study individuals who were in a marital relationship during the stay-at-home order will be asked to complete altered versions of the Dyadic Adjustment Scale, as well as the Love Map questionnaire in order to test for this association. The results will potentially inform how to maintain marital satisfaction during pivotal life transitions.

Daniel Villalobos Cruz

Public Health at University of Arizona

Mentored by Dr. Julie Armin (Family and Community
Medicine)



The Use of Telehealth in Cancer Psychological Support Programs: A Scoping Review

ABSTRACT: TBA

Alexander Esqueda

Neuroscience and Cognitive Science at University of Arizona

Mentored by Dr. Torsten Falk (Neurology and Pharmacology)



Evaluation of Contributions of Opioid Receptors in the treatment of Levodopa-induced dyskinesia by Sub-anesthetic Ketamine

ABSTRACT: Parkinson's Disease (PD) is the second most common neurodegenerative disease, affecting roughly 5 million people worldwide. Levodopa (L-DOPA) is the gold-standard treatment for PD patients, but after about 5-7 years of usage many patients develop a serious side effect known as levodopa-induced dyskinesia (LID). With onset, patients experience choreiform and dystonic movements, drastically reducing quality of life. We are working on repurposing sub-anesthetic ketamine to treat LID and have shown great efficacy in the rodent PD models to both reduce established LID and attenuate the development of LID, work that is currently progressing to a Phase II clinical trial. How ketamine works in addition to the well-known N-Methyl-D-aspartate (NMDA) receptor antagonism, is still unclear due to its multi-functional nature. Thus, this summer we are using the pan-opioid receptor antagonist naloxone to determine if opioid receptor activation by ketamine contributes to the lessening of abnormal involuntary movements (AIMs) associated with LID. Lesioning unilaterally with 6-hydroxydopamine (6-OHDA) to establish PD in rodents, we can test for lesion efficacy by administering amphetamine and have included rats with ≥ 4 net ipsilateral amphetamine-induced rotation scores into the study (mean \pm SEM: 6.44 ± 0.49). The baseline dyskinesia being used to group animals: 35.9 ± 1.78 mean AIMs \pm SEM. Three 10-hr treatment groups (all i.p. injections) – vehicle, naloxone, or naloxone (3 mg/kg) + ketamine (20 mg/kg) – with $n=7$ each were dosed with L-DOPA (6 mg/kg) according to our established model of LID, and AIMs were scored. Pilot analysis to be presented at the conclusion of summer.

Elsa Joanna Gonzalez

Environmental Science at University of Arizona

Mentored by Dr. Joseph Blankinship (Soil, Water, and Environmental Science)



Exploring Microbial Compounds and Mineral Amendments to Slow Down Compost Decomposition in Desert Soils

ABSTRACT: Climate change is a significant issue that can be attributed to high carbon emissions to the atmosphere. Previous research has identified soil as a potential sink in which we can sequester carbon in order to improve climate change mitigation. Adding compost to cropland is a practice that can encourage carbon sequestration by increasing the amount of organic carbon present in soil. However, Arizona farmers have found that most compost added at the start of the growing season has decomposed by the end of the season. Therefore, in order to improve soil carbon sequestration and the soil health of desert croplands, preventing the rapid decomposition of compost is necessary. The present study examines how adding various additives to pre-prepared compost affects the decomposition rate of compost. The microbial compounds xanthan gum and beta-glucans were chosen to examine the potential of adding microbial biomass to compost to improve organic matter stability in soil. Additionally, clays in the form of vermiculite and zeolite were chosen to increase surface interactions between organic matter and minerals. These substances were added in varying amounts to compost obtained from a local composting company and left to incubate for three days. The carbon dioxide emitted by the incubation trials was measured using the Li-Cor 840A CO₂/H₂O analyzer to determine decomposition rates. Further research will entail extending the incubation trials for long-term results to determine recommendations for Arizona farmers.

Jamie Guido

Linguistics at University of Arizona

Mentored by Dr. Gus Hahn-Powell (Linguistics)



Comparison of State of the Art End-to-End and Disambiguation-Only Approaches to Entity Linking

ABSTRACT: Entity linking is an uncommon term but is relevant to daily life for many people. Entity linking is the process of using recognizable real-world objects, or named entities, in text and linking them to a corresponding entry in a database with more information, such as Wikidata. This can be used for other machine learning techniques such as text retrieval, which is most associated with search engine queries. The two main approaches to entity linking are end-to-end and disambiguation-only approaches. End-to-end is a two-step process involving finding the named entities through Named Entity Recognition and disambiguating those entities to a database. Disambiguation-only takes gold-standard entities which have been manually selected and only disambiguates them from a database like the name suggests. Previous research has recognized that disambiguation-only technique is more accurate than end-to-end, however any model that involves manual manipulation is not ideal. Therefore, this research will compare both models with the use of the revolutionary transformer model for the process of Named Entity Recognition in the end-to-end model and determine if the model's efficiency can improve the end-to-end approach. For the purposes of this research, the models will use a novel knowledge base for entity recognition and the Wikidata database will be used. Accuracy will be determined using InKb F1 scores and the end-to-end model will be processed through a General Entity Annotator Benchmark.

Nizan Howard

Information Technology and Science; Linguistics at University of Arizona

Mentored by Dr. Celina Valencia (Cancer Center)



BRCA testing disparities

ABSTRACT: Breast cancer is the most common cancer among women in the United States in 2021. Breast Cancer 1 (BRCA1) and breast cancer 2 (BRCA2) gene mutations can increase an individual's risk of breast and or ovarian cancer. Women that test positive for either BRCA 1 or BRCA 2 gene mutations have a 60 to 70 percent lifetime risk of breast cancer. However, there are a plethora of researchers who found that many racial and ethnic minorities that include: African Americans, Hispanic or Latino, Asian and Pacific Islanders, have a higher risk of breast cancer mortality and late-stage diagnosis than non-Hispanic Caucasian women in America. This study focused research on the racial and ethnic minorities in BRCA testing. Geospatial analysis on social determinants of health in socio-economic status and their measures of influence in breast cancer genetic testing referral disparities are examined through multi-dimensional data maps in Arizona.

Natalia Jacobson

Neuroscience and Cognitive Science at University of Arizona

Mentored by Dr. Katalin Gothard (Physiology and Neuroscience)



The Interplay Between Social Status and Short-Term Memory For Faces

ABSTRACT: All human and non-human primates who live in hierarchical societies, use knowledge about the status of others for social decision making. Dominant individuals command visual attention. Novelty also captures visual attention. The goal of this study was to determine whether Rhesus macaques prioritize social rank over novelty when they perform a Visual Paired Comparison (VPC) task. We hypothesized a conflict between the natural inclination to look at novel faces and the drive to view dominant faces changes accuracy and reaction time in a VPC task. We generated artificial social hierarchies and independently assessed that the viewer monkeys learned the position of each individual in the hierarchy. During the VPC task, the viewer was first familiarized with a video of a conspecific selected from the learned hierarchy. This was followed by the presentation of two images: a static frame from the prior familiarization video (familiar image) next to a static image of another monkey chosen from the rest of the same hierarchy set (novel image). Both the familiar and novel images contained only neutral facial expressions. To successfully complete a trial and receive a juice reward, the viewer monkey was required to fixate on the novel image. We measured the choice accuracy of one viewer monkey and compared the proportion of errors when choosing a dominant familiar vs. a subordinate familiar monkey. We found a higher probability (ANOVA $p < 0.05$, $N = 34$ sessions) of errors when the familiar individual was dominant. The probability of incorrectly choosing the highest-ranking animal when paired with the second highest was even higher ($p < 0.01$). Thus, we confirmed that preference for dominance can influence the preference for novelty in a VPC task. These errors in novelty selection may be related to the viewer's certainty of rank because the effects were strongest for both the highest and lowest ranking individuals ($p < 0.01$). Furthermore, preliminary data indicate that this dominance effect is temporary and depends on social context, as the effect was not present when the stimulus monkeys were not engaged in hierarchical interactions ($p = 0.5$). The interference between preference for novelty and for high social status suggests that the VPC task can be used to probe the perception or knowledge of social status.

Kara Kemp

Speech, Language and Hearing Sciences at University of
Arizona

Mentored by Dr. Elena Plante (Speech, Language, and
Hearing Sciences)



Establishing concurrent validity for the Shirts and Shoes Test

ABSTRACT: During language development, receptive language skills are among the first communication abilities a child learns and it is the foundation of language acquisition. These language capabilities relate to a child's ability to understand spoken information (instructions, a story being read to them etc.) It is crucial for a Speech-language pathologist (SLP) to identify whether or not a child has a receptive language disorder. One method a SLP uses to identify this language impairment is by using the Token Test for Children. The Token Test for children is a well-established and reliable method for assessing receptive language in children ages 3;0 to 12;11. This assessment includes 20 small tokens that vary in size, shape and color and the child has to manipulate the tokens based on commands given by the examiner.

Unfortunately, young children with receptive language impairments do not always know shapes and color words, a prerequisite for taking this test. To address this concern, Plante & Vance (2017) developed a test named the Shirts and Shoes test, which also tests receptive skills but with vocabulary familiar even to those with language disorders. By establishing concurrent validity, or the degree to which the new test correlates with an established test of the same skills, we set out to ascertain whether this the Shirts and Shoes test also examines receptive language processing in children.

Marissa Luna-Ridenour

Psychological Sciences at University of Arizona

Mentored by Dr. Jessica Andrews-Hanna (Psychology)



Substance Abuse and its Daily Effects on Depression and Depression Predictors

ABSTRACT: Depression is one of the most common mental health disorders, affecting 7% of adults in the United States every year. One common trend found in adults suffering from depression is substance abuse of illicit drugs or alcohol. The aim of this current study is to investigate the significance of substance use as a day-to-day predictor of depression in adults ages 18-30. An analysis of adults ($n=365$) and their depression and substance use levels was conducted to see if substance use affects their daily emotional experiences and then in turn their depression levels. This analysis was done using a smartphone app called "Mind Window" that identifies patterns of users' thinking by asking questions about their thoughts at random times throughout the day along with established questionnaires to assess trait-level characteristics. Examining depression as an outcome variable, linear regression models and independent sample t-tests were used for the two parts of this study. The first is an analysis of users indicating non-clinical level substance use levels ($n=283$) and individuals who indicated possible clinical level substance use ($n=82$) to see how this difference may change the participants daily responses to the questionnaires. The results of this analysis indicated that possible clinical level substance use participants have significantly ($p<.05$) higher levels of depression, negative valence emotions, and spend more time thinking about the past than participants who are not abusing substances. The second part analyzes possible clinical level substance users and how different levels of intake influence these same variables which are predictors of depression. It was then determined that higher levels of substance use are correlated to higher depression levels, an increase in negative valence scores, and a greater amount of participants thoughts being set in the past.

Giovanni Marquez

Psychological Sciences at University of Arizona

Mentored by Dr. John Ruiz (Psychology)



Social Vigilance & Depressive Symptomology: An Unexplored Behavioral Pathway

ABSTRACT: **Background:** Social Vigilance is a psychosocial stress behavior characterized by the monitoring of one's social environment for potential threats. There is a paucity of stress research investigating social vigilance as a potential behavioral pathway for psychological health outcomes. Individuals of racial-ethnic minority status may experience unique psychosocial stressors compared to Non-Hispanic White counterparts; due to this variance in stress burden race-ethnicity and acculturation may serve as moderators. **Aims:** The purpose of the current study is to ascertain whether social vigilance is associated with depressive symptoms and whether this association is moderated by race-ethnicity and acculturation status. The hypotheses were threefold: 1. social vigilance is positively associated with depressive symptoms, 2. this relationship is significantly greater in racial-ethnic minority groups compared with Non-Hispanic Whites, and 3. acculturation, within a Hispanic/Latino subsample, is associated with higher levels of social vigilance. **Methods:** A multi-site, cross sectional study consisting of N = 3,283 diverse young adults was used as the secondary data source. **Results:** Results revealed a significant association between social vigilance and depressive symptoms, $p < 0.001$. A significant interactive effect between social vigilance and race-ethnicity on depressive symptoms was found, $p = 0.001$. Acculturation did not moderate the association between social vigilance and depressive symptoms in the Hispanic/Latino subsample, $p = 0.39$. **Conclusion:** Analyses revealed support for the first hypothesis and evidence that the association between social vigilance and depressive symptoms varies significantly across racial-ethnic groups. Findings provide motivation for future research to determine causality between social vigilance and health outcomes.

Nalani Moss

Public Management and Public Policy at University of
Arizona

Mentored by Dr. Yotam Shmargad (Government and Public
Policy)



We Got That Good, Bad and Ugly:

The Potency in Ownership of the Black Image in Entertainment

ABSTRACT: Social media has provided a stage for many talented creatives like DC Young Fly and King Bach, who have established a platform and brand in Black Entertainment. Nonetheless, it is common to see the memes and other forms of creative content produced by Black creatives maintain stronger virality than the creator themselves. This was the case for the recent cancellation of one of the most lucrative MTV Shows in the 2010s decade, *Wild n Out*. The host of the show, a well known producer, actor and songwriter, Nick Cannon, was accused of making anti-semitic remarks on his separate talk show. Such remarks resulted in an outright contract termination with all of Viacom productions. The unfortunate fate of the *Wild n Out* Television Show should have been a rude awakening for many Black corporate entities in the Entertainment industry and the supporting fans of the show; that the creative control of Black Entertainment has still been in the hands of major Entertainment corporations and has further transitioned into the globalization of Black Culture through Social Media most commonly represented through the same means of entertainment reminiscent of minstrel shows and blaxploitation film. This form of Black Media entertainment is most commonly referred to as Black Face, Black Fishing or Digital Black Face. Furthermore, mass media has indicated that the traction that non African American content creators gain from Black culture references, and the lucrative career they obtain is provided through their ability to appeal to their audience, through comedic interpretations of Black Culture commonly referred to as Black Face, Black Fishing or in academia as Digital Black Face. This situation has created a unique market for Black culture, where other races have maintained their interpretations of Black Culture through exploitation. The purpose of the present research is to identify the trend most commonly identified as Digital Black Face or Black Fishing in American Entertainment that capitalizes on the exploitation of Black Culture. The research question being addressed is: Do Black Culture Content Creators, both African American and non-African American, obtain higher frequencies of engagement on social media when they utilize exploitative marketing or Digital Black Face to advertise Black Culture?

Ana Murrieta

Natural Resources at University of Arizona

Mentored by Dr. David Hogan (Environmental Science)



Biodegradation of Synthetic Surfactants

ABSTRACT: Bioremediation is a type of biotechnology used to remediate the environment of pollutants. In bioremediation, pollutants are degraded by microbes that are either found naturally or introduced to the environment. Biodegradation can be enhanced by the introduction of surfactants which reduce surface tension of the pollutant, making it easier for microbes to degrade. Natural surfactants called biosurfactants are created by bacteria which excrete the surfactant compound (Philip and Atlas, 2005). Synthetic surfactants can be produced by using biosurfactants as a model. Biosurfactants are usually known to be biodegradable, but the biodegradability of many synthetic surfactants are still unknown. In this study, synthetic surfactant biodegradability is identified by measuring the amount of carbon dioxide produced by microbes and surfactants in enclosed biometer flasks. The study was conducted in triplicate. 5 surfactants were studied along with a positive and negative control for a total of 21 flasks observed. Flasks contained microbes obtained from the Tres Rios Water Reclamation Facility in Pima County, Arizona, along with an Environmental Protection Agency recommended nutrient medium and respective synthetic surfactants or control. All flasks had an attached sidearm filled with potassium hydroxide to capture carbon dioxide released into the flask's atmosphere. Carbon dioxide was then measured by titration of the potassium hydroxide base. The purpose of this study is to determine if the synthetic surfactants are readily biodegradable, according to the Environmental Protection Agency guidelines. Although data analysis is ongoing, we hope this study will contribute to the knowledge of how to safely remediate the environment.

Loretta M. Notah

Veterinary Science at University of Arizona

Mentored by Debbie Schaefer (Animal & Comparative
Biomedical Sciences)



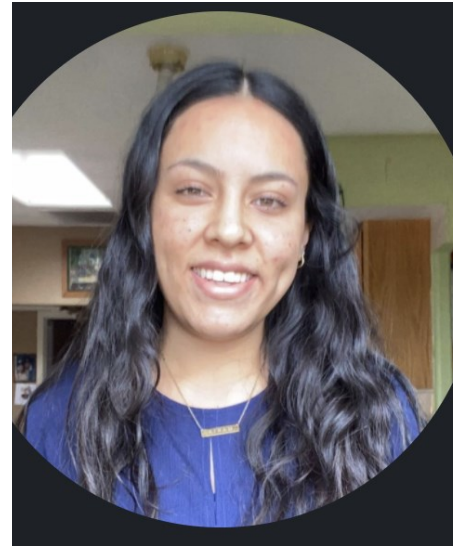
Mechanisms of Clostridium difficile: Analyzing Current CDI Therapies Efficacy

ABSTRACT: TBA

Maria Guadalupe Ochoa

Family Studies and Human Development at University of Arizona

Mentored by Dr. Rebecca Crocker (Health Sciences and Southwest Center)



Beyond Language Barriers: Intruding factors in Healthcare Accessibility for Mexican Immigrants

ABSTRACT: Mexican immigrants face many barriers in their attempt to access healthcare in the United States. While language barriers are one of the most well-known issues, Mexicans in the US face many other obstacles, including the financial burden of care, lack of health insurance, difficulties navigating healthcare systems, and lack of pre-migration access to health care. While some of these barriers are well documented in the literature, others, such as the impact of pre-migration factors, remain poorly understood. The purpose of the current study is to address a fuller range of barriers faced by Mexican immigrants in the US by exploring immigrants' pre-migration access to medical care, health experiences, and knowledge of medical systems to determine whether such factors impact immigrants' care seeking practices once in the US. Specifically, this quantitative research project will include conducting surveys with 300 Mexican origins, foreign-born participants drawn from the sample of a previous study focusing on liver disease in southern Arizona. In collaboration with University of Arizona researchers who specialize in Latino immigrant health, I worked to create and finalize a survey instrument aimed to document the relationship between pre- and post-migration care access, define methodology for the proposed project, and submit a full Institutional Review Board application in order to prepare for data gathering in Fall 2021. Given the strong correlation between barriers to healthcare access and utilization and overall well-being, this research is designed to inform interventions that decrease the difficulties Mexican immigrants face in accessing healthcare and thereby improve overall health.

Gabrielle Peterson

Molecular and Cellular Biology at University of Arizona

Mentored by Dr. Daniela Zarnescu (Molecular and Cellular Biology)



The Significance of Genetics, Environment, and Mechanism in the ALS Phenotype

ABSTRACT: ALS is a fatal complex disorder characterized by the degeneration of upper and lower motor neurons. Genetics likely play a role in most cases, however, only 10% of cases are familial while 90% are sporadic. The finding that TDP-43 cellular protein aggregation occurs in 97% of ALS cases illuminated a key component of ALS pathology, however the underlying disease mechanics are unknown. Additionally, disease progression varies between patients. These disease characteristics have led to the consensus that the ALS phenotype is not solely determined by genetics and that environmental factors likely play a role. Physical activity and toxin exposure have been theorized as environmental contributors based on clinical data. One process which could mechanistically link these factors to the ALS phenotype is oxidative stress. Oxidative stress has been shown to potentially induce TDP-43 aggregation in recent studies and many of the theorized environmental factors are likely capable of inducing oxidative stress. At this time, the experimental outcomes of environmental exposures in ALS have not been researched. To address this, I have designed a comprehensive study that investigates the effects of oxidative stress inducing toxin exposure in an ALS-like phenotype. Specifically, I am introducing the herbicidal toxin, sodium arsenite, and the common sweetener, sorbitol via food for *Drosophila*. I anticipate that an ALS-like phenotype based on diminished function can be established in this animal model. If my hypothesis is correct, oxidative stress and TDP-43 aggregation will be observed and quantified in *Drosophila* motor neurons to further elucidate the potential mechanism.

Eduardo San Juan

Sociology at University of Arizona

Mentored by Dr. Joseph Broschak (Management and Organizations)



Title IX and its effect on careers in women's intercollegiate athletics

ABSTRACT: Classic studies of inequality within labor markets have noted that segregation of women and men into certain job categories is one of the primary causes to differences in social attainment. Understanding how men and women come to be differentially distributed in labor markets, and the features of organizations in which men and women come to be located, is essential to understanding sources of inequality, and gaining insights into potential remedies. By integrating arguments from organizational ecology, institutional theory, and organizational demography, we make predictions about the mobility patterns of male and female coaches in women's intercollegiate athletics. Further, we propose that newly implemented federal legislation that directly addresses issues of inequality, such as Title IX of the Educational Amendments to the Civil Rights Act, has the potential to cause a shift in the relative rates of men and women manager's mobility patterns. We perform preliminary examination of these predictions using data on the mobility of coaches of two women's intercollegiate sports: basketball and volleyball in 319 U.S. colleges between 1972 and 1980. We test our hypothesis by examining the hiring rates of men and women head coaches before and after the passing of Title IX.

Alek Sepulveda

Systems Engineering at University of Arizona

Mentored by Dr. Larry Head (Systems and Industrial Engineering)



Learning an Unwalked Path: Machine Learning for a Mobile PTPS

ABSTRACT: The number of pedestrian accidents, both fatal and non-fatal, continues to increase. As mobile compute power increases, the practicality of smartphones in helping this issue improves. Previous research in reducing pedestrian accidents has explored using embedded smartphone sensors with algorithms to improve the accuracy of pedestrian position and trajectory measurements, providing a warning to both the pedestrian and surrounding vehicles. In order to improve the effectiveness of these warnings, this paper investigates the effectiveness and viability of various models for predicting pedestrian trajectory using mobile phone sensors. With pedestrian motion being individualistic in nature, we present a diverse set of time-series datasets with natural raw motion and location data. This data is collected on a university campus to simulate the potential paths of university instructors and students. Several machine learning methodologies are employed and analyzed for accurately predicting the trajectory of a pedestrian across several prediction times using the data collected. The purpose of this machine learning study is to determine an appropriate model architecture to predict pedestrian trajectory both in accuracy and viability in terms of modern mobile computing power. Although this study is ongoing and we have not concluded our data analysis, we hope that our findings support future traffic system and Pedestrian Trajectory Prediction System (PTPS) research.

Erika Valdes

Speech, Language, and Hearing Sciences at University of
Arizona

Mentored by Dr. Leah Fabiano-Smith (Speech, Language,
and Hearing Sciences)



Speech Sound Disorders in Spanish-English Speaking Children

ABSTRACT: Speech sound disorders can occur in children whether they speak one language or two. To prevent a misdiagnosis, it is crucial that a speech-language pathologist accurately identifies how speech sound development is similar to, and different from, monolingual speech sound development. The purpose of this study is to identify how underlying language-learning disabilities present themselves in children who speak more than one language. Sixty-six bilingual Spanish-English speaking children participated in this study. Children were recorded on a single-word phonological assessment in both English and Spanish. Parent interviews were used to obtain information on language history and use in both languages. Samples were phonetically transcribed using the Logical International Phonetics Program (LIPP) (Oller & Delgado, 2000) and error targets and substitutes were analyzed for speech sound complexity (Fabiano-Smith & Barlow, 2010) and between-language interaction in the context of the PRIMIR model (Curtin, et al., 2011). We observed that bilingual children utilize markedness parameters to select sounds to avoid and use as substitutes in their production errors. Evidence of between-language interaction was observed at the level of the phoneme and the syllable. Bilingual children utilize rule systems from both of their languages during the process of phonological acquisition, supporting PRIMIR (Curtin, et al., 2011). Speech-language pathologists must accurately distinguish between-language interaction from evidence of an underlying language-learning disability in order to avoid misdiagnosis.

Hailey Van Vorce

Neuroscience and Cognitive Science at University of Arizona

Mentored by Dr. Jamie Edgin (Psychology)



Sleep Dependent Memory: Outcomes in Autism Spectrum Disorder and Down Syndrome

ABSTRACT: Current research has failed to evaluate gist memory in developmental disabilities, like autism spectrum disorder (ASD) and Down syndrome (DS), groups with specific memory deficits. Memory evaluation within the criminal justice system has increased, focusing on eyewitness testimonies and false memory. False memory stems from the fuzzy trace theory or dual-process theory, where the two types of memory processes, verbatim and gist, utilize different retrieval processes. Gist processes rely on semantic features, while verbatim processes rely on surface details. During sleep, memories are consolidated into long-term storage. People with ASD and DS have specific sleep deficits that have been shown to impact memory. Autistic children have reduced sleep latency, while children with DS spend less time in rapid eye movement (REM) sleep, likely decreasing hippocampal activation, reducing memory consolidation (Luongo et al., 2021). To investigate the gist memory in neurodevelopmental disorders, specifically ASD and DS, a developmentally appropriate novel picture-based assessment for a gist memory task was used. In this computerized task, participants will complete a short and long-term delay task, separated by either a period of sleep or wake. Actigraphy watches assess sleep quality which are compared to the gist memory performance taken at each condition. Eye-tracking is utilized to assess attention to stimuli and encoding processes during the gist memory task. This study will be the first to investigate sleep-dependent gist memory in children with neurodevelopmental disorders. It is hypothesized that children with neuro-developmental disorders will rely more on gist memory than explicit memory, presumably influenced by sleep. **Keywords:** Autism spectrum disorder, down syndrome, gist memory, memory consolidation, fuzzy trace theory

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Differential Alpha-2 Adrenergic Receptor Expression Across Sex and APOE Mutation

ABSTRACT: Pre-synaptic alpha-2 adrenergic receptors, commonly recognized for their role in catecholamine induced vasoconstriction, may also contribute to the progression of neurodegeneration. In the central nervous system, these receptors regulate changes in the interstitial space through mediating norepinephrine levels. When the interstitial space is reduced, metabolic waste clearance such as A-beta is not as efficient. Additionally, alpha-2 adrenergic receptors are found in the hypothalamus, locus coeruleus (LC), pancreas, kidney, and adipose tissue, requiring a holistic view to accurately identify the mechanistic role of alpha-2 adrenergic receptor activity in AD. In humans, the number and activity level of alpha-2 adrenergic receptors has been suggested to play a role in arousal and alertness. We are interested in investigating whether Apolipoprotein (APOE) isoforms reflect behavioral and physiological differences in mice animal models. The aims of this study are to image hypothalamic, LC, adipose, and livers from homozygous APOE-epsilon3 and APOE-epsilon4 male and female mice to determine if the amount of alpha-2 adrenergic receptors in the tissues correlate to behavioral and physiological effects such as adipose index, cognitive measures, or weight trajectories. These results will establish the foundation for more accurate and translatable testing of AD treatments in the future.