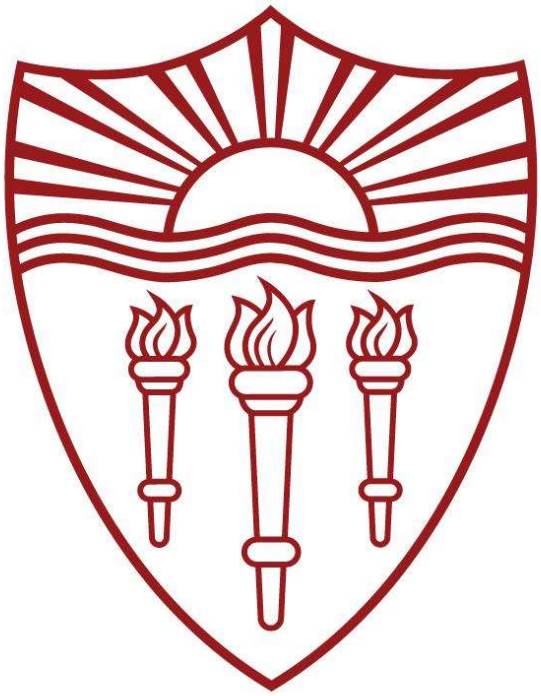
USC Research Gateway Scholars Program

Summer Research Institute

Academic Programs

Office of the Provost



July 19, 2023

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Welcome

Dear Members of the USC Community & Guests:

With great pleasure, we welcome you to the 2023 USC Research Gateway Scholars Summer Institute Symposium. The Symposium is designed to provide Scholars with the unique opportunity to present their summer research projects before an academic audience. Each project represents the Scholars' individual work under the advisement and mentorship of program staff, USC faculty and graduate students.

While working on individual projects, the Scholars' excitement, curiosity, and diligence was at an all-time high. We expect that they will continue their research explorations and further expand their projects. Please join us in celebrating their early contributions to scholarly research.

Thank you for attending today's Symposium. We hope you enjoy meeting the Scholars and learning about their research interests and graduate school objectives.

Sincerely,

David Glasgow, Ed.D., MPH
Assistant Vice Provost for Undergraduate Education
Director, USC Research Gateway Scholars Program

Sabina Hills-Villalobos, Ph.D. Student
Academic Advisor & Program Coordinator

Berenice Morales-Garza, M.A.
Graduate Assistant

Program Information

The USC Research Gateway Scholars Program is a student academic services initiative sponsored by the University of Southern California. The program provides graduate school preparation, research training, professional development, and competitive scholarships to a select group of high-achieving undergraduates from first-generation, low-income, and underrepresented ethnic minority backgrounds. It builds on the best practices and remarkable success of the USC McNair Scholars Program and is administered by the USC Office of Undergraduate Programs, along with the support of various USC academic and student services departments.

USC staff and faculty work closely with program participants as they complete their undergraduate requirements and encourage them to enroll in graduate programs. All academic disciplines are eligible, including the arts and humanities, social sciences, and STEM. The program tracks students' progress all through their undergraduate years until the successful completion of advanced degrees. The goal is to increase the attainment of graduate-level degrees, specifically the Ph.D. and other doctorates. The program aims to diversify higher education at the graduate-level and the professoriate ranks.

In summary, the Research Gateway Scholars Program provides the following services: opportunities for research or other scholarly activities; summer internships; workshops and seminars designed to prepare students for graduate-level study, specifically the doctorate; academic tutoring; academic counseling; and advising designed to assist students with securing graduate-level admission and financial assistance. Furthermore, the program may provide the following: counseling services designed to improve the financial and economic literacy of students; mentoring programs involving faculty members and graduate students; and exposing students to cultural events and academic programs not usually available to underserved populations.

Program Staff and Instructors

David Glasgow, Ed.D., MPA
Assistant Vice Provost, Office of Undergraduate Education
Director, USC Research Gateway Scholars Program

Sabina Hills-Villalobos, Ph.D. Student, American Studies and Ethnicity, Academic Advisor and Program Coordinator

Berenice Morales-Garza, M.E. in Postsecondary Administration and Student Affairs, Graduate Assistant

Riley Grosso, Ph.D. Candidate, Alfred Mann School of Pharmacy and Pharmaceutical Sciences, Clinical and Experimental Therapeutics, Mentor

Alisa Catalina Sanchez, Ph.D.
Faculty, Dornsife College for Letters, Arts and Sciences, Writing Program, Writing Instructor

Bo Cheng Jin, Ph.D.
Faculty, Viterbi School of Engineering, Aerospace and Mechanical Engineering, Mentor

Amelia Cruz, Ph.D. Candidate, Dornsife College of Letters, Arts and Sciences, English, Mentor

Symposium Agenda

Continental Breakfast: 8:30AM – 9:00AM

Welcome & Introductory Remarks: 8:55AM – 9:00AM

Group 1 STEM: 9:00AM – 11:00AM
Carol Alata
Andrea Morfin Valencia
Gabriel Solis

Break: 11:00AM – 11:10AM

Group 2 Pharmacy: 11:10AM – 12:00PM
Ariel Ford
Jeremiah Lee
Haley Jun

Lunch: 12:00PM to 1:10PM

Group 3 Humanities and Social Sciences: 1:10PM – 2:00PM
Za'Keithia Robinson
Cain Trevino
Blanca Godoy

Closing Remarks: 1:30 – 2:30PM

Carol Alata

Major: Computational Neuroscience, Dornsife College of Letters, Arts, and Sciences

Faculty Advisor: Brian Lee, Ph.D., Associate Professor of Neurosurgery, Keck School of Medicine

Title: Gamma- and Beta-Band Spectral Analysis during Go/No-Go Arm Reaching Movements

Abstract: Gamma and Beta bands are two ranges of frequencies that have been observed to modulate during the execution of movement in the brain. Gamma has been shown to be prokinetic, which means that it activates the execution of movement. Conversely, beta is known to inhibit movement and therefore delay the onset of movement (Nowak et al, 2015; Khanna and Carmena, 2017). For example, in recent studies, the hippocampus has been observed to be involved in the execution of movement, and that during the response phase, the beta band is suppressed (Del Campo-Vera et al, 2020).

The Beta power relationship with execution of movement was shown to change significantly between Go and No-Go tasks, where there was beta power suppression during the Go Task and beta power activation during the No-Go Task (Del Campo-Vera et al, 2022). A statistically significant increase in gamma band power was shown in the response phase—indicating the activation of the execution of movement—of the direct reach task in the amygdala, a subcortical region in the brain (Gogia et al, 2020).

Beta power can be measured in decibels or V2/Hz using spectral power analysis and represents the strength or magnitude of the signal within the frequency range of 13-30 Hz. In this analysis, I examined the relationship that exists between gamma and beta bands to be able to better implement Deep Brain Stimulation (DBS) treatments. This is because there may be a possibility that these bands are dependent on each other due to the inverse relationship between their responses to execution of movement. In this preliminary study, I analyzed the neural signal data of one patient

who had refractory epilepsy using MATLAB version 2023a, along with the Chronux package. The data were visualized using Power Spectral Densities and Spectrograms. The results analyzed from one patient with refractory epilepsy suggest that gamma induces the execution of movement and beta inhibits execution of movement. This is crucial in understanding how to target specific brain regions at frequencies that induce the desired effects of mitigating refractory epilepsy symptoms and symptoms of other diseases like Parkinson's Disease. Deep Brain Stimulation has been shown to be better in terms of ameliorating symptoms for Parkinsonian patients in comparison to the best medical therapy (BMT) out there, however, having a better understanding of how frequency coupling can impact execution of movement throughout the brain could help improve DBS by decreasing serious adverse effects (Bratsos et al, 2018).

Ariel Ford

Major: Biopharmaceutical Sciences, Mann School of Pharmacy

Faculty Advisor: Ricky Bluthenthal, Ph.D., Professor of Population and Public Health Services, Keck School of Medicine

Title: Substance Abuse Treatment Readiness and Motivation For People Who Inject Drugs: A Review of the Literature

Abstract: Substance use disorders (SUDs), one of the most deadly and expensive public health crises the country has ever faced, are a growing problem in the United States. For people who inject drugs (PWID) specifically, unsafe syringe practices result in increased risks for HIV, hepatitis C, skin and bacterial infections (Henderson et al., 2003). Many available pharmacological and behavioral treatments have shown to be effective in treating SUDs, and access to these treatments has increased significantly in recent years. However, utilization of these resources remains low among PWID due to medical stigma, lack of insurance, and other barriers that can impede treatment entry, retention, and engagement (Frost et al., 2018). More research must be done in improving treatment programs to account for specific needs of this population, ensuring that they help patients remain engaged and break the cycle of substance abuse. Health outcomes following SUD treatment are associated with the patients' motivation to change and seek help in lowering drug use, commonly described as treatment readiness. Countless treatment readiness measures have been developed to predict retention, relapse, and other health outcomes for SUD patients. In this paper, I performed a meta-analysis to thoroughly assess a wide range of these measures in a standardized manner. Studies which have utilized these measures among PWID were compared and analyzed for accuracy, associations with drug problem severity, and possible limitations across diverse populations. Out of 10 articles used, 6 consisted of marginalized racial and ethnic groups as sample majorities, with many participants also unhoused, incarcerated, or living in poverty. Correlates of readiness measures mostly included one's recognition of their problem drug use and intention to quit drug use by setting

goals. Although readiness prior to treatment was often high, overall utilization and retention remained low in most studies. These findings suggest that these readiness measures should be improved and tailored to account for barriers accessing treatment, lack of education, and comorbidities often present in PWID.

Blanca Godoy

Major: Political Science

Faculty Advisor: Mary Helen Immordino-Yang, Ed.D., Professor of Education and Technology, Rossier School of Education

Title: Critical Hope as Cultural Capital

Abstract: Using critical race theory as a framework, this empirical study focuses on how Black and Latine high-school students from South Central, Los Angeles make meaning of their social and racial identities within a colorblind society.1 The author, Blanca Godoy, examined the intersection of community cultural wealth acknowledgment and critical racial awareness through a nine-week filmmaking course. The course encouraged a small group of high-school students from South Central, Los Angeles to engage in peer-led discussions about belonging, racism, and identity. Based on an analysis of class journals, video diaries, and interview data, Godoy finds that these students carry an intuitive sense of critical hope developed through their personal experiences within socio-economic systems. Duncan Andrade (2009) posits that critical hope challenges the shortcomings of false hope by "demanding a committed and active struggle against the evidence in order to change the deadly tides of wealthy inequality, group xenophobia, and personal despair"(West, 2004, pp. 296–297). This research project will focus on the socratic aspect of critical hope which "requires both teachers and students to painfully examine their lives and actions within an unjust society and to share the sensibility that pain may pave the path to justice" (Duncin-Andrade, 2009). Acknowledging the role that racial and social identity can play within systems and day-to-day experiences can help students avoid internalizing stereotypes rooted in racist prejudices.2 The purpose of this research is to 1) encourage Black and Latine youth to engage in social and racial discussions about belonging, racism, and identity to strengthen students' development of critical hope. 2) To inform educators and community stakeholders about the importance of creating intentional spaces within academic settings to include experiential knowledge as part of the learning process.

Haley Jun

Major: Pharmacology and Drug Development, Mann School of Pharmacy

Faculty Advisor: Paul Seidler, Ph.D., Assistant Professor of Pharmacology and Pharmaceutical Sciences, Mann School of Pharmacy

Title: 3D Reconstruction of Amyloid-Beta Fibril in Alzheimer's Disease

Abstract:
Alzheimer's disease (AD) is a neurodegenerative disease that impairs cognitive and mental functions such as memory, thought, and language. A major cause of Alzheimer's Disease is the buildup of amyloid-beta plaques. As amyloid-beta precursor proteins (APP) clump and break down, they create amyloid-beta (Aβ) fibrils that are resistant to degradation since they can often become volatile and form dangerous plaques. In AD brains, amyloid plaques are largely composed of amyloid fibrils, which contain 36-43 amino acids (protein building blocks). Thus, this accumulation between neurons in the brain disrupts cell function and damages nerve cells. We propose to create a 3D atomic reconstruction of the amyloid fibril to investigate what drugs bind to and inhibit fibrils from aggregating. This is because these binding sites have not yet been identified. After purifying and collecting Aβ fibrils from the AD brain, we employed Cryogenic electron microscopy (Cryo-EM), Cryo-EM Single Particle Ab-Initio Reconstruction and Classification (CryoSPARC), and Chimera software to see if these fibrils are suitable to yield an atomic resolution of the fibril's structure. To solve and process Cryo-EM structures, we use CryoSPARC, a software program designed to process Cryo-EM structures. Lastly, we converted the images into 3D structures using Chimera and discovered 2 appendages protruding from the Aβ fibril. By using this structure-based approach, we propose that these appendages may be drug-binding spots that can be used to identify small-molecule drugs that inhibit amyloid disease, such as Alzheimer's disease, and lead to possible AD therapies.

Jeremiah Lee

Major: Pharmacology and Drug Development, Mann School of Pharmacy

Faculty Advisor: Terry Church, Ph.D., Assistant Professor of Regulatory and Quality Sciences, Mann School of Pharmacy

Title: Transgender Inclusion: The Language of Sex and Gender in PrEP Clinical Trials

Abstract: PrEP, or pre-exposure prophylaxis, is an invaluable resource for the prevention of HIV-infection and transmission within at-risk communities. However, PrEP's implementation into the HIV-care system faces many challenges, such as inaccessibility, lack of trust, and inadequate clinical data for key demographics. One such demographic is transgender individuals, especially trans-feminine people, who face the highest risk for HIV infection. Despite this, trans-identifying persons are not adequately represented nor recruited in PrEP clinical trials, causing HIV prevention efforts to lack crucial trans-specific nuance. This paper examines contemporary clinical practices to understand the barriers to trials that persist and how they have contributed to transgender invisibility in data. This has involved the development of a trial assessment scale that evaluates sex and gender eligibility criteria, to document practices that discourage and exclude gender-diverse individuals from entering trial spaces. Applying this scale to contemporary PrEP clinical trials has revealed that clinicians are struggling to grapple with sex and gender, evidenced by the lack of standardized language which perpetuates a sense of *not belonging* for gender-diverse individuals. This scale will be useful to clinicians as a resource to evaluate their trials and recognize key areas for improving inclusion. Though the scale was developed under the context of PrEP clinical trials, it is intended that it will be used for all types of clinical trials. This scale innovatively combines the principles put forth by diversity, equity, and inclusion (DEI) with the clinical sciences, to initiate a genuine shift toward inclusive trials, with gender-diverse persons in mind.

Andrea Morfin Valencia

Major: Biological Sciences, BA

Faculty Advisor: Peter Chung, Ph.D., Assistant Professor of Physics and Astronomy, Dornsife College of Letters, Arts, and Sciences

Title: The Phosphorylation of the Residues Within the Huntingtin Protein Fragment Htt Exon 1

Abstract: Huntington's disease is a neurodegenerative disease that becomes fatal for patients 15 to 20 years after the first symptom development. Many of Huntington's disease symptoms have? crucial long-term effects such as mental disorder development and the loss of physical control in motor skills. Huntington's disease is caused by the ~3000 kDa Huntingtin protein which holds the protein fragment Httexon 1. Within the Httexon 1 fragment, there has been a possible indication of the first protein region called the N terminal and how phosphorylation of residues, adding phosphate groups to the amino acid residue group, inhibits fibril aggregation similar to aggregation found in Huntington's disease. The Biophysics Chung lab focuses on further purifying and mutating with post-translational mutations the Httexon1 protein fragment critical to this disease with biophysical techniques that can provide similar fibril aggregation to Huntington's disease. A possible area of interest for an increase in fibril aggregation is the phosphorylation of residue sites within the first 17 amino acid sequences in the N-terminal of the Htt exon 1 fragment. The phosphorylation of the T3, S13, and S16 within this N terminal region has demonstrated through many past scholarships a higher possibility of aggregation within the protein fragment. Under the guidance of Dr. Peter Chung's lab and its collaboration with the Langen lab, I will analyze the relationship between the phosphorylation of T3, S13, and S16 sites within the N terminal region of the Huntingtin protein. I will then verify its impact on aggregated fibril development in hopes to obtain a similar formation

as Huntington's disease. By invoking phosphorylated sites within the N terminal of the huntingtin protein to aggregate fibril growth, this can be used to further recreate huntingtin fibrils similar to naturally occurring disease fibrils for therapeutic treatments. The development of these fibrils can also be further investigated for the overall understanding of the development of this neurodegenerative disease.

Za'Keithia Robinson

Major: Psychology, BA

Faculty Advisor: Stan Huey, Ph.D., Associate Professor of Psychology and American Studies and Ethnicity, Dornsife College of Letters, Arts, and Sciences

Title: Examining Racial Bias Through Disciplinary Decisions

Abstract: Research shows that Black children are far more likely to be referred for exclusionary discipline (e.g., suspension, expulsion) than White children. Emerging evidence suggests that this disparity may partially be due to racial bias. In an online experiment using school-based vignettes or scenarios, Okonofua and Eberhardt (2015) found that teachers disciplined Black boys more severely than White boys for the same behaviors and attributed the finding to anti-Black stereotypes. This study replicates Okonofua and Eberhardt (2015) but uses college student participants rather than teachers to examine racial disparities in their responses to classroom misbehaviors. We recruited 286 college students via the USC Psychology Subject Pool. Participants read vignettes describing a Black or White male student misbehaving in a classroom setting, then rate the severity of the student's misbehavior and recommend discipline. This study provides experimental evidence for racial bias as a cause of school-based discipline disparities for boys with analysis of the responses via SPSS. SPSS is a software program that is used for statistical analysis. This study is a piece to understanding the effectiveness of diversity training implemented at the university level. This understanding encourages adaptations to diversity policies within the University to create a less racially tense environment within college classrooms.

Gabriel Solis

Major: Economics/Mathematics (BS)

Faculty Advisor: Alex Miller, Ph.D., Assistant Professor of Marketing, Marshall School of Business

Title: The Cookie Conundrum: An Investigation Of Consumer Behavior And Online Privacy Regulations

Abstract: Recent regulations as necessary corrective measures against the powers of big tech have attempted to empower the consumer through consent-based mechanisms like 'notice and choice.' Notably, the European Union's General Data Privacy Regulation (GDPR) and the California Consumer Privacy Act (CCPA) require user consent, often through cookie banners. However, left unexplored is how these consent mechanisms interact with consumer psychology. In this paper, we investigate whether data tracking consent mechanisms that have become commonplace under recent privacy regulations (e.g., GDPR and CCPA) tend to favor some types of firms more than others. Our study examines how subliminal factors such as brand affinity and legacy influence consumers' privacy decision-making. We conducted an online between-subjects experiment that measured participants' willingness to accept cookies from a hypothetical company, given information varied across size, legacy, and product mix. Participants were randomly assigned to one of four treatment variants and asked a series of questions about cookie consent behavior. We found that a majority of participants tend to favor larger, more established firms compared to their smaller, start-up counterparts. This study contributes to the literature on privacy regulations by corroborating established knowledge of consumers' online decision-making while also exploring the possible implications of privacy regulations prioritizing consent-based mechanisms.

Cain Trevino

Major: American Studies and Ethnicity (BA)

Faculty Advisor: Josh Kun, Ph.D., Professor of Communication, Annenberg School for Communication and Journalism

Title: Border & Sound: Cumbia Rebajada in the Texas-Mexico borderlands

Abstract: Cumbia is not just a genre. It is a rhythm, it is a dance– it is an origin point for the array of subcultures across Latin America that have found international audience via the physical migrations of listeners, artists, and as well the dilation of digital channels of cultural exchange across the internet, continually eroding the significance of borders on the cultural plane.

In the Texas-Mexico borderlands, Cumbia rebajada is paradoxical. A sound and style synonymous and inseparable from the barrios of Monterrey, Mexico– yet having an influence and listener-base transnational, moving in parallel with physical processes of migration and rhizomatic channels of digital communication and cultural exchange via the internet, the same channels that which I believe have led the slowed sounds of Monterrey's barrios to the city of Houston, Texas, that in some way have influenced or collided with the south-Texas city's own signature sound: Chopped N' Screwed. Through this project, consisting of a series of interviews with DJs based in Monterrey, connoisseurs and collectors that have traced rebajadas roots all the way from the Caribbean coasts of Colombia, and as well as members of my own family from Monterrey's southern barrio of Guadalupe that migrated to Houston on their lived experiences with rebajada and its impact within and outside the city– I seek to complicate a history of two "regional" musics in the Texas-Mexico borderlands by examining the relationship between Monterrey's cumbia rebajada with Houston's Chopped N' Screwed via both the sonic and social factors that may have influenced this exchange. I position Monterrey as a special point of cultural contact between North and Southern America in its capacity for transnational exchange, for its role in the transmission of cumbia

and also for its radio industry playing a central role in exchanges not only in Texas but across Northern Mexico. Furthermore, I intend to use this unique relationship between Monterrey and Houston to demonstrate the unique facilitation of music and cultural trade in the Texas-Mexico borderlands, exploring in what way certain social or migratory factors may encourage this intermixture that, through this project, I will show only occurs through the transnational and heterogeneous qualities inherent in borderlands spaces.

Special Thanks:

USC Career Pathways
Octavio Avila
John Foulger
Jennifer O'Connor

USC Graduate School
Kate Tegmeyer

USC Kortschak Center
Julie Loppacher
Amy Yeu

Boston University Diversity and Inclusion
Emma Zheng
Simone Gill
Anita Destefano