

**Personal statement:**

My ascent towards science has been far from traditional. My mother was fifteen when she gave birth to me. My father was also a teenager and died from a car accident when I was a toddler. My step dad, who was addicted to alcohol and cocaine, was physically abusive which prompted me to run away from home. As a homeless teenager, I did not have the necessary resources to continue with my high school education and earned a General Education Degree (GED) when I was sixteen. Upon returning to school, *I was able to overcome these obstacles and develop a passion for science through a combination of my own determination and support from various diversity initiatives such as the McNair Scholars program and research funding from a National Institutes of Health diversity supplement.* Because I have experienced first-hand the importance of diversity initiatives, I have continuously worked towards increasing diversity in academia.

While attending Santa Rosa Junior College (SRJC), I founded a club called Second Chance. The club mission is to provide support for underrepresented students, such as minority and first-generation students. While serving as Co-President, I saw that many of the barriers that I faced were common amongst students with non-traditional backgrounds. Finding an identity, applying for financial assistance, registering for classes, becoming familiar with degree requirements, and grappling with costs, for example, are obstacles that disproportionately affect underrepresented students. To address some of these obstacles, the club developed a generous book and food voucher program for members. Though my tenure as Co-president came to an end when I transferred, I still visit current members to discuss and give advice about various topics related to academic success.

Although the Second Chance was not exclusively for STEM students, I formed a relationship with other organizations such as the Mathematics, Engineering, and Science Achievement (MESA) program. Through this relationship, I contribute to an annual youth forum for underrepresented students. The topic of my panel session is minorities in STEM. In addition to communicating opportunities available to them, I also attempt to make research questions relatable to their lives. For instance, I discuss Dr. Tyrone Hayes' research with amphibians that investigates various hazards, such as endocrine disruptors (e.g., pesticides), that may be contributing to health disparities between ethnicities and how undocumented individuals working in agriculture are especially vulnerable. I have been told that this is the first time these children and/or teenagers have felt a personal connection with science and that they now realize a career in science would allow them to address issues of personal and societal importance.

I also contribute to a scholarship in which I serve on the selection committee. Called the Yolotli (i.e., heart: Nahuatl [Aztec] origin) Scholarship, it is specifically for Latino/a's who are seniors at Elsie Allen High School (Santa Rosa, CA) and will be pursuing a college degree. At this school, the student body consists of 90 % minorities, most of which are of lower socioeconomic statuses. As I serve on the selection committee, I read and rank all of the finalists' personal statements. In one instance, I read of a young Latina struggling to simultaneously learn English so that she could succeed in school and also deal with homelessness after her father was deported to Mexico. In addition to her inspiring personal story, her superior academic record (aspiring doctor) resulted in being awarded the scholarship.

**Relevant Background/Intellectual Merit:**

Through research experiences at Emory University, Sonoma State University, and the San Francisco Zoo, I developed a deep passion for behavioral neuroendocrinology and acquired

interdisciplinary training that integrates neurobiology, animal behavior, and statistics. I hope to build on this foundation as a National Science Foundation Graduate Research Fellow.

My previous research experiences have prepared me to begin advanced study in behavioral neuroendocrinology. Two summers ago, I participated in the Summer Undergraduate Research Experiences (SURE) program at Emory University. As a research assistant in Dr. Donna Maney's lab, I investigated the rapid effects of estradiol on territorial aggression and immediate early gene induction in the medial amygdala of songbirds called white throated sparrows. Through this project, I gained valuable experience in the research methods essential to a career in behavioral neuroscience: brain sectioning, tissue processing, multi-day immunohistochemistry protocols, image analysis, cell quantification, and video scoring. Though it has been known for some time that estradiol affects neural responses, our results were particularly exciting because, in contrast to the predominate view that sex steroid action is slow, we demonstrated that estradiol has rapid effects on territorial aggression. *The summer research experience culminated in a first-authored poster that I presented at SURE's annual symposium, a third-authored abstract presented at the annual meeting for the Society of Behavioral Neuroendocrinology, and a third-authored paper that is currently being written.*

In addition, I have participated in various animal behavior studies. At Sonoma State University, I was a member of Dr. Karin Jaffe's primate ethology lab where I studied mandrills at the San Francisco Zoo. Because of my interest in hormones and behavior, I developed an independent project that looked at agonistic interactions between females, dominance rank, and the reproductive cycle. For this project, I put forth and tested my own hypotheses, determined behaviors of interest, and collected data on animal behavior. Our results showed that group behavior is influenced by the number of maximally tumescent (i.e., fertilizable) females. This finding is especially important because, when zoos address animal welfare and captive breeding, often times only intra-sexual competition between males is considered. Thus far, I have published my findings in a McNair Scholars undergraduate journal and presented original research on various topics related to zoo-welfare at four conferences. *Most notably, I presented my project as first-author at the American Society of Primatologists 38<sup>th</sup> annual meeting. My collaboration with Dr. Jaffe is ongoing and we are currently preparing a manuscript that will be submitted to a journal that specializes in zoo management.*

Through my academic endeavors, I realized that a commonality between all disciplines is statistics. As such, I honed my abilities for a career in research by minoring in applied statistics. From independent literature reviews and self-directed study, I learned R programming language and advanced techniques such as multi-level Bayesian modelling. Through a combination of this training and passion for contributing to our shared body of knowledge, I developed several research projects investigating oxytocin as an experimental therapeutic for reducing symptoms of schizophrenia. While funded by a diversity fellowship to conduct research the summer before entering graduate school, I submitted two first-authored manuscripts and two first-authored commentaries critiquing previous meta-analyses on the same topic to relevant journals. *Indeed, one of the first-authored manuscripts was accepted by the journal Psychoneuroendocrinology and the other is in revision at Schizophrenia Bulletin. Researchers read these papers on my Open Science Framework account and requested that I contribute Bayesian statistics to their research methods paper. This endeavor also resulted in a publication that is currently under review at Psychological Science.*

While my academic experiences are diverse, I have found a perfect intellectual fit at the University of California, Davis, where I am in the Animal Behavior Graduate Group and being

mentored by Dr. Karen Bales. For example, Dr. Bales uses two study systems—prairie voles and titi monkeys—which closely matches my research experiences. Under Dr. Bales’ guidance, I can become a successful scientist through learning how to integrate the literature, research design, and methodology to ask questions using a variety of non-human animals.

### **Future Directions:**

My future goals are inextricably linked to my personal background, research experiences, and work with underrepresented communities. As a graduate student, and then as a principle investigator at a Research 1 institution, I will ask questions that push the boundaries of what is known through thoughtful, hypothesis driven research. Moreover, I will continue my work with underrepresented individuals through which I hope to be a positive influence on the next generation of scientists, increase diversity in academia, and attain personal fulfillment.

I am very fortunate that Dr. Bales’ lab has numerous undergraduate volunteers. As a graduate student, I will recruit underrepresented students that are considering a STEM related career to assist on my research projects. As a mentor, I will ensure they have the skills and experiences necessary to be a successful graduate school applicant. For instance, I will put them in a position to co-author research papers and conference presentations. During the graduate school application process, I will assist with locating and contacting prospective mentors, editing and commenting on their statements, and guiding them through the interview process.

In addition to working with non-human animals, I hope to publish quantitative reviews or statistical methods papers that parallel my lab’s research. My training in statistics has therefore put me in a position to mentor underrepresented students in mathematics or quantitative psychology. I am currently recruiting assistants for two projects. Through working on these projects, students will learn several skills related to synthesizing research papers, computation of effect size quantities and variances, and how to use a fully Bayesian framework for statistical inference. Most importantly for math majors, they will have an opportunity to see applied aspects of mathematics as opposed to only the theoretical. These projects will hopefully culminate in opportunities for conference presentations and/or publications.

As a graduate student, I will be participating in “Shadow Day” with MESA students from SRJC. This consists of having students gain insight into science by participating in lab activities. Additionally, I have been asked by the director of MESA to find several other graduate students who would like to participate. Since these students are at community colleges, this opportunity will be invaluable as they have never experienced a research setting. Many of the participating students will be transferring to UC Davis, so I am also coordinating their visits with the directors of the McNair scholars and UC Leads (UC Leadership Excellence through Advanced DegreeS) programs. Upon transfer, they will therefore have a support system in place and be in a position to join a program that is aimed towards assisting underrepresented students gain acceptance into graduate school.

My goals and plans for the future are well thought out and ambitious. Execution will take hard work and a substantial investment of time. Being awarded the NSF-GRF would provide me with the flexibility to: (1) focus on research related activities such as submitting publications at a consistent rate and to communicate the results at public venues; (2) provide my mentees guidance that will prepare them for current as well as future success; and (3) become involved with the various diversity oriented initiatives such as the McNair Scholars program.

