

## Personal, Relevant Background, and Future Goals Statement

**Personal Statement:** Last year, I audited a law and neuroscience course at Vanderbilt University Law School. During one discussion on blameworthiness of criminals, I noticed that the majority of the room had not yet considered a unique position. Vacillating for a moment while the tension among students' opinions in the room lowered, I raised my hand to pose the following, aloud: "It seems that we're failing to recognize the possibility that individuals might have biological tendencies to make risky decisions or fall victim to peer-pressures that lead to making harmful choices." I saw puzzled faces, so I quickly elaborated with minor examples of evidence linking genetic variation and brain activity with poor decision making or susceptibility to social influence, and then waited for any response. To my sharp surprise, among a room of lawyers-in-training, there was no counterargument and we moved on. This experience is one of many similar encounters I can recall with people unsure about the possibility that one might be "hard-wired" to make poor choices or succumb to social influence. However challenging these encounters are, they reinforce my desire to answer difficult questions linking risky behavior, social influence, and biology through psychological research. An NSF Fellowship would provide invaluable assistance for a career in research to answer these difficult questions that leave law students speechless and have broad implications for jurisprudence and public policy.

As a first-generation college student, I had no educational role models in my family to encourage my pursuit of science, so I relied heavily on forming personal connections with scientific inquiry through life experiences. Specifically, my interests in risky behavior and social influence stem from my experiences seeing family members yield to peer-pressure in their community that led to gang violence, drug use, and volatile financial choices. I have always wondered what made their lives so different from mine: Were they "hard wired" to make poor choices? Was it their exposure to other poor decision makers? Or maybe a combination of both? Wherever the answer lies, I am determined to find it. Social influence is a known risk factor for engaging in risky behavior and even more so in urban, ethnic communities like the one my family members call home. Experiences like this push me to ask questions like the ones I posed to law students in that discussion on blameworthiness because brain research may spotlight issues affecting individuals in troublesome communities facing roadblocks to success.

With these interests in mind, I immersed myself into an academic passion that I find to be a practical synthesis of scientific theories and social issues like guilt determination and prison sentencing. I'm interested in pursuing a Ph.D. in psychology in order to explore how neural mechanisms are driven by and shape one's social environment. Most studies assessing the neural underpinnings of risky behavior focus on differences in personality and tend to underestimate factors linked to one's social environment. Namely, it is important to understand how biological systems relate to an individual's risk preferences in social contexts where the outcomes of their decisions depend on their resiliency to overcome harmful social influences. Understanding how these systems work is vital to unlocking the relationship between social interactions in the development of traits that drive people to engage in risky behaviors and commit violent offenses.

**Relevant Background:** I was so sure of my interests in brain research that during my first week as an undergraduate, I added neuroscience as a second major to political science. From then on, I took every opportunity to enroll in courses that would allow me to link compartmentalized fields like psychology, politics, and anthropology to better understand how science can shape society. My ability to perform well in this interdisciplinary range of courses earned me a renewable science and engineering scholarship, granting me the flexibility to devote time to research.

As a sophomore, I took advantage of that flexibility by joining Dr. Mara Mather's Emotion and Cognition lab. I chose this lab because it provided the opportunity to work on

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multiple projects answering different questions that fell under the umbrella of cognition. In my first role assisting Dr. Mather and Dr. Sarah Barber on a study examining differences in re-telling stories, I took the opportunity to contribute to the team's overarching hypothesis. Specifically, I was entrusted to perform a linguistic analysis on participants' word usage; I thought it would be interesting to explore whether there were differences in profane speech when participants re-told stories to entertain. After testing the hypothesis, our team found a statistically significant difference that was included in the published findings. That experience further solidified my passion for research because I was able to pose an idea and apply it to the available data to enrich the argument, a skill I can easily translate in graduate research.

In order to gain additional research experience, I applied for and received a competitive USC summer research grant. This allowed me to continue working with Dr. Mather and Barber on projects related to socially-shared memory. A manuscript of our findings on collaborative memory is under revision for publication. Through this project I developed an interest in the ways in which social interactions can impact cognitive abilities and decisions. To pursue this interest, I designed a protocol to test individuals' susceptibility to false information suggested by confederates of different ages. I applied for and received another competitive USC research grant to fund this independent project on memory conformity. For this project, I worked closely with the institutional review board to ensure that my research participants would not be adversely affected by the deception required to reduce suspicion of fabricated confederates. Notably, this project helped me build my research interest on susceptibility to social influences.

Although I had gained experience in social-cognitive research, I needed to gain an additional skill set in order to incorporate my interest in neuroscience. To do this, I worked on a project that examined dietary influences on brain function. After an extensive independent literature review on the mechanisms of neuroplasticity, I applied for and received a third competitive USC research grant to examine how dietary calorie restriction affects brain structural volume. My analysis, which I presented at a conference in 2014, concluded that calorie restriction was associated with volume growth of regions vital to reward and motivation. This project thus gave me the chance to work with neuroimaging analysis tools and ask questions related to brain function—a central part of the methods I plan to use in graduate research.

During my time in college, I balanced gaining research experience with co-founding and then leading an organization of undergraduate, graduate, and law students in a neuroscience and law academic interest group. This niche organization has grown within the university and is noted as a student group resource by the MacArthur Foundation Research Network on Law and Neuroscience. The USC Neuroscience and Law Society (NLS) is an example of my role as a leader and my ability to produce long-lasting contributions to the scientific community in bridging gaps with legal scholars to discuss broad societal impacts of neuroscientific research.

After graduating from USC with two independent majors in less time than most students, I joined Dr. David Zald's research lab at Vanderbilt University. I chose this lab because although I had some experience working with neuroimaging tools and social-cognitive theories, I wanted to become more engaged in other concepts fundamental to my research interests in reward processing and risky decision making. As a research analyst and project coordinator for a pair of studies examining dopamine function related to decision making, I was able to reflect more on how neurotransmitters and brain activity, rather than simply structural volume, relate to personality and risk-taking. Through data analysis and involved discussions with lab members, I began thinking more critically about linking brain function, social influence, and personality. My first step in evaluating this cluster of topics led me to think about brain function and impulsivity.

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In the context of healthy aging, I examined functional connectivity differences and found that aging influences attentional impulsivity and brain function. I presented this at the Society for Neuroscience annual conference in 2015. I then extended this work as it relates to learning and temporal discounting of social rewards and have not only contributed to a manuscript submitted for peer-review on the topic, but also delivered an oral presentation on my analysis of genetic associations with social reward preferences. In graduate school, I intend to expand this focus on risky decision making in social contexts in relation to brain function by considering the role of social influence in the neural computations of risks and reward value.

In addition to gaining research analysis experience, I have gained skills that are critical to conducting collaborative research. As a project coordinator, I proposed and implemented a change in how the Nuclear Medicine department supervises positron emission research scans. This protocol change, based on feedback I collected from nursing and technical staff, affects all other research groups affiliated with Vanderbilt radiopharmaceutical research. Experiences like this demonstrate my ability to effectively lead a research team to increase efficiency and improve data collection quality. I would draw on experiences like this in my future projects to ensure participant safety and conduct experiments that benefit multiple investigations.

Outside my research experience, I have taken steps to educate myself on how to impact society through research. This year, I was invited to attend a seminar hosted by the American Association for the Advancement of Science on pressing neuroscience issues in law. Joining in lively discussions with judges helped me understand the scale of issues that everyday jurists encounter where neuroscience may provide clarity on rulings contingent on our sense of risk taking. In addition, I was selected for a competitive fellowship at the Sackler Summer Institute of Developmental Psychobiology whose topic this year was on law and neuroscience. As a fellow, I met with, learned from, and debated researchers and leaders in this field. This experience has allowed me to build a network of colleagues and mentors with whom I will surely collaborate.

Recently, I was offered the opportunity to continue growing my skills as a lab manager for Dr. Katherine Karlsgodt's new group at UCLA where I will help build a team from the ground up while furthering my understanding of reward function in a clinical population.

**Future Goals:** By pursuing a Ph.D. in psychology, I intend to advance the field by linking social and decision neuroscience: two disciplines that have been typically segregated. By conducting research using neuroimaging tools, outcomes from this joint perspective can provide new insight into the interrelationship of social influence and poor decision making. Attending graduate school will allow me to collaborate with scientists who also bring their unique perspectives.

I envision my role in the scientific community not only as a professor and researcher, but also as a leader and communicator between scientists and policymakers. My interests in translating science in the courtroom and urban communities, educational background in neuroscience and politics, experience disseminating research, and leadership in the USC NLS have prepared me for the challenges that lie ahead in bridging the gap between science and law. I hope to advise policymakers who lack the specific neuroscience knowledge that may help their communities work toward legislation that accurately reflects research from the neuroscience community. I firmly believe that an NSF grant, like my science and engineering scholarship at USC, will allow me the flexibility to focus on conducting compelling research in graduate school that has broad implications for society. Finally, I intend to serve as a role model for youths who have an inclination toward science but lack support from individuals with whom they can identify. Increasing diversity within the scientific community can help introduce new ideas and perspectives from unique experiences like those that have pushed me toward a career in science.