

When I was in high school I wanted to attend a University in Washington D.C. in order to stay close to my mother who had been diagnosed with triple negative breast cancer. I picked Howard University, a private black HBCU, as I thought I could get a scholarship to go there. Four years later in 2011, my mother had been complaining about feeling weaker than usual, but the doctor said she was in remission and we thought it might be psychological. One day after an extreme bout of weakness, my father and I followed an ambulance to a hospital, where they told us her cancer had metastasized to her brain and she was not going to survive much longer. She fell into a coma later that day, was put on life support, and we made the difficult decision to remove that life support later that week. I can still remember how cold her hand felt and thinking to myself that I kept the promise of staying with her from diagnosis to death.

I never received a scholarship to Howard University having missed the mark on my test scores by one point. I decided to attend Virginia Commonwealth University (VCU) because the school gave me enough money to be able to live without struggling. I was not thrilled when I arrived and did not really have much of an idea of a major of study. I originally majored in nursing, as coming from a large West African family; it was a common and suggested path as the stability of a nursing career. I had also learned that it is a stereotypical career for a woman. However, I decided to major in both Mathematics and Bioinformatics. I can remember my father saying to me that he hired a person with a degree in biology as a cashier to persuade me to keep with nursing as a career. However, it mattered to me to follow my inspirations, and not simply what my family always desired. I choose to live by the last thing my mother told me which was “I just want you to be happy”, and I believed a future in science would make me happy.

Prior to college, I always felt that I was not smart enough to major in mathematics or any field of science, because anytime I approached a teacher during my secondary education with an interest in science or mathematics I was either not taken seriously or inadvertently pushed aside. As a black female who was not the top student in the class I think their impression was that I did not look like a mathematician or a scientist or did not possess the skill to be a mathematician or a scientist and my passion alone was not enough. I cannot say my experience is unique in that sense, but coming to a VCU, my experience interacting with faculty in the Mathematics and Bioinformatics departments was quite the opposite. My university is quite diverse ethnically and culturally so those stereotypical instincts of what a scientist looks like are not as entrenched. Instead, VCU is more “color-blind”. I spent many hours in my professors’ offices going over concepts that were quite new and almost alien to me, but my professors never gave up on guiding me to the solution; to them my passion was enough.

My father was diagnosed with pancreatic cancer late in my freshman year of college in the same year my mother passed away. It was not until my sophomore year of college that I realized that he was not going to get better. I originally thought he had pancreatitis. He kept me in the dark until I happened to call his surgeon after a hospital visit after he tore his stomach open after trying to eat my birthday cake, and required emergency surgery. All I could do was cry; I felt helpless and a panic surrounded me. The speed of his deterioration drained me physically and emotionally. I felt numb and if I did not have the support from people at the university I do not know if I would have finished. My last memory with him in 2012 was watching “Gunsmoke”, an old western show he loved to watch as he lay there anemic from the treatment and unable to hold down food or liquid. It was a hard five years of my life, and at the end of it I completed my degrees in Mathematics and Bioinformatics even after experiencing the difficult loss of both of my parents to cancer.

I got my first taste of research rather early in the summer of my freshman year. That summer I was accepted into the NIH HERO (Health Education & Research Opportunities) minority program at VCU where I interned at the VCU Massey Cancer Center with Dr. Bradford Windle. I was tasked with continuing the development of a database that contained human genetic information related to a gene, called P53, which in its non-mutated form is responsible for suppressing tumor growth. The database would be used to identify gene mutations and a potential treatment pathway for lung cancer. This first research experience exposed me to a frustrating and confusing, but satisfying world that was computer programming. It felt like I was working on a puzzle. It was also the first time I worked independently on a scientifically impactful project. I really did not know what research was until this point, but after this experience I knew it was something I wanted to do because I wanted to “solve puzzles”, proverbially speaking, that helped at solving bigger problems.

From there I transitioned into a long-term undergraduate research assistantship in the MARC (Maximizing Access to Research Careers) and IMSD (Initiative for Maximizing Student Development) minority programs under the VCU Center for Cultural Experiences in Prevention (CCEP), where I worked with Drs. Faye Belgrave and Raymond Tademey. The CCEP’s primary focus is working in minority populations conducting research and educational community outreach focusing on preventing the spread of sexually transmitted diseases and infections. Here, I received the opportunity to conduct outreach among the freshman student population at VCU and African American communities in Richmond to facilitate workshops on safe sexual practices and explaining distinguishing factors between common STIs and STDs. I also worked with Dr. Tademey on projects such as investigating whether drug-related crime expenditures were associated with other drug-related factors such as increased juvenile crime rates in two rural Southwestern Virginia counties. We were looking at the deficit of field-independent learning techniques in African-American students, and how this phenomenon has an adverse effect on the retention of minority students in STEM-related fields.

During my time in the CCEP, I also worked with Dr. Jasmine Abrams and Ms. Morgan Maxwell, who were prevention specialists. The components of our research primarily focused on the physiological and psychological effects of internalized racial stereotypes and historical discrimination on African American populations. We also conducted extensive HIV/AIDS prevention workshops that are targeted towards the African American student population at VCU. I was trained as a facilitator for Safe in the City and SISTA, which are HIV prevention programs sponsored by the Center for Disease Control and Prevention. I researched with CCEP for 2.5 years, and I learned a lot about how working with people and conducting more human-centered research has its benefits and frustrations. The benefits are being able to give useful information to those without access or opportunities to learn such information, such as how to prevent themselves from getting an STD/STI; but, frustration occurs in having to generate and code social science data and sometimes not finding clear or convincing results. Many of the data we collected pointed to how lingering historical poorly-conducted experiments had strong impacts to this day, especially mistrust of the medical system (e.g., Tuskegee Syphilis Experiments), and its impact on the approach in conducting outreach within minority populations. It is this experience that encouraged me to want to obtain a doctoral degree. I knew that in order to continue to conduct research with a varied approach across disciplines, I had to become a professor. I intend to have my own research center that focuses on health issues affecting minority and disadvantaged populations, and incorporates research that communicates solutions directly to these populations.

At the end of my junior year, I decided to change my focus from a purely social science approach to one that focuses on genetics research in human populations. I worked briefly on a genetics research project looking at changes in mosquito DNA between malaria endemic and eradicated regions. I found this work especially fascinating as malaria is endemic in Western Africa, and many of my relatives get malaria as often as individuals get the flu in the United States. During that time period I applied to graduate school, and I met with my current research advisor, Dr. Brian Verrelli. His research focuses on the population and evolutionary genetics of diseases and disorders. I looked at programs and emailed program directors to converse with about the application process. Dr. Verrelli, who is the director of the VCU Integrative Life Sciences (ILS) Doctoral Program, was the first to respond and meet with me, and I found our interests overlapped considerably. Specifically, my interest is in human health related research with a population genetic component that takes advantage of my bioinformatics and math skills. Dr. Verrelli's research projects matched with my skills and my ideology.

Now in my first year in the ILS program, my research focuses on using schizophrenia as a population genetic model to understanding the development of complex genetic diseases and disorders. We are examining single nucleotide variants (SNVs) from a GWAS (genomewide association study) to determine whether an underlying model of sequence evolution (i.e., conservation) over time can predict those SNVs that are likely to be causal. Few studies have ever applied this evolutionary predictive model to the vast amount of data that come from GWAS projects. We are finding that schizophrenia mutations can occur at both highly and lowly conserved sites, which can be surprising given that most assume these mutations need be highly deleterious. In fact, it may be the case that several of these mutations could have been under positive natural selection in humans. I presented this work at Society of Study of Evolution conferences in summers of 2016 and 2017, with help from an NSF BEACON Center for the Study of Evolution in Action minority travel award. My project is to develop ways to interpret these patterns using my unique skills in computational and mathematical approaches, as part of a multi-institutional collaboration with Dr. Verrelli, other professors, and graduate students.

Finally, outreach to the non-scientific communities, particularly communities that often have no access to the knowledge we have as scientists, is something I am passionate about. Since January of 2016, I volunteer twice weekly at the Richmond City Justice Center where my position has expanded to being both a mathematics and science instructor working with both male and female inmates. I enjoy this aspect of my work and I plan to expand it to recruit other doctoral students as the jail greatly needs STEM-related instructors. Scientific educators should be bringing knowledge to the most sensitive populations, especially those incarcerated as short-term/repeat offenders that pass in-and-out of their communities and need help with these transitions (e.g., GED testing). I am well-suited for this position, as my history in traumatic experiences as well as shared ethnic history enables me to better-relate, and I hope to educate other doctoral students on this outreach approach. In achieving the NSF GRFP award, I intend to be a model for other minority female students as my future in science and mathematics research, teaching, and service can grow both the scientific and non-scientific communities.