PETTY, CAILISHA L., Ph.D. Successful African American Women in Science: A Narrative Inquiry. (2015)
Directed by Dr. Heidi Carlone. 303 pp.

This study used narrative inquiry as a methodology to explore the lived experiences of five African American women in science across the academic spectrum, from doctoral candidate to full professor. The research questions guiding the inquiry included one overarching question and three sub-questions: What are the lifestories of successful African American women in science?; (a) How do successful African American women in science define themselves?; (b) What have been the facilitators and barriers encountered by successful African American women in science?; and (c) What have been the systems of support for African American women in science? The study was theoretically positioned within the frameworks of Critical Race Theory and Black Feminist Thought. The two theories were used to guide all aspects of the study including methodology, data collection, and analysis. Data included eleven 40–60 minute semi-structured interview transcripts as well as the participants' Curriculum Vitae.

The study design and data analysis were built upon Clandinin and Connelly's (2000) and Clandinin's (2006) model of narrative inquiry which explores narratives as a means to understand experience. Analysis and interpretation created three dominant narratives: Scientific Beginnings, An Unexpected Journey, and Lift as You Climb. Each narrative set explores multiple stories that describe storylines which aligned with the participants' goals of who they were and who they were becoming as scientists; and, storylines of tension which ran counter to the women's goals and aspirations. Barriers

and support systems are revealed, as well as the meanings the participants made of their experiences and how it affected their lives.

Keywords: African American women, science, narrative inquiry, Critical Race Theory, Black Feminist Thought

SUCCESSFUL AFRICAN AMERICAN WOMEN IN SCIENCE:

A NARRATIVE INQUIRY

by

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A Dissertation Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Greensboro
2015

Approved by

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APPROVAL PAGE

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ACKNOWLEDGMENTS

First, I thank my participants who graciously open hearts and shared their stories with me.

I graciously thank my advisor and committee chair, Heidi Carlone, for the opportunity and for her leadership, advice, and friendship.

I thank my committee members, Jewell Cooper, Edna Tan, and Anthony Graham. I consider the four to be my "Dream Team." They provided me with the necessary professional expertise, support, and motivation to persist.

I thank my supportive team of friends and volunteer editors, Cemeré James, Adrienne Smith Walker, and Angela White, who provided their services whenever called upon without hesitation.

I thank my children, Marlon Jr., Cemeré, Josephine Layla, and Elijah Petty for their understanding patience and their sweet, kind spirits. They are my motivation and joy.

I thank my parents, Rev. Clarence L. James, Sr. and Miriam Johnson Miller for instilling a love of education and a strong sense of work ethic and responsibility.

I thank my siblings and cousin, Clarence Jr., Cean, Jesse, Danjuma, Cemeré James, and Milton James Suggs. Without them, there is no me. They were my first friends and playmates and I love the way we continue to support and encourage each other.

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CHAPTER I

INTRODUCTION

When asked in her interview by Aimee Sands (1993) whether it was the racism or the sexism that affected her most when she decided to leave the physics program at Massachusetts Institute of Technology (MIT) in 1980, Evelyn Hammonds replied:

> They are not separate. Because they are not separate in me. I am always Black and female. I can't say "well, that was just a sexist remark" without wondering would he have made the same sexist remark to a white woman. So, does that make it a racist, sexist remark? You know, I don't know. And that takes a lot of energy to be constantly trying to figure out which one it is. I don't do that anymore, I just take it as you know, somebody has some issues about *me* and who *I am* in the world. *Me* being Black, female and wanting to do science and be taken seriously. That's it. (as cited in Sands, 1993, p. 248)

Evelyn Hammonds knew she liked science early. At the age of nine, her father gave her a chemistry set, and she had a grand time with all of the experiments. She yearned to know and learn more. In high school, Evelyn discovered physics and pushed herself to learn more mathematics. As she participated in a summer program at Emory University for high achievers in mathematics, she felt pain and agony "because I felt I was as smart as the other kids, the white kids in class, but I had this gap in my background. I didn't know what to do about it, how to go and find the information I didn't have, and I didn't know how to prove I will still good" (Sands, 1993, p. 240). Pain was eventually replaced with anger when Evelyn encountered two teachers (math and science) who were "just outright racist" in the school she was being bused to, and she realized that she was "being denied

a good education because I was a Black person and I lived in the South" (Sands, 1993, p. 240). She was hurt and then angry, but not discouraged. She knew better than to go home and tell her mother she was quitting because someone was making it difficult for her because she was Black. Her mother would have allowed her to stop if she did not *like* it anymore, but quitting because she any reason other than that was unacceptable. She had to know, expect, and understand that "difficult" came with the territory. She would have to learn to contend with discrimination. Her mother would never let her stop for such a reason as that.

At Spelman College in Atlanta, Georgia, Evelyn entered the dual degree program in physics that required her to spend two and a half years at Spelman and then her final two and a half years at Georgia Tech. She began Spelman in 1971. Despite the feelings of isolation when she was the only female in labs and classrooms; and despite, the challenges from her male collegues and professors regarding her intelligence and ability; and despite, the fact that her male classmates both a black and white would take apart and reassemble experiments she had set up; and despite, the outright racist and sexist comments that ate at her and wore her down; and despite, being alone both outside and even outside the classroom because she did not fit the traditional gender roles that soceity expected, Evelyn survived her undergradate years. She graduated in 1976 with a bachelors degree in physics from Spelman and a bachelors degree in electrical engineering fromm Georgia Tech, but her survival in science was short-lived.

After entering a Ph.D. program at MIT, she faced racism and sexism that was more overt than Georgia Tech and "in the end more damaging" (Sands, 1993, p. 245).

She did not complete the program Ph.D. program at MIT. In 1980, she chose to leave after three and a half years when she finished her master's work. She felt she was in a crisis. Her confidence in her skill and ability was depleted, and her mind was filled with doubt. So she decided to leave. She knew that as a black scientist her work would be under more scrutiny, and she would always be questioned more severly (Sands, 1993). She no longer wanted to fight.

I highlight Evelyn Hammond's story because it is typical of the fate of too many little black girls who begin with dreams and aspirations of one day becoming scientists. But far too often, their dreams are shattered because of the obstacles they face and the barriers they must negotiate to gain access into the scientific community. After reading Evelyn Hammonds interview, as an African American woman and self-professed "science nerd," I was deeply saddened and emotionally troubled by the fact that her dream was unfulfilled. Yet, I was also intrigued and curious to know more about the experiences of African American women who have persisted and succeeded in science. Evelyn Hammond's story reveals some of the ugly truths about American society. These are truths that, unfortunately, have not diminished with time and distance from the Jim Crow era and the feminist movement. There are other untold stories of African American women in science who have succeeded and persisted. I have been educated and inspired by these women. I have encountered successful women in science who look like me with varying hues and tones of brown, bronze, black, and tan. It is because of these encounters that I seek to discover the stories of triumph and victory despite the overwhelming odds.

In general, the outlook of African American students aspiring to become scientist is disappointing and bleak. In 2011, African Americans received just 7% of STEM-related undergraduate degrees. They were also awarded approximately 4% and 2% of master's and doctoral degrees, respectively (Calabrese Barton, Tan, & O'Neil, 2014). African Americans continue to be underrepresented in science classrooms, as science majors, and in science professions. In addition to the data above concerning the science profession, the number of African American physicians is also disproportionately low. African Americans make up about 13% of the U.S. population but only 4.4% of all physicians and surgeons in the nation (Rao & Flores, 2007). Of the 2% of practicing African American PhD scientists, a much smaller fraction is African American women. African American women face the unfortunate dichotomy of being both highly visible yet invisible in American society (Collins, 2000). Similarly, they are virtually invisible in scientific society. When African American women are allowed access to science, they often must contend with isolation, marginalization, and racialization as well (Brickhouse & Potter, 2001; Carlone & Johnson, 2007; Hurtado, Cabrera, Lin, Arellano, & Espinosa, 2009; Lewis, 2003; Malone & Barabino, 2009; Scantlebury, Tal, & Rahm, 2007).

With the gravely disproportionate number of African American women in science, there is a lack of diversity in scientific research areas. The problem is tremendously significant in because minority scientists are more likely to study issues specific to the minority community (Hurtado et al., 2009). Along the same vein, "research documents that increase in the number and proportion of African American physicians can enhance patient-physician communication and increase access to

healthcare for African American and Medicaid-covered patients" (Rao & Flores, 2007, p. 993). Scientists very often conduct research on topics that are of importance to them and their lives. Additionally, the approach of scientific inquiry is not diversified if the persons gaining access to research opportunities continue to be overwhelmingly male, and more often than not, white males.

> [M]inority women's unique backgrounds, cultural traditions, perspectives, and experiences could bring dramatically new approaches to scientific discovery and innovation and could be leveraged to help solve complex technological problems . . . their work would have the potential to improve the quality of life for all Americans . . . an increase of minority women in science holds the potential for resolving national concerns such as race/ethnicity-based health disparities and environmental concerns. (Ong, Wright, Espinosa, & Orfield, 2011, p. 176)

Mutegi (2013) makes several recommendations for research about African American students in science that explores the relevance of the sociocultural construction of race. The author asserts that "social racial construction (the meaning we ascribe to racial categories) is grounded in historical and social convention, plays a role in shaping our present day interactions, and merits consideration in studies of African American science education" (Mutegi, 2013, p. 88). The purpose of this study is to explore the experience of successful African American women in science and understand how they have responded to messages about themselves; crafted narratives of success; and, persisted despite the odds. By understanding how successful African American female scientists have persevered through the stories they tell about themselves and their experiences, we can provide aspiring black female scientists with the wisdom of experience from those who have traveled the path before them. In addition, with a light

shone on the barriers that impede the path into science, the scientific community can be held accountable for the role it plays in perpetuating practices that inhibit access and participation for African American women.

Though literature that focuses on the experiences of African American women in science is sparse (Ong et al., 2011), there are successful African American women that have endured despite the almost impossible odds. The stories of successful African American women in science who have persisted despite living in a racist and sexist society should be privileged. The position, plight, and history of African American women are unique because of our struggle to survive and thrive in post-slavery America. For this very fact, the perspective of African American women is different and unique; therefore, there is a need for research that captures the perspective of the African American woman.

The goal of this study is to investigate the experiences of African American women who have persisted and are succeeding in science. By understanding the struggles and triumphs of these women, perhaps we can encourage and guide aspiring African American female scientists. Consequentially, the road for them could perhaps be less treacherous if they have access to the knowledge and wisdom from women who have traveled the road before them. Furthermore, their narratives may serve as a source of inspiration and a beacon of hope.

Research Questions

As I seek to understand the narratives of successful African American women in science, my research is driven by the following questions:

1. What are the lifestories of successful African American women in science?

    a. How do successful African American women in science define themselves? (self-definition)

    b. What have been the facilitators and barriers encountered by successful African American women in science?

    c. What have been the systems of support for African American women in science?

CHAPTER II

REVIEW OF THE LITERATURE AND THEORETICAL POSITIONS

This chapter provides a review of literature in three areas that are of interest in this study: (a) Women in science, (b) African Americans in science, and (c) African American women and women of color in science. Following the literature review, I discuss the two theoretical positions within which this study is grounded, Black Feminist Thought (BFT) and Critical Race Theory (CRT) with special attention given to Critical Race Theory in education.

Review of Literature

Women in Science

Unfortunately, the outlook of women in science is not a fairytale with a dramatically fascinating ending. For many little girls who aspire to pursue science, the story has an unhappy ending. Often, it begins with girls who have expressed an interest straying from science at some point in high school and the trend continues into college (Eisenhart & Finkel, 1998). When looking back at the history of women in science, it is encouraging to note that there was an increase in the rate of gender balance in the 1960s, 1970s, and 1980s. The late 1980s showed a slowing in this previous progress (Eisenhart & Finkel, 1998). However, the number of women in higher education as both students and faculty has been increasing steadily despite the slowing of the 1980s (Easterly & Ricard, 2011). The trend has been in favor of women overall in the STEM areas, but only

in certain disciplines and, as faculty, only at lower ranks (Easterly & Ricard, 2011; Heilbronner, 2012). In 2009, women earned 39.9% of undergraduate degrees in STEM with overrepresentation in biology (59.7%) and premedical degrees (72%), but gross underrepresentation in engineering (16.5%) and physics (19.3%) (Heilbronner, 2012). The findings are paralleled on the doctorate level. In 2009, 54.5% of doctoral degrees in biology were awarded to women, but the numbers were again disproportionately low in physics (29.5%) and engineering (21.3%) (Heilbronner, 2012).

From the sidelines, the numbers give the appearance of a leveling of the playing field for women. However, the reality is that these higher rates of women's degree attainment do not translate to the workforce. Women only make up 25% of the entire STEM workforce (Heilbronner, 2012). More importantly, women are not staying for very long if they do make it into science. Easterly and Ricard (2011) discussed the many reasons why women do not stay in academic research. First, they noted that women leave after about a decade in academic research. Also, when women are present in higher education, they are largely concentrated in lower level positions, such as assistant professor, and at a lower pay rate (Easterly & Ricard, 2011; Eisenhart & Finkel, 1998). Although more women attend college and eventually earn terminal degrees, the statistics reveal that these women do not continue in academia or advance at the same rate as men (Easterly & Ricard, 2011). One integral factor is that discrimination against women persists in academia. The beliefs we hold as a society about "what women should, could and can accomplish" limits the mobility of women in areas that are seen as non-traditional (Easterly & Ricard, 2011, p. 64). The belief that women care less about

earning high wages than men translates into women earning less, as well as meeting disapproval when they make bids for increased wages (Easterly & Ricard, 2011).

Additionally, women in academia must contend with the tenure clock versus their own biological clocks. The first five to seven years as a faculty member requires consistent productivity to gain tenure. These years often coincide with the childbearing years for female faculty members. Very often, these women have spent their twenties focusing on obtaining a PhD. If they were able to marry and begin a family, they enter into a category that is not the typical picture of a woman with a PhD. Moreover, if they have families at home, female faculty members must balance 40-hour plus work weeks and life issues of home and family. It is still the case that male faculty members' wives take primary responsibility to tend to home and family. There is often less pressure for them to negotiate both home and work (Easterly & Ricard, 2011; Eisenhart & Finkel, 1998; Heilbronner, 2012). Another factor that unfairly affects women is the fact that tenure and promotion is tied to publishing. Research has shown that bias exists in the review of manuscripts as well as tenure portfolios. In the majority of cases, men are favored over women. In their research of the blind review process of evaluating manuscripts, Budden and colleagues (2008) found that when a double blind review is conducted the representation of female first authors increased by 33% (Budden et al., 2008).

Therefore, although the number of women in science has increased significantly over the last decade, we continue to find that when women enter science, it is still male dominated and obstacles persist. Noted obstacles begin with stereotyped expectations by

about the participation of women in science and engineering by male professors and

students (Leslie, Cimpian, Meyer, & Freeland, 2015). Women receive the message that

they do not belong and are not capable of doing "real" science. Leslie and colleagues

(2015) conducted quantitative study to examine underrepresentation of women in some

STEM areas versus others. They tested four hypotheses to determine what might account

for the gender gap in some disciplines versus others. The large-scale, nationwide study of

academics from 30 disciplines compared (a) the field specific ability beliefs hypothesis

(fixed, innate talent); (b) gender differences in willingness or ability to work long hours;

(c) differences due to extreme aptitude selectivity; and (d) the disciplines requirement of

systemizing or empathizing (Leslie et al., 2015). Faculty, postdoctoral fellows, and

graduate students ($N = 1820$) from 30 disciplines (12 STEM, 18 social

science/humanities) were surveyed. In the survey, participants were asked to rate

statements based on the extent to which they personally agreed with the statements and to

the extent to which they believed other people in their field would agree with statements.

For example, "Being a top scholar of [discipline] requires special aptitude that can't be

taught" (Leslie et al., 2015, p. 262). Responses to survey questions were averaged and

analyses were conducted over disciplines. The percentage of female PhD recipients in

each discipline was used as the dependent measure.

Leslie et al.'s (2015) findings suggest that the field-specific ability beliefs

hypothesis is able to predict women's representation across all academia, as well as

representation of other stigmatized groups such as African Americans. "As predicted, the

more a field valued giftedness, the fewer female PhD's. Field-specific ability belief

scores were significantly correlated with female representation across all 30 fields"

(Leslie et al., 2015, p. 262). Similarly, field-specific ability beliefs were the only

significant predictor of African American involvement. One of the findings that I found

most interesting was when participants were asked to rate the statement, "Even though

it's not politically correct to say it, men are often more suited than women to do high-

level work in [discipline]" (Leslie et al., 2015, p. 264). Higher endoresement of this

statement as assoicated with lower female representation as well as rating themselves as

less welcoming to women. Not surprisingly, the fields that rated themselves as less

welcoming to women had fewer female PhDs. "Together, ratings of whether women were

suitable for and welcome in the discipline mediated 70.2% of the relation between field-

specific ability beliefs and the percentage of PhDs" (Leslie et al., 2015, p. 264). The same

as true for African Americans. There was less representation in disciplines where the

membership believed giftedness was essential for success.

The discussion of the literature above suggests that greater access into science is

not enough. What happens after access is granted and participation is achieved? Far too

often, women leave science because there are various and multiple barriers. Evelyn

Hammond (mentioned in Chapter I) is an illustration of this fact (Sands, 1993). Currently,

the community of science is ruled by the white male ideology that determines what

questions will be asked, what approaches will be taken to answer these questions, and

finally, what conclusions and interpretations will be given merit (Heilbronner, 2012). As

noted by Leslie and colleagues, women as well as African Americans are affected by

these norms of science. This leads to the next section in which I review the literature that examines African Americans in science.

African Americans in Science

As previously stated, the representation of Africans in science is dismal. In 2011, African Americans received just 7% of STEM-related undergraduate degrees. They were also awarded approximately 4% and 2% of master's and doctoral degrees, respectively (Calabrese Barton et al., 2014). With the numbers so disproportionately low, examining the research that investigates African Americans in science may help shed a light on factors that increase or decrease participation. It is important to note that African American students are not always studied exclusively. In some of the studies presented African American students are included with other underrepresented ethnic minorities. I begin this section with elementary science education, followed by secondary and then post-secondary science education. Under secondary and post-secondary science education, I discuss that factors from the literature the positively and negatively impact student engagement and achievement in science.

Elementary science education. Research studies that focus on African American students in elementary school settings have contributed to our understanding of how they understand what science is, how it is conducted, and who can do science (Varelas, Kane, & Wylie, 2011, 2012; Varelas et al., 2010; Walls, 2012). For example, Varelas and colleagues (2011) used an approach consistent with constructivist grounded theory to "capture and understand how young African American students frame themselves relative to science and scientists and how others' framing of them become part of their

ideological becoming" (p. 829). Twenty-five students in first, second, and third grade

participated in the study. All of the participants were African American and attend

elementary school in a high poverty area.

The findings revealed that many of the students associated "doing science" with

"doing school." They offered descriptions of science as the following: not talking too

much; working hard; helping others; respecting the teacher; and, staying in their seats. On

the other hand, there were other students that gave more meaningful description of "doing

science," such as the following: building, designing, exploring, discovering, observing,

and experimenting. For some students, there was the development of sophisticated

conceptions of science that carried social, cultural, and affective captial such as gaining

status, furthering their education, and feeling good inside (Varelas et al., 2011). The

children were constructing both science and academic identities in the classroom. The

researchers pointed out that science educators need to be troubled by this connection

between doing school and doing science. Emphasis on regulatory control may mean that

we miss opportunities for students to participate authentically in science.

> A *pedagogy of control* may lead to compliance that is so contrary to the stance of
> science as inquiry, as exploration, as 'thinking out of the box' that educators may
> celebrate and strive for. Such pedagogy controls and limits ideas discussed,
> questions raised, the criticalness of the discussion that occurs and who gets to
> participate in classroom discourse. (Varelas et al., 2011, p. 834)

In a second study of African Amerian elementary students, Walls (2012), using a

critical hermeneutics approach, examined third graders' views of the nature of science

and of themselves as producers and users of science. The participants were administered

a multiple instrument assessment including open ended questionnaire, the Modified Draw-A-Scientist Test, and a photo eliciting activity. The findings suggest that young African American participants hold very distinct and often unique views of what science is and how it operates. They spoke of science as processes, functions, invention, discovery, and experimentation. They also connected science to the study of the natural world. The students carried some stereotypical veiws of what scientists look like (glasses, male, lab coat). The three tops qualities that students' believed scientists possessed were intelligence, studiousness, and happiness. Additionally, the participants expressed excitement an self-efficacy in describing their own relationship with science.

Both of the research studies summarized here provide evidence that African American science students have very sophisticated veiws of the nature of science. It also appears that they begin at a young age to connect with scientific processes and procedures and seeing themselves as scientists. What has the research shown as African American students get older? In the following section, I examine literature on the secondary level (middle and high school).

Secondary science education. In this section, I explore the positive and negative impacts of science education for African American students at the secondary level.

Positive impact on science engagement and achievement. At the secondary level, students begin to have designated courses that focus on science. Because of this new focus, the teacher becomes an extremely powerful influence in how an African American student experience science. A teacher's instructional practices can greatly influence students' interest and motivation in science. Example of effective instructional practices

include leveraging a students' funds of knowledge in the classroom (Basu & Calabrese

Barton, 2007; Calabrese Barton & Tan, 2009; Eisenhart, 2008; Emdin, 2010; Hagiwara,

Calabrese Barton, & Contento, 2007; Moje et al., 2004; O'Neill, 2010; Seiler, 2001; Tan

& Calabrese Barton, 2007, 2008; Upadhyay, 2006; Varelas et al., 2010), developing

students' science identities (Aschbacher, Li, & Roth, 2010; Buxton, 2005; Calabrese

Barton et al., 2013; Hatt, 2007; Tan & Calabrese Barton, 2007; Tan, Calabrese Barton,

Kang, & O'Neill, 2013; Varelas et al., 2011), and creating a third or hybrid space within

the science classroom that leverages multiple funds of knowledge (Calabrese Barton &

Tan, 2009; Calabrese Barton, Tan, & Rivet, 2008; Emdin, 2010; Moje et al., 2004; Tan &

Calabrese Barton, 2010).

For example, Calabrese Barton and Tan (2009) investigated the funds of

knowledge and use of Discourse displayed by students in a sixth-grade urban classroom

setting where the teacher, researchers, and five students have collaborated to design a

four part unit lesson on food and nutrition. This design experiment allowed the researcher

to assume the role of participant observer. The unit relied heavily on the students making

use of their funds of knowledge. The results showed that students make connections to

family, community, peer and popular culture funds of knowledge when they completed

the assignments. One surprising finding was that there was 100% participation from the

class on this assignment, and even the most unmotivated students were enthusiastic about

participation and sharing. Implications for this study suggest that teachers should find

various ways for students to enact their funds of knowledge in the classroom because it

deepens their connection to the scientific material. "[S]tudents learned to display

competent and meaningful scientific literacy in applying scientific knowledge to their local communities and their daily lives" (Calabrese Barton & Tan, 2009, p. 70).

Another example of the influence of instructional practices is Tan and Calabrese Barton's (2010) study of the different "figured worlds" created in Mr. M.'s sixth grade science classroom that utilized students' funds of knowledge thereby increasing participation and engagement. The authors utilized collective third space as a conceptual tool to guide their understanding of learning in science and "to examine not only how practices travel through contradictory contexts and activities but also how those practices reciprocally transform and are transformed by those communities" (Tan & Calabrese Barton, 2010, p. 40). The methodology for this study was an ethnographic case study. The results of this study revealed that Mr. M. created three figured worlds in his classroom through his teaching practices, construction of physical space, and student interactions identified by the researchers. The first was the figured world of storytelling. He and his students regularly used storytelling to ask questions, expand and challenge idea, and gain access to conversation. The second figured world of "being real." Mr. M. crafted a figured world in which students were able to utilize their funds of knowledge to showcase who they were and where they came from as it connected to the science content. Through the creation of skits, Mr. M. encouraged and allowed space for students to bring their culture along with its unique body language and slang into the classroom. This validates the student for who they are and motivates them to be who they are science learner simultaneously. The third figured world was diverse, authentic, science-based participation. Mr. M. provided the opportunity for students to take up various science

identities with different positions in his classroom that deviated from just "student" such as pet and plant caretakers and student leaders. Students were recognized as "good science student" outside of traditional norms (Tan & Calabrese Barton, 2010). As a result of his teaching practices, Mr. M. developed collective third spaces for students to participate in science more authentically; where more equitable opportunities were available for participation; and where student voice and authority were valid.

These two studies exemplify the potential of the use of effective instructional practices to motivate African American students in secondary science education. Too often, however, students receive messages that discourage them. I present negative influences on African American's science engagement and achievement next.

Negative impact on science engagement and achievement. In this section, I discuss factors that negatively impact success in science for African American students include the struggle of cultural identity versus academic identity, deterring messages from influential others, and lack of engagemetn in science activites. Below, I highlight two studies that demonstrate these factors.

Brown (2004) conducted a qualitative ethnographic study of ninth-, tenth-, and 11th-grade students in two life sciences class. His study investigated the use of classroom discourse and explored reasons why students choose to use or abandon the use of science language. Based on the use of discourses, which the author termed "discursive identity," students were classified as opposition status, maintenance status, incorporation status, and proficiency status. Students characterized as Opposition Status avoided use of science discourse. Students who exhibited Maintenance Status illustrated a commitment

to maintaining their normative discourse behavior, despite a demonstrated ability to appropriate science discourse. Students characterized as Incorporation Status made active attempts to incorporate science discourse into their normative speech patterns, while Proficiency Status students demonstrated a fluency in applying scientific discursive. Brown witnessed an exchange where a student abandoned his science discourse because another student admonished him for giving an accurate, thorough answer. The student recognized the threat to his cultural identity when he was criticized (Brown, 2004).

Next, Aschbacher and colleagues (2010) categorized students in their study of high school student that had expressed an interest in science as High Achieving Persisters, Low Achieving Persisters (high and low: 55%), and Lost Potentials (45%). There were several factors identified that contributed to students wanting to leave science including family, teachers, counselors, instruction, lack access to activities, and career goal changes. Student identified some of the deterring messages the contributed to their decisions to leave science. These included the following: "not for everyone"; "not smart enough"; "science too difficult"; "less demanding classes"; and, "better suited to be a business major." Students were getting the message that science is either something that you were good at or not. The Persisters had very different experiences with teachers and high school courses and programs, including extracurricular science programs, which nurtured their interests in science and allowed them a space to foster deeper and more pronounced science identities. Familial and school support was different for these students versus the former group. By identifying the factors that contribute to a student persisting or leaving the "science pipeline," the authors pulled out instances where

students talked about the messages they received from others: counselors, family, and teachers. These were important predictors of students' persistence in science. "Our students' experiences suggest that the value of communities of science practice lies partly in the depth and personal meaning of the activities and interaction there, and that identity within a community is deepened by competence and positive assessment by self and others" (Aschbacher et al., 2010, p. 579).

Postsecondary science education. Science education research on the post secondary level provides us with the aspects that positively and negatively impact student engagement in science education. In this section, I present the research divided across those two categories.

Positive impact on science engagement and achievement. From the literature we find that post-secondary experience in science that postitively impact engagement and achievment include developing competence through participaton in authentic science practices (Hurtado et al., 2009) and the support and recognition of others (Brickhouse & Potter, 2001; Carlone & Johnson, 2007; Hurtado et al., 2009; Lewis, 2003; Malone & Barabino, 2009; Rao & Flores, 2007).

Hurtado and colleagues (2009) conducted a qualitative phenomenological study that examined the benefits and challenges students experienced in undergraduate research programs intended to diversify the scientific workforce. The 65 students who participated in focus groups and interviews were members of undergraduate research programs at Xavier University, the University of New Mexico, Massachusetts Institutes of Technology (MIT), the University of Texas, San Antonio, and the University of New

Mexico. Students' research experiences in these early intervention programs contributed to feeling more self-assured in the classroom setting which, in turn, allowed them to demonstrate competence (Hurtado et al., 2009). One participant stated it clearly as she described how she felt comparing herself to her non-minority peers:

> I took a class where [the professor] was teaching all these experimental methods so that you could basically write a paper or a grant proposal. But some of my classmates didn't have any idea what the methods were and I was familiar with most of them, so it helped me succeed in the class, because I was like, 'Well, I've done that,' so I know exactly why you would do it and how, and they didn't . . . couldn't comprehend that other than reading a chapter of the textbook. (Xavier female student, as cited in Hurtado et al., 2009, p. 201)

In the same study, another student affirmed her assertion by stating:

> [W]hen you're in a lab doing research, you're actually contributing to a project that you can actually see what you have done and when it leads to something, like a publication, then it sort of reaffirms your confidence in science as a profession because you see that you are actually doing something as compared to just being in a class and learning what other people have done. (Xavier male student, as cited in Hurtado et al., 2009, p. 201)

Students frequently cited their experiences with conducting research as an activity that helped to solidify their career plans and build their confidence and skill level with the discipline (Hurtado et al., 2009). Furthermore, conducting research allowed them to strengthen their science identities because they were able to perform skills with increased confidence and competence.

In addition to an increased level of competence, the literature reveals that recognition and support of others in the science community helps to solidify a student's recognition of themselves as a science person (Brickhouse & Potter, 2001; Hurtado et al.,

2009; Lewis, 2003; Malone & Barabino, 2009; Rao & Flores, 2007). Malone and

Barabino (2009) further illustrated the significance of recognition when one participant

described how she felt uplifted and supported when a visiting faculty, a woman of color,

began mentoring her. I have provided several accounts of experiences that positively

influence student engagement in science, but in far too many instances the negative

experiences are more prevalent than the positive ones.

   Negative impact on science engagement and achievement. The literature

revealed that students had numerous experiences that negatively impacted their feelings

of competence and confidence in their science ability. These experiences included

racialization and being the "only one" (Brickhouse & Potter, 2001; Hurtado et al., 2009;

Lewis, 2003; Malone & Barabino, 2009; Scantlebury et al., 2007); non-recognition,

including marginalization, invisibility, and alienation (Malone & Barabino, 2009); and,

wrestling with cultural identity versus science identity (Hurtado et al., 2009; Rao &

Flores, 2007; Scantlebury et al., 2007).

   Racialization is described by Malone and Barabino (2009) as "related to

stereotype and never being able to escape being seen as a Black (or minority) person" (p.

495). The research revealed that feelings of competence and confidence are affected

when students feel as if they are constantly proving themselves because of their race

(Hurtado et al., 2009; Malone & Barabino, 2009). This was often seen in cases when

students were "the only one." Malone and Barabino (2009) conducted a qualitative

ethnographic study of 24 underrepresented minority students who were mainly graduate

students at a predominantly White institution. One student described her experience of

being the only one as being like "a speck of pepper in a sea of salt" (Malone & Barabino, 2009, p. 486). In this research study, one African American student described being given a menial research project not seen as important by the laboratory Principal Investigator (PI). The more important research projects that could lead to publications were given to other graduate students. This student was the only African American in a lab of 100 people. She felt that her ability to perform and competence were ignored because of her race (Malone & Barabino, 2009).

Other literature suggests that, because racialization, African American students feel uneasy being "the only one" in a space, and try to avoid the occurrence of stereotype threat by not performing in a way that might reinforce stereotypes (Brickhouse & Potter, 2001; Hurtado et al., 2009). Stereotype threat is define as: "When stigmatized individuals find themselves in stereotype-relevant situations, their self-awareness of stereotypes heightens performance pressures in what may already be an anxiety-provoking experience, especially when the performance is challenging" (Hurtado et al., 2009, p. 195).

Racialization is further evident for students when they are recognized primarily by their race and not their ability (Carlone & Johnson, 2007; Hurtado, et al., 2009; Lewis, 2003; Malone & Barabino, 2009; Scantlebury et al., 2007). For instance, in Hurtado and colleagues' (2009) study of students who were involved in minority focused research programs worried that they would be unfairly characterized as one who was only able to obtain access to science and science experiences based on their race rather than their academic ability (Hurtado et al., 2009). One student worried about being viewed as

having token participation rather than meaningful incorporation (Hurtado et al., 2009). In another study, students spoke about feeling like they were constantly being judged and tested because of their minority status (Malone & Barabino, 2009).

To synthesize the literature, I found that negative experiences affected African American students in one of three ways. First, it pushed some of them out of the area of science altogether as they became disinterested in the constant need to prove themselves (Malone & Barabino, 2009). Second, some students become even more motivated to excel because they felt they had something to prove (Hurtado et al., 2009). And finally, students took alternate routes into science such as those described by Carlone and Johnson (2007; e.g., public health or pharmacy). They were successful in finding science-related careers without having to navigate and be recognized by members of mainstream science communities.

Post-secondary African American student performance in the science environment is also affected by their conflict between their cultural identity and science identity (Hurtado et al., 2009; Rao & Flores, 2007; Scantlebury et al., 2007). Getting recognized as a "science person" often clashes with cultural identity because very often minority students must struggle with issues of being considered a "science geek" or a "science nerd" (Hurtado et al., 2009; Rao & Flores, 2007). When faced with this dilemma, it is not uncommon for students to feel the need to find new support systems to help to reinforce their developing science identity such as research programs that they may be involved in or other science classmates (Hurtado et al., 2009).

African American Women and Women of Color in Science

As previously stated, the literature of African American women in science is

sparse (Ong et al., 2011). According to Ong and colleagues (2011), since the turn of the

century there has been an increase in research that focuses on women of color in STEM,

with African American women as the most researched group. In this section, I present the

literature that focuses on the experiences of African American women in science and

other STEM areas. Because of the lack of literature, it was not always possible for me to

find articles that focused on science alone. Additionally, in many of these articles,

African American women are often studied with other women of color. I first present

statistical data regarding the state of women of color in STEM areas. I then present the

literature related to women of color in STEM.

Statistics. Women of color have been awarded more stem degrees since the

1970s, but are consistently underrepresented in advanced education and career stages

relative to white women and men of color. Proportionally, women of color are

underrepresented relative to their representation in the U.S. population compared to white

and Asian American/Pacific Islander women. For example, in 2006, African American

women compose 6.54% of the population (ages 15–24), but were only 5.31% of the

STEM bachelor's degrees. At the doctoral level, African American women represent

6.01% of the population (ages 25–44), but represent only 2.61% of STEM PhD

recipients.

> Clearly, the U.S. education system and research infrastructures systematically
> undereducated and underutilize women of color. The daunting magnitude of their
> underrepresentation in advanced STEM areas represents serious equity concerns

that connects with important historical and contemporary issues of social justice in the U.S. education and employment systems. (Ong et al., 2011, p. 175)

Women or minorities are usually targets for efforts in STEM. There have been program created with the intention of increasing the pool of minorities and women in science. "Unfortunately, history has borne out the reality that programs intended to serve women disproportionately benefit White women, and programs intended to serve minorities mainly benefit minority males" (Ong et al., 2011, pp. 175–176). When focus and resources are put in place to address the needs of women *or* minority populations, there is a disregard for the *double bind* that women of color must contend with. This double bind takes into account how race/ethnicity and gender function *simultaneously* to produce distinct experiences (Ong et al., 2011).

Because of the lack of research on women of color in STEM, there is a lack of coherent knowledge. "A dedicated research base about women of color would help assess the root causes of attrition, retention, or advancement for this population; to identify and remedy gaps in the research; and to broadly examine and improve programmatic, institutional, and nationwide efforts" (Ong et al., 2011, p. 176). Our current knowledge base is attributed to the researchers that have privileged the experience of women of color in science. In the following section, I present a summary of the literature on women of color in STEM at the undergraduate level, followed by the graduate level. I explore the positive and negative influences at each level.

Undergraduate. As stated previously, the number of women of color in science and engineering has increased overall within the last several decades. Many scholars

point to the social and structural environments in college as the main source of women of color's attrition in graduate STEM education (Carlone & Johnson, 2007; Hanson, 2004; Ong, 2005; Ong et al., 2011). Some of the key factors that influence women's development of identities in science include the undergraduate learning environment, STEM enrichment programs, relationships and self-concepts.

   Positive impact on science engagement and achievement. Several studies have illustrated that supportive environments in STEM are found in miniority serving instiutions, specially historically Black colleges and univerisities (HBCUs). The key factors in these institutions are openness, lack of stigma when remidiation is required, high expectations, and supportive faculty student relationships (Ong et al., 2011). Women of color valued environments where the instructors' pedagogical approach fostered cooperation instead of competition and included various opportunities for class participation and engagement.

   Additionally, enrichment programs that provide research opportunities have been shown to benefit women of color and motivate them to continue in STEM. Research opens the door to mentoring opportunties from other women of color. Retention and recruitment programs, such as Maximizing Access to Research Careers) and RISE (Research Initiative for Scientific Enhancement) also had a positive impact on supporting women of color in STEM. Specifically, Ong et al. (2011) found the these programs provided a safe place for women of color in physics enrolled at a PWI to:

   1) belong to a supportive community of scholars who looked like them; 2) reject negative stereotypes; 3) validate their identities as emergent scientists; 4) learn how to address microaggressions (subtle offenses) from faculty and peers; and 5)

grow their subcommunity by serving as role models, mentors, and teachers. (p. 184)

Likewise, fostering supportive relationships with peers, administrators, faculty members, family members, and student groups helps bolster confidence and learning for women of color in STEM. Interestingly, Ong (2005) found that among the various sources of support, it was not necessarily the case that role models and peers shared the same gender and racial/ethnic backgrounds. Strong student-faculty experiences seen in the research mentor relationship are critical and has been reported in numerous studies.

Carlone and Johnson (2007) emphasized in their qualitative study the importance of positive recognition by meaningful others. The authors conducted ethnographic interviews with 15 women of color during their undergraduate careers and then followed up with them six years later. All the women who had successfully entered science careers, such as doctoral students and those holding Ph.D.'s, consistently received recognition from established members of the science community. This recognition came in the form of summer research fellowships, co-authoring articles, and presenting at conferences. Recognition from others reinforced their own self recognition and further reinforced their science identities (Carlone & Johnson, 2007).

Additionally, family and community support are influential factors that encourage women of color in STEM (Carlone & Johnson, 2007; Russell & Atwater, 2005). Russell and Atwater's (2005) research of senior African American biology students identified three factors of parental influence: encouragment, acceptance, and high expectations (p.

707). Studies have shown the influence of mothers as a strong, consistent, supportive force (Ong et al., 2011).

Lastly, personal drive and agency has been shown to develop greatly during undergraduate years and attribute to persistence in STEM for many women of color (Carlone & Johnson, 2007; Ong et al., 2011). "Despite marginalization, women of color often use their status as member of two underrepresented groups- as a woman an as a person of color- to empower themselves" (Ong et al., 2011, p. 188). Hanson (2004) pointed out that personal charateristics such as high self-esteem, independence, assertiveness, and high educational and occupational goals are attributes often instilled in African American women and are also needed for success in science.

Negative impact on science engagement and achievement. Women of color often experience an unwelcoming environment. Several studies specifically demonstrated that gender *and* racial/ethnic bias that women of color experience, sometimes daily as STEM majors, situates them in a unique position of confronting multiple system of oppression (Carlone & Johnson, 2007; Ong et al., 2011).

Often the social realities of racism and sexism in the science environment are ignored within the myth of a meritocratic environment of science; unfortunately, women of color must learn to contend with this oppression. Ong and colleagues' (2002) study of women of color in physics concluded that

> [Y]oung women of color in science have to carry out a tremendous amount of extra, and indeed invisible work in order to gain acceptance from their male physics peers and faculty. These women must also pay careful attention and learn to articulate for themselves the unspoken rules of membership in the physics culture, then learn creative ways to access and maintain this membership. (p. 43)

The science environment is often a lonely place for women of color. They very often find themselves as the lone woman of color in classrooms and laboratories. One participant explained it this way: "As far as being a woman, I don't think they expect too many women to be in that area; as far as being a black woman, they don't expect you to be there at all" (Ong et al., 2011, p. 183). Feeling of loneliness and not being accepted affects a woman's sense of self and can lead to social stratification and low expectations.

Although faculty and family can be sources of support, they can also be unintentional sources of frustration. Johnson (2007) found that when faculties prioritize subject matter expertise rather than creating interpersonal relationships, it can discourage women of color. Additionally, family can sometimes pull women away from STEM. When family members question their decisions and time commitments, it can be damaging. Also, financial struggles, child care, and traditional female role of marrying and raising children can create a strain that is too much pressure to endure.

Graduate level. Minority serving institutions do a much better of job of producing female doctoral recipients than predominantly White institutions (PWI). It has been reported that between 1980 and 1990, 30 out of the top 50 undergraduate institutions that produced African American female doctoral recipients in science and engineering were HBCUs (Solórzano, 1995). HBCUs and women's colleges produced far greater numbers of African American female PhDs in biological and physical sciences because of their "deliberate efforts to establish an infrastructure to recruit and retain students in these fields. Infrastructure included supportive faculty, strong sense of

community, curricula that encouraged collaboration and real-world applications, and programs designed to promote success" (Ong et al., 2011, p. 191).

Positive impact on science engagement and achievement. Mentorship and having role models were shown to be an important element in promoting women of color in STEM (Hanson, 2004; Ong et al., 2011). When in place, strong mentors helped increase confidence and help women navigate their way into the culture. Also, networking and graduate training programs were a great way for women of color to find support and encouragement. In addition, as seen at the undergraduate level family members and community support women of color in STEM (Ong et al., 2011). One doctoral student credited her strong, religious upbringing with providing her with the resilience to succeed. Hanson (2004) found that in the African American community mothers, especially, provided young women with more liberal sex-role attitudes that was a source of support and encouragment.

Negative impact on science engagement and achievement. For some women of color, the transition from Minority Serving institutions (MSI) to graduate programs can be difficult. In one study included by Ong and collegues' review (2011), six African American women in chemistry and mathematics graduate programs were interviewed who were transitioning from HBCU undergradate programs. She found that the women encountered problems because they were coming from environments filled with encouragement and support into environments where they experienced social isolation and academic difficulties (Ong et al., 2011).

Financial strain can be another source of frustration for women of color (Ong et al., 2011). Funding their graduate education can be an issue for women of color when it comes to finding resources and being accepted into fellowships. The women needed guidance when navigating the sometimes complicated and confusing processes. Women of color are less likely to receive offers of fellowships even when factors such as undergraduate grade point average are controlled. Even when awarded fellowships, women of color are significantly less likely to complete their degree requirements compared to other groups (Ong et al., 2011).

Also, the social and cultural climate of STEM is, according to Ong et al. (2011), the leading challenge to the persistence of women of color in STEM career trajectories. Outweighing structural barriers such as financial aid, faculty composition, and teaching or research assistanceships, women in STEM graduate programs revealed that "interpersonal relations" causes the most difficulty (Ong et al., 2011). These "interpersonal relations" included isolation, racism, racialization, and relationships with faculty and other peers. Studies have found that the prevelant cultural belief in White male superiority played out as microaggressions in everyday practices which affected the experinces of women of color.

Tension also occurred when women of color found themselves as the *only* woman of color in a department, especially when transitioning from an HBCU (Johnson, 2007). As a coping strategy with feeling the need to downplay who they were, women of color in these enviroments would alter their mode of thinking, dress, speech, and behavior. For

example, one woman in Ong's (2005) study purposely wore drab clothing and reserved her pink wardrobe for events outside of lab.

Additionally, cultural bias against women and/or minorities played a significant role in undermining the success of women of color in STEM. Women from MSIs or less prestigious undergraduate institutions felt that their professors had lowered expectations of their ability. This highlights the critical need for increasing women in STEM because acquisition of advanced degrees leads to an increase in faculty positions. "[C]reating more women of color STEM PhDs and getting them into faculty positions could help foster cultural changes that would improve overall faculty support for and increase the enrollment and retention of minority women" (Ong et al., 2011, p. 195). HBCUs have successfully in produced high achieving women of color in science. In the following section, I explore their history and impact in higher education.

Historically Black Colleges and Universities (HBCUs)

Historically Black institutions of higher learning are essentially an outcome of discrimination against Black people in America. Prior to the emancipation of slaves, most Whites believed that giving African Americans an opportunity to attend college would threaten the existence of slavery (Kim, 2002). Despite these beliefs, White religious missionaries and some Black churches established Black colleges primarily to train teachers for the segregated schools (Gasman, 2007; Newkirk, 2012). Thus, the first Black colleges were established in the mid-1800s (Kim, 2002; Newkirk, 2012). While the efforts of the White missionaries appeared to be benevolent, their actions were actually an example of interest convergence. The missionaries established the Black colleges with

the hopes of converting formerly enslaved Blacks to Christianity (Gasman, 2007).

Following th Civil War, additional Black colleges were established with the intent of

providing education to newly freed slaves (Redd, 1998). Thus, most of the institutions

were established in southern states, and were funded without state government support

(Allen & Jewell, 2002; Allen, Jewell, Griffin, & Wolf, 2007). Black colleges were

transformed in 1890 in response to the adoption of the second Morrill Land Grant Act,

which designated funds for the establishment of public higher learning institutions that

implemented agricultural and mechanical arts curricula; most importantly, making higher

education accessible to former slaves (Gasman, 2007). Furthermore, this land grant act

lead to the establishment of additional historically Black land grant colleges. Today, there

are a total of 103 historically Black institutions of higher learning, making up just three

percent of the nation's institutions of higher learning (National Center for Education

Statistics [NCES], 2006).

The Higher Education Act of 1965 defines an HBCU as ". . . any historically

black college or university that was established prior to 1964, whose principle mission

was, and is, the education of black Americans" (NCES, 2006). Prior to the *Brown v.*

Board of Education decision in 1954, the majority of Black students were enrolled in

HBCUs (Allen, 1992). However, the landscape of HBCUs changed following this

decision, as more Black students began to enroll in PWIs and other racial groups began

attending HBCUs (Newkirk, 2012). Disparities in the racial composition and academic

achievement of students at HBCUs and PWIs can be attributed to the unique mission of

Black colleges (Allen & Jewell, 2002). Historically, HBCUs tend to enroll students who

otherwise would not be able to attend an institution of higher learning due to financial, social, and political hurdles (Allen & Jewell, 2002). These institutions take great pride in their ability to equip financially disadvantaged and academically underprepared students for graduate schools and their chosen professions (Allen & Jewell, 2002; Allen et al., 2007). While HBCUs only make up a small percentage of the nation's higher education institutions, they graduate close to twenty percent of African Americans who earn undergraduate degrees (NCES, 2006). Significantly, HBCUs have gained notoriety for producing a disproportionately high number of minority graduates in science, technology, engineering, and mathematics (STEM; Shorette & Palmer, 2015).

Theoretical Positioning

This study utilizes Black Feminist Thought (BFT) and Critical Race Theory (CRT) as theorectical positions to privilege the lived experiences of African American women who have successfully obtained a Ph.D. in science. To begin, Black Feminist Thought (Collins, 2000) is a useful framework to examine the unique experiences of African American women who face multiple forms of oppression. Likewise, CRT is a movement by those who are committed to "studying and transforming the relationship between race, racism, and power" (Delgado & Stefancic, 2001, p. 2). Because of their position in American society, both frameworks are appropriate for the investigation of the narratives of black female scientists. In this section, I discuss the key characteristics and themes of each theory and discuss how each addresses issues related to racial and/or gender equity. I begin with Black feminist thought.

Black Feminist Thought

Black feminist thought gives voice and credence to a group of the American

population has been silenced by oppression (Collins, 2000; Parsons & Mensah, 2010).

> Oppression describes any unjust situation where, systematically and over a long
> period of time, one group denies another group access to the resources of society.
> Race, class, gender, sexuality, nation, age, and ethnicity among others constitute
> major forms of oppression in the United States. However, the convergence of
> race, class and gender oppression characteristic of U.S. slavery shaped all
> subsequent relationships that women of African descent had within Black
> American families and communities, with employers, and among one another.
> (Collins, 2000, p. 6)

In 2000, Collins's book, *Black Feminist Thought: Knowledge, consciousness, and the*

politics of empowerment, articulated the condition of Black women in America. In this

book, Collins (2000) identifies the three interdependent dimensions that encompass the

oppression of African-American women. The dimensions are: (a) the exploitation of

Black women's labor in American capitalism; (b) the political exploitation that denied

African-American women the rights and privileges extended to White males; and (c) the

controlling images that have been attributed to Black women beginning in slavery that

confirm the racist and sexist ideologies within U.S. culture (Collins, 2000). This

oppression is manifested by the historical disregard for Black women's ideas and

experiences as a legitimate source of knowledge. It is not to say that Black women have

not created a space where ideas and experiences could be expressed. It is within the

history of rhythm and blues, literature, Black female organizations, and Black churches

where a safe place has been made for African-American women to communicate their

lived experiences (Collins, 2000). It is only until recently that there has been visibility of

African-American women in academia. These women who occupy positions of academic authority and status have the unique opportunity to study, research, and share the struggle of their African-American sisters (Collins, 2000).

There are two factors that historically stimulated U.S. Black women's critical social theory known as Black feminist thought. First, the creation of all Black neighborhoods by ghettoization in urban areas across American created a placed where within these self-contained communities crafted oppositional knowledge that led to a communal resistance to oppression (Collins, 2000). The second factor that stimulated U.S. Black women's critical social theory is the common experiences gained from domestic work. Black women's involvement in domestic work enabled them to see more clearly the divide between themselves and their employers as well as the economic exploitation that came with this type of labor (Collins, 2000).

The purpose of U.S. Black feminist thought is to actively respond to oppression and to "resist oppression, both its practices and the ideas that justify it" (Collins, 2000, p. 25).

> As a critical social theory, Black feminist thought aims to empower African-American women within the context of social injustice sustained by intersecting oppressions. Since Black women cannot be fully empowered unless intersecting oppressions themselves are eliminated, Black feminist thought supports broad principles of social justice that transcend U.S. Black women's particular needs. (Collins, 2000, pp. 25–26)

There are six distinguishing characteristics of Black Feminist Thought. The first is a commitment to social justice—not only for Black women, but justice for all (Collins, 2000). The significance of combating oppression in its multiple forms is defined as

intersectionality. By not identifying the multiple, overlapping, intersecting forms of oppression, Black women will never be fully empowered (Collins, 2000; Parsons & Mensah, 2010). As Hammonds pointed out in her interview (mentioned in Chapter I), she is both female and Black, always (Sands, 1993). There is not a moment when one identity is more important than the other. There was no point where she could attribute evidence to discrimination to one or the other. Oppression weighed heavily on her shoulders and caused her to crumble under its weight. Intersectionality emphasizes that, in any situation, Black women face multiple forms of oppression based on their location within the matrix of oppression. All Black women will not face the same kinds or degrees of oppression. For example, a Black woman with a lot of financial means will not face the same life conditions as a Black woman living in poverty.

The second characteristic is diverse responses to common challenges (Collins, 2000; Parsons & Mensah, 2010) also known as heterogeneous collectivity. Although a collective with shared group knowledge and common lived experiences, African American women navigate barriers caused by oppression with various strategies. For some women, resistance comes in the form of activism (marches, sit-ins, and boycotts). In the Jim Crow era, many women responded with small acts of resistance such as sneaking to use "white only" restrooms. For other women, resistance comes in the form of challenging and deconstructing notions of "Barbie-doll femininity premised on middle-class White women's experiences" (Collins, 2000, p. 31). A 14-year-old Black girl named Jaminica described her strategy:

> Unless you want to get into a big activist battle, you accept the stereotypes given to you and just try to reshape them along the way. So in a way, this gives me a lot of freedom. I can't be looked at any worse in society than I already am- black and female is pretty high on the list of things not to be (Collins, 2000, p. 31).

The third characteristic of Black feminist thought is Black feminist practice, which is described as the connection between collective lived experiences and the resulting group knowledge or viewpoint (Collins, 2000). Historical experiences have stimulated the rise of a self-defined Black female standpoint to oppression that has fostered Black women's activism (Collins, 2000). U.S. Black feminism illustrates the *dialogical* relationship along Black women. "On both the individual and group level, a dialogical relationship suggests that changes in thinking may be accompanied by changed actions and that altered experiences may in turn stimulate a changed consciousness" (Collins, 2000, p. 34). There are two prominent moments that characterize Black feminism's visibility. The first was at the turn of the century with the formation of Black women's clubs. The second was the Black feminist movement stimulated by the anti-racist women's social justice movements of the 1960s and 1970s (Collins, 2000).

The fourth characteristic of Black feminist thought is the dialogical practices of Black women intellectuals. Black women intellectuals have the important task of presenting the lived experiences of other Black women and must do so by "asking the right questions and investigating all dimensions of Black women's standpoint with and for African-American women" (Collins, 2000, p. 37). The relationship between Black woman scholars and the larger community is essential to the continuance of Black feminist thought as a voice for masses.

The fifth characteristic is that Black feminism is dynamic and changing. As social conditions change, so must the knowledge and practices of Black feminist thought (Collins, 2000). Black feminist thought must be fluid and adapt to the conditions and environments where oppression has taken root. The fluidity and adaptability of Black feminist thought is facilitated by heterogeneous collectivity (Parsons & Mensah, 2010).

The sixth characteristic of Black feminist thought is the relationship with other social justice projects. Shirley Chisholm eloquently speaks to this concept:

> [W]orking toward our own freedom, we can help others work free from the traps of their stereotypes . . . In the end, antiblack, antifemale, and all forms of discrimination are equivalent to the same thinking as antihumanism . . . We must reject not only the stereotypes that others have of us but also those we have of ourselves and others. (Collins, 2000, p. 47)

Collins (2000) identifies seven themes in Black feminist thought. They are: (a) work, family, and Black women's oppression; (b) Mammies, matriarchs, and other controlling images; (c) The power of self-definition; (d) The sexual politics of black womanhood; (e) Black women's love relationships; (f) Black women and motherhood; and (g) Rethinking black activism. The theme that connects best to this study is self-definition, as I describe below.

Self-definition. Judith Rollins recognized the power of self-definition to the Black women's history when she noted the amazing ability of Black domestic workers to maintain a "remarkable sense of self-worth . . . They skillfully deflect these psychological attacks on their personhood, their adulthood, their dignity, these attempts to lure them into accepting employers' definitions of them as inferior" (Collins, 2000, p. 107). I see

acts of resistance as a way that African-American women have been able author

acceptable identities in the face of oppression. Despite messages that positioned them as

inferior, unintelligent, and lazy, they were able to reject the messages and author

identities of pride, dignity, and self-importance. Black women have been able to survive

because within their consciousness they were rejecting the intersecting oppressions of

race, class, gender, and sexuality. "Inner speech" is how one "authors" the world

(Holland, Lachicotte, Skinner, & Cain, 1998). Authoring is in response to the language

and activities one has experienced. What one learns about oneself through interaction

with others must be negotiated. It will be taken up and accepted, modified, or rejected

(Holland et al., 1998). Black feminist thought defines this rejection of oppressive

messages as "self-definition." "Black women's lives are a series of negotiations that aim

to reconcile the contradictions separating our own internally defined images of self as

African-American women with our objectification as the Other" (Collins, 2000, p. 110).

As with any framework, Black Feminist Thought as a theory guides the questions

that are asked and the lens that through which our observations and analyses are viewed.

Within the last fifteen years, specifically after Collins's (2000) book, Black Feminist

Thought has been used as a framework to guide many education and sociological studies.

Black Feminist Thought as my lens allowed me to pay attention to how my

participants experience both racism and sexism. It also required that I privilege the

meanings that my participants make to their own experiences. Also, by using self-

definition as a main point of investigation, I was able to understand, not just the

experiences but the meaning they made and the coping mechanisms they employed to find success in science despite the odds.

Critical Race Theory

Critical Race Theory (CRT) is a movement by those who are committed to "studying and transforming the relationship between race, racism, and power" (Delgado & Stefancic, 2001, p. 2). Containing an activist dimension, CRT began in the mid-1970s and was birthed out of the stalled smoke and ashes left from the fire that was the civil rights movement of the 1960s. The movement began within the field of law, but has spread well beyond the boundaries of the courtroom (Delgado & Stefancic, 2001). CRT is about not just understanding and critiquing, but is ultimately dedicated to transformation. Therefore and as one might expect, CRT has moved into classrooms and crossed boundaries into other disciplines (Delgado & Stefancic, 2001; Ladson-Billings, 2009).

The first CRT conference was held in the summer of 1989, in Madison, Wisconsin (Delgado & Stefancic, 2001). It is built upon the foundation laid by other theories such as critical legal studies and radical feminism. From critical legal studies, CRT borrows from the idea of legal indeterminacy which is . . . "the idea that not every legal case has one correct outcome" (p. 5). The outcome is very heavily dependent upon the perspectives of those involved in presenting and judging the evidence. From feminism, insight is drawn from the construction of social roles and the dimensions of power and domination. From the civil rights movement, there is a dedication to addressing and vindicating historic wrongs (Delgado & Stefancic, 2001). There are two

principal figures credited with inception of CRT. Derrick Bell was professor of law at

New York University. He is viewed as the movement's intellectual father figure. Alan

Freeman from the State University of New York at Buffalo law school wrote a number of

foundational articles that documents how the Supreme Court's race jurisprudence

legitimizes race (Delgado & Stefancic, 2001).

Bell (2009) describes CRT as

[A] body of legal scholarship . . . whose members are people of color and ideologically committed to the struggle against racism, particularly as institutionalized in and by law. Those critical race theorists who are white are usually cognizant of and committed to the overthrow of their own racial privilege (Bell, 2009, p. 40).

Bell admits that CRT may not be completely cohesive, but he asserts that is at least

committed to resistance against oppression and racism. Even though he is given credit as

the father of CRT, Bell (2009) states that he does not know who coined the phrase, and

he proclaims that he is given more credit than he feels he deserves.

There are six basic tenets of Critical Race Theory. First, racism is ordinary,

normal, and endemic in American society (Delgado & Stefancic, 2001; Ladson-Billings,

2009; Parsons, 2014; Taylor, 2009; Vargas, 2003). Racism is deeply rooted in American

culture and institutions. "Racism is a global White supremacy and is itself a political

system, a particular power structure of formal and informal rule, privilege,

socioeconomic advantages, and wealth and power opportunities" (Taylor, 2009, p. 4). It

is not just the isolated incidents that are publicized, but the use of terms such as "other"

and "colorblind" society that are examples of engrained racism. Other examples include,

but are not limited to, the protection of slavery, the Electoral College, and the Fugitive

Slave clause (Vargas, 2003).

The second tenet of CRT is the theory of interest convergence (Delgado &

Stefancic, 2001; Ladson-Billings, 2009; Taylor, 2009; Vargas, 2003). Interest

convergence is described as follows: "[T]he interest of Blacks in gaining racial equality

have been accommodated only when they are converged with the interests of powerful

Whites . . . the bourgeoisie will tolerate advances for the proletariat only if these

advances benefit the bourgeoisie even more" (Taylor, 2009, p. 5). The situation is

improved for minorities only when it serves the agenda of White America. A perfect

example is integration law (*Brown v. Topeka Board of Education*). The law was not

established because integration was in demand and popular; but rather, integration was

necessary because America could not continue to be seen as a respected global power

with images of violence against minorities that were seeking equal rights (Delgado &

Stefancic, 2001; Taylor, 2009). The world was watching. The *Brown* decisions as well as

the aftermath are discussed in more detail in the following section: *CRT in Education*.

Next, the third and fourth tenets are very closely connected; the "social

construction" thesis and differential racialization, respectively. "What we call race is a

social phenomenon that is experienced subjectively. When theorists assert that race is

'socially constructed' what they mean is race an objective phenomenon that has no

positive or negative implication until cultural and social practices provide that social

meaning" (Vargas, 2003, p. 10). Furthermore, race is "a social construction that ascribes

meaning to aspects of human physiognomy" (Parsons, 2014, p. 698), and there is no

biological basis for a differentiation between Homo sapiens. We are one species. Worth is only assigned to physical features by those who have the power to choose in order to serve political, economic, social, and cultural aims. This concept is defined as differential racialization (Delgado & Stefancic, 2001). Different minority groups are racialized by the dominant group in response to the needs of the labor market. It is done to create social hierarchies. In the early history of the United States, white people were categorized into inferior (Irish) and superior (English) groups. As settlements grew in the U.S., a resistance to white servitude grew. "Race was based on biological markers, physical features lined to characteristics that were used to assign value to various groups in relation to the needs of the developing nation" (Parsons, 2014, p. 699).

For example, Mexican Americans were granted "white" status in 1848, but in 1930, Mexicans were taken out of the white category and given their own separate identifier. The reclassification is evidence of the diminishing status of Mexican in the U.S. In essence, they were asked to turn in their "white card." Not having white status meant, and still means, "limited and structurally (informally and formally) circumscribed political, economic, and educational influence" (Parsons, 2014, p. 700). This is an example how race persists across space and time in the United States of America. Race still matters. Clear evidence can be seen in the educational system where schools with low or no white student enrollment means low quality facilities and staffing, as well as fewer resources. This creates a vicious cycle of poverty and hopelessness (Delgado & Stefancic, 2001; Ladson-Billings, 2009; Parsons, 2014).

The fifth tenet of CRT is the notion of intersectionality (Delgado & Stefancic, 2001). No person is one single lineage, affiliation, or identity. Intersectionality speaks to the idea that everyone has multiple, overlapping, often conflicting identities. It is "the examination of race, sex, class, national origin, and sexual orientation, and how their combination plays out in various settings" (p. 51). Further, it can be defined as "an intersection of recognized sites of oppression" (p. 51)

Lastly, the sixth and final tenet of CRT is voice of color or narrative (Bell, 2009; Delgado & Stefancic, 2001; Ladson-Billings, 2009; Parsons, 2014; Solórzano & Yosso, 2009; Vargas, 2003). "Stories can name a type of discrimination; once named, it can be combated" (Delgado & Stefancic, 2001, p. 43). The use of narrative is embraced by CRT because it gives credence to the experiences as people of color as illustrations of oppression and racism. It demands that the racism be viewed through the eyes of the oppressed, rather than from a white perspective (Bell, 2009). "Critical writers use counterstories to challenge, displace, or mock these pernicious narratives and beliefs" (Delgado & Stefancic, 2001, p. 43). Slave narratives, Indian storytelling, and Latino novels are ways that various ethnic groups have recorded their histories. By hearing, seeing, and feeling the perspective of someone else's experience, we make room for understanding. Narrative extends the invitation for others into a world that is unfamiliar. Narratives that are powerfully written can help to adjust people's thinking and mindsets. For examples, women or men that have suffered childhood incest have the ability to use their stories to bridge the gap for those who have never walked in their shoes and view

such an experience as inconceivable. Narratives help to create understanding. Stories offer a cure for silencing (Delgado & Stefancic, 2001).

Moreover, when discussing the use of narratives in CRT, we can more specifically discuss the emergence of Critical Race methodology. Critical Race methodology is a theoretically grounded approach to research that: (a) foregrounds race and racism; (b) challenges traditional research methods that are used to explain the experiences of people of color; (c) offers liberatory solution to racial, gender, and class subordination; (d) focuses on racialized, gendered, and classed experiences of people of color; and (e) uses interdisciplinary knowledge base of ethnic studies, women's studies, sociology, history, humanities, and the law to better understand the experiences of students of color (Solórzano & Yosso, 2009).

CRT began in legal studies and was first applied to the laws and policies that unfairly discriminated against people of color, specifically African Americans. But if racism is endemic and deeply rooted in American history and culture, then one would expect to find evidence of its existence in other institutions across the nation. Hence, CRT has been used as an analytic tool to examine equality in education.

Critical Race Theory in Education

> CRT scholars call into questions schooling practices that perpetuate whiteness
> through expectations of student behavior and narrowly constructed curricular
> content, among other factors . . . (They) have also sought to challenge and expand
> our understanding of research methods and methodologies such that we can
> capture, analyze, and represent racialized educational inequity. (Dixson & Lynn,
> 2013, p. 3)

In their seminal work titled *Toward a Critical Race Theory of Education*, Ladson-Billings and Tate (1995) begin by discussing the savage inequalities articulated by Jonathon Kozol when he discussed the immense inequities that exist between poor African American and Latino and their while middle-class students. They suggested that these immense inequities are a result of "a racialized society in which discussions of race and racism continue to be muted and marginalized." (Ladson-Billings & Tate, 1995, p. 47). Because of the continued deafening silence regarding race that permeates within conversations of schooling and education, CRT in education has emerged. CRT in education centers race as an analytic tool to understand school equality (Dixson & Lynn, 2013; Ladson-Billings, 2009; Ladson-Billings & Tate, 1995). "Adopting and adapting CRT as a framework for educational equity means that we will have to expose racism in education and propose radical solutions for addressing it" (Ladson-Billings, 2009, p. 33).

Before beginning to look deeply into how race and education intersect, we must first investigate the intersection of race and property in the American history. Ladson-Billing and Tate (1995) posit that social and school inequity is based on three central propositions:

> 1) Race continues to be a significant factor in determining inequity in the United States.
> 2) U.S. society is based on property rights.
> 3) The intersection of race and property creates an analytic tool through which we can understand social (and, consequently, school) inequality. (Ladson-Billings & Tate, 1995, p. 48)

Even though the concept of race has no biological merit and fails to make sense, race is a construct used to distinguish between individuals and is a major factor in inequality. Omi

and Winant (1994) have established what they call the racial formation theory. It is

defined as:

> [T]he sociohistorical process by which racial categories are created, inhabited, transformed and destroyed . . . [It] is a process of historically situated projects in which human bodies and social structures are represented and organized. . . . Race is a matter of both social structure and cultural representation. (Ladson-Billings & Tate, 1995, p. 50)

This point echoes the theory of the social construction of race discussed previously.

Scholars of CRT in education seek to uncover how race continues to "create oppressive

educational experiences for students of color" (Dixson & Lynn, 2013, p. 3)

American society is based on property rights. Activists in the civil rights

movement made pleas to appeal to the civil and human rights of society, yet they ignored

the fact that American society was founded on property rights with no regard to civil and

human rights. An example from a 1600s underscores the belief on which America was

founded. The governor of Massachusetts, John Winthrop, excused robbing the Indians of

their land by declaring, "The Indians had not subdued the land, and therefore had only a

'natural' right to it, but not a 'civil right.' A 'natural right' did not have legal standing"

(Ladson-Billings & Tate, 1995, p. 53).

The rules of American society and government were created to reinforce the

superiority of European immigrants of a certain class. The American government was

constructed to protect the rights of property owners. There was never a regard for human

or civil rights. Examples can be seen throughout the course of history.

> The grand narrative of U.S. history is replete with tensions and struggles over property . . . From the removal of the Indians (and later Japanese Americans) from the land, to military conquests of the Mexicans, to the construction of Africans as property, the ability to define, possess and own property has been a central feature of power in America . . . Thus, we talk about the importance of the individual, individual rights, and civil rights while social benefits accrue largely to property owners. (Ladson-Billings & Tate, 1995, p. 53)

How does property connect to inequity in education? It is simple. Owning property means more property tax dollars to fund schools. Those that live in more affluent neighborhoods are entitled to better schools because there is more money to fund it. The disparity in average expenditures per pupil for school districts in rural, urban, and suburban communities is staggering (Ladson-Billings & Tate, 1995). Expenditure per pupil is just one example of the inequity among schools. Expansive and advanced curricula, certified and highly qualified teachers, access to technology, and resources are other factors that are disproportionately favor students in affluent neighborhoods. At the very basic level, it is about whiteness as property. Understanding this concept is central to understanding how white privilege is manifested in the American educational system. The reality of whiteness as property impacts how students are expected to dress, speak, and behave (Brown & Jackson, 2013; Chapman, 2013; Ladson-Billings, 2009; Ladson-Billings & Tate, 1995). The cultural practices of whites are rewarded. Ladson-Billings (2009), her discussion of racism and education highlights one of my favorite research studies in which white students were asked how much they would have to be compensated monetarily to become Black. The amount ranged from $1-50 million per year. This is example of the value of "whiteness as property." "Whiteness automatically carries with it greater economic, political, and social security" (Brown & Jackson, 2013,

p. 19). The history of privilege, citizenship, and property ownership are carried into education and we see evidence of racism in education practices and procedures (Ladson-Billings, 2009).

Moreover, the tenets of CRT can help us understand educational inequality. CRT affirms the position that racism is endemic and deeply ingrained in American life. Evidence of racism is illustrated by the conditions the poor children who find themselves in within the education system is the result of "institutional and structural racism" (Ladson-Billings & Tate, 1995, p. 55). Ladson-Billings and Tate (1995) use Wellman's definition of racism. Racism includes "culturally sanctioned beliefs which, regardless of the intentions involved, defend the advantages Whites have because of the subordinated positions of racial minorities" (Ladson-Billings & Tate, 1995, p. 55). Institutional and structural racism were evident in the aftermath of the *Brown vs. Board of Education of Topeka, Kansas* decision. It is critically important to understand the history of the *Brown* case and its subsequent attempt at implementation in order to realize the connection with the tenet of interest convergence within the CRT framework.

Historically*, Brown* has taken on "a mythic quality" and used as the symbol for marking the end of school segregation and the beginning of integration in the American educational system. *Brown* is viewed as the hallmark for the nation's commitment to school equality, but sadly this has not been the case. Ladson-Billings (2004) declared that "the *Brown* decision is not the result of America as a good and altruistic nation but rather the result of the decision's particular historical and political context" (p. 3). To understand what she means by this statement, there must be a clear understanding of the

cases' history as well as the political climate of the time. *Brown* was not just one case, but was the accumulation of a series of cases that spanned over a 100-year period. In 1849, Benjamin F. Roberts sued the city of Boston on behalf of his five-year-old daughter who walked past five White elementary schools to the broken down Black school across town. After failing in this attempt to register her in one of the White schools, Roberts sought legal support from Robert Morris (an African American attorney) who in turn, recruited Charles Sumner (a well-known white abolitionist). The court ruled in favor of the school committee denouncing the lawsuits argument that school segregation was discriminatory and harmful to *all* children.

Almost 50 years later in 1896, the *Plessy v. Ferguson* case (that *Brown* reversed) challenged the Louisiana segregation law that stated that separate facilities were permissible as long as they were equal. When the U.S. Supreme court upheld Judge Ferguson's ruling the ideology of discrimination and segregation were validated and reinforced. Other subsequent cases brought before the Supreme Court failed to make any headway. So it was the NAACP that decided to combine a total of five separate cases in what became known as *Brown v. the Board of Education of Topeka Kansas.* However, parents were not just fighting discrimination on the K-12 level, college and professional schools were being challenged for their discriminatory practices. In the 1950 case *McLaurin v. Oklahoma State Regents*, the Supreme Court ruled against the University of Oklahoma's practice that allowed a Black man to attend class, but fenced him off from other students. On the very same day, the Court ruled in favor of the plaintiff's in *Sweatt v. Painter*. The Court believed that the makeshift law school created by the state of Texas

to avoid admitting did not represent the equal facility described in *Plessy*. Therefore, before the *Brown* case came before the Court there was precedence for cases that challenged discriminatory practices.

Even more critical to the decision in *Brown* than the legal cases coming before the court, was the political climate of the time. Eisenhower was not enthusiastic about the rulings. He felt the real implementation would be left up to the states. "Eisenhower was counting on the power of states' rights to hold school segregation in check while the federal government could point to the ruling as an example of its commitment to equality" (Ladson-Billings, 2004, p. 4). Additionally, the United States could not convincingly declare to the world the power and hope of democracy while treating a sector of its population as second class citizens. "The United States is trying to prove to the people of the world, of every nationality, race and color, that a free democracy is the most civilized and secure form of government yet devised by man," wrote the U.S. Justice Department in a brief filed in *Brown* (Ladson-Billings, 2004, p. 4). The way America was treating its African American population was not sitting right with those who wanted ammunition to attack the democracy agenda. Therefore, the *Brown* decision is a perfect example of the CRT tenet of interest convergence. Ladson-Billings (2004) summed it up very concisely when she stated, "Thus, the *Brown* case could be positioned as serving White interests—improving the national image, quelling racial unrest, and stimulating the economy—as well as Black interest—improving educational condition of Black children and promoting social mobility" (p. 5).

Despite the victory *Brown* symbolized in the fight for school equality, the true story is told when looking critically at what happened with implementation. *How can significant progress toward racial equality be made within a racist system?* I would equate it to preparing a deep-fried salad. All of the benefit is lost when one realizes the context. The salad is equality and racism is the deep fryer filled with bubbling hot oil. No one had anticipated the depth of White fear and the degree to which White supremacy would affect desegregation (Ladson-Billings, 2004). Even the supporting arguments used to argue the case were filled with statements of Black inferiority. Racism trickled, like hot oil; through, between, and within every aspect of the case, ruling, and attempted implementation. Despite the ruling, segregation prevailed and persisted in the 1960s and 1970s (Dixson & Lynn, 2013; Ladson-Billings, 2004). "Instead of providing more and better educational opportunities, school desegregation had meant increased white flight along with a loss of African-American teaching and administrative positions" (Ladson-Billings & Tate, 1995, p. 56). In fact, segregation within schools actually grew in the 1990s. In some rural areas, groups of white families created their own private schools to avoid integration referred to as segregation academies. Later, there was the creation of magnet schools, designed to attract White families to schools in Black or Latino neighborhoods (Ladson-Billings, 2004).

For example, in cases where desegregation appeared to work, it was because magnet school were put in place that were designed to bring white students into schools with large enrollments of students of color (Ladson-Billings, 2004). These schools have some success at attracting white families. Examples can be seen to this day across the

country. In the successful magnet schools, all of the children are taught together in

unified classrooms with a unified curriculum. All too often, however, in some magnet

school there is a "school within a school" model where White families receive a

specialized curriculum or free childcare and the "neighborhood" kids and their families

do not benefit. It is essentially "segregation within a school" where one can visually see

the divide by walking up and down the halls and peering into classroom doors. In more

recent history, we find re-segregation in the language of school "choice" where middle

income white families are given the opportunity to send their children to school away

from poor "at-risk" students (Ladson-Billings, 2004). Districts supported programs that

on the outer surface looked like desegregation. There were some schools that were

praised as models of desegregation because they were able to attract and retain white

students. "Thus, a model desegregation program becomes defined as one that ensures that

whites are happy (and do not leave the system) regardless of whether African-American

and other students of color achieve or remain" (Ladson-Billings & Tate, 1995, p. 56)

 Unfortunately, the costs we paid for Brown were high:

> [J]ob loss and displacement over time (of black teachers), the re-inscription of
> Black inferiority, the rise of segregation academies, the missed opportunity for
> working-class White and Black coalitions to work together for quality education,
> and the focus on race over quality education- all point to the high price that was
> paid in the name of getting the Supreme Court and the nation to acknowledge a
> principle it already understood to be important to democracy. (Ladson-Billings,
> 2004, p. 9)

However high the costs, there was some benefit such as the passage of the Civil Rights

Act of 1964 and Title IX which enforced co-education and gender equality. The legal

foundation of *Brown* allowed for the impetus of other legislation that sought to combat injustice and inequality (Ladson-Billings, 2004). The importance of *Brown* in the history of American education is vividly apparent when pausing to take note of how the case significantly affects policies and program such as magnet programs and choice school vouchers. Understanding the history of *Brown* helps us to understand the need for centralizing race when analyzing American education. As we centralize race, we must also use methods that are appropriate for combating inequality and injustice.

Specifically, CRT utilizes "naming one's own reality" or "voice" as a tool for combating the stories told by the oppressor about reality (Brown & Jackson, 2013; Ladson-Billings & Tate, 1995). In regards to education and naming one's truth, Ladson-Billings and Tate (1995) "contend that the voice of people of color is required for a complete analysis of the education system" (p. 58). Furthermore, "without authentic voices of people of color (as teachers, parents, administrators, students, and community members) it is doubtful that we can say or know anything useful about education in their communities" (Ladson-Billings & Tate, 1995, p. 58). By using parables, chronicles, stories, poetry, and fiction to tell our own stories, we begin to document our reality within American education. We cease to have one storyline of what it means to be educated as an African American student in the United States. Storytelling also serves to counter racist stereotypes. "Historically, storytelling has been a kind of medicine to heal the wounds of pain caused by racial oppression" (Ladson-Billings & Tate, 1995, p. 57). Naming one's own reality with stories also has the potential of affect the oppressor. Oppression does not look like oppression to the perpetrator. Stories, if they are willing to

listen, can force the oppressor to hold up a mirror and face the wrong they have

committed and the hurt they have caused. Narrative can be used to prove that racism is

neither "aberrant nor occasional parts of the lives of people of color . . . (but are) deep

and enduring parts of the everyday existences of people of color" (Brown & Jackson,

2013, p. 19). Narrative can be ". . . used to make visible the racial biases that are deeply

embedded in the unstated norms of American law and culture" (Brown & Jackson, 2013,

p. 19)

Moreover, counterstorytelling can help others to recognize what Delgado and

Stefanic (2013) refer to as "critcal moments" (p. 27). Critical moments arrive when

connections are made among seemingly desparate events. There is power in capturing the

perspecive of the oppressed versus the oppressor.

> Oppressed people turn out to be better at spotting critical moments than those who
> are satisfied with the current order. As George Hegel pointed out, the slave tends
> to know the master better than the other way around. Professors, teachers, and
> scholars desiring to sharpen their pedagogy can do well to heed outsider voices,
> scholarship, and concerns. (Delgado & Stefanic, 2013, p. 32)

In addition to what has been presented thus far in regard to CRT in education, and

as a means of focusing and concluding the discussion, Solórzano (2013) developed a list

of the five tenets of CRT in Education: (a) CRT foregrounds race and racism and

challenges separate discourses on race, gender and class (intersectionality); (b) CRT

challenges traditional paradigms and theories; exposes deficit notions about students of

color and educational practices that are assumed to be neutral and objective; (c) CRT

research, curriculum and practices focus on experiences of students of color and view

these experiences as sources of strength; (d) CRT offers transformative solutions by linking theory to practice, scholarship with teaching, and academy with community; and (e) CRT in education challenges ahistoricism and acontextualism and insists on expanding analysis of race and racism in education using contextual, historical, and interdisciplinary perspectives to inform praxis. These five tenets focus my framework with particular emphasis on how race and racism affects science education and science trajectories for African American women.

Connecting CRT and BFT

By using CRT as a lens, I attend to and look for evidence of not only blatant forms of racism, but microaggressions that affect the path of my participants into science. Microaggressions are the verbal, nonverbal, and environmental slights, snubs, or insults whether intentional or unintentional that communicate hostile, derogatory, or negative message to target persons solely based upon their marginalized group membership (Sue, 2010). I used my lens to identify evidence of interest convergence, where access to science may only be allowed when it benefits white society. Most specifically, CRT requires that I use a methodology that captures the counternarratives that disrupt the dominant narrative of experiences in science. By using narrative analysis, I captured their experiences and privileged their voice and the meaning they give to their experiences. Figure 1 visually depicts the connection that I made between Black feminist thought and Critical Race Theory as the lens to ground this study.

Black Feminist Thought

Critical Race Theory

Heterogeneous collective

Collective knowledge

Black women intellectuals

Justice for all; everywhere

Self-definition

Intersectionality

Racism is endemic

Race as social construct

Differential racialization

Interest convergence

Counter narrative
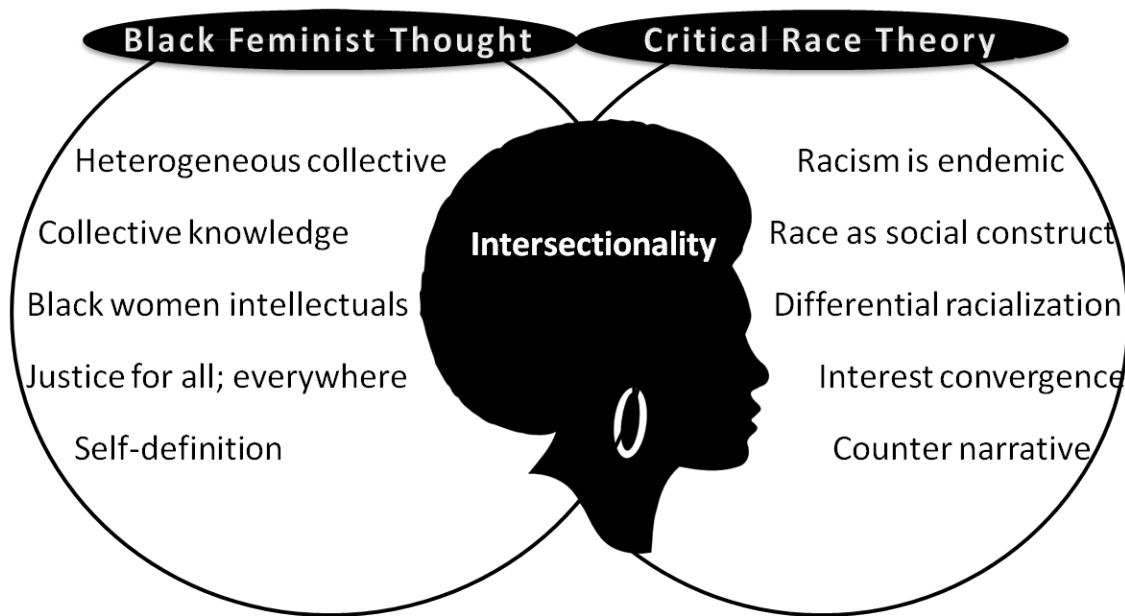
Figure 1. Theoretical Positions Diagram—Intersection of Black Feminist Thought and Critical Race Theory.

CHAPTER III

METHODOLOGY

> People shape their daily lives by stories of who they are and others are and as they interpret their past in terms of these stories. Story . . . is a portal through which a person enters the world and by which their experience of the world is interpreted and made personally meaningful. (Clandinin, 2013, p. 13)

Collecting the stories told by African American female scientists about their experiences is an ideal method to deeply and intimately understand how these women successfully persevered in a professional society that is traditionally both racist and sexist. By privileging their voices, I gathered authentic stories and the meanings they gave to their experiences. In this chapter, I discuss the difference between narrative and *narrative inquiry*, followed by an explanation of the narrative inquiry process and how validity is addressed within the methodology. I then describe the research procedure for this study including the data collection, analysis, and overview of participants.

Narrative

"The object of narrative is understanding . . . the outcome is interpretation" (Kramp, 2004, p. 1) Narrative both structures experience and gives it meaning. Narrative, the telling of stories, is how humans make experiences meaningful (Clandinin, 2006). Through stories, we preserve memories and share them with others linking our past, presents, and futures. Through stories, we preserve memories and share them with others linking our past, presents and futures (Barrett & Stauffer, 2009). According to Kerby

(1991), "narratives are a primary embodiment of our understanding of the world, of experience and ultimately of ourselves" (p. 3).

Narrative is both process and product. A narrative should demonstrate connectedness and coherence, but also movement and direction through time. "Narrative privileges the storyteller" (Kramp, 2004, p. 8). Through the storyteller, we come to know the life that was lived and experienced. Story and narrative are often used interchangeably. "A narrative is a particular genre with formal characters. A story is an example of a narrative" (Kramp, 2004, p. 3). In describing the difference between narrative and narrative inquiry, Connelly and Clandinin (1990) pointed out that

> Narrative names the structured quality of experience to be studied, and it names the pattern of inquiry for its study . . . Thus we say that people by nature lead storied lives and tell stories of those lives, whereas narrative researchers describe such lives, collect and tell stories of them, and write narratives of experience. (p. 2)

Narrative Inquiry

> Narrative inquiry is a way of understanding experience. It is collaboration between researcher and participants, over time, in a place or a series of places, and in social interaction with milieus. An inquirer enters this matrix in the midst and progresses in the same spirit, concluding the inquiry still in the midst of living and telling, reliving and retelling, the stories of the experiences that make up people's lives both individual and social. (Clandinin & Connelly, 2000, p. 20)

There is no story until it is told. The story comes to life as it is being told. Before that moment, it does not exist. The research provides a safe space for the participant to create and share their stories. The researcher then interprets the experiences and events of these actions and activities. Narrative inquiry goes beyond observation because the teller

is, in turn, allowing space for the researcher to come to an understanding of how they construct their stories and ultimately how they construct themselves. The power and potential of narrative inquiry is to reveal the individuals in all of their complexity and uniqueness. The object of narrative inquiry is the narrator, the storyteller (Clandinin & Connelly, 2000; Kramp, 2004). In sum:

> Narrative inquirers study the individual's experience in the world, and experience that is storied both in the living and telling and that can be studied by listening, observing, living alongside another, and writing and interpreting texts. Through narrative inquiry, we seek ways of enriching and transforming that experience for themselves and others. (Clandinin, 2013, p. 18)

Why narrative inquiry? Sandelowski (1991) answers this question by stating "Because lives are understood as and shaped by narratives, narrative approaches to inquiry parallel the ways individuals inquire about experience, and in a sense, naturalize . . . the research process" (p. 162).

In African American culture, narrative is integral to African American life and interwoven throughout the philosophical underpinnings of African American education. African American narratives pass on a philosophy of schooling that equates learning with power, which is tied to the identity of African Americans as free people, and "were central to identity formation of African Americans as intellectually capable people" (Perry, Steele, & Hillard, 2004, p. 12). Such narratives reflect slaves' and ex-slaves' desire for literacy and the barriers and struggles they had to endure to become literate. "Literacy was more than a symbol of freedom; it was *freedom* [italics in original]" (Perry et al., 2004, p. 13). Perry and her colleagues remind us of Frederick Douglass's view of

"African-American philosophy of schooling, of learning: freedom for literacy and literacy for freedom (Perry et al., 2004, p. 15). Thus, a grand narrative that surrounds African American children in their everyday life foregrounds the need for, and power of, literacy and education, along with hard work that would help them overcome obstacles and succeed.

Living, Telling, Retelling, Reliving

Clandinin (2013) identifies four key terms in narrative inquiry, (a) Living, and (b) telling: "People *live* out stories and *tell* stories of their living" (Clandinin, 2013, p. 34). Narrative inquirers come alongside participants and begin to engage in narrative inquiry by asking them to share their stories. (c) Retelling: "We call this process of coming alongside participants and then inquiring into the lived and told stories *retelling* stories." (d) Reliving, "Because we see that we are changed as we retell our lived and told stories, we begin to *relive* our stories" (Clandinin, 2013, p. 34). Within the inquiry process the researcher works within the "three dimensional narrative inquiry space" to "unpack" the lived and told stories. We meet our participants in the midst of their living and ask that they share their stories. I visualize it in this manner:

> I imagine a beautiful home with sophisticated architecture contrasted by a simple elegant aesthetic. I knocked on the large heavy door. My anxiety is quelled after a pleasant greeting and an invitation to step inside. After exchanging pleasantries I am told that I may freely explore the new world I have been invited into. As I walk around I am fascinated by all that has been collected over the years but what I find most intriguing are the books. Shelves from floor to ceiling filled with only books. Beautifully bound books neatly shelved and labeled with years and titles that hinted the reader as to the contents within. I notice one book in particular with a title that interests me. I open it and it contains a story from my host's life. Intrigued by all of the books and curious to learn more, I ask permission to

read further into the book I took off the shelf. I wonder if maybe, just maybe, the
author has the time to share a tale with me.

As a narrative inquirer, this is how I envision my connection with my participants. I have

entered their lives and mental spaces with the purpose of asking questions that require

them to retell a story that was simultaneously written and lived. My presence, in the

moment of retelling, and the retelling itself, creates the instance where the story is

relived. Yet, as they share their tale, a new story is written as the author and I co-compose

this story within the narrative inquiry space. This is another book that can be placed on

the shelf. The narrator is first author, and I am second. I have become a character in the

story of their lives.

Basic Assumptions in Narrative Inquiry

Schram (2006) presents several basic assumptions of narrative inquiry. First,

people frame the experiences that they have not in individual events, but as larger

structures that provide context and allow for meaning making. Another assumption is that

stories are "natural, obvious, and authentic" windows into how people structure their

experiences and construct meaning (Schram, 2006, p. 105). Other assumptions include

that narratives are essentially sequential as well as the fact that they can be real or

imaginary. Neither instance diminishes the power of stories. The last assumption is that

"narrative needs a 'voice'—that is, it requires a narrator's perspective" (Schram, 2006, p.

105).

In narrative inquiry, a relationship is required between the researcher and the

storyteller that alters from traditional research. The research gives authority to and

privileges the storyteller (Kramp, 2004). The narrative, as product, becomes the embodiment of the relationship between the researcher and the participant. The participant is actively involved in the research process. This helps to minimize the gap between the narrative told and the narrative reported (Elliott, 2005).

In this study, I used the strategies of narrative inquiry to privilege the experiences and voices of my participants. Specifically, I gathered the narratives of my participants with the purpose of interpreting their stories and framing them in a way to make the explicit the meanings they made of their experiences. I then looked across the stories of my participants to find either complementary and/or conflicting experiences that contributed to my understanding of the experiences of African American women in science. I also looked within the narrative to identify storylines of cooperation and tension. Storylines of cooperation aligned with who the women were and who they were becoming as scientists. The storylines of tension ran counter to and pushed against their developing scientist identities. I completed the inquiry within the frame of understanding my role as facilitator only. The women were actively involved in the research process.

Narrative Inquiry Commonplaces

> Commonplaces are places that need to be explored in undertaking narrative inquiry. Attending to experience through attending through all three commonplaces simultaneously, is, in part, what distinguishes narrative inquiry from other methodologies. (Clandinin, 2013, pp. 38–39)

The three commonplaces in narrative inquiry are temporality, sociality, and place. Thinking within these three commonplaces is necessary throughout each narrative inquiry. "Thinking in this way highlights the shifting, changing, personal, and social

phenomenon under study. Thinking narratively about a phenomenon challenges the dominant story of phenomenon as fixed and unchanging throughout an inquiry" (Clandinin, 2013, p. 38).

First, the temporality commonplace requires attending to the "past, present, and future of people, places, things, and events under study" (Clandinin, 2013, p. 39). Attending to temporality is giving keen consideration to not just the event, but the meaning made by the participant within the experience. Next, the sociality commonplace requires attending to personal and social conditions, simultaneously. Social conditions refer to the cultural, institutional, familial, linguistic, and larger social narratives that provided the context, the landscape of, each life. The sociality commonplace highlights each individual's experience within a particular context. This commonplace also directs attention to the relationship between researcher and participant. Once this relationship has formed, the narrative inquirer cannot subtract themselves from the inquiry relationship or from the narrative of the participant. Lastly, the *place* commonplace of narrative inquiry is defined as "the specific concrete, physical, and topological boundaries of place or sequence of places where the inquiry and events take place" (Clandinin, 2013, p. 41). This commonplace recognizes that "all stories take place some place . . . (and) . . . people, place, and stories are inextricably linked" (Clandinin, 2013, p. 41). As a narrative inquirer, I am not just standing watch to view and appreciate the landscape that is the life of each participant, but as I am very much a part of the scenery. Author Leslie Marmon Silko (1996) spoke of this when she wrote:

So long as the human consciousness remains within the hills, canyons, cliffs, and the plants, clouds, and sky, the term landscape, as it has entered the English language, is misleading. "A portion the eye can comprehend in a single view" does not correctly describe the relationship between the human being and his or her surroundings. This assumes the viewer is somehow outside or separate from the territory her or her surveys. Viewers are as much a part of the landscape as the boulders they stand on. (p. 27)

Narrative Inquiry Justifications

Clandinin (2013) suggested three ways that a narrative inquiry should be justified: personally, practically, and socially/theoretically. First, within the personal justification the researcher asks: Why does this narrative inquiry matter to me? (Clandinin, 2013). The narrative inquiry is justified within the context of my own life experiences and tensions. There are three reasons why personal justification is important. First, we must inquire and understand who we are and who we are becoming within the inquiry. This realization must occur before moving forward. Only then can narrative inquirers enter into the research relationship with a clear sense of ". . . what stories we are living and telling in the research relationship" (Clandinin, 2013, p. 36). And, a clear understanding of our personal justifications allows us to be fully ". . . awake to the ways we attend to the experiences of research participants" (Clandinin, 2013, p. 36). I share my own story and experiences below in the section titled *Narrative Beginnings.*

Within this study, I am narrative inquirer and researcher, but also possess identities as a science educator and teacher educator. This narrative inquiry matters to me because I educate African American women who aspire to be scientists. By understanding the experiences of successful African American women in science, I can

better prepare the next generation. This study also matters to me because as a teacher educator, I train teacher candidates who have the potential to inspire their students and nurture their scientific curiosity.

Second, within the practical justification, the researcher asks: What difference will this research make to practice? "To justify a particular narrative inquiry, a researcher needs to attend to the importance of considering the possibility of shifting, or changing, practice" (Clandinin, 2013, p. 36). The practical justification for my study is grounded in the tenets of Black Feminist Thought (BFT) and Critical Race Theory (CRT). CRT posits that racism is deeply rooted in all aspects of American society; therefore, science is not immune to its pervasive nature. Together, BFT and CRT also bring attention to ways in which multiple forms of oppression manifest themselves. Therefore, this study is grounded in the need to understand more deeply the experiences of African American women in science as they navigate a sexist and racist system. The justification for this study is to make visible how African American female scientists crafted narratives of success. My practical justification is to understand the experiences of African American women in science who have persevered. Indeed, as we understand more deeply these experiences, perhaps those within science might attend differently to women of color who are bidding for a space within the discipline.

Third, within the social and theoretical justification, the researcher asks: What difference might this research make to theoretical understandings or making situations more socially just? Understanding the counternarratives of those less often seen and heard has the potential to combat racism and injustice within science. Another,

justification for this study is to transform the way African American women are recruited and retained in science.

Design Considerations

While planning and conducting a narrative inquiry Clandinin (2013) advised that we use several design considerations throughout the process as a guide to living out and engaging in narrative inquiry.

Entering in the midst. Narrative inquirers enter into the research relationship in the midst of lives being lived. "When our lives come together in an inquiry relationship, we are in the midst" (Clandinin, 2013, p. 43). We enter in the midst of the ongoing personal and professional narratives of our participants; in the midst of institutional narratives; and, in the midst of our own narratives of research. Our lives and the lives of research participants are shaped by our attending to the past, present, and future unfolding narratives of cultures, families, institutions, and language. Understanding this concept has implications on how we gain entry, live alongside, and tell stories of their lives. "In narrative inquiry, the story itself stands, shifting the focus of the inquiry to understand the many stories it stands on, beside or among, to render an account of life as it is lived" (Downey & Clandinin, 2010, p. 387).

From field to field texts. "In narrative inquiry, we negotiate with participants an ongoing relational inquiry space, a relational space we call the field" (Clandinin, 2013, p. 45). As we design a narrative inquiry, we must first begin to imagine our field of inquiry and how the inquiry will "play out." Narrative inquiry begins with two starting points; either listening to individuals tell their stories or living alongside participants as they live

and tell their stories. The former, listening to stories, can take the form of either conversations or interviews. The latter, living alongside, requires creating a space to come alongside and go where the participants chooses to take us. This could perhaps mean meeting friends, family, and colleagues and seeing the landscape within which their lives are lived. From either entry points, we begin to create field texts (Clandinin, 2013). Field texts are co-composed with the participant as the stories are told and lives are lived. There is also ongoing interpretation of the stories that are being attended to and the meanings that are made within them (Clandinin, 2013).

In narrative inquiry, the researcher collects the individual stories from the storyteller. This can be done through casual conversation or within a formal interview. The interview questions should prompt the participant to tell whatever it is that they wish to say. It is the researcher that decides how and what question will be asked, but they must be asked in such a way that the interviewee is in control of the response and the story that follows. The prompt "Tell me about a time when . . . " sets up a single focus and yet allows for the participant to have freedom of choice in the story they will tell (Elliott, 2005; Kramp, 2004). The researcher must pay careful attention to the language used by the participant. Language is important in the narration. Attention should be given to the whole story before beginning to pull out certain particulars. The commitment in narrative research is "describing the phenomenon you are researching rather than explaining it" (Kramp, 2004, p. 13). Within narrative inquiry, literary elements such as time, plot, place, and scene are typically identifiable. Field texts are the stories collected by the researcher. Interviews are not the only means by which data can be collected.

Journals, autobiographical literature, letters, family stories, and photographs may also be used to gather information about an experience (Clandinin, 2006).

       From field text to interim research text. Field texts are then used to create interim texts. Interim texts requires taking everything that has been collected (documents, interview transcripts, field notes, etc.) and seeking to create coherence among chaos. Downey and Clandinin (2010) use the metaphor of a shattered mirror. "In narrative inquiry, we do not intend to reassemble the bits but rather to enter the strewn bits of a person's life in the midst and in relational ways, attending to what is possible in understanding the temporal, social, and place dimensions within an ongoing life" (Downey & Clandinin, 2010, p. 391). Within the interim text, we are taking each bit or "shard of glass" and placing it in a manner that will allow us retell the story in a narratively coherent way. The interim text is where the work is done. It is where we work and re-work the materials that we have collected to create the final research text (Clandinin, 2013).

       From interim research text to research text. "Moving from field texts to interim and final texts is a complicated and iterative process, full of twists and turns" (Clandinin, 2013, p. 49). The participants continue to be a part of the process and all texts are co-composed and negotiated with participants. The research text is the final text where the stories and their meanings are shared. Within the process of creating final texts, Clandinin (2013) suggests avoiding smooth or cover stories. "Our hope is to create research texts that allow audiences to engage in resonant remembering as they lay their

experiences alongside the inquiry experiences, to wonder alongside the participants and researchers who were part of the inquiry" (Clandinin, 2013, p. 51).

The importance of the relational throughout the inquiry. Entering into narrative inquiry requires a negotiation of relationship and the negotiations are ongoing processes. Neither the researcher nor the participant walks away unchanged. We enter in the midst and leave in the midst, but we continue to relive and retell the stories long after the inquiry has ended. "Listening deeply and inquiring into our changed lived and told stories calls forth the possibility of attending differently, of shifting practices, and of creating possible social-political or theoretical places where our work and our lives can make a difference" (Clandinin, 2013, p. 52).

Positioning of narrative inquiry. Narrative inquiry is not the type of qualitative research that looks for themes or uses the participants' stories to create or confirm existing taxonomies or conceptual systems. Narrative inquiry attends to the lives of our participants over time and in relation with our own lives and experiences. Therefore, within narrative inquiry

> . . . the focus remains on lives as lived and told throughout the inquiry. The knowledge developed from narrative inquiries is textured by particularity and incompleteness—knowledge that leads less to generalizations and certainties and more toward wondering about and imagining alternative possibilities. (Clandinin, 2013, p. 52)

Every narrative inquiry should begin with the research understanding her/his own positionality within the research. Next, I share my research position called "Narrative Beginnings."

Narrative Beginnings (Researcher Position)

I was born in Chicago, where my father was born and raised. My parents met in Atlanta when my mother was attending Spelman and my father was across the street. He was a Morehouse Man. They married in Chicago, and the first four of us were born there. Later, we moved to Rockford, IL where my baby brother and sister were born. In Rockford, I was the only black child in class in both kindergarten and first grade. Because of my mother's own educational background and teacher training, she taught us how to read long before we began school and we were all accepted into gifted education programs. I attended a gifted magnet school when we moved from Rockford to Indiana. I was the only Black girl in my class. I remember distinctly that in my class there was one Black boy with a twin in another classroom and a boy of mixed race whose father was Black and mother was White. After moving to Atlanta, I was for the first time living in the South where my classrooms were filled with students like me. But even though they were Black, I again stood out because no one spoke like me. Not only did I talk like a White girl, I talked like a White girl from Indiana. I did not have the distinct Southern drawl so I was constantly asked, "Why do you talk like that?"

On summer mornings before it got too hot from the Atlanta heat and humidity, we tended the garden that my father insisted on planting just about every year. Despite being born and raised in Chicago, my father was a country boy at heart. In the afternoons, my brothers, baby sister, and I watched science documentaries whenever we had the chance. We were all fascinated by learning new things about the world. Additionally, we all excelled in our studies at school. We didn't have a choice actually. C's were unacceptable

in the James household. In his sermons and at the dinner table, my father would tell us that C's meant *average* and "Where is the *average* Black man?," he would inquire. We knew his answer. The *average* Black man was in jail or on his way to jail. Therefore, average was unacceptable. My mother was a former English teacher who stopped working to raise six children, and my father was a traveling Baptist preacher and full-time scholar. He read two, three, or even four books at a time. He would come home with books that he would pick up from Black bookstores that he discovered during his travels across the country and sometimes abroad. There was a love of books and learning that filled our home like the aroma of a freshly baked sweet potato pie.

In addition to a love of books and learning, my heritage was on the curriculum in my childhood home. My father had been a foot soldier in the civil rights movement and protégée of Dr. Martin Luther King, Jr. and Rev. Jesse Jackson. Throughout my life, I learned about the struggle of my people and the history of Africans in America. Not just African Americans, but we are an *African* people is how my father explained it. Learning my history went hand in hand with learning how to read. In second grade at the gifted school in Ft. Wayne, Indiana, I was asked by one of my White classmates why my skin was so light. I did not look like other Black people to her. I told her, in a very "matter of fact" manner, that my great-great grandmother probably had been raped by her White slave master so I have some White blood in my family and that's why I am so light. I may be the only little Black girl with light complexion brought up on the saying, "The blacker the berry; the sweeter the juice." My father's mission as a preacher included not only saving souls from sin and bringing them to Christ, but also uplifting our people and

removing the shackles of oppression and ignorance. He would always cleverly weave African American history into his sermons.

In the winter of 1993, as a junior in high school, I needed to complete a social science fair project. I went to my father with the problem of not knowing where to begin searching for a topic to study. He handed me a book titled *"Keeping Track: How Schools Structure Inequality"* by Jeannie Oakes (1985). I read the book from cover to cover in a matter of days and was enthralled by the author's findings. I consulted other resources on the topic and developed an award winning project. I won first place at my high school and second place at the Atlanta Public Schools (APS) district fair. The award from both the school fair (1st) and APS district fair (3rd) are framed and still hanging in the hallway of my childhood home in Atlanta. It was not until the fall 2008, as I sat in my first doctoral class at the University of North Carolina at Greensboro that I heard mention of the author and the aforementioned book as a seminal work in the history of American education. As I sat in class that evening, I thought back to my initial emotion of anger and discontent I experienced when I first read the book. In a flash, I realized that somehow, in 1993, my path in the field of education had been laid out before me those many years ago. When I first read the book, I remembered wondering if I could ever make a difference in education so that children who are negatively affected by corruption and inequity would somehow be freed from the shackles of an unjust system. As I sat in class that night, I realized although my impact may never be large, every student I teach and every teacher for whom I provide professional development and guidance is potentially my contribution to breaking the cycle of inequity in education. I am a teacher

educator, but I am more specifically a science teacher educator. I have always connected with science.

Just before graduating from high school, I remember standing on stage at my high school senior awards night for the Center for Engineering and Applied Technology (CFEAT) Magnet Program and declaring that I was going to Bennett College as a MARC (Minority Access to Research Careers) scholar and majoring in biology because "I want to find a cure for cancer." It sounded good at the time. Really, really good, in fact. It sounded massive, important, and impressive. Honestly, at the time, I had never conducted any research outside of the biology classroom. I had never been in a real laboratory, but I had and still have a love for biology. I chose to major in biology.

I began Bennett College in the Fall of 1994 as a MARC scholar. Bennett became my first choice because of the scholarship I was offered. I had planned to follow my older brother to Florida A&M University (FAMU). But instead of heading south to Florida, I headed north to Greensboro and began my post-secondary academic career. My younger siblings all followed my older brother to FAMU. My parents insisted on HBCUs for our undergraduate education. I had applied to other schools, but attending an HBCU was expected. I stayed with biology throughout undergrad. While others left for various reasons, I stuck with it even after transferring from Bennett College to North Carolina A&T State University. I never considered majoring in anything else. I enjoyed and was fascinated by what I was learning. My only other consideration was majoring in biology education instead of professional biology. I can still remember that critical moment as I sat in Dr. Perry Mack's office and attempted to determine which of the two options

would make the most practical sense. My role as simply student had dramatically shifted in three years since leaving high school. I had become a wife and mother both in the same year. Curing cancer was not at the top of my 'To Do" list anymore. I had to be practical about employment after graduation. I didn't have time to consider other options at the time. So I chose, professional biology. I figured that it would make me more marketable than professional biology.

After teaching seventh grade for two years, I returned to A&T for graduate school. I decided to earn my master's degree in biology. I still had not had any significant time in the lab. Slowly, as the time approached to pick a lab and a research project, I began to have anxiety about what was to come. I did not like being in the lab and doing lab work. I knew it was not for me. So I again sat in Dr. Mack's office, but this time I came with the decision already made. I was changing course and getting a master's in biology education. From my first education course, I immediately fell in love with education as a discipline. I enjoyed my classes, professors, and fellow educators. The classes were a refreshing change from biology classes where lectures and tests were the order of the day, every day. In my education courses, we read articles, discussed topics, and wrote papers about teaching, learning, and educational theory. I enjoyed it thoroughly. My path in science as a profession stopped there. I entered the realm of science educator. I began to imagine a job where I would be able to teach both biology and education. Suddenly, the department was left in a bind at the beginning of an accreditation year when the current coordinator informed that she would not be back the following year. They needed someone quickly to come on board and fill the role. I was

offered the position because of my background in education. The universe answered and I was offered a position as Biology Teacher Education Coordinator a few years after receiving my Master's in Biology Education. I began teaching both education I biology course just as I had imagined.

Because I work in the biology department, my connection to science has never ceased. I am surrounded by scientists and I can speak the language and understand the culture because on some level, I am one of them. My best friend earned her PhD in cancer biology so I lived vicariously through her experiences of difficult coursework, lab rotations, and the hectic life a doctoral researcher. I lived through and learned from her experiences, and thanked God that He had intervened on my behalf and set me on the correct path. I have the ultimate respect for anyone remains on course and earns a terminal degree in science. The path is not easy. I remember my best friend not being very pleased with her research advisor or her institution. When it came time for graduation, there was little assistance provided to her regarding the next step. No one seemed to care what happened to her beyond graduation. She was left to figure it out on her own. So, she decided to leave research.

For the last few years, I have mainly taught and advised students majoring in biology and biology education. I feel especially connected to my students in biology education. I have a passion for not only teaching biology and education, but also mentoring and supporting students. They often come in academically underprepared and unsure of themselves and their abilities. My job is to encourage and help them find their purpose and passion in life. I take that part of my job very seriously and I handle my

students with care and compassion. They are at very delicate, critical stages in their lives.

Their interactions with me should be encouraging and inspiring. I know the power that

my words and actions have. I do not take it lightly. I am mentoring future teachers,

doctors, dentists, scientists, and researchers. They must leave me prepared to follow their

passions and possibly change the world.

Validity

Validity "refers to the ability of research to reflect an external reliability or to

measure the concept of interest" (Elliott, 2005, p. 22). Internal validity is the ability to

produce results that are not simply an artifact of the research design, and external validity

is a measure of how far the findings relating to a particular sample can be generalized

(Elliott, 2005). Some qualitative researchers take the position that these criteria are not

appropriate for evaluating narrative research, but there are ways to address both internal

and external validity for research within narrative inquiry. In narrative inquiry, one can

attend to stability, trustworthiness, and the scope of the findings to increase the validity.

In this section, I discuss how internal validity and external validity are addressed in

narrative inquiry.

With internal validity, within narrative inquiry, it is not important to seek out the

truth from an external perspective of the experience. A participant's account of the event

and the impact it had on their life is accepted as his or her truth and meaning. This is

appropriate for narrative inquiry. Validity is enhanced because the aim is not to just . . .

"reflect experience, rather they give meaning to it" (Elliott, 2005, p. 24). I wanted to

understand the experience that shaped the meaning my participants made about the world

they encountered. I was not looking to simply report facts, but rather I have provided the participant's with a space to narrate their lives around the experience that were most salient to them. It is within the presentation of the narratives provided by my participants that validity is judged. Polkinghorne (2007) reminds us that "Readers are asked to make judgments on whether or not the evidence and argument convinces them at the level of plausibility, credibleness, and trustworthiness of the claims" (p. 477). Additionally, "Readers should be able to follow the presented evidence and argument enough to make their own judgment as to the relative validity of the claim" (Polkinghorne, 2007, p. 476).

Another important aspect of validity in narrative inquiry is guaranteeing that the interview provides the space for storytelling that is almost as natural as regular conversation. The distinct difference from regular conversation is that the interview provides the opportunity for an individual to provide an extended account of their life experience without interruption, judgment, critique or criticism that often occurs in regular conversation. The interview provides a safe and confidential environment. Participants may not feel free to be open and honest when sharing in other settings. With this format, there is opportunity for robust self-presentation. Therefore, narrations of life provided within in-depth interviews offer accounts that lead to greater confidence in their validity.

To ensure validity in this study, I was deliberate about recruiting participants with whom I already had relationships. It is within the established relationship as well as in the inquiry that a space is created for sharing that is free of judgment and fear. Also below, I present my data procedures, collection, and analysis in a way that is transparent and clear

to the reader with the goal of establishing trust. Additionally, I present the narratives in a manner that clearly illustrates the narrative threads across participant's stories.

When addressing external validity in narrative inquiry, we must remember that there is a trade-off in narrative between depth and breadth. Because depth is prioritized over breadth, there is not a focus on generalizability. Part of the trade-off in qualitative research is "creating a deeper and richer picture" (Elliott, 2005, p. 26). Qualitative research adopts what one might call a 'common-sense' view of generalizability (Elliott, 2005). The readers draw their own conclusions as to how far the evidence can be transferred. When interviewing small homogenous groups of individuals that are most likely from similar geographical locations, it is unrealistic to have data that is generalizable across the population. In one narrative study described by Elliott (2005), the researcher improved the external validity of her study by interviewing participants that lived in both rural and urban British Columbia. Because she chose to recruit participants from both geographical locations, the results are more widely generalizable than if she had only interviewed persons residing in an urban setting. Within this study, although I only interviewed African American female scientists, I purposely recruited women whose educational and academic careers span over 30 decades.

Participants

I recruited five African American women for this study by purposeful selection (Maxwell, 2005). I chose to recruit women that I defined as "successful" in science. For the purpose of this study, the term "success" has been operationalized to mean one has obtained a PhD in an area of science or is currently enrolled in a program that leads to the

acquisition of a PhD. Therefore, there are three criteria for participants: African American, female, and academic status. Because I conducted a narrative injury, I recruited women with whom I already had an established relationship. Additionally, I chose to interview women across the spectrum of academic status. By doing so, I diversified my sample with the intention of encountering variety in their experiences that spans across several decades. The experiences of the women allowed me to view the culture of science as I am interested in whether or not the environment has changed as the years have passed.

Table 1 provides an overview of the participants. All of names are pseudonyms either entirely selected by the participant or co-composed with me.

Table 1

Overview of Participants

Participant	Age	Level	Undergraduate Institution	Doctoral Institution	Institution of Employment
Grace S. Williams	57	Full Professor	Frederick Douglass University (1978)	McNair College of Medicine (1986)	Frederick Douglass University (2003-Present)
Cynthia Niema Anderson	41	Associate Professor	Ida B. Wells University (1996)	George Washington Carver University (2002)	Frederick Douglass University (2006-Present)
Skylar Dawson-Bennett	38	Assistant Professor	Maya Angelou University (1997)	Whittaker University (2007)	Harriet Tubman University (2010-Present)

Table 1

(Cont.)

Participant	Age	Level	Undergraduate Institution	Doctoral Institution	Institution of Employment
Samantha Johnson	30	Postdoctoral Fellow	Harriet Tubman University (2006)	South East University (2012)	University of Freeman (2015-Present)
Dahlia Rhodes	25	Doctoral Candidate	Frederick Douglass University (2011)	North State University (Pending)	N/A

African American vs. Black

I chose to study African American women because of their unique position in American history as the descendants of a slave society. This position is unique to other women of African descent because of the context of oppressive structures within American society. Because of our history and place in American society, African Americans have struggled to combat oppression and system racism since emancipation. For other persons of color, there is not the same history. For example, I paid attention to the news broadcast as I was getting my hair braided by three Senegalese women earlier this year. All of the newscasters had dark complexions and donned African garb. I thought of the difference between my children being raised in an environment where their skin color, hair texture, culture, and clothing are considered unacceptable, and African children being raised in an environment where who they are, the color of their skin, and what they wear is considered normal and beautiful. It became noticeably and visibly clear to me the unique position we are in as African Americans in American society.

Data Collection

In narrative inquiry, in-depth interviews are most often the tool used to elicit stories. (Clandinin, 2013; Clandinin & Connelly, 2000; Elliott, 2005). The interview is not just a means for collection of data, but it is also the place where meaning is made of the data. The researcher must permit the participants to share stories of their lives and redirect the power differential by allowing for the participants to control what they share.

The interview process consisted of two semi-structured interviews. The first focused on the path that led the women into science. The second set of interview questions focused on their current and perceivable futures in the science. I interviewed each woman at least twice, with interviews ranging 32–68 minutes, and each interview was audio recorded. Because Elliott (2005) recommends the researcher carefully listen to the recordings and analyzing the material covered between the first and second interview, I listened to the first interview before conducting the second one. By doing so, I identified areas that needed further clarification or elaboration and added these questions to the interview protocol. The second interview began with these questions. Both interview protocols are provided in Appendix A.

Data Analysis

After all of the interviews were completed, over eight hours of audio was professionally transcribed resulting in 191 pages of interview transcripts (field texts). Field texts are the stories collected by the researcher (Clandinin, 2013). To assure that the transcripts were accurate, I listened to the audios and while simultaneously editing errors and adding emphasis. Next, I inspected each transcript to assign a generic title to each

story told as I identified the narrative threads. I began with Grace's stories and created titles such as "Stories about Teachers and School," "Stories about Research," and "Stories about Mentoring and Support." After completing all of her stories, I captured all of the titles in one table. Within the table, I added notes and quotes from Grace's story. I then used the table as I titled all of the other transcripts, adding notes and quotes from their stories as well. When needed, I added additional titles or edited the existing titles. During this process, there were several instances where I needed clarity of the women's meanings of certain words, phrases, and experiences. When necessary, I emailed them with follow-up questions. After all of the transcripts had been titled and the "Stories About" table was finalized (interim text), I requested each woman's curriculum vitae and carefully analyzed each document as a means to further understand their experiences and the place and time of their stories. As a reminder, the interim text is where the work is done. It is where I worked and re-worked the materials that I collected to create the final research text (Clandinin, 2013).

Next, I looked back through the "Stories About" table to determine stories told across all the participants—i.e., the most salient narrative threads. I selected three main areas that were strongly supported by the women and began to pull together the narratives that told the stories. The first section centered around women's narratives about connecting to science inside and outside the classroom and as undergraduates. In section two, I gathered the women's stories about the experiences of entering doctoral programs and later in careers as scientists. In the third section, I pulled together stories within which they shared their common commitment to helping other succeed. At this level of

interim text, I pulled the stories all to one of three documents. To keep track of each woman's stories, I color-coded their entire transcript before pulling the stories into one of the three documents. In the final step, as I created the research text, I looked across all of the collected stories to determine the order of presentation. I wanted to allow my participants to tell their own stories, so I did not alter or interrupt the stories when possible. I wove in commentary to create flow and clarity as I moved within and between their narratives. As I completed the sections, I emailed each woman her story and allowed her the space to edit them freely.

The three main areas became chapters as I began to develop a feel for how to best present their narratives. In the following three chapters, I present the narratives of the women who graciously shared their stories. Chapter IV, *Scientific Beginnings*, presents stories about how the women came to first become connected to science through curiosity, science teachers, and research experiences. Chapter V, *An Unexpected Journey*, follows as women shares experiences in doctoral program and careers in academia. I chose to present each woman's story in its totality by weaving together their narratives with very little interruption from me to allow the full measure of their experience to be absorbed. Chapter VI, *Lift as We Climb*, shares stories that demonstrate the women's commitment to supporting and helping others as they travel along life's journey. The chapter ends with and epistolary composition titled *"Dear Little Black Girl"* which presents letters of advice and wisdom from each woman to the next generation of African American female scientists.

CHAPTER IV

SCIENTIFIC BEGINNINGS

For every good tale, there is a captivating beginning that grabs the reader and pulls them in. For the women in my study, there were captivating scientific beginnings which sparked their curiosity about the natural world around them and gradually pulled them in. In this chapter, I begin with stories about curiosity where the women shared their earliest memories of first being connected to science. I then move into the classrooms of science teachers, as the women shared stories of being more deeply connected to science because of the experiences they had in school and classroom setting. Next, I present stories about the women's exposure to research and the support and mentoring obtained at the Historically Black Colleges and Universities (HBCUs) they attended in college. At the end of each section, I discuss the storylines of cooperation and tension revealed by the collection of narratives.

Stories about Curiosity

"Being Nosy"

> Neima: When I talk to my mom we always joke around because we say other people say its curiosity. We know it's just being nosy. That's the bottom line.

When I ventured back to the earliest moments in life when they first felt connected to science, all of the women described themselves as curious little girls who

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wanted to know more; wanted to know why; and, asked 'what if' questions. I went along with them as they played outdoors on summer days and nights, mixed chemicals in the sink, and began asking questions and searching for answers. For Niema, Samantha, and Grace, their relationships with science began with feeling connected to the natural world. As they shared their narratives, they took me with them as they explored outside, on the farm, and in the yard with siblings. While listening to these stories, I remembered my own endless summer days in the hot, humid Georgia sun where my brothers, baby sister, and I played incessantly exploring the woods and creek next to our home and where my own love of science began. When I asked Niema to tell me about when she first felt connected to science, she took me outside with her sister, father, and mother:

Cailisha: Tell me about when you first . . . if you can remember . . . .when you first became interested in science.

Niema: I remember I was . . . I don't remember the exact time but when I was growing up my mom was a science teacher and my dad was very "outdoorsy." [They were] always outside, and so that meant that we were always outside. And I remember growing up, we would go outside a lot and my mom would talk to us about the sky and the clouds. And I thought she was the smartest person in the world because she knew what cumulus clouds were. I was like "Oh, my gosh! She knows everything." And then my dad would have us playing with bugs and you know he would talk to us about how they fly and so he was, they were really teaching us about the world of science without really trying that's when I really became interested. Just being with them and listening to how they talked about the science or the natural world. That's very interesting.

Cailisha: Do you remember any times in particular being with, doing something with your mother or father that stands out to you?

Niema: So there are a couple of things. The earliest memory I have is my dad and my sister, we were all outside. It was during the summer because I remember it was really warm, and I had on shorts and we were rolling

around in the grass. And um it started getting dark and I remember my dad said "Well, I'm gonna show you all this game we used to play when we were little." And he said, "We need to find a click beetle." And I had no idea what a click beetle was until he caught this big, black bug and when the wings would come together they clicked and he got some of my mom's sewing string and tied the string around the beetle's leg and had the beetle flying around like a helicopter. And he was . . . and he was like "Ok, you have look real close so you can see how the wings work and how the legs move." And I was just in awe. It was awesome. And then, I remember . . . for some reason all my memories of the summer . . . another night we were outside and there were a lot of lightening bugs in our community and my mom and dad asked us if we wanted to make a nightlight for our room. And so they . . . we went in the kitchen, and got some mason jars. And my dad took a knife and punched holes in the top of it. And my mom put . . . I'm not sure why . . . but she put some grass and some sticks and stuff in the bottom of it. And they said, "Ok, we are going to go out and catch lightening bugs." And so I know for an hour we were outside chasing lightening bugs, and I don't know why, but now I'm scared to death of them now. But then we played with them all the time. And I know it sounds so nasty, but we would make jewelry out of them. [Laughter] And I think when I actually made the connection between lightening bugs and the science was when I was in graduate school because we were using an enzyme called luciferase and it's the same enzyme that the lightening bugs make that makes their tails light up. And so, of course, when that clicked I was like, "Oh my gosh, they knew what they were talking about." [Laughter]

Cailisha: Any other interesting stories?

Niema: I remember when I was in Jr high. So about this time I had started figuring out that I really liked science and so since my mom was a science teacher she would come home and practice all of her experiments with my sister and me before she did them at school. And I remember one time she brought home this humongous telescope and I was very, very interested in astronomy. And I . . . originally I wanted to be an astrophysicist, that's really what my dream was because I wanted to work for NASA. And so she brought home this telescope that had this beautiful big round barrel. And it was orange. I had never seen an orange telescope before. And that night . . . .it was really late. I remember she woke me up, we went out and I just got a chance to look at the moon up close and we could even so Jupiter using that one because . . . it was such a large telescope. And we could see the little red eye on Jupiter. And I just thought it was the best thing in the world.

> And I was like I could do this the rest of my life. Like . . . it was so much fun.

> Cailisha: Do you know where your mother's interest in science started? Or where that came from?

> Niema: I don't because I always asked her and she said no one else in her family really liked science, but my mom has always been a book worm. And she said for some reason when she would read about it she would just get very, very excited. And then when she went to college there was . . . she was a biology major and she just fell in love with it.

Niema's mother was her first official and 'unofficial' science teacher. This unique relationship served as the fuel to ignite her spark ablaze. Her parents' knowledge of such things as click beetles and clouds, and her mother's profession allowed Niema access to telescopes and science experiments at home. Most little girls are not as lucky as she was. Niema's description of her early experiences highlights the various ways in which she was exposed to science at home. Niema's narrative introduces the storyline of connected to nature. Grace, too, recalled that her connection to nature was an early catalyst in her interest in science. When asked her start in science, she stated:

> Grace: It was probably when I was growing up. I grew up on a farm. There was a curiosity about nature and animals and the biology of things, you know, life in general . . . And I was in Girl Scouts too and so we dealt with the outside world all the time. Bugs and stuff. I was a nature person, probably because I grew up in the country and I was around it so much and it was just fascinating to me.

Grace and Niema strongly connected to nature. They spoke first of their bond with nature. On the other hand, Dahlia, Skylar, and Samantha, all spoke about their curiosity being sparked when they played around with mixing chemicals. They asked

"what if questions" that drove them to experiment to see what would and could happen.

Dahlia remembered being curious about chemicals: "I had probably been interested in science for a long time, but I just didn't know it. When I was a kid, I would mix up all types of chemicals in the bathroom sink to see if they would explode and all that stuff." Samantha also described her curiosity as mixing chemicals, but she also remembered being connected to nature:

> Samantha: As a child, I just liked trying . . . I don't know how to [explain it]. I was just very curious. I remember making mud pies. Something that simple. I found out that you could mix the soap . . . I'd mixed soap and water and put that in the dirt and it made it so much smoother, so my mud pies looked better than other people's. So I just was curious as like, "Why? What is it about soap and water?" I did little stuff like that around the house and we used to love to play outside, me and my brother and my cousins. We all really close. Like catching fireflies . . . I'm just very curious, so I want to look at the firefly. Why is it lightning up? This is kind of . . . We called it lightning bugs, but what is it about a lightning bug that makes it light up? I just remember being curious about nature because we used to play outside a lot, but that's probably . . . I just always have been inquisitive about stuff around me.
>
> I like to ask questions, which my mom does tell me, when I was little, I asked a lot of questions, just about anything. My parents divorced when we were very young. And of course, as a child, you don't know and she used to tell me, "You really just kept asking and asking and asking." She'd be like, "Just go ask you dad." I just know that I asked a lot of questions about everything when I was little.

Samantha's inquisitiveness led her to mix chemicals and ask tons of questions. As she took me back to her "mud pie moments," she smiled and recalled her pie making skills with pride and delight. I can imagine the multitude of questions she asked daily; to herself, her mother, and anyone who would listen. Samantha stated that, "she likes to ask

questions" and within her narrative, she fired off several without batting an eye. These

smaller, curious questions eventually led to bigger questions about scientific phenomena.

A significant moment for Samantha was when her Aunt became sick. Her curiosity

surrounding what happened caused her ask more serious scientific questions:

Samantha: In eighth grade, my mom's sister was diagnosed with lupus. She got really, really sick. Like was having seizures. It took them a year to diagnose her and I'm like, "Why does it take so long? She's so sick." In my mind, at that age, I'm like you just go to the doctor and they fix it. Why is it taking her so long? She's really sick, so why can't they figure it out?

I never heard of lupus, so I started doing a lot of reading. And it's mostly a disease in black women, so that made me want to . . . At that time, I took my experience . . . So that was two years later, I took biology. From there, I carried that with me, so by the time I'm graduated from high school, I wanted to go to medical school because I was like, "I want to cure diseases like lupus." So very naïve, but those two things. And I still credit my aunt for all the decisions in grad school that I made because I just really kinda took off with the whole . . . lupus and the idea that your body can turn against you in disease. Even at that age, I knew this was pretty cool to read about. But those two things I would say.

Cailisha: Did you start reading and researching lupus as soon as she was diagnosed?

Samantha: It wasn't like I was reading journals, but just looking in books. And I was interested in the medicines that she would take because people . . . I'm from a very small town, and so I was out of school a lot and that never happened, so my teacher's like, "What's going on?" They knew my family. They would be like, "How is your aunt?" I remember I was, "Oh, yeah. She had a CAT scan today, and they did this and this and that." I remember my teachers looking at me like, "How you know all this stuff?" Because I would just want to . . . I wasn't reading journals, but I was just trying to get as much information about what was happening to her. I wanted to know why she was having seizures. I remember to the day what happened. She just . . . It was so scary. She just passed out and it was very traumatic. I just wanted to know, so I was trying to find any and everything I

> could. Internet was out back then, and we had internet. It was very slow, like the dialup connection, but I would get on the dial-up and just look for stuff about lupus.

Samantha's aunt's traumatic turn in health was a significant moment for her. As she talked about it, I could immediately feel how concerned she was for her aunt and how that moment had impacted her. It became a part of her. "I carried it with me," she said and she began to ask bigger questions. Instead of asking, "What will happen if I add soap?"; she began to ask "Why does the body attack itself?"; and, "How can lupus be cured?" With her story, the storyline of the impact of illness emerged. Dahlia also connected with a disease through unfortunate circumstances that influenced her decision to pursue science:

> Cailisha: You talked about mixing stuff in the sink. Do you have any other early experiences with science? Even as you got older any projects or anything where you really felt connected to science, other than the class? Connections to science.

> Dahlia: Not really. I just knew that I wanted to be a researcher while I was in high school. Then I wanted to . . . I guess the only way to be a researcher of science was to do science. I don't think it was any . . . I always just watched scientific TV shows and all that kinda stuff, but it wasn't something that I was like, "I'm going to go out and collect rocks today." It wasn't that. It was just something, a school thing I guess.

> Cailisha: Okay. When you thought you wanted to be a researcher, what did you think that researchers did?

> Dahlia: I don't know. I wanted to be more of an outreach person, so somehow I was going to be this liaison between the scientists and the regular people, and try to help them connect with each other so that the understanding of HIV could be very clear. So that's what I wanted to do, but then somehow I got deep off into the science part. I guess I still could be some type of outreach person. That was my initial goal, because I didn't know what all it took to be a researcher. I really didn't

even think about getting a PhD until my sophomore year in college. It was just early, "I want to do this. This is what I want to do with my life" . . . but not knowing what it takes to be a researcher, quote unquote.

Later in the same conversation, my own curiosity caused me to question Dahlia further as to why she wanted to understand HIV as opposed to any other focus in science:

Cailisha: Why HIV?

Dahlia: My mom was actually diagnosed with HIV, and she went really fast. She progressed to full-blown AIDS real fast.

Cailisha: I'm sorry to hear that.

Dahlia: That's okay. She passed when I was two. I don't know if anybody knows this, but when you grow up in the hood and you have a parent that has passed of HIV that makes your teasing very, very, very much harsher. And it was weird, because my closest group of friends, both their parents had passed from HIV in a four-year time period. Their mom went and then their dad went. Then there was another little girl that, her mom had passed from HIV, and she would tell the other kids, my mom, she passed. They just teased her so bad. My group of friends that lost both their parents, their aunt that came in to take care of them, she wouldn't let them leave the balcony. We all had to play on the balcony with them, because she didn't want them to go downstairs, because it's just bad.

My grandma, who raised me, she never told me that my mother passed of HIV and AIDS, because A: everybody thought AIDS was cancer and they held on to that stigma, so she would just tell me it was cancer. And B: I guess she figured that if I told other little kids that my mom died of cancer, it would be easier on me to deal with other kids. It was just like, this sucks. There's nothing wrong with you if your parents pass away of HIV, but little kids, they don't know that, so . . . It was just like, this is what I . . . I want to know why this virus is so bad. That was my thought as a young child. Why is it . . . Because I didn't really realize it. My grandmother didn't tell me it wasn't cancer until I was 12. She was like, "Well it's still a kind of cancer. I'm like, "No. AIDS is AIDS and cancer is cancer."

I was like, "Okay. I have to figure out why this virus is so bad. What's the problem?" That's why I knew I wanted to be somehow involved with HIV from very early on. Then the older I got, the more classes I took. That's when I realized I wanted to be a researcher.

Cailisha: Okay. Did you start doing any research on your own after you found out that she had died of HIV?

Dahlia: I did, but not in elementary school or anything. This is back when we had dial-up. Ain't nobody had time to be researching with the dial-up.

[Shaking her head emphatically]

I'm going to the library. When I got into high school, that's when I started reading and learning about it. Then when I got to Douglass and I was going through labs and looking for summer internships, I was like, I need to read up on HIV research. Then I ended up working in an HIV lab at Hopkins for my final summer internship, and that's when I was . . . I really learned a lot about the virus. I was like, "Yeah. This doesn't sound so bad. People just don't understand it." That was one of the things I guess that, I was like, "Okay. I know what I want to do."

This was a difficult part of the interview for me and it really made me question the motivation behind the choices that scientists make when selecting a research focus. I wondered if such serious life circumstances had drawn others to science. I have a colleague who studied breast cancer. He talked about his mother's battle with breast cancer influencing his decision to study the disease. For Dahlia, there already was a natural curiosity even before learning from her grandmother that her mother had died of AIDS and not cancer. However, this knowledge, just as with Samantha and her aunt, created a deeper level of interest in Dahlia and a desire to understand more about the disease that had tragically affected her life in a very intimate and personal way. Samantha and Dahlia share the storyline of impacted by illness. It created disharmony for them in their childhood and it influences their decisions to pursue science.

Storylines of Curiosity and Connections

Within the narratives presented in this section, the women presented storylines connected to nature, mixing chemicals, being nosy, and asking questions. They narrated stories of these experiences as being their first connections to science. All of the women were curious, or nosy, as Niema and Ms. Anderson would describe it. Connecting to nature and being curious about the natural world went hand-in-hand with playing outside. Mixing chemicals strongly connects with a curiosity about the physical world and how different materials interact. For Dahlia and Samantha, the storyline of the impact of illness was significant. Not only did it foster their curiosity as a young girl, but it continued to be a part of their motivation to pursue science. Within these various out-of-school science experiences that initially connected them to science, a spark was lit. Their experiences at school with great science teachers would fan the budding flame.

Stories about Teachers and School

> [A]ll stories take place some place . . . (and) . . . people, place, and stories are inextricably linked. (Clandinin, 2013, p. 41)

After creating order to my field texts, I began to see that school was a central setting within the narratives of being connected to science. In the previous section, I showed how my participants' earliest memories of science took me to witness experiences outside of school. When asked "When did you first become interested in science?" Skylar, Samantha, and Dahlia immediately took me back with them into classrooms of teachers who connected them to science in very meaningful ways. For these three women, stories about curiosity outside of school came only after I prodded

them to go back further. Initially, Skylar, Samantha, and Dahlia spoke first of teachers and of science classrooms. I went with Skylar into Mr. Walker's eighth-grade science class where science was fun and relevant, and she shared about her science fair project where she began to consider studying psychology. Dahlia took me into Mr. Davis's honors chemistry course. A class that she says "kicked her butt, left and right." But after surviving that good "butt-kicking," she became filled with a desire to study chemistry; a desire stayed with her all the way through college. Samantha took me into Mr. Richardson's tenth-grade biology class where biology where she met Eli, but she also took me into Ms. Crabtree's AP biology class where a storyline of tension emerged when she compared the two classes and different instructional practices. On the other hand, when asked the same question about feeling connected to science, Niema and Grace spoke first of being connected to nature in their narratives of their beginning interest, but eventually they also spoke of teachers that impacted their growing love of science. I went with Niema into Mr. Howards' 2nd grade class, and Ms. James' and Ms. Marquette's, chemistry and physics classes, respectively. And with Grace, I ventured into Mr. Howard's high school physics class. The era in which she took this class was after the *Brown* decision; after school integration had become law of the land. As I looked closely at each of the narratives of scientific beginnings, I discovered storylines of influential science teachers who created learning environments where science was fun and interesting; where personal connections to science were forged.

In the following sections, I present each woman's narratives of teachers and school in their entirety without interruption. I feel the collective of narratives are best

presented in this manner to appreciate how each the women recalled first feeling

connected to science. Following their stories, I discuss the storylines exposed within their

narratives; storylines of cooperation and storylines of tension. I shall begin with Skylar's

account:

"Of Mice & Mazes"

Cailisha: When did you first become interested in science?

Skylar: I'll probably say eighth grade. I probably always had an interest. I've always built and put stuff together and built with my hands, experimenting with chemicals at home, and these other things that a lot of us little geeky people used to do. Eighth grade was when I actually experiment like the science fair that I really enjoyed. I didn't know that's what it was called at the time, it was like cognitive research for mice. And I built a little maze and had a boy and girl mice and had them run in the maze. To me, I thought that was just so awesome.

I really enjoyed it and I really had a good eighth-grade science teacher. I don't even know if that was his area, but Mr. Walker made it so fun that it really piqued my interest.

Cailisha: Do you remember what kinds of things he did that made you more interested in science?

Skylar: He would do real-life examples, how things applied to you. I really cannot think of any specific examples right now, but I just remember him explaining things in such a simplistic way where you might not even realize that's science but it was science. I think that's what really intrigued me at the time.

Cailisha: What about your science fair project? What made you decide to do something that seems so advanced for an eighth grader? Building a maze? Do you remember where the idea came from?

Skylar: I just remembered I was always like a tomboy. I still am, and I loved to be able to go with my dad and stuff like that. My uncle, he did woodwork, built furniture. It was always like wood and hammers and nails around. I was like, "I'll just build a maze and work with mice." I remember dad taking me to the pet store to buy these mice. It just

seemed like an awesome thing to do. I guess, too, back then, and it's probably the same way now, it's always this thing of what boys can do and what girls can't do. That kind of drove it a little bit too. I'll build this thing and I can show that the female mice are smarter. That was my bias going into the experiment. I think that that's what drove me to it.

To be honest, I never really thought about biology. I didn't even know all of what psychology was, but at the time, I was like, "I'm going to go to Princeton and be a psychologist." I saw those on TV shows. From elementary school until probably I got to high school, that's what I was going to do. So it kind of all fell together with psychology.

Cailisha: Other than in eighth grade, was there another time that you remember being interested in science?

Skylar: Yeah. We had this thing called Kids College, and so the community college in our city, they had this program where they brought in elementary school kids. And you basically came in and you did science experiments. And I remember I was doing things like learning about blood typing. We dissected pigs and all these different aspects of biology that were just really for an elementary school really cool. That really promoted a big interest at a young age. As I moved forward, I did things like MSEN.

Cailisha: What is MSEN? Do you remember?

Skylar: It's the Math and Science Educational Network. They're minority-based programs that promote STEM. They essentially over the summertime . . . they bring kids in onto the campus and you did the six-week program and you come in and you take math and science classes and you go on fieldtrips. And they even had Saturday academies where you come in on Saturdays. That really helped a lot with I guess fostering that love of science.

Cailisha: Do you remember any of those specific things that you did that really were exciting to you with the MSEN or with the Kids College?

Skylar: With the Kids College thing, I know the anatomy was really interesting. When we did the blood typing . . . that was crazy because they were actually testing our blood. Even as a kid, I'm like . . . "It's all sorts of unethical stuff." You're just a kid. I was like, "This can't be right." I remember cutting myself on a scalpel. As we were dissecting the pigs, they're like, "Oh, you can do the blood typing now." I just remembered that.

>Really, I think I was just a nerd stereotype and called people certain things. I really feel like I was just a big nerd because I just liked figuring out problems. I was that kid that loved to go to classes and do work. I loved to do the homework. When we learned problems during the program, I will go home and just keep working on stuff to figure how to perfect them and do them better. I think that's what stood out most, was actually perfecting or I guess we look at it now learning how to think analytically, critically and all that stuff. I didn't know this was what I was doing. But, I think that's what really excited me. The more I accomplished, the more I perfected things, the more excited I got about it. Those were the specific things that stood out to me.

Mr. Walker made science fun, interesting, and relevant for Skylar. She couldn't recall any of the specific activities that he did, but she left his class with deeper connection and a favorable impression of science because of his teaching. She stated, "He would do real-life examples, how things applied to you." In this first narrative, I was introduced the storyline of influential science teacher. Additionally, Skylar was exposed to hands-on experiments like dissecting and blood typing labs further deepened her love of science. It is evident that her family supported this connection by her participation in the KIDS College and MSEN. Within Skylar's narrative, I was also introduced to the storyline exposure to structured science opportunities and experiences outside of the school setting. Niema also had family support and access to science outside of school. Her mother, Mrs. Anderson, was her first science teacher, but she also credited other science teachers for nurturing her interest.

"Like Drinking Water"

Cailisha: What was it like being a black girl that loved/liked science?

Niema: It depends on the day. [Laughter] Sometimes it was really cool. If I was at home with my family, it was nothing. It was just like drinking water.

It was very natural. At school, you know, especially in elementary and junior high, I was, of course, labeled a nerd. But luckily I wasn't one of those people who was bothered by that term. I loved that people thought I was smart. I just, you know, I thought it was cool. [Laughing] so it didn't bother me at all. But I do remember when I was in junior high school, you know at the end of the year they would have we could vote people for different categories like most popular and all that but at our school they had a bunch of categories and one of the categories was 'most likely to become a scientist.' And I was actually voted in that category. And I thought it was really cool, but you know I got picked at sometimes, but it didn't bother me because I just, I don't know . . . I always felt like this was what I was supposed to do so it wasn't as big of an issue.

My relationship just continuously grew with science. When I talk to my mom we always joke around because we say other people say its curiosity. We know it's just being nosy. That's the bottom line. So when I was in elementary school, I was just very curious about everything. And I again, with my parents, I was just very lucky because they really encouraged my sister and I to explore as much as we could. And then when I got into junior high school it was even better because we had science fairs . . . in elementary school . . . I can tell you one more really cool thing that I got to do. In second grade, my teacher, Mr. Howard, he realized that I was really interested in science and he started a science club and we so got to write letters to NASA and they sent us these posters that I still have today . . . [laughing] I told you I'm a nerd [more laughter] . . . but they wrote us letter back. These we letters from scientist. They sent us these beautiful, full color posters of planets and they sent us a picture of the . . . I can't remember the name of the craft that landed on Mars for the first time, but when they took the pictures . . .

Cailisha: Was it sputnik? Or something like that?

Niema: I can't remember. Sputnik was the Russian one.

Cailisha: Ok, ok . . . go ahead.

Niema: But it was so awesome because you could . . . I mean it seemed so close that you could touch it. And I could imagine what the soil would feel like. And I had already starting learning about iron so I knew that the reason it was red because of large amounts of iron. I'm like . . . Who in elementary school is thinking about iron in the soil, but me? I thought it was awesome! And so, I know that experience that I had in second

grade helped me understand that it was ok to be whoever you are. Didn't matter your ethnicity or anything like that. If you had a curiosity in science, if you could reach out to people, then you could really start getting a foothold. And, you know, my interested really grew from there. And I love Mr. Howard. He was so awesome! And then in Jr high, going back to the science fair. I was talking to my mom about this the other day. We did a project on plants and, you know a lot of people did plant stuff, but what we were trying to do was figure out the effect of different chemicals on plant growth and so we tried to choose a variety of things. So, we actually used like some dishwashing liquid. We used milk. Of course we had water as a control. So I even learned what a control was back then. And, we just had a variety of chemicals. And the things that we thought would actually kill the plants were the ones that made the plants grow the best. I think we were growing black-eyed peas. But it was so awesome. And I remember I won second place in the science fair and that just did it. I was done! I was going to be a scientist! [Lots of laughter] That was exciting!

Cailisha: What about high school? How did it continue?

Niema: High school was . . . I loved my science classes. I loved chemistry. I'm going to leave it there. In high school, I loved chemistry. I remember Ms. James did a diffusion experiment. And so she made the whole class move to the back of room and she said, "I am going to lecture for about 15" . . . I mean, she didn't call it [lecturing] . . . "I'm going to teach for about 15 minutes." And we didn't know what she was doing and she had a bottle of perfume at the top of the room. And she took the lid off, and she said for each of you if you when you smell this perfume as I'm talking just raise your hand and keep your hand raised. And it was so cool because very slowly you could see different people raising their hands until the entire class had their hands raised and when everybody . . . the last person raised their hand she stopped teaching and she started talking about diffusion and what was actually happening and for me that experience helped me visualize what was going on because I never thought about science as being something that you could . . . that very interactive before. But because of that active learning experiment that she did with us, the way that I thought about science completely changed. And I remember another subject that I never thought I would be interested in was physics. And we had a physics teacher, Ms. Marquette, who was very unconventional. I'll put it that way. But she was just the cutest little lady and if you ever had a chance to meet her you wouldn't think she was a science person at all, but she was extremely smart and she would always tell us that, "There is nothing wrong with being smart and there is nothing wrong with science. You

should all be into it." And I remember she was teaching us about how waves work in the ocean. And then she brought in these big Slinkys and we spent a whole class period playing with Slinkys. And it so much fun because we didn't realize we were doing experiments. We were just playing. And she ended up having us shake the Slinkys side to side or up and down. And we didn't realize that we were measuring, like um, the top of a wave or a crest of a wave and then we calculated it. And I was just like, "This is just ridiculous. [Laughter] Who comes up with this stuff? This is so cool." So even now when I go to the beach, I can't just look at the ocean as the ocean. When I see it, I visually see the crest of those waves and I really watch them rise and fall and . . . I mean . . . Those experiences just changed my life. It really did.

Niema provided several specific examples of hands-on learning activities that made science fun and interesting, such as the diffusion demonstration and playing with Slinkys. I was very impressed by Mr. Howard and how he took a significant interest in the lives of his students. He created the science club for his elementary school students and it was evidence of his commitment to developing future scientists and exposing students to science beyond the classroom. Ms. James and Ms. Marquette also nurtured a love of science by creating classrooms where science became real and visible for Niema. The storyline of influential science teacher was reinforced by Niema's narrative. Also within her narrative, she introduced the storyline of "being labeled." Niema was labeled by her peers as a "nerd" and they teased and picked at her about being smart. Yet, on the other hand, she also was voted "Most Likely to be a Scientist." She embraced both. She did not mind being "called out" for being smart and received recognition as a future scientist, as she put it, it was "really cool."

As with Niema and Skylar, Samantha also had an amazing science teacher, Mr. Richardson whom she credited for her decision to major in biology in college and whom

she continued to describe as her favorite teacher. Mr. Richardson was absolutely

wonderful, but Samantha recalled that it was Little Eli who really piqued her interest.

"Little Eli"

Cailisha: When did you first become interested in science?

Samantha: Tenth grade biology. My teacher's name was Mr. Richardson and he still today has been my favorite teacher.

Cailisha: Oh, wow. Okay.

Samantha: It was tenth-grade biology and at the time, I was a sophomore in high school. And I hadn't really thought about what I wanted to do, but people kept telling me, "You're really smart. That means you're going to be a doctor or a lawyer." Like I just heard that (a lot). We dissected a pig in class and nobody wanted to do it but me. I named the pig, we opened it up, I aced all the . . . learning all the organs. Today, I'm looking at it . . . Like, it wasn't really that much of an experience in teaching me anything, but it was just the . . . This is the first time I felt really excited about something that I learned in school. The whole class was like that. I enjoyed going to this class, so that was a first thought of, "I like biology. I'm going to continue on this path." Then, I took AP Biology as a senior. By that time, I decided that I wanted to go and get a college degree in biology, and I still give him credit to this day for making it fun, but it was the pig.

Cailisha: What did you name the pig, do you remember?

Samantha: I don't know why. Eli. I have no idea. I have no idea why.

Cailisha: Okay.

Samantha: I just remembered and I was so sad because he was a little baby, a little baby pig.

Cailisha: A fetal pig, right?

Samantha: Yes. We opened him up and put the pins, but it was still fun looking at the organs. It was little Eli.

Cailisha: I remember naming mine Wilbur.

Samantha: Yeah? I don't know where Eli came from . . . I have no idea because Wilbur, I would think from Charlotte's Web, right?

Cailisha: Mm-hmm (affirmative). I know it was sad, though, because it is a dead pig.

Samantha: Yeah, and it was a baby pig.

Cailisha: Yeah. Were there any other times other than . . . You're saying the fetal pig was probably the first time you . . . Do you remember anything else that he did that really connected you to science?

Samantha: He was funny. It's strange . . . that's something I didn't like [about him], but that made it even more like I want to know more. He refused to teach evolution. He was a staunch Christian.

Cailisha: It sounds like it was probably the beginning, that curiosity and just wanting to know. In your AP courses, or your AP Biology course, was there anything in particular, any experience in there that continued to spark your interest?

Samantha: That's funny. My AP Biology teacher, Ms. Crabtree, was . . . I thought, was terrible. We won't tell her that now. Even then, I thought, "I could teach this better than she can." Even at that point, I didn't know I wanted to teach as a career. I thought I was going to be a doctor, but I always thought, "I know this stuff." We had this huge, the Campbell book; the Campbell & Reese Biology is what we used, the early edition, obviously. All she would just make us write definitions out of the book. But we did have one project. They call it a bio-blitz now. We had to collect leaves. It was this big leaf project. I didn't know much about plants. We had to press the leaves and dry them and then look at the structure. So that was like the only thing in that class that I thought excited me. Other than that, we just wrote a lot of definitions. I learned some things, but it was mostly self-taught.

Again, this is two years after my aunt's diagnosis [tenth-grade biology] so still . . . We starting learning about systems . . . like biology, organ systems, and that made a little bit more sense because I was starting to understand immunology, just a smidge. I had heard a little bit about immunology.

I remember that leaf project. And she was much the very opposite of my tenth-grade biology teacher. They did not get along because she was all about the truth of evolution and he was like, "I'm not going to teach it." It was like, "What's wrong with you? You're not telling the whole story." We got all of that from her, so it was two very different kinds of teaching where he was going to withhold information and she was like, "I'm just going to tell you all this because there's evidence that say that this happened."

Samantha and I shared a good laugh and a bond as we talked about Little Eli and Wilbur. Again with Samantha's narrative, I was able to see how hands-on activities nurtured a budding scientist's relationship with science. The storyline of influential science teacher continued with Samantha; however, she also expressed her dissatisfaction with Mr. Richardson for "not telling the whole story." His religion influenced his ability to tell students everything that is known scientifically because he refused to teach evolution. Within this narrative, I was introduced to the first storyline of tension. Additionally, Samantha introduced another storyline of tension with Ms. Crabtree. She described her as a terrible teacher. She could have negatively affected Samantha's love of science, but I believe, however, that Samantha's curiosity and desire to learn science was already firmly in place and luckily unaffected by Ms. Crabtree's terrible teaching. Next, in Dahlia's narrative, we once again find a teacher that left a lasting impression, but this time for a different reason.

"Kicked My Butt, Left and Right."

Cailisha: When did you first become interested in science?

Dahlia: It's really, really, really weird, but it was in high school. In high school, my first two years, I was terrible. I was a *bad* kid. A *bad* child. My high school started an IB program. The summer of my sophomore year they

sent out letters saying, "Hey, we would like you to join the IB program?" So I met with the lady and she was like, "You need to take these classes in order to be ready to join in the IB program your junior year." One of those classes was honors chemistry. And I was bad in high school, but stuff was easy for me, so it just wasn't challenging. I got to honor's chemistry with Mr. Davis and that class kicked my butt, left and right. It was the first time I had to study. I failed *every* single test. I literally got a 67 on every test we took. We had lab reports and stuff to write too, so that was kinda helping my grade, but it wasn't.

So Mr. Davis was like, "Well, you can't flunk, because then you won't get into the program and you'll have to retake this class." What he used to do for students was let them do test corrections, but you had to give up your lunch period and sit with him and do the test corrections. I was like, "That's fine, because I'm not failing no class. I can't fail no class." Somehow, I got my grade up to a B and I passed my EOCs. I was like, "Hmm . . . That class was hard, but I liked it." I decided then that A: I was going to college, and B: I was going to major in chemistry. It was kind of a weird story that brought me into science. I guess it was the challenge of it, because nothing else had given me a hard time in high school, so I didn't know what I wanted to do.

I had probably been interested in science for a long time, but I just didn't know it. When I was a kid, I would mix up all types of chemicals in the bathroom sink to see if they would explode and all that stuff. I just didn't hone in on it, because where I grew up, it's not cool to be smart. So um . . . "I like science and I like math." You can't really say that, but you just do what you've got to do in class to get help. I think maybe I was interested in chemistry the whole time, and just didn't realize it until I got that class.

Cailisha: When you say it wasn't cool to be smart, how were smart kids treated?

Dahlia: You got *teased*. And it was bad, because I was moved to a talented and gifted program in fourth grade, and I lived *way* on the other side of town. I had to get bused to a new school, and make new friends, and all that. My home friends was like, "Oh, you think you all that because you go to this school, with these people and . . . And your classmates do this." It was just not . . . When I came home, I had to downplay the fact that I was in this program. When I was at school, I had to really be smart, because it was just kids from everywhere in the program. It was hard, but it was just like, you just got teased and you had to deal with it. It didn't matter.

It was the challenge of chemistry that piqued Dahlia's interest and connected her the discipline. She remembered chemistry as being the first time she was really challenged, and therefore the challenge developed intrigued. It reminded me of a love affair where a romance develops simply because one person challenges the other. In Mr. Davis's class, Dahlia's love affair with chemistry began to blossom. It was not sweet and romantic like how Niema came to love astronomy by looking at Jupiter with her mother through the telescope late one summer night. The relationship between Dahlia and chemistry began through turmoil, yet it was still the beginning of the affair. Dahlia's said, "That class was hard, but I liked it." From there, she said that she made two important decisions: to go to college and to major in chemistry. So the love affair had begun.

One the other hand, Dahlia introduced a storyline of tension that is not presented by any of the other women. Within the storyline of 'being labeled,' she is teased for being smart and desperately wanted to disassociate with the term. She stated it wasn't "cool to be smart." She found it necessary to downplay how smart she was because of the teasing that she received from other children in her neighborhood as a result of being bused across town. Because she was bussed across town to the program for gifted children, she was disconnected from the kids in the neighborhood. In the gifted program, she said, "[A]ll of my classmates were from different origins. They were Polish and Lebanese and from Guatemala and El Salvador. A very few amount of black kids in the program. We had girls from Hungary. We were all from the same city, but we were just mixed up in that program." At school, she had to be display her smartness in order to compete, but at home she had to hide how smart she really was so that she didn't appear to "think she

was all that." Grace also experienced being bussed. Her experience began in middle

school and continued all the way through high school as a result of the *Brown* decision.

"Being Bussed: I Even Drove the Bus"

Cailisha:	All right. So tell me about when you first became interested in science.
Grace:	You know, it was probably when I was growing up. I grew on a farm. There was a curiosity about nature and animals and the biology of things, you know, life in general. I think it probably began there. But then more formally in high school I was really interested in physics. I had a wonderful physics teacher, Mr. Williams, and he really took time to explain things and to get to know the students. That was *really* big for back then. He was an African American male and he was really, really very smart and so I liked physics coming into college. I thought I was going to major in physics.
Cailisha:	And why didn't you?
Grace:	You know, by the time I got to college, I had done some work with a biology teacher as well as with the physics teacher and said, "Ah, I like this better." But I knew science was going to be my thing. I liked science and math.
Cailisha:	Okay. Can you describe your early experiences with science, some of the things that you remember doing that really made you-
Grace:	I was in 4H Club when I was in high school and middle school and we had these projects that we had to do. One of them was in soil and water conservation and we had to do these demonstrations where we take this big boxes of soil around and looked at water erosion and the kinds of things that farmers needed to know about keeping their soil in good shape for growing crops. That was probably one of the first formal things that I did when I was back in middle school.
Cailisha:	Would you say that you were a little girl that liked or loved science?

Grace:	I *loved* it. I loved science and *particularly* in high school when I got into physics and math. That was . . . Yeah.
Cailisha:	What would you say it was like being a black girl that loved science?
Grace:	When I was at school we didn't have a lot of . . . We were segregated until middle school, so I wasn't integrated until middle school. In my hometown, I was a pretty good student. I was number four in my whole class and so we didn't get the . . . I didn't feel the stigma around girls and science. We were good at *everything*. Back then we had teachers that pushed us and made us . . . Those of us who were good in one thing were good in most things so it wasn't this big separation that we somehow feel now this big distinction . . . At that time, it was just what we were supposed to do. We were pretty good in most classes.
Cailisha:	In middle school you said schools became integrated. Were you bussed or-
Grace:	Yes. I was bused all the way through. I even drove the bus when I was in high school.
Cailisha:	Did you?
Grace:	I was bused all the way through. Yes. When I was in the country and when I was coming through, kids at the age of 16 get your driver's license; you can drive a school bus, unlike now. You have to be fully adult now.
Cailisha:	Did anything change then? Did you feel anything different once you were in a different environment as far as science and-
Grace:	As far as being integrated? No. We were almost equal in terms of numbers. At the time I was integrated there were classes ahead of me . . . There were people ahead of me that had, who had higher grades, and they actually probably went through more but the top people in our class were black. And so they knew better than to mess with us. The top people were black and that was the way it was in my high school as well as my middle school. We were integrated.
	We were not the minority in terms of numbers, so we didn't stick out that way. But I didn't feel what the young girls feel now.

> They're often one or two in a class, if you will. They take honors classes or AP classes. They're in the minority. I remember my son taking AP classes in high school and he would be one of maybe 20 kids. So he was clearly the minority and so he kind of stuck out and the girls were like that as well. I didn't have that in my middle school and high school.

Cailisha: That's interesting. You kind of talked about middle school and high school. What were you doing with those biology teachers that kind of fed your interest in science?

Grace: My physics teacher, again he was the most influential with regard to-

Cailisha: And that was high school?

Grace: That was high school. We would have special projects that we did and we'd sell them and I think because of his interest in science he really motivated us and pushed us towards science. When I say "us" I mean some of the top black kids. I think his one-on-one attention was probably a key factor. And then he was so brilliant himself. He was great and that was unusual to have an African American male at that time who was in physics.

Grace was a good student throughout her school-age years and she graduated at the top of her class. Mr. William's motivation and encouragement were key factors. He had students doing interesting projects that fostered Grace's love of science. Yet again, the plotline of influential science teacher is evident. Her experience with Girl Scouts and 4H left a lasting impression and impacted her connection to science.

Teachers and School: Storylines of Cooperation & Tension

All of the women narrated stories of teachers that positively influenced their interest in science and deepened their level of interest and love for the discipline. The storyline of influential teachers was carried throughout each narrative. These storylines

are all in cooperation between the participants' stories. They each credit a teacher for fostering their relationship with science.

The storyline of out-of-school science was evident in the stories told by Niema, Skylar, and Grace. These three women were all experienced science outside of school. Grace participated in Girl Scouts and 4H club. Skylar attended KIDS College and MSEN classes. Niema was exposed to science at home with her mother as she practiced her science lessons with her and her sister. The exposure to science outside of school continued to forge their connection with science.

For Samantha, however, tension arose with Mr. Richardson and Ms. Crabtree. Even though she loved him and he is still her favorite teacher to this day, she was not pleased with his decision to allow his religious beliefs to affect what he would and would not teach. She felt cheated because she was not getting the 'whole story'. She also felt cheated in Ms. Crabtree's class. AP biology should have been a course where biology was taught in a way that engaged the students, instead she remembered writing definitions more than anything. This storyline is counter to Samantha's desire to deepen her relationship with science. In Ms. Crabtree's classroom, there was a missed opportunity to engage students in science in a real and meaningful way.

Next, the storyline of 'being labeled' is expressed by all of the women as well. They used terms such as smart, nerd, and geeky. Grace recalled being at the top of class and graduating #4, and Samantha was salutatorian of her graduating class. They each defined themselves as smart, but were also recognized by others for being academically talented. They participated in gifted and IB programs as well as AP courses that were

reserved for only the top students. For the most part, there was no disharmony expressed

with the labels except from Niema and Dahlia. They were both remembered being teased

for being smart, but they each handled it differently. Niema embraced it and thought it

was cool. It was a storyline of cooperation within her narrative. But for Dahlia being

labeled a "nerd" was a storyline of tension. Dahlia tried to hide her smartness and escape

the teasing by the kids in the neighborhood.

As I moved beyond their school experiences, the women in my study graduated

from high school and entered college where they all majored in science and began to

think about future careers.

Stories about Introductions to Scientific Research

The science experiences of their childhood and youth led to my participants to

attend college and major in various disciplines of science. As they shared stories of their

undergraduate year, I went with them onto the campuses of several southern Historically

Black Colleges and Universities (HBCUs). All of the women attended HBCUs and were

given their first opportunity to conduct laboratory research. Grace attended Frederick

Douglass University and majored in biology and secondary education. She knew that

when they dropped her off she had no plans of returning to the farm. Even though Mr.

Williams's physics class had left a lasting impression, she chose to major in biology.

Grace said, "I think my own passion led me into biology coming to undergrad." She felt

more connect to biology than to physics. Dahlia made the decision in Mr. Davis's class

that she would attend college and major in chemistry. Several decades after Grace

graduated, Dahlia attended Douglass University. Because Dahlia came from an

environment where she said, "nobody went to college," she was breaking the norm. Skylar attended Maya Angelou University and originally intended to go to medical school. Samantha also had her sights on medical school. She attended Harriet Tubman University and majored in molecular biology. Niema attended Ida B. Wells University and originally still thought about becoming an astrophysicist one day. That is, until she met one:

"I Met an Astrophysicist"

Cailisha: Your first thoughts of a future in science was becoming an astrophysicist, but when you got to Ida B. Wells . . . .

Niema: I met an astrophysicist.

[Laughter]

That did it!!!

[More laughter]

Cailisha: So tell me about that.

Niema: So I was really, really . . . .because I love space. That's really my first love and so we had a seminar one day and everybody . . . all of the science majors were required to come. And this gentlemen from NASA came. And he was an African American male which just blew me away. I had never met and African American male astrophysicist before. He talked for, I don't even know how long he talked for. It was the most *boring* thing I have ever sat through in my life. Oh, my gosh! And I was thinking, "If this is what my life is going to be like, I can't do this!"

[Laughter]

Cailisha: That was hilarious!

Niema: But he was so smart that he had trouble bringing it down to our level. So at the end of his talk, you know, usually you would applaud.

Nobody even knew when they were supposed to clap. I didn't know if he was finished [laughter]. It was the strangest thing I've seen.

Cailisha: So did you go in majoring in physics and then change?

Niema: No, I actually went in majoring in biology. And I think I selected biology when I was in high school because I found it to be the most fun. And I could connect more with biology and so I figured, well you know, I'll go this route because I knew you could be a biologist and still work at NASA.

Mentoring, Support, and Undergraduate Research

The women in my study received a tremendous amount of mentoring, support, and encouragement in college. At the HBCUs they attended, they were encouraged and given one-on-one attention. They were also provided with opportunities to conduct research. Just as with their science teachers during their K-12 years, there were professors and advisors that took the time to mentor them. This attention nurtured their passion for science. Grace explained the support that she received from her professors and the opportunities offered:

Cailisha: Who or what supported you in your path into science as you kind of continued into it? Where would you say your support system was?

Grace: I think my 4H leaders did, and certainly he [Mr. Williams] did. My parents, it didn't matter to them. As long as we went to college, they didn't really care what we went into. I think my own passion led me into biology coming to undergrad. When I got to undergrad, I had probably Warren and Dr. Hall were very influential in terms of steering me toward a PhD. I did research with Dr. Warren in microbiology, and she was probably the most influential person. I was a teacher assistant in the classes. I did research and she had us going to meetings and presenting our work back then. And that was pretty impressive back then. That was pretty special back then. Kids now kind of take advantage of . . . They take it for granted. But for us at that time, it was

very . . . And then it was Dr. Hall who said, "Grace, you really, *really* need to go get your PhD."
My interest was fostered with Dr. Warren. She was my mentor at undergrad for several years.

Cailisha: Was it being in her lab?

Grace: In her lab. She was a microbiologist. Yeah, we presented at our meeting . . . They had what they called an MBRS (Minority Biomedical Research Support) program and it supported us to do research in the lab, and then supported us to go to meetings like ABRCMS (Annual Biomedical Research Conferences for Minority Students) and present our data. That was really . . . That was something that really steered me toward microbiology. But it was another mentor, Dr. Hall, who said, "You need to try to go." And then he said, "Let me call somebody at McNair." And then he helped me with my application and then it was from there.

Cailisha: Again, it seemed like that kind of one-on-one that-

Grace: The mentoring

Cailisha: The mentoring

Grace: Yes. And someone noticing that you might have a particular skill or drive to do something and encouraging you to go . . . That was very important. And we believed . . . At that time, we believed our instructors. Yeah.

Dr. Hall and Dr. Warren both provided Grace with the skills, experiences, and the encouragement that she needed to build her confidence as a scientist. Dr. Hall and Dr. Warren were both African American scientists on the faculty at Douglass University. Dr. Warren, an African American female, provided Grace with her first opportunity to conduct scientific research. She credited both professors with seeing something in her and not just talking to her, but putting their belief into action by allowing her to conduct research, making the phone call to McNair, and helping her with the application process.

She was not left to do it on her own. There was great power in their words. Grace said

how important it was that they recognized her talent and ability. Within her vignette, the

storyline of support and encouragement were introduced, but also it was evident that the

experience of being in the lab and conducting research was equally important as she

continued in science. Dahlia attended the same HBCU as Grace, although several decades

later, but she also received mentoring and her first exposure to research:

Cailisha: As you got older, maybe an undergrad or even later in high school, do you remember feeling more connected? You have your high school and your earlier experiences. When do you remember feeling more connected to science? Maybe as you got to Douglass.

Dahlia: Probably when I got to Douglass in the chemistry department, and I actually had to be in the lab. I think that's when I was like, "Okay. This makes sense. This is where I think I'm supposed to be." I think I started in Dr. Freeman's lab my first summer at Douglass. It was organic chemistry, and I was like, "I don't know if I'm going to do organic chemistry, but I do like this lab life kinda stuff." I just got to find something I like to do. That's when I started feeling like, "Okay." This is a comfort-level thing. I think I could do this for the rest of my life.

Cailisha: What were you doing in his lab?

Dahlia: I think then we were synthesizing these things called chalcone derivatives. He was big on using natural chemicals to treat glioblastoma, I think. He was a brain cancer researcher. So we would make compounds, and then test them on Dr. Marcus' cells and that kind of thing.

Cailisha: Okay. All right. Who or what has supported you in your path into science?

Dahlia: I think my advisors have been really supportive. Even the people that are not my advisors. There's people that I've latched onto from different summer programs. Then, my undergrad thesis advisors, and other students in the labs that I've been in that I've kept connections with. They've been really supportive.

I'm like tight to people. One person comes in mind. Her name is Linda Brown, and she was one of the admins for the summer program at Mae Jemison University. She was a PhD but she didn't do any research. She was one of the people that I connected with while I was at Hopkins. Then, we still talk to this day. We check in on each other. She's like a dean now at Brunson Community College. We just be like, "Hey, how you doing? How's it going? School is great . . ."

I think I like to make connections with people that are in science, if that makes sense. Or know, I guess, know the struggle with being a female or black or whatever in science. Then latch onto them and keep up with them over the years.

Cailisha: What made you decide to go to Douglass?

Dahlia: My guidance counselor in high school, you know at the end you have your senior exit interview with your guidance counselor? We were supposed to bring her a list of schools that you wanted to attend, and she would look at your files and your grades and see, "Maybe that's not for you." I had a list, Alpine State, City Center State, North State and Douglass. She basically told me my grades weren't good enough to get in anywhere else but Douglass and I took that to heart because I didn't know any different. I was working and I had to pay for stuff myself. I thought, "I'm going to roll the dice and bet on a place where I think I'm going to get in. I don't have enough money to be sending all these application fees out." It was a combination of life circumstance and bad guidance. If that makes sense? I applied to Douglass and I got in and that's the only school I applied to and that was the only place I went.

Cailisha: Did you decide before getting there that you were going to major in chemistry?

Dahlia: Uh-hmm (affirmative). I knew I wanted to major in chemistry so I was looking for schools with chemistry programs and Spanish programs because at the time I thought I was going to minor in Spanish so that was what I was looking for.

Cailisha: You came to Douglass in 2007 and what were any of your highlight experiences while you were there? I know you did some summer programs.

Dahlia: Douglass was really good at nurturing us, I think, as scientists. Our department was tough but it was a pretty good department to come through, I think. I did a lot of summer programs . . . well, not a lot, we

had three summers. I did three summer programs while I was there and then during the semester we had to do research because at the end of our senior year we had to write our capstone project. So I had experience at my home institution which really didn't translate into my summer programs but the theory . . . you know the idea of being in a lab and working however many hours a day, that's universal. So the logistics were still universal. When I got out in the summer and went to different places that was when I was like, "Okay, I know how to maneuver in the lab, you all don't do exactly what we do but it's the same." Science is science.

Cailisha: Did you start that after your freshman year? The summer program?

Dahlia: Yes, after my freshman year, I worked with Dr. Freeman in the chemistry department, working on organic synthesis of the chalcone derivatives and it was a simple summer program. They were looking for students that wanted to do research over the summer and I was working with Mr. Patrick in the HOT on Science high school enrichment program simultaneously. That was my first research experience; an experience where it's you, in the summer and all you do is research. No schoolwork, no nothing else, you just come in and do your science and go home. Then, the second year, I was under Dr. Adeyemi and I was on the NOAA (National Oceanic and Atmospheric Administration) project so it was funded by NOAA I was like, "I just don't like NOAA, I don't want to be an oceanographic scientist, a marine biologist," so I had to stick it out though because that's where my funding was coming from. Then junior year . . . that summer after my sophomore year, I went to Colgate Palmolive in New Jersey and I worked on bar soaps.

Then my junior year I switched to being funded by MARC (Maximizing Access to Research Careers) because I was tired of NOAA and MARC was more my speed because I wanted to do biology. I stayed with Dr. Adeyemi the whole time, he was my thesis advisor all of undergrad. He put me on a more biological project. That's my . . . we collaborated with Dr. Marcus, so I got to stay in the same lab. After my junior year, that's when I interned at Mae Jemison University (a Southern Predominantly White Institution [PWI]) with Dr. Sakia and that was a real heavy biology lab. I was, "Oh, I don't know what you all do up in here, I don't know nothing 'bout genes and cloning," I was like, "I can learn it though, I can learn it." So me and the graduate student worked on a part of her project and that's when I knew that I wanted to move into biology for my PhD.

Cailisha: How was that experience at Jemison?

Dahlia: It was tough because I just did not know how biological research worked. So in an undergrad, when we needed to know something about a compound that we made, you run it through the intermar, if your peak is there, good. If not, you have to do something else. It's very . . . chemistry is a long process to make stuff but to characterize it is very straightforward. In biology, it's like everything takes three days or a week or whatever. If you mess up, you've set yourself back like a couple of days. I was like, "I don't know if I have the patience for this." It was good to learn, it's just that sometimes I felt really incompetent, but I did whatever I had to do to figure it out.

I had my mentor, Linda Brown there and she would quiz me every week on random biology stuff. The PI was really good with sitting down and answering questions for me and I would read textbooks. My graduate student, even though she left for part of the summer, she was really good at explaining stuff to me too. The people in the lab were really nice so if I needed help ordering a primer or something then they would help me with that. But it was really different because I was not used to working with all this stuff and you have to get this pipette and I was, "I don't even know how to pipette," I just don't know. Even I think the PI, by the end of the summer, I think he was like, "You've learned a lot this summer, you really did the best you could do coming from the background that you come from," which is no biology.
I was, "Thank you because I still barely understand what's going on." Now I look back at that rotation project and, "Really, all I did was some cloning all summer and that was about it." Now it's really simple but then I was, "Mmmm . . . What is you talkin' 'bout? What's a plasma?" I was, "Oooohh . . . I should have listened to Ms. Petty in biology and Dr. Winfield in micro."

Dahlia had multiple experiences with undergraduate research in multiple and diverse scientific settings. Her story reinforced storyline of support and encouragement at HBCUs, as well as the importance of undergraduate research. During her undergraduate experience, Dahlia was supported and mentored throughout. All of her research mentors at Douglass were African or African American males. She had research mentors as well her academic advisors in the chemistry and biology departments. Dahlia also mentioned

the importance of not just her professors and advisors, but also the other students in her major. She told me about the two other chemistry students who began with her freshman year. They had a pact they would finish together; and finish in four years. Students, in recent history, finished several semesters past four years. The support of these two other students was crucial.

Dahlia was not just emotionally supported, but she received financial support as well. She received stipends from NOAA and MARC. Both research programs supported students financially with the goal of encouraging more diverse student to pursue PhDs in science. The financial support allowed her to focus on research and pursue it without the distraction of working an outside job. It also provided her with the opportunity to conduct research all three summers. The research programs supported her financially during the summers, as well. Dahlia found a home in the lab. She stated about the lab, "This is where I think I'm supposed to be."

Samantha also connected to research once she was exposed to it. She explained that it was her summer research experience that influenced her decision to no longer pursue a medical degree:

Cailisha:	At what point did you . . . Because you said at first you wanted to go into medicine. At what point did you decide that medicine was not for you?
Samantha:	In college.
Cailisha:	Okay.
Samantha:	That's what makes me laugh about so many of the students I work with now, is I was just like them. Only reason I thought I was going to medical school is because I was smart and my parents said I

would make a lot of money and I wanted to cure lupus. That's what I thought, but then I got to college and everyone in freshman biology . . . All teachers now will say, "All of y'all aren't going to medical school." You do the whole, 'Raise your hand if you want to be a doctor.' Everybody in the class raises their hands. "All of you aren't going to medical . . . " I was like, "Whatever. I'm going to medical school. I don't know what you talking about."

But I realized after I took immunology, it wasn't a fact that I really wanted to treat people. I just like learning about disease. I don't want to treat sick people. I just want to understand what's wrong with them.

Cailisha: Yeah.

Samantha: Because I would see my aunt go to the doctors and I would just start to get really angry. You pay all this money, and they can't even tell you what's wrong. All they do is they're going to give you more medicine. They don't even know if it's going to work. I started to get a little angry, like we need more people that's trying to figure out what the problem is versus just giving people more drugs and you don't even know how they work. I kinda got that mindset. Then I did some more research.

They forced me . . . I thank God for the advisors I had in college because they really saw my potential. I remember one teacher saying, "You have really great writing to be a scientist." Nobody ever told me that before. "The writing structure, the way you phrase things, you could really . . . You are really good at scientific writing." That's like, "Oh! I never thought of myself as being a scientist." I just was a biology major in college. Never called myself a scientist.

I had one teacher that told me that and then the department chair pretty much forced me to do this internship at Parks State (Northeastern PWI). I was going to work for the . . . I don't know why, but it just sounded fun. I'm going to go work for the FBI for the summer, and she pretty much talked me out of that and told me to go to Parks State because she like, "You're going to go to graduate school." I thought, "I don't even know what that means, but okay."

I went to Parks State for the summer and did a research project similar to what the students [that I work with] are doing now, and I

really . . . That was the first time I heard about what it meant to do research. There were graduate students there and they told me, "Yeah, we get paid to go to grad school." I'm like, "What? What is this?" It was that whole summer that I decided I don't want to be around sick people. I did this internship. Their schedule was flexible, so they just came in the lab when they wanted to. It was like they were going to work, but they were in school and they were getting paid to do this. I was like, "I need to do a little bit more research."

I got back to college the following . . . my senior year, and I pretty much just got myself prepared to go grad . . . I studied for the GRE on my own. I researched programs on my own. I did everything, so, to see students that get to participate in like RISE (Research Initiative for Scientific Enhancement) and MARC, I tell them, "You should really appreciate that because you have people that are there just to help you get into grad school" and I had to do it all by myself because those programs didn't exist at Tubman University when I was a student. That was pretty much it. That one summer, and then it just was like, "I don't want to go to med school. Yeah, I could make a lot of money, but that's not really what I want to do."

Samantha's story echoed Grace's and Dahlia's experiences with storylines of undergraduate research and strong supportive mentors. Although Tubman University did not have a program like MARC, Samantha did have professors that she said "saw my potential" and encouraged her to participate in a summer research program and later apply to graduate school. Grace and Samantha had similar experiences. Their professors recognized their potential to pursue a PhD and provided them with the push needed to continue to the next level. Like Samantha, Skylar originally thought that she would pursue medicine, but she had a change of heart as she connected more with science through exposure to research:

Cailisha: Was it in college where you first . . . When would you say you first felt like a scientist?

Skylar: I think I first. . . . even though we had been doing lots of science stuff and experiments in classes and all that . . . To be honest, my junior year, I think I did an externship at Whittaker University (Southern PWI). And it was just ten weeks of just nonstop research, working with professors that to me were just so brilliant and established. And other students from all these different schools that approached things somewhat similarly but different because of their backgrounds. I think that's when I *really* started feeling it. When you do that first presentation, I think that's when it hits you, when you stand at the poster or you're doing the oral. They're expecting you to really know something.

I think that's what did it for me. When I came back to my school, it gave me an extra level of confidence. I felt like it gave me a leg-up over my peers a little bit. I might not have said it, but I felt that way.

Cailisha: Were you involved in any kind of research program?

Skylar: Yeah. Being a part of the honors program and doing a senior thesis and because I was biology, it was research-based which meant I had an advisor. That was an awesome experience because that meant I had to come up with my own project. I had to develop it. I had to follow scientific method and write this thesis, our little undergraduate version of it. And it's just a sense of accomplishment because the way it was setup, it was like, for us, the real deal, the honors program had this committee. You come in there, you got to present. They have your written work in front of them. They'd grill you. It's just like you already felt that little added level of pressure before you even went to the next level.

For me, that was a good experience. Other people hate stuff like that, but for me, I thrive on stuff like that. Just feeling like you know something where you can be tested like that and come through it out on the other . . . come out the other side successful. That makes me I guess more motivated to move forward.

Cailisha: After your junior year and then with the senior project, did you do any other research experiences in college?

Skylar: Yeah. I did Whittaker and I did another one . . . I'm getting so old I can't even remember. *Actually*, I did Whittaker University maybe that was going into my senior year. *Yeah*, that was going into my senior year. The year before that, it wasn't really a research-based one. It was more of a clinical-based one where I worked mainly with patients. I did

some lab stuff but it wasn't the same thing like you're testing . . . It's with the hospital. It was a little bit different. At the time, like I said, I was still looking at medical school as being that option once I finish, going into my junior year. So that year before, I did a clinical rotation at the hospital and it was more patient-oriented, things of that nature.

Those were the two major experiences: one my junior summer and the one going into my senior year. Of course, like I said, the senior thesis which was on-going basically through my senior year so pretty much the whole year. Freshman and sophomore year, like with most students, you were taking courses and getting acclimated and things of that nature. That was pretty much it for me.

Cailisha: In college, when did you decide that you were going to move forward and pursue science or at what point did you decide that?

Skylar: Definitely, after I did the summer experience at Whittaker. It's just like this is the life for me. Like I said, "I do not want to do academics." That was no-no for me. I definitely want to be in the lab, doing research, cutting edge. I want to go to these conferences. I want to present. I want to be on papers. Just all these different things that come with being one of those great minds. That was my thinking. That did it for me, that summer experience.

That's why to this day I feel it's so important to have students come into the lab and get on this opportunity. It's just that one experience can flip a kid. That's how it was for me in regards to me being so motivated to go on to STEM moving forward.

Cailisha: Who or what supported you in your path into science? Could you tell me about a time when you remember getting the support that you needed?

Skylar: I guess first and foremost, my parents and not that they were like, "Oh, be a scientist? Great!" I don't think they had any understanding academically what it was. They were just these parents that were whatever you need would give you what you need.

And I guess along the way, I always, and even now, I try to find mentors and people around me. It's almost *strategic*. I see where I want to go and I was like, "Who's already there?" I'm finding people that are already where I want to be and I bug them to death, or people that I feel like are not like me but they understand me. I have the same friends

from college, the same couple. They've always been supportive and that was helpful.

I have two other friends that they were on the same journey. Both of them ended up going to dental school. But along the way, we had to take the same courses and it wasn't until going into really our senior year, we just went different paths but we were always there for each other and helping and communicating about different issues, whether it'd be academic or personal, whatever. Those close friends were always a good support.

I guess back to mentors, my honors program advisor, she was just a no-nonsense lady. She was just that person that I didn't want to be her because she . . . When I say . . . She put the fear of God on people, just her whole demeanor. That's who she was. You need somebody like that in your life because you don't want somebody to always feed you positive things. You need those critical people. That's who she was. I'm not saying she was always critical but she will always point out things that you may not have thought about before. She was probably one of those good supportive people.

My sister. We're actually almost nine, ten years apart. If I ever need to get away, I could come to her house and have talks or whatever. She had already been to college so she had already done all the things I was trying to do. Her and also my older cousin because she's like four years ahead of me. Once my sister left to go to college, she took over that role. I've always had close family around me and good mentors. The person that ended up being my research advisor at Maya Angelou University (MAU), and he's still there now. We still communicate. He was also a mentor. My niece is actually at MAU now. He talks to her and tries to influence her as well. So I think those were big supports.

Skylar's exposure to research flipped the switch for her from medicine to research. Her narrative reinforced the storyline of undergraduate research and the importance of exposing science students to it. She also introduced the storyline of supportive family and friends. Skylar was "strategic" about finding mentors and building her support system. She is similar to Dahlia in this regard. Dahlia sought out mentors that

were black females, like Linda Brown at Jemison University, who had traveled a similar

path to the one that she was about to venture down in science.

Skylar also shared that she first experienced insecurity about her ability while in

the summer internship at Whittaker University. It was the first time she remembered

feeling what she described as "uncomfortable":

> Skylar: When I did my summer fellowship at Whittaker. It's like I went *there*, initially. I was like . . . I was not necessarily scared, but uncomfortable because what all these kids from like Duke and Chapel Hill, just all the country. And even though at the time, it was supposed to be a minority program. The majority of kids though, when you looked at them, they look *white*. I mean like 10% Irish or whatever. It was just so crazy. You're in this program and you just felt like you weren't as prepared.
>
> It wasn't until you got moving along and doing your presentations, interacting where you're just like, "Oh, I know just as much as you."
>
> It just took that experience to, I guess, kinda realize that you're just as competent. And if you do have deficiencies, and this is what I tell my students, "Work on them." I'm constantly working on myself. I think the more you work on things or areas that you feel you're weak, the more confident you feel. I think at that time, I didn't know enough or I wasn't knowledgeable, or I wasn't exposed enough to know that. I think it kinda scared me on the front end being in those situations. I guess moving forward, it really helped me because it's like, "I can make it." I did well in the program and I came out on the other side and went back at to school. And it's like I'm so much more of a better student because of it and I approached my work differently. That's about it.

Skylar's initial feelings of being insecure about who she was and where she was

coming from were countered by feeling competent and confident once she was able to get

to know the other students. Within her narrative Skylar introduced the storyline of feeling

insecure, but also the storyline of feeling confident and competent.

Skylar's experience during her undergraduate years took a surprising turn in her junior and senior years. It was a time when she recalled that her support system became critical:

Cailisha: Do you remember a time in particular getting the support maybe from a mentor or a friend when you really needed support, getting that support?

Skylar: I would guess, yes. Along my way, everything has just been so structured. I'm a really structured person that plans and all that good stuff. My junior year, my oldest daughter, Asha, she popped up and surprised me and so, that was not in the plan. It was just one of those things where, okay, for a long time, it was just like, "Okay, we're just going to ignore this is happening." It was like four or five months into my pregnancy before I felt like I was exhibiting symptoms. I was running cross country. I was just doing it up. Then, just that realization hit like something is wrong with you. You know something's wrong with you. You know what I'm saying. Go to the doctor. It's like, okay, my whole situation is about to change.

I guess for me at that time, it was more of "What are people going to think?" You put all this time into what you're doing? It's going to drastically change your situation moving forward. I guess my thing was *not* to let that happen. My parents from the time that I told them, they were so supportive, not a negative word about it. It's just all about what was the best plan moving forward.

I just felt like I didn't miss a beat, and I know that sounds crazy and unrealistic but I felt like I didn't. It's just like my parents are always there to help out. Me, I was like, "Well, I'm grown and I'll get my own place." They were always there to help if I needed to study or whatever. It didn't change the social dynamic too much. I try to be responsible and all that good stuff. I guess they didn't want me to miss out on certain things. So certain social things that I could do.

In regards to my honors program advisor, I went to her. She's like that kinda second mama figure for me at the time. It's like, well, this is the situation. I'm not going to let it interfere with anything. She's looking at me like, okay, all right. I don't want to be treated any different or anything like that. She was just always there. She saw me slowing down a little bit. She would give me that look. And they just kept me

going. My friends at the time. Everybody was just like, "Okay, we're just going to keep this going. And everything just turned out fine."

That was one of those times where things where you don't necessarily plan for it to happen and you come out on the other side better than when you went in. It's not that you try to be, but even the students you see them that come through, we were selfish. They're selfish kids. I think the generation has changed where some of the kids now, unfortunately, I feel like they are even *more* selfish. And they feel like they deserve certain things without even working for them. But, we're teaching them. But during that time, you're just thinking about yourself. But then you come out on the other side. "Oh, it's not just about me anymore."

And I think moving forward, it made me a more selfless person. Like what I do now. I think that's what helped me become who I am. The whole medical school thing, all that was those decisions. It helped identify the type of person that I was at the time.

Asha's birth changed Skylar's life. She said that she became less selfish and realized that it wasn't just about her anymore. Becoming a mother, also threw her off course after graduation because she is a planner. She had planned everything. She expressed how difficult it was after graduating undergrad and having her daughter because for the first time in the life she had not planned her next move. Her next move became moving and working at Whittaker as a lab technician. Her sister lived in the same city and she was able to live with her sister, brother-in-law, and their young daughter who was just a few months older than Asha. The made room in their lives for her and Asha. They even moved to a bigger house so that she and Asha could live in the basement and have their own space.

Niema received her undergraduate education at Ida B. Wells University. As a MARC scholar, she participated in research experiences at Wells during the semester and

then over the summer she traveled to research programs at other schools. She also had the

opportunity go to Australia for six months and conduct research. When I asked her about

if there was ever a time that she felt invisible or alone, she talked about traveling in the

summer:

Cailisha: So when or have you ever felt invisible or alone being an African American woman in science?

Niema: All the time . . .

[Laugher]

Pretty much through undergrad I think because I went to an HBCU, I felt very comfortable during the academic year. During the summers, I always went away to do research. And the first time I remember experiencing that feeling was when I did a research program at Henrietta Lacks University in NY (PWI). And I was the only African American. I don't remember hardly ever seeing African American there. Even just walking around campus. And a lot of times, I felt extremely lonely. And one of the things that I started realizing when I was in undergrad is that you don't have to be . . . you don't have to be around a big group of other minorities. If there is one other minority, you tend to sort of flock together. And so, that's the first time I really felt invisible and completely alone. Even though I was with a big group of students. Because I think there were maybe 25 students in the program, but I was the only minority.

Cailisha: As far as your support at Ida B. Wells . . . you described it as feeling comfortable when you would return to school. What was your support system at Wells?

Niema: My support system was wonderful and broad. In my department my advisor, I mean she was just wonderful and she is one of the people that I really give credit for keeping me in science. I had a research adviser who was outstanding.

My academic adviser was African-American woman. Her name is Mary Swift Hayward and she's still extremely active. I can't remember which university she's located at right now. I think she's a provost or a vice provost I just remember that name but she is awesome. She was

one of the first African-American female PhDs I'd ever met and so she was very impactful.

My research adviser was named Dr. Josh Phillips and I love him to death. He was a micro-biologist. He gave me my first real research experience and it was so much fun because it was outside. I'm not an outside person but we went to the fauna forest in West Virginia and collected water sample and stayed in a cabin.

It was really cool because I learned how to do field work with him and I'd never done that before. He also had a project where he studied the effects of hurricanes on erosion. I thought it was amazing, I didn't know that you could do that. They were very impactful and from my advisers to every teacher that I had, everybody . . . It wasn't just that they wanted you to do well, they expected you to do well.

You were expected to complete the program with A's, you were expected to go away and represent the university the way you would represent your own family. Even to the President of the institution . . . There were two presidents while I was there. I remember you would just see them walking around campus. They would walk up to you and talk and I was just like, "This is amazing!" They came out of their office to really see what was going on, on the ground. That was great, I thought that was a really great way to model what we supposed to do.

Cailisha: What about your undergraduate research experiences in the summer? How did that impact your relationship with science?

Niema: My first experience was actually in a program between John Hope Franklin University and McNair College of Medicine (both Southern HBCUs) and I was lucky to be able to go with my best friends. I took my support with me. In that program, it was more of a program to introduce you to science and to different careers that you could participate in. That was wonderful.

Then once I did that I realized, "Hey, this is something really cool to do during the summers." When I came back to school I was working with Dr. Phillips at that time and he encouraged me to keep applying for summer programs. The next summer that was the summer I went to New York, I went to Lacks University. After that the following year that was when I went to Australia.

Cailisha: Did you come back for a semester and then go or you came back and then went immediately in the fall?

Niema: I came back in the fall of my junior year and I went to Australia in the spring of my junior year.

Those experiences were invaluable, there's no way I would have continued in science if I hadn't had those experiences. It wasn't that every experience lead me to the research bench. It was that every experience helped to really increase my belief in myself. It helped me realize that I could actually do this and that I wasn't the only one who wanted to do and that was very powerful. In addition, I was able to develop a whole new support system. A lot of the people that I met when I was in these programs we still keep in touch. A lot of them are nurses or PhDs, MDs, people doing lots of different things there.

While in New York, Niema recalled having to contend with racism. She was the only minority student out of about 25 and she remembered feeling alone. She also told me about an experience that had a very lasting impact on her:

Niema: I went to a summer program in undergrad at Lacks University in New York and I was working with a post-doc and he was awesome . . . to this day . . . I mean he was wonderful. And he never meant any harm, but he and his wife were having a baby and we were talking about what he was going to name his baby. And it was a group of us. There were other students. There were graduate students and other post-docs. And I remember he turned to me and he said "Well Niema, your parents were so smart." And I said, "Why?" He said, "Because they gave you a name that you can use in business and one that you can use at home." And it took me a minute, and I was like "What was he talking about?" And my first is Cynthia, and my middle name is Niema. And I remember, I didn't get mad at him because I knew that he didn't mean any harm. He just didn't know any better. And that day when I got back to the apartment I called my dad. Because my dad gave me the name Niema. And I told him, I said, "Daddy, I hope you never think I'm ashamed of my name or I hope you never take offense." But I told him, I said "Every chance I get, I will be called Niema. I don't care if I'm at home. If I'm at the office. Wherever it is." And, now it's so funny because now when people call me Cynthia, I know its people that don't know me. But that was very, very telling. And it could have . . . if I were a different person that could have ended very badly, but I was raised that you should use every opportunity as an educational experience. Not use it to show out. So . . . you know.

That experience altered how Niema chose to operate in the world by changing how she

wanted others to identify her. She also had another uncomfortable experience that she

said stayed with her all of her life. She described it when she told me more about

Australia:

Niema: So I did . . . it was sort of like a study abroad program but it was a
           program that was paid for by the National Institutes of Health. It was
           called the MERCK fellowship. And during my junior year of college I
           spent six months in Australia and during that time I had my first big
           experience with research and that was really beneficial. The research
           was in physiology. Which I have absolutely no interest in, but I didn't
           know that at the time. So, it gave me a chance to be trained in animal
           safety because we did a lot of animal studies. I really got a chance to
           listen to researchers who were not from the United States. I got a
           chance to hear about how they talked about science which was really
           interesting. And just to see how people outside of the US thought about
           science in general and how they thought about people in the US. It was
           really interesting.

Cailisha: And what were their thoughts about people in the US?

Niema: Most of them had very positive things to say but when it came to the
           perception of African Americans it was very negative for the most part.
           I know one person who was a non-scientist but someone who I
           interacted with . . . I remember he asked me what gang I was in. And he
           was serious and he showed me this newspaper article that talked about
           how like 90% of African American women were in gangs. And he
           asked me how many children I had because another stereotype was that
           we have children very early and lots of them. The only African
           American female that he had really been exposed to was Oprah. And
           Oprah was in a special category. So that was very interesting.

Cailisha: Wow.

Niema: And there was one other thing that made me aware of how African
           Americans are seen outside of the US. The gentleman that I worked
           with, he as a post-doc in the physiology lab. Very nice. Just a very
           sweet person, and he was German. No . . . He was Dutch. And I
           remember he asked me and one my friends if we wouldn't mind
           babysitting for him and his wife one night. And we were very happy to.

> You know I love playing with little kids. And so we were at their house and they had shown us a little bookshelf with all of the reading material that we could read to the little boy. And I remember there was book in there and it's called the Little Pickaninny. I will never forget it. And on the front of the book it had picture of little black child. It was a cartoon drawing. And if you remember how Buckwheat looked . . . .I forgot the name of that show with Alfalfa.

Cailisha: The Little Rascals

Niema: The Little Rascals?

Cailisha: Yes.

Niema: The picture looked like that and so the little child on the book had the pigtails that were sticking everywhere. They had little bows on them. It was a very dark skinned child and it really made me think, how was this scientist seeing me? It made me really question that. And so I have carried that with me all my life. I'm always wondering how I'm being perceived.

Niema's experiences forced her to question how other people saw her. Her research experiences with her mentors at Wells and abroad struck a chord with her and she became excited about a future in research. Unfortunately, however, she also had to contend with antagonistic forces that made her feel insecure. In the following sections, I look across women's narratives and discuss the storylines of cooperation and tension.

Mentoring, Support, and Research: Storylines of Cooperation

The experiences that the women in my study had as HBCU undergraduates reinforced and solidified their passion for science. All of their experiences were in cooperation with who they were and who they were becoming as emerging scientists. The storyline of research experiences was strongly supported by the narratives that all of the women shared. It was within research where they first felt like scientists and saw science

as a possible future. Whether gently led into research or strongly shoved (Samantha),

they all found themselves deeply connected.

Also, the storyline of support and mentoring by HBCU professors and advisors

was strongly supported. The one-on-one support they received made the women in my

study feel important and valued because of the time and energy their mentors were

willing to spend on them. When explaining the value of the HBCU experience, Samantha

stated:

> Samantha: I really value the HBCU experience because my professors in school . . . I wouldn't have gotten that at another school. I would have been just a number, but for them to say "Samantha, you really could do this." I hadn't thought about grad school. I would not have thought of it if my advisor and the department chair had basically . . . I remember, I stayed in her office until like 10:00 that night because she wanted to make sure I submitted this application for this internship before . . . She knew it was not . . . that I didn't want to leave. I have not left the state, and you want me to go spend a whole summer in Pennsylvania on a farm. My boyfriend was . . . I'm like, "I don't want to go." She's saying, "You gotta think beyond right now. You've got to think about your future." She stayed with me in her office until 10:00 that night to make sure I got the application submitted and she wrote my letters.
>
> Even when I came back I told them I loved it. I was just like, "I really thank you for pushing me to do it because I needed that."

Additionally, the storyline of feeling competent and confident resulted from the

encouragement and recognition from their advisors and mentors. Because of the time and

energy of their mentors, all of women went on to pursue PhDs. Skylar took a detour and

worked after undergrad before beginning a master's program, and then a few years later

starting a doctoral program. All of the other women went straight from college to graduate school.

Feeling Uncomfortable & Insecure: Storylines of Tension

Storylines of tension were exposed in the narratives of Niema and Skylar. When she discussed her summer, Skylar said, "I was not necessarily scared, but uncomfortable because what all these kids from like Duke and Chapel Hill, just all over the country . . ." She was uncomfortable at first and later realized that she was just as competent as everyone else. Niema experienced feeling uncomfortable during her summer program at Lacks University in New York because she was the only student of color in the group. She also became very insecure regarding how she was being perceived because of her experiences in Australia. The experiences created a heightened sense of insecurity.

In the next chapter, I share the women's journeys as they graduated from undergrad and continued in science. I share narratives about the many triumphs and challenges they experienced in their various doctoral programs and beyond, as some of the women entered careers in academia. The journey has not been an easy one. The women used many adjectives to describe the various experiences they had the emotions they felt along the way. There is only one word that I could settle on to describe their collective experience: unexpected.

CHAPTER V

AN UNEXPECTED JOURNEY

For every good tale, there is a captivating beginning, but then there is the part of the story where the plot thickens, and the heroine faces challenges and adversity. She might encounter a disgruntled dragon, an angry ogre, or perhaps a nasty troll that resides beneath an ancient stone edifice. Although our heroines did not met physically with trolls, ogres, or dragons; they did all encounter barriers and challenges that they were forced to mentally battle with and struggle against. For some of the women, the obstacles seemed so insurmountable that they almost abandoned the course. At some point, each woman came to a crossroads in their journey that tested who she was and what she was made of. Ultimately, our heroines were required to make some tough decisions that would impact their journeys, their stories, their lives. The unexpected encounters thicken the plot as we follow each women's journey into doctoral programs and careers in academia. I chose to present each woman's story in its totality by weaving together their narratives with very little interruption from me so the readers may absorb the full measure of their experience. The title of each women's story was either pulled from the narrative or chosen by the individual themselves. We follow each woman in order of their position along the academic trajectory. Our first narrative is from Dahlia Rhodes a doctoral candidate at North State University: *Dahlia Rhodes: "This is hard for too many reasons."* The second tale, *Dr. Samantha Johnson: "A long, hard journey,"* follows the

story of the South East University TEACH postdoctoral fellow. The next story, *Dr. Skylar Dawson-Bennett: "There is no substitute for hard work,"* details the journey of assistant professor at Tubman University. Douglass University associate professor, Dr. Anderson, shares her story in *Dr. Cynthia Niema Anderson: "A Serious Scientist."* And finally, *Dr. Grace S. Williams: "I Gave It My Best"* is the narrative of the Douglass University full professor.

Dahlia Rhodes: "This is Hard for Too Many Reasons."

Dahlia Rhodes began the PhD program at North State University (NSU) in July of 2011. NSU, a Predominantly White Institution (PWI), is located in a large urban metropolis in the Northeastern region of the United States. She graduated in May from Douglass with a bachelor's degree in chemistry and began the doctoral program in basic biomedical sciences in July. She only had a short break over the summer during which she worked with her sister before moving north to begin the program. At NSU, she was one of three black students in her program, with one African male, and another African female. She noted,

> Dahlia: A lot of the African-American students in the program up there just didn't matriculate. They didn't make it. They ended up dropping out and going off somewhere. It was like you come into this program and the pool of African-American students is already small. Then they drop like flies left and right, and then you don't really have anybody left.

Dahlia also had another challenge that she remembered: she was coming straight from undergrad. There were students with medical and master's degrees and coming from industry. Only a small percentage of the students entered the program with just a

bachelor's degree. She remembered questioning where she fit in because students often grouped together based on whatever country they were from. During the first year, the other students who came straight out of undergrad became the group that she congregated and studied with. There were about 15 of them and they became very close. She recalled, "It was hard for me to be coming straight from undergrad into this program, and then having to relearn the dynamics of different people, and being culturally aware, and all these kinds of stuff. "Why is everybody competing against each other? We all gotta go pass this class. What's *wrong*?" It was especially hard for Dahlia because she came from an HBCU with a very different cultural milieu:

> Dahlia: I don't know if it's all HBCUs. I don't know if it's a college thing, but when you come from Douglass and you come from this family setting where, especially in our department. Because it was three of us that were finishing. And we had been through everything together. You expect that, wherever you go next, if there are people that are in the same situation as you, i.e., incoming students into a graduate program, that people would be more open to, "Okay. We all have the same goal, at least for this first year. We need to get out of these classes. Let's work together." And so, I guess that was my thought process coming into graduate school, but that is not the case.

In fall of 2014, Dahlia passed her qualifying exams, a period that she recalled as the most challenging because she felt alone and overwhelmed. By the beginning of 2014, Dahlia could not take it anymore. She had enough and left the program. She decided to return to her southern home city and began teaching high school physical science. By summer, after the school year ended, she had a conversation with her advisor, who then made accommodations for her to continue her thesis work and remain in the south. Dahlia had begun a computational research project and only needed computer space to

work. Just as she intended, she was working on a project that involved HIV. When I

asked her about her thesis work, she said, "I study a protein in HIV called the protease.

Specifically, I use computational methods to determine how mutations interdependently

cause high levels of resistance to the most potent inhibitor on the market. The proteases I

am studying are from actual people with highly mutated viral genomes."

Her advisor from NSU arranged for Dahlia to have lab space in with a colleague

at South East University (SEU) so that she could stay close to home. Once everything

was arranged, she got back to work. We met for our interview in a small conference room

down the hall from her research computer space. She pointed it out to me as we walked

down the hall to the conference room for her first interview. She recalled her advisor

making the arrangements for her to stay home as a time when she received help when she

really needed it:

Cailisha: Can you tell me about a time you remember getting the support you needed? Maybe a particular situation you were going through where you needed out, either to vent or to ask for suggestions.

Dahlia: The reason why I'm here is I was reaching out to people for help. My thesis program is actually up north at NSU. I'm technically a NSU student. I'm just here at SEU. It got to a point in my third year where I was just like, "I'm not going to make it up here." This is just not for me. If I could pick up my lab and move it to New York or Connecticut or New Jersey or somewhere, it would be fine. I just was not going to make it up there. I talked to my thesis advisor, and we've had several conversations on this. [She said] "Is it that you want to drop out? Or do you want to master out? Or is there some other solution that we could work out for you?" I was like, "I need a break."

So I took a break, and I went to go teach high school. Then, I talked to my thesis advisor and I was like, "I think I just want to stay close to home. I don't want to quit my program. I don't want to get a masters. I want to finish my PhD, but I just can't do it there." She and Ronald

Sooner, whose lab I'm in here, they worked out an arrangement where, since I'm computational anyway, "Can Dahlia just sit in your lab? She doesn't need you for anything really." Because I don't do any experiments. "Can she just sit in your lab and finish her thesis?" He was like, "Yeah." It was just one of those . . . your thesis advisor is the only one you can turn to in that situation, but she used her resources to find a way that I could finish my program but not have to finish back up at NSU.

Cailisha: What was it about up there made you feel like you needed to get away?

Dahlia: It's just a different . . . The environment is different. The people are different. The lack of African-Americans is different, especially in the labs. It's really hard for you to like, I don't know, kinda like stake your place. It's *cold*. The *people* are cold. I think they're cold because it's always cold *outside*. It's just a different type of place, where I guess if you're not from there, it's hard to adjust. At some point, I think I was doing fine. Then after, in my third year, where, in your third year you're thesis and it's just like, I passed everything. Now, I'm just into this abyss where I have to do research all the time and everything is failing. It's negative two degrees outside. This lady has been rude to me for the 15th time today. I just am like, "I need to go back home, recharge and reboot somehow, finish this program, and then just move on with my life." It's just a rough place.

So in the summer of 2014, Dahlia returned to the lab and to the computer to continue her computational project. She had been back full-time for one year when I met with her during the summer of 2015 to conduct our interviews. Living up north with the cold weather and 'cold people' were just two of many barriers she face while in her doctoral program. There were times she remembered feeling very alone because she did not have any help:

Cailisha: Can you remember, I guess while you were there, any experience that were especially challenging or difficult? A time in particular where you had to deal with that and came to realize this was the culture?

Dahlia: I think probably studying for our exams the first year, our class exams. And then, going through the qualifying process were probably times where I was just like, okay. You really got to be worried about yourself, because nobody else is going to worry about you type-thing. I think those were the moments where I was like, "Oh, Lord. I got to get myself out of here because can't nobody help me."

Cailisha: How did you study for your exams? Did you do that alone?

Dahlia: No. The thing was . . . We are broken up into three blocks, or three classes. Biochemistry was the first class we took when we got there. I didn't need help with biochemistry, so I kinda studied alone. Then, when we got to the molecular biology course, I was like, "Oh, Lord. I need help. Because I don't know nothing about what y'all is talking about." That's when I started studying with the group of kids. Again, they're all from masters programs, or they got medical degrees, or they have . . . You know they're from places where they have done biology for a long time and they get it. I couldn't keep up because I'm just like, I don't know. What do you mean your gene gets transferred? What happens? What do you mean this thing sits on a promoter? What is the promoter? I was like, I know Ms. Stamm taught me this in my sophomore year, but I didn't think I was going to have to use it.

            So it was just one of those things where I was like, "Okay. I've got to study with the group, and I have to be careful what I say so I don't offend anybody and all this other stuff. What ended up happening was, I did not pass molecular biology the first time. I was mad because they draw a cut-off of kids that passed and didn't pass, and I was at the top of the list of kids that didn't pass. I was like, I was *1% away*. Then we took cell biology and I was like, "Okay, now molecular biology makes sense, because y'all didn't tell me all this stuff happens when a ligand binds to a receptor and all this. Y'all could have told me that in the beginning." I didn't get the big picture. Nobody told me all this stuff in the beginning. The cell biology made sense, because immunology was the last class that I took at Douglass.

            When I retook the molecular biology class, because it was a small group of us retaking it, that's when I really started to connect with my classmates more. They were from everywhere, Singapore, Mexico, and I was like, okay, now this is like I'm going back to elementary school where all of my classmates are different, and we're all on the same page because we gotta pass this class. And if you don't, they're gonna kick you out. It's one of those types of situations. I think that was a really hard time.

In a follow-up conversation, I asked about her statement "I have to be careful what I say so I don't offend anyone and all this other stuff." I wanted to know what she thought about when she made that statement, what did she thought she might do or say to offend someone. She explained, "Different languages/cultures have different slang terms and beliefs, etc. It's easy to offend someone unintentionally when you don't realize that what you've said is demeaning because they are from a different place." She made a conscious effort not to do or say something that would offend someone. When I asked Dahlia about the challenges that she faced, why thought she experienced feelings of loneliness and not making connections, she replied that it was probably the culture:

Cailisha: To what would you attribute the challenging experiences? You not being able to really make connections or feeling alone. What would you attribute to those experiences? What do you think was the root or the cause of you being alone?

Dahlia: I think in these programs, because of the way that they're set up. I guess it's more of an every man for himself mentality. When you try to reach out to say, your lab mates, and you're like, "I am flunking this class and I'm going to tutoring and I'm still flunking." And so you reach out to the people that you feel like would be most apt to help you, but I feel like the further along you get in these programs, you get to be a little bitter and a little cranky, and you want to get out. And you just don't remember what it's like to be in your first year, in a molecular biology class, from a chemistry or an engineering or whatever background, and you just don't know what's going on. I feel like there's a disconnect almost, where the incoming students have to go through this whole process and they're in these labs with people that have gone through this same exact process, but nobody . . . I don't know if it's they're not willing to help, or they just don't want to be bothered or what.

But there's definitely some sort of thing where, I guess it's maybe a nurturing kind of thing. It's kind of like being a baby and you're reaching out to your mom or your mother figure for help because you're hungry and can't feed yourself. Then, you're like okay. What do

I do now because this person can't help me? What am I supposed to do? You keep going through this process, and you cycle through this process with different people. You get frustrated because you're like, "Why isn't anybody helping me?" And then that leads to whatever feelings, like, "Oh, I feel so alone here or this is really depressing." It's just one of those things where the natural inclination is to reach out to the people that you think have gone through the process and know what it's like and they can help you. But that's not always the case. I don't know if that makes sense.

Cailisha: No, it makes sense. You already said that there were times when you thought you wouldn't make it, correct? Daily?

Dahlia: Mm-hmm (affirmative). I would drop out every day in my mind. I'm telling you.

I was very troubled by her account of being depressed. When I followed up with Dahlia about her statements, I asked if she had suffered from depression during graduate school. I wanted clarity and to know if she used the term "depressing" for emphasis or if it expressed true feelings. She replied, "Yes, I became severely depressed there." This concerned me greatly. Dahlia explained that it was not just coming straight from college that made her feel alone:

Cailisha: Can you tell me about a time, as an African-American woman in science, where you felt invisible or alone?

Dahlia: That happens a lot. Basically that was my entire experience at NSU, which is why I'm here [back home]. My first year it was more of, I felt invisible because I was not really able to contribute to my classmates studying for the tests, because I just didn't know a lot of stuff. But then my second year . . . you get separated from your classmates because everybody goes on their own individual path and so I was like all these people that I spent my whole first year with . . . they're gone now. They're all separated. That's when I really started to feel alone. Then, I think I was trying to learn molecular dynamics and there was one girl in the lab who was like on her way out and she just took this other engineer under her wing and I was, "What about me? I need help too."

> But for whatever reason, I don't know, maybe I wasn't catching onto stuff fast enough for her, but I ended up working with another post doc and he was really patient. The problem is everybody treated him like he was invisible too. Kyle. He was quiet and stayed to himself. It was like the more that time progressed up there, the more I felt like, "Ummm, this might not be the place for me" For those reasons. "Am I incompetent? Am I not really here? I don't really fit in with everybody. Basically my time up there was like, "This is not cool!"

This experience led Dahlia to feel like she did not want to continue. When I asked if there were times when she thought she wouldn't make it, she recalled it happened early in the PhD program. She said:

Dahlia: When I got to grad school, and I was just like, "I'm failing. I have never failed a class in my life. These people up here are mean. I don't know what to do." My thesis advisor is just really too nice so she doesn't know how to help me all the time. I don't have anybody to reach out to. This is lonely. I don't need this. I have a bachelor's. I can go teach high school and be done with my life and have a career for the next some-odd years.

All these emotions come and keep coming and keep coming, and so I think there was really a time where I was like, "I could just stay down here and teach high school. I love my high school kids. I love them to death. I could stay with them forever. But it's like, in the back of your mind you know if you don't finish the program, you're going to be like, "I could've gotten my PhD." There was nothing wrong academically. It was just the emotional side that was jacked up. For me, I spent all last summer trying to figure out, do I stay a high school teacher or do I go back and finish this program? Nothing, logistically is wrong. I have funding. I have a lab. I have a project. My mentor is okay. It's just, do I really want to do this? You don't need this. I'm 26. I don't have any kids. I should be out here traveling the world, but I'm stuck in here with this computer. I just . . . you just get to a point where you are like, "I do not need this." Then some other part of your brain is like, "Just shut up and finish."

I wanted to know more about Dahlia's experiences as an African American woman in science. So I asked her to describe how she perceived it:

Cailisha: What does it mean to be an African-American woman in science? How would you answer that?

Dahlia: I don't know what it means I just know it's hard. I think it means that we, as black girls, basically, can do science and we can do it with . . . I always, I hate to sound racist but you always get the feeling that science is an old white man's sport. It's just like politics, it's just an old white man type of deal but you have so many other people who can grasp the concepts and can do the work. I think it's a good thing that we're here but it's just very tough sometimes. I know for me, I second guess myself all the time and these people will have you second guessing yourself. You are like, "No, I know I'm right. I know I did that calculation right."

It's just one of those things. Then when you do second guess yourself, I know for me, I have run down . . . run through a list of okay, is it because I'm black, is it because I'm a woman? Is it because . . . I think they just feel like I don't know this? They assume that I don't know this or did I say something? So I just always question myself but I take what anybody says anyway and listen to them. If they're wrong then I'm like, "I don't think that's right." But I just feel like it's empowering to be here but at the same time, it's really tough because you're like, "This is hard for too many reasons."

Cailisha: What are some of the reasons that you think it's hard?

Dahlia: My first year in grad school, sometimes you just feel like . . . even Dr. Parsons, I talked to Dr. Parsons about this, you feel like nobody listens to you or they don't hear what you're saying. And you literally can . . . somebody can pose the question and you can literally be like, "Boom! that's the answer," but then they will go on for 30 minutes trying to figure out the answer to the same question they posed 30 minutes ago and then they'll get to the same answer that you gave 30 minutes ago and then you'll be, "That's what I just said." So I feel like that happens a lot and I don't know if people do it intentionally, scientists like to hear themselves talk. So I'm pretty sure they like to figure everything out on their own, no matter how long it takes. But there's been several occasions where I've been in a conversation with people and I'm just like . . . it's pretty obvious that X, Y and Z is the answer to your problem but . . . that gets frustrating because you're, "I just said that."

That's one of the problems. And you know some people can be pretty rude and so it's very hard for you not to react a certain way, even if you feel like you're being talked to a certain way. Nobody checks these

people sometimes so they just go along with their day and they're rude all day to everybody and nobody says anything. So maybe they're not aware but I'm not that person, I'll would let you know. "Hey, you're being a little abrasive, can you say this without that tone?" I know I can do it too sometimes but I don't realize it. It's just different little things that just makes it tough and you question, "Oh, is it because I'm a black girl that you think I don't know this because I know this? You didn't ask if I didn't know. I didn't tell you I didn't know." It's those little pieces that makes it a little bit tough.

In this narrative, Dahlia highlighted the fact that her race and gender seemed to run counter to the norm of science. Also, she described feeling invisible because "you feel like nobody listens to you or they don't hear what you're saying." Once she mentioned her race and gender, I questioned whether or not she felt like they played a factor in her experiences:

Cailisha: You mentioned questioning whether it was your race or your gender, did you feel like, when you were there that that's why you were being treated as invisible? Or what did you think it was?

Dahlia: I don't know . . . I could never put my finger on it, I just knew that I was different from everybody else and I assumed that if anybody treated me a certain way, it was because I was different.

Cailisha: Different as in?

Dahlia: Black and female. And I had a chemistry degree so I really didn't know the biology. I don't know . . . you always, you get the feeling that okay, somebody says something to you and it's a little out of place. Yeah, if somebody said something to you and you're already out of place, being here, and then if they say something that's a little just sideways, you're like, "Why did you say that to me?" Or if you asked for help and somebody gives you an answer like, you should already know what's going on, then it makes you question yourself.

I thought, "I am tired of doing this with you all." Obviously I'm here in the same lab, I'm at the table for dinner with you all. Clearly, I'm supposed to be here. I passed my qualifying exam and everything, but

. . . and I think that that was one of the things too, where, I don't know if it happens to all first years or if it's just me, I feel like after I passed my qualifying exam, that's when people were like, "Oh, maybe she did know what she was talking about." Then I got my grant funded and then everybody started to be a little more at ease, I guess. So I guess people want you to prove yourself to them as a scientist. I don't know, I feel like maybe it's magnified when you're black and female.

I also wanted to know if her race and gender played a part in her wanting to leave:

Cailisha: Did you think that your wanting to leave though . . . you talked about race and gender, do you think played a part at all-

Dahlia: Uh-hmm (affirmative).

Cailisha: In your wanting to leave? In what way?

Dahlia: It was just . . . I don't know if it was a matter of there are more black people in the South or if it was more females I feel like . . . I don't know. But it was definitely like I just didn't fit in up there and I felt like I was never going to fit in because nobody looked like me and the people up there have these different sort of attitudes that I just wasn't accustomed to. Even growing up in the north, I was like the temperament of the people is a little bit more mild, even though it's still in the North. I feel like the people up there are not very accommodating people to outsiders. So it was a culmination of everything.

Like, I am black and I am a girl and I am out of place and I don't really have any friends up here. And I'm not making any friends up here. It wasn't until I was about to leave that there were more African-American females that were coming through. So by that time I had made my decision and it wasn't . . . and they would be at the beginning and we would be at two different points in our graduate careers. So we'd still be different but at least, I guess, you would have somebody to talk to. But like I said, at that point I was already ready to go. I think it was the lack of community between diverse students that was there. There were diversity programs there but a lot of people don't participate so that defeats the purpose. So it was just hard, you don't have anybody to turn to because you're comfortable turning to people that look like and they're just scarce. They just don't exist.

Although Dahlia had a lot of low moments and even suffered from depression

during the program, she did have times when she left really confident in herself and her

ability as a scientist. She recalled those moments:

Cailisha: Can you tell me about a time when you felt comfortable and competent, really competent in yourself as a scientist?

Dahlia: I think when . . . so some of the younger scientists in my lab at NSU now come and . . . not even in my lab, even in other labs . . . they'll come to me and ask me, "What does this mean? What is the theory behind this? How do I write this grant?" I'm able to tell them so I feel like, so just now within this last year, I feel like maybe I am a scientist, like maybe I'm a just nerd and it's time for me to accept it. I feel like we always have this . . . I have this, I guess they call it impostor syndrome where I don't think I'm smart. I don't think there's anything spectacular about me and then everybody else is like, "Dahlia, you're so brilliant," . . . and I'm, "No, I feel dumb as a box of rocks because I still don't know the answer to X, Y and Z and . . . " But people actually come to me for advice and help trouble shooting and they're . . . when I perceive them . . . a lot of the times are higher than me at some level or something.

But I feel like it's more of an "everybody has their strengths" thing. Everybody has their own individual strengths and we all have to lean on each other for each of our strengths. It's probably more of that than, "Dahlia, knows all this stuff and she's really good at all this stuff." But when one of my lab mates called me to ask me, "What's the theory behind molecular dynamics?" And I could give her a very straight-forward answer I was like, "Ohhhh *snap*! Maybe I do know. Maybe I do know this stuff." I don't know if I'm ready to defend it or not but I get the general gist of it.

Even when Dahlia recalled moments of pride, she also revealed times of

insecurity and self-doubt. "I guess they call it impostor syndrome where I don't think I'm

smart." Her professors told her she was brilliant, but she still second-guessed her ability

and felt unsure. Despite these low moments, Dahlia also reminisced about times in the lab

and at a conference when she felt really confident in herself as a scientist:

> Cailisha: Can you tell me about a time when you've been in the lab that made you feel especially good about yourself as a scientist?
>
> Dahlia: I don't know if there's been a specific time. I know I'm pretty good at when I get data . . . before my first paper came out and I had my data and I was trying to interpret it and figure out what it was all saying and then some other lab published a paper and it was kinda in-line with what I was doing and I was, "That's what this means!" So I took it to my boss and I was, "Look! Look! They said this and this is what I'm seeing in my data so this is why this is happening." She said, "I can't keep up! I can't keep up!"
>
> So I had to keep re-explaining it to her so through that process I was, "Okay, I'm tired of talking about it now. You should have got it five minutes ago." But that was probably one of the times where I was like, "Ha! I figured it out. I think I'm ready to go." I wasn't ready to go of course but I was, "Yes! I told you I could figure this mess out." Now I'm back at the same starting point because my project is taking a different turn so . . . but I'll be able to figure it out.
>
> Cailisha: What about at conferences? When you go to a conference, has there been a time when you've gone to a conference and you felt really good about yourself as a scientist?
>
> Dahlia: It's weird because when we go to conferences . . . if it's an oral presentation, it depends. Normally, if it's an oral presentation, if somebody asks me a question then I feel good. Normally, at the end of a talk, if nobody asks you a question something's wrong, you didn't give your presentation correctly. If it's a poster presentation, I think being able to talk to the person at the poster. I go to a lot of different conferences, I got to virology conferences, I go to structure conferences. So especially being at a conference where the people are from a different background and they'll see my poster and they'll cringe because they're, "I do not understand anything about computers," getting them on board and explaining something to them and having them understand it, that always makes me feel good. Because if I can explain it to you, I can

explain it to anybody. That's one of the, I guess, times I feel good at conferences.

Although Dahlia had many up and downs in the program and even left for several months, she did return to her chosen path and resumed the journey. At the time of our interview, during the summer of 2015, she was back at the computer and continuing her doctoral program. When I asked her about her relationship with science right now, she replied that she had a list of things that she wanted to add to her CV before she finished her PhD to make herself more marketable when she started looking for jobs. One of the items listed was learning a basic programming language. She talked to the PI in the lab at SEU and he suggested that she sit in on a programming class and she even considered online courses. On the final leg of graduate school, her friends, mentors, and two thesis advisors offered a lot of support. She said, "That's pretty much my support system. Basically a group of scientists and a few friends of mine." With her support system, she was confident that she would finish strong and move on to the next phase in her life. Leaving and returning to the program were very significant moments in her journey, so I asked her what made her stay when she could have just walked away:

> Cailisha: What made you stay when you thought about leaving was . . . How would you sum up what made you stay when you thought about leaving?
>
> Dahlia: I think I probably, mostly . . . I've never quit anything in my life. If I start it, then I have to finish it. That's what I guess was my deciding factor. You started this program. You're in your third, fourth year. You don't have that much left to do. Just finish and be done with it. That way you can say you did it, versus I started it and I couldn't do it and I just dropped out. That was my thing . . . just, just finish.

When I asked her why "never quitting anything" was so important to her, she replied, "My stubbornness is the root of my self-motivation." And I thought to myself, "Nice! I like that!"

Dr. Samantha Johnson: "A Long, Hard Journey"

Dr. Samantha Johnson graduated from Tubman University (TU) at the very top of her class in May of 2006 with a 3.96 GPA. She earned a bachelor's degree in molecular biology and two minors: chemistry and psychology. After graduating, she immediately began the PhD program at South East University (SEU), a southern PWI. She applied to three graduate programs and got interviews to all three. Samantha received offers from two and decided to go SEU. She graduated in May and began the doctoral program in June. SEU is the same southern university where Dahlia completed her thesis work. When I interviewed them, I realized that their research labs were across the street from one another.

Samantha disregarded the advice she received from several people telling her that she should take the summer off. About her decision, she reflected:

Samantha: It was a wrong . . . That was a bad [decision] . . . The things that exist now didn't exist. If I had to go back, I probably would have done a post-bac first because I was very naïve coming out of college. The thought was, everybody was like, "Just take the summer and go home." My line of thinking was, "Okay, if I go home for the summer, I'm going to end up working at some restaurant or something." Whereas, if I go ahead and start grad school now, I'll still be getting paid and I would just go ahead and get this whole thing started. Because my mom was like, "You're already focused on school, you just might as well just keep going." But I was not prepared for the things that I faced in graduate school. I was just not prepared.

Samantha was referring to programs like MARC that support students when she stated to the opportunities that did not exist when she was in college. Although, they existed at other universities, they did not exist at Tubman and therefore they were unavailable to her. So Samantha did an early summer rotation in the toxicology doctoral program, even though everyone else entered the program in August. I wondered why she felt like she was not prepared:

Cailisha: When you say you weren't prepared, what were you not prepared for?

Samantha: How much time do I have?

Cailisha: As much time as you need.

Samantha: To put it bluntly, graduate school was the worst period of my life so far.

Cailisha: Okay.

Samantha: So everybody's like, "Oh, your 20s are great." And I'm just like, "No, they weren't!" Um . . . The rigor. In some ways . . . I feel like in some ways I wasn't prepared in terms of the course work, and the rigor of the coursework. People and politics and subtle racism. I was naïve and every decision I made at the beginning of grad school, I made it out of ignorance because I didn't know how things worked. My idea was, "You like lupus. You should study lupus, and this person studies lupus so just go to her lab." Yeah, and she was a terrible mentor.

Um . . . .

[Long Pause.]

[Visibly fighting back tears]

Ah, man. . . .

Sorry . . .

> Like the whole not thinking that you're good enough. Like people tell you . . . I made it into grad school. I was admitted, passed all my classes, but that whole imposter syndrome just never goes away. Where they're going to figure out that I'm not good enough to do this. At some point, it's all going to fall apart. I just thought . . . It's a lot that really happened, so I had to switch labs.

I did not expect Samantha to refer to graduate school as "the worst period of my life so far" or for her to become so emotional. The pain was still very fresh for her, and I could *feel* it. I took a deep breath in that moment. We both could not fall apart. Her interview was the most emotionally raw conversation that I had with any of the women. It was difficult to watch her relive those experiences.

After Samantha passed everything, classes and qualifying exams, she found it necessary to switch labs. As she recalled her emotions right from the beginning of the program, I understood her many emotions and why moving to a new lab was so imperative. When I asked Samantha to summarize her journey in the program, and she replied:

Cailisha: What have been the highlights since you've been here?

Samantha: Oh man, I've been at SEU almost ten years now. Let's see, I came from this small HBCU, came to SEU, so of course there's like the whole culture shock issue. It's a big campus and people telling me I got to take a bus to get here. "Oh, my gosh!" That was my first experience really understanding how big of a gap it was in science for minorities because people were telling me when I was applying to grad school how important it was, like how big of a deal it was for me to get accepted into grad school, especially at SEU but it didn't really dawn on me until I got here and was like "There really aren't that many of us," especially women that are doing this. That's like my first realization that, "Wow! This is a big deal that I'm in grad school" so the next step was like freaking out because I didn't want to mess up.

I took these graduate level courses and it was just so much material. Like what we would learn, say, in a week at grad school would be like the whole semester in undergrad so I was just dealing with all this material and trying not to panic and then people in your class that came from all these Ivy League . . . People that graduated from Duke and they want to say "Oh yeah, I got my degree from here. And then okay, where'd you go to college?" I'm like "Tubman University." "Oh, where is that?" You know, trying to not feel like I wasn't prepared. Some days I really did feel like "I'm not prepared for this," but then I'd take a test and do as well, if not better as my peers. It's like, "Okay, I can do this. It's hard but I can do it!"

I went through that the first two years of school, because we took classes our first two years. I was dealing with that stuff like "Am I good enough?" The whole impostor syndrome like I talked about before. Like people think I'm stupid or all kinds of . . . Some of it was warranted but some of it was just in my head, I guess.

I took qualifying exams, that was tough, too. Basically after you take classes then you have to qualify to be the pre-doc candidate. It was a week-long exam. You just stay calm and to people like me, it's such a big deal because like if you don't pass, you know, you're going to get kicked out of school. I was freaking out about that, but then I said to myself "Well, Samantha, you've been passing your classes. Not just passing but doing well. So you know, you can do this!" I took the week and I got up every morning like I was going to work and just worked on this test for five days.

Cailisha: What kind of test is it?

Samantha: Yeah, so we got five questions and we had to answer four of them in five days. It was mostly like designing experiment or it was just a long four question exam. Yeah, so we have five days to do it. It was pretty much just based on all our coursework we had taken for the first two years.

That was tough, like waiting to get that graded because it took a couple of months to hear back. So the whole time you're trying to focus on lab, but in the back of your mind it's like "What if I don't pass? Like, what am I going to do now?" I could out for a masters. "But, I don't want to do that." That was tough. It have made me feel like I had failed but you just never know. I passed, so I was like okay, one hurdle . . .

Cailisha: You're officially in 2008, was it 2008?

Samantha: Yep, 2008.

Cailisha: Officially a doctoral candidate.

By successfully passing qualifying exams, Samantha completed a major hurdle. But after qualifying exams, she needed to start all over in a new lab. Just like all of the other students, she started in a lab her first year with the expectation of staying with that research advisor to complete her project, but that experience was disastrous. She told me about her two research advisors:

Samantha: I was in one PI's labs. A white man. Definitely good ole' boy mentality, an old white. He came through in a time when science was just old white men. I was the first black student, especially a black female that he had ever mentored in his lab.

Cailisha: Oh, wow.

Samantha: He was so passive aggressive. I was new so I would have been okay with you telling me that something I wasn't doing wasn't right, but he'd make all these comments.

Cailisha: What kinds of things would he say?

Samantha: Like, well, "I need everybody working here 60+ hours a week," but I was taking class at the time, so he wanted me to be in the lab all the time. I was of the mindset, "Well, I did all my work and I just want to go home and study for a class." And he was not at all okay with that.

Cailisha: Okay.

Samantha: Then I know race was an issue because we have this program called IMSD here at SEU.

Cailisha: What is it called?

Samantha: I-M-S-D.

Cailisha: IMSD. What does that stand for?

Samantha: It's the Initiative for Maximizing Student Development. It's a training grant that SEU has to support graduate students of color.

Samantha: I was involved with IMSD when I first got here, and people don't like the idea of us getting extra help.

Cailisha: Got it.

Samantha: They feel like we should just come here and do what they do, but this system wasn't built for us. We have other needs that you don't even know about, like you don't have to go to work and worry about what your PI thinks of you just based on how you look.

Cailisha: Mm-hmm (affirmative).

Samantha: Other grad students really had a problem with that.

So at one point, we had this collaboration. This is just a small story to say I know something was wrong with this situation. We had this little thing where we do our experiments and then we work with these bio-stats students and they're going to analyze our data. And my PI was basically like, "I don't believe in it." Because we were all black. It was black graduate students analyzing the data, doing the statistics and he just had no faith in it. He told another student in the lab . . . He didn't know that she would tell me this. She went to him and was like, "Oh, can I do this collaboration that Samantha is doing with these students?" He basically told her, "No." He was like, "Oh, are you talking about the thing with those black students? Yeah, don't do that."

Cailisha: Okay, and what was his reason? Because you all were black?

Samantha: Yeah. He didn't trust that we knew what we were doing. He thought the whole thing was a joke. And so I was like, "Okay, he really does have a problem with race whether he wants to confront it or not." Like whether he even realizes he does or not. And other things happened. He didn't have money to pay me. He didn't tell me that. It was kind of like bait-switch. He got me in the lab and then he didn't have money to support what I was doing.

Cailisha: Were the other students in his lab being supported?

Samantha: Umm . . . To some degree, they had money, but what was interesting is another student in the lab left right after I did. She was a female, so I really think he had a problem with mentoring females, even more so, me because I was black, but the girl that left the lab was white. So we both left. I really just think in his mind, men are just better at doing science. Once you get that in your mind, how can you stay in an environment like that? When you know that someone is looking at you and they already think that you're inferior?

              Another instance in graduate school where I was interviewing a guy to potentially work in his lab, and he told me, he was like, "You would be a great asset to my lab." And I'm thinking it's because he saw my little resume, or my CV. He's like, "No, because you're black and you're female, so I could get lots of money with you in my lab." He said that! Like so many weird things. I'm not saying everyone here at SEU is racist but people do have . . . I don't know if it's unconscious or conscious. They have bias and they do stereotype people.

              But in any case, I left his lab thinking I was going into a better situation and I didn't. All that to say, I made some bad decisions because I didn't know what to do. Nobody told me.

Cailisha: The first lab you were in was with a man?

Samantha: Yup.

Cailisha: Then you moved to . . .

Samantha: A woman's lab.

Cailisha: A lab with a woman. How was that?

Samantha: Because I thought . . . She was so nurturing, at the beginning. And it just made me feel more comfortable. And she didn't mind talking about race and so, I thought, "This is going to be great" and it was, but the problem is that she is very much a micro-manager. She was. She was like the helicopter. In the beginning, I needed that. By my fifth year, I was already behind because I switched labs and I was just tired. I got stressed out. Grad school was tough. Things don't work. You got to work long hours. Everybody, my friends, were out having a good time. People were getting married, having babies. I'm just

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like, "I don't want to do this anymore. Please just let me graduate." She just did not want to let go. She didn't want to put any papers out. She just wanted me to stay. She's like, "Well, I have to do what's best for my career."

Cailisha: Wow.

Samantha: She just . . . We just got into it because she did not want to let go. I knew the ins and outs of my project. I had enough data for two papers and she just was not of the mindset that I was ready to go. I remember telling Shayla Foster, who's a director at IMSD . . . Shayla's like a God-send.

She's the director of IMSD, that program I told you about. She's also a good friend of mine, so I would go to her office at least once a week at the end and cry. I was like, "I can't do this." I remember she came to see me because I took some time off. I had to just away. I'm sitting in my apartment in the dark crying, and she came to me. She's like, "I'm coming over." I'm sitting in the dark, and I was like, "Okay, so I need you to tell me how to withdraw from school cause I'm not doing this anymore. Either I withdraw, or I leave, or this lady and I are really going to go at it." Because I was completely broken by that time. She's like, "Nope. I'm not going to let you do it. You came this far. You're not going to let this lady do this. You deserve your PhD. You worked hard for it."

So she helped me get my committees set up, my meetings and my . . . My committee chair was not my PhD advisor. I told my committee chair what was going on. She's like, "No. You're not doing this." And she basically paved the way for me to set up my defense and just . . . Because at the time, my program did not require any publications for graduation. She made it so that I could finish. "Well, you present us your data and we'll sign off on it." Basically she just took over the whole thing and helped me defend. It was tough. I just was not prepared. Everybody told me it would be hard, but it was not the hard that I thought. It was just a personal attack at some point. It's never all about the science. I'm okay with the science being hard, but this other stuff, I shouldn't have to deal with.

Samantha's narrative describes experiences of racism and sexism. She was not

supported by either of her research advisors. They did more to destroy and break her

down than to mentor and develop her as a scientist. After Samantha shared these

accounts, I began to understand why she described this period as "the worst of my life so

far." She had left a nurturing supportive environment at Tubman and was now alone and

dealing with subtle and, at times blatant, racism. I asked if she remembered any other

times that she had to contend with racism:

Cailisha: You mentioned subtle racism. Were there any examples for racism other than what you've already said?

Samantha: People just don't know that you can't say these things in front of people of color. It's just-

Cailisha: What kinds of things?

Samantha: We were out to lunch . . . It's funny. We were out to lunch at this place in SEU. It's a joke. It's called Aunt Dee Dee's. It's supposed to be soul food. It was the blandest food I've ever eaten!

Cailisha: It's called Aunt *what*?

Samantha: Aunt Dee Dee's. All the white people in the lab were just raving about it. "Oh, collard greens!" I'm eating the food and I'm like, "This is terrible!" Then, one guy was like, "Hey. Don't you all eat something special for New Year's? Don't you all eat like black-eyed peas or something like that and fried chicken?" I was like, "Are you serious right now?" And he said y'all . . . He was talking about black people! I knew what he was talking about because we do, but I said, "I don't know what you're talking about." I wanted to make him feel stupid, like, you cannot . . . It's not like I can say, "Hey, don't y'all just eat pumpkin pie?"

It's little stupid stuff like that. Then another postdoc would say, "Oh, why did you go to that little 'podunk' school, Tubman?" People always assume that because I came from an HBCU that I didn't know anything. Like my degree meant nothing because it wasn't from Duke, or whatever. But I did just as well, if not better than my classmates that did come from those schools. I dealt with that, like, okay, negative perceptions on HBCUs and then not feeling comfortable enough to just be myself.

I like clothes. I like fashion. But my graduate student advisor would always comment on it, so I found myself getting dressed in the morning not wanting to wear something that she would say something about. I like color, and she would say, "You spend a lot of money on clothes." [I thought] "Okay. This is not anything to do with the science, so why are you talking to me?" [She would say] "That must be a new shirt. I haven't seen you wear that before." I would have to like . . . to not draw attention to myself, to dress down because that's what they did. And I love to look nice. But she had stuff to say about . . . I could just go on and on about weird stuff that happened. Then, of course . . .

[Long Pause]

[Visibly emotional and tearing up. More intense than the first time]

Sorry.

People just . . .

Cailisha: Go ahead. What did you want to say? I want to know it all, so whatever you have to say, that's why I'm here.

Samantha: Sorry, I'm just—

Cailisha: No, it's okay.

Samantha: Just to know that. . . . you are judged, like you are judged as a group. If one person makes a mistake, and they're black, from now on all black people do that, but it's not the same for them. You can have one person that . . . So several people in IMSD when I was coming through were not making it all the way through. For whatever reason, they didn't finish their program. And so while I was coming through, it kinda made me feel threatened because it's like, "No, I have to succeed because they think that we can't do it." You take on this whole burden for your group of people that's just not fair. My success doesn't mean anything about success of all black people, but I feel like it does. If I don't make it, then they're going to say, "Oh, there's just another one you couldn't cut it." They don't have to worry about that. White men and white women, they . . . you know . . . Of course they're going to make it anyways because they don't have to deal with all this extra stuff.

Cailisha: Yeah.

Samantha: I'm carrying all this weight to prove a point, and that's pretty much what got me through to the end because I was like, "I'm not going to give them the satisfaction of quitting." I made it to SEU. It's a huge school. And on my CV it's going to say: PhD in toxicology from SEU and I'm not going to give them the satisfaction of saying, "Oh, yeah. We knew she wasn't going to do it." I had people say, "That's okay. You're doing good for . . . " What they wanted to say was, "What you did is okay. It's not great, but what you did is okay because you're black." Just feeling mediocre. "Because that's what we expected of you anyways."

Sorry.

Cailisha: No.

Samantha: I just get angry because we always have to just do above and beyond what everybody else . . . Just always. I'm going to have to do that for the rest of my life. Even this job now I go to, I'm only the second black person in the department.

Cailisha: Wow.

Samantha: Everybody else is white, so they're always going to be looking at me like . . . Of course they wanted me to come because I can do my job, but one little mistake, who knows what could happen.

Cailisha: How does that weight feel? How does that weigh on you?

Samantha: I'm kind of used to it now, but kinda just don't want to let anybody down. I don't want to let myself down. I feel like I've just been . . . I want to just be there. I feel like I've just been climbing and I just want to sit down and just stop and just enjoy life. I don't have a family. I'm single. Like I just . . . Sorry.

I just want my life to be . . .

I just get tired.

[Tears welling up]

Cailisha: I understand.

Samantha: [Fully in tears]

I feel like I made so many sacrifices and I really just want to be . . .

I know my family and everybody's proud. I'm proud of myself, but it gets tiresome.

Sometimes I think, why did I go through all this? I'm not old. I'm 31, but I could have been doing other things, so I just . . .

Sorry.

Cailisha: No, it's fine. It's fine.

Samantha: It's a tough burden to carry that not many people understand. I would cry to my mom and she's just like, "What is going on? Why don't you just graduate?" And I'm like, "Mom, it's not that simple." You have these people that have your life, they decide what the next few years of your life are going to look like and I'm just tired of that. I just want to get this job, love it, make some money, lay down some roots and just be in a career. I think that's the other thing about tenure track jobs that stress me out, is you have to still keep climbing this thing and you don't know when it ends, and I just want to just stop and enjoy my life. Enjoy what I've accomplished and not have to feel this burden, I guess is what I'm trying to say.

Sorry.

Samantha became the most emotional and could no longer fight back the tears after she mentioned not having a family and being single. Earlier, she talked about how all of her friends were married and some had babies. She was certainly frustrated that she was not a member of "the club" yet. It made more sense to me later in our conversation:

Cailisha: We've talked about some especially difficult and challenging experience. Are there any others that you want to share?

Samantha: Yeah. I look at just difficulty in general. Growing up—I'm a woman, of course, so—most women dream of their future and what it's going to look like. And . . . I still wonder, "Am I not going to get that because of this path that I chose."

Cailisha: You say, "that." What do you mean?

Samantha: I mean a husband, kids because when I started grad school, I was engaged. I thought, "Oh, I'm on track. I'm going to get my degree. I'm going to be married by the time I'm . . . I'm going to have kids." That was another part that made grad school tough is because we broke up while I was in grad school. That was, like-

Cailisha: Oh, I'm sure.

Samantha: I still wonder. Everybody's like, "Samantha, you're so pretty. You're so smart. You're going to find somebody." And like yeah, that seems like it should be true, but every time you look at the news, it's like, "Oh, black women are the least married group in . . . " You just start to wonder, "Am I going to be one of those people?" I know it's plenty of single women that are great, but they just never . . . Sometimes the importance of that really . . . At one point, I was like, "I want a baby. I want a baby. I want a baby." I was like, "Okay. You don't need a baby. You don't make enough money for a baby and you don't have a husband, so you don't want it."

I go through these periods where it bothers me more. This is one of the times right now that's bothering me a lot because I'm the only girl in my family now that doesn't either have a child or a husband.

Cailisha: I got it.

Samantha: All my mom's brothers and sisters have grandkids. My brother doesn't have any kids . . . Yeah. I just think like, "Is it because I chose this path?" Maybe if I hadn't chosen it, I still wouldn't- . . . I don't know. It's just like, that bothers me sometimes. I want to have it all, but maybe I'm not supposed to. I just want to feel like . . . Uncertainty just bothers me, I guess. That was the hardest part of grad school, too, was the uncertainty. Am I going to finish this year, or next year, or two years? Now, am I still going to be single when I'm 40? Am I going to have to give up on the idea of having a family just because I chose this other path that not many people choose? My family tried to like, "Oh, but you have a PhD. Look at all your

cousins. They didn't even go to college." So they try to make me feel better, but it's not the same.

You go home every day. I've had a really bad day in lab. And I go home. And my dog is there, but it'll just be like, "How many more days am I going to have to do this?"

Cailisha: I understand. I understand.

Samantha: That gets tough. That's very stressful sometimes.

Because Samantha had been engaged and started to plan for that phase of her life, I imagine that made being single a little more unbearable. In her mind, she was supposed to be married already, but instead of a husband and family, she had a PhD. She was the only single friend left in the group. Her doctorate was not enough to counter her feelings of frustration and uncertainty about the future. On a personal level, outside of science, she was very emotionally distressed. The break-up of Samantha's engagement occurred in the middle of graduate school. It was one of the times the she remembered feeling alone:

Cailisha: As an African-American woman in science, have you felt invisible or alone?

Samantha: Oh man. In grad school. Third or fourth year, I was engaged and I had just broken up with my fiancé and then things are really tough in the lab. I just felt like nobody would understand what I was really feeling, so I feel like I was failing. It just felt like I was not where I thought I would be at that point in time. I just felt like I could complain and cry to my mom but she wouldn't get it. Nobody really understood.

That was tough. Middle of grad school was tough because it's too far in to go back. You can't quit but you're not far enough ahead to be confident that you're going to finish, so the middle is the toughest because again you can't 'see for the trees,' whatever that whole little thing is. You just can't see your way out so I actually had to get some

counseling in grad school. I was embarrassed at first but I was just like we don't take mental health seriously enough. It was really too much to bear. I could just stay here in the grad school was like I think you should talk to somebody. I had to get help so somebody in the office of graduate education here suggest that I go see this therapist. "Tell this stranger my problems?" We don't do that. We just go to church, pray it away. She's like, "It's free. What's it going to hurt? Just go. You don't have to pay for it." I was like, "I'm not telling this lady . . ." but I laid on that lady's couch and just cried. I felt there's something about telling a stranger your problems that it helps so I tell anybody today like I'm not embarrassed, it helped me get through a very tough period of time. If you need help, I think you should go get . . . Easier said than done, but I do have to do that. I was in my fourth year because it was just too much to bear and I didn't want my mom . . .

My mom's all stressed out. I don't need to bring this to her. She couldn't anything to help. That was a time I felt just, yeah, invisible.

Later, I guided our conversation back to the difficulties that she experienced because I wanted to be sure that I accurately captured what was at the root of her challenges:

Cailisha: You already attributed a lot of your difficulties to what you describe as racism, subtle or otherwise.

Samantha: Right.

Cailisha: You said imposter-

Samantha: And putting too much pressure- . . . Yeah. Imposter syndrome.

Cailisha: Imposter syndrome. Do you have an example of or an experience where you really felt like, "I'm an imposter. Somebody's going to find out."

Samantha: I still feel like that right now because I still . . . When you think of an image of a scientist, I just do not feel like I fit that. Because I'm not one of these people that can just . . . I don't want to sit and read articles all day. I've never felt like . . . My classmates, when we were

taking classes, they would just be all about, "Ooooh! I read this paper and I read this paper by so and so" And I just can't think of people's papers. I don't do that. That's just not . . . I want to go out and be normal, so for a lots of times . . . I even tell students the perception of scientists is not what you think, but I have to tell myself that, too, because I love music, I love going out. I almost feel like I can't even be myself around people at work. Like I have to be a completely different person because if I'm not, then they're going to know, "she's not the real thing"

When I was taking my qualifying exams and everybody was like, "Oh, I read these papers today and I know this and I know that." And I was like I didn't know anything that they're talking about. Everybody was out studying. I was just like sitting at home watching TV. It's not that I couldn't. It's not in me to be like . . . I don't want to think about science every single minute of the day. I was like, "What am I doing? I want a regular life! This is not a regular life." Even now with my postdoc it's like my boss is always wanting to talk about science and talk about science. And some days, I just don't feel like I'm the picture of what a scientist looks like, but I realize that's because all people, all scientists aren't the same. You can like fashion and like other things and still be a scientist, but I have to tell myself that.

So that whole imposter thing, I really sometimes just have to be a different person when I'm here in the lab versus at home or with my family. So I deal with it every day. They're just going to find out that I don't know what . . . I'm not like them. And then sometimes I just don't care. Like this shirt, probably people don't get it, but I don't care. I like it. Sometimes I get like this . . . What do they call it?

Cailisha: Radical?

Samantha: Yeah, like . . . Not the angry black man, but like that whole-

Cailisha: Fight the power?

Samantha: Yeah. Exactly. The militant. That's the word. I feel like him. I get tired of being around all these white people. I'm so sick of being . . . I'm not . . . I don't say, "Are you being racist?" No . . . It just wears you down.

Cailisha: I understand.

Samantha: You have to be a completely different person.

Samantha's use of the term "imposter syndrome" made me very curious. I had

been introduced to the term in the early years of my educational doctoral program. I

wondered where she might have happened upon it. In a follow-up conversation, I asked

when she remembered first hearing the word, how it became a part of her vocabulary:

Samantha: I was a first year grad student, and I was attending an IMSD meeting with a guest speaker who introduced me to the concept. I honestly felt relieved that there was an actual term that described my exact feelings as a firs year student, and that I wasn't the only person experiencing those feelings-like you don't belong. From that point forward, I learned that I had to face those feelings and understand that I did truly belong and that I was qualified to be in a Ph.D. Program.

Despite the all of her many challenges while in her doctoral program and all of

her difficult experiences, when I asked Samantha about her support system she

remembered one of the best moments of her life:

Cailisha: Who or what supported you into science?

Samantha: Oh, man . . . My mom. She's a single parent. She raised me and my brother by herself. My dad was kind of around but . . . I never knew about how hard she struggled until later. I come from a big family, so . . . My mom has lots of brothers and sisters so I have a lot of cousins and all of them grew up with both of their parents. But I never knew that . . . I never felt like I couldn't do stuff because of financial strain on my mom. Everything they did, we got to do. One day, I came home and my mom was in the kitchen just crying. I was like, "Mom, what's wrong?" And so as a kid, you don't know. As an adult, I found out about some things that happened and all of the sacrifices she

made and I just feel like I do all this for her because now she gets to say, "Oh, my daughter, she's in science. She's going to be a professor."

I feel like all the work that she did for me and my brother, I want to give that to her. I want to make her proud so that she feels like she did a good job. She raised us the best she could and good things are coming out of it. Definitely with my mom, I feel like she did a lot for just me and my brother so why can't I? I can be strong just like her. I would call her crying. She didn't understand, but she was there . . . It's so funny . . . at my defense. She had never met my boss so she's like, "Where is she? I need to see this lady. I need to see this lady who's been stressing out my daughter." My whole family was there. So at my defense . . . You know about the public defense, right?.

Cailisha: Yes.

Samantha: For most people here, white people, maybe their husband comes, or their parents. I had 25 people at my defense and the people at the school were not understanding. And they were clapping and cheering. That's the best day of my life, hands down so far! You go through this stuff and you don't feel like you're going to make it out. And then I'm standing on the stage, and I'm defending my dissertation and my mom is out there.

[Talking through tears]

It's the best day.

It was so hard, and to say I finally did this.

No, I don't have a family, but I do have this thing that I earned on my own.

Sorry.

I get really . . .

I just think about my mom.

Cailisha: You do have a family. You have your family that was there for you that day.

Samantha: There were kids in the audience. My uncles came and they brought their grandkids. It was just crazy.

Cailisha: It was a family reunion?

Samantha: Pretty much. And then I had to have my private defense after while they all sit out here. We're going to meet, and they're going to decide, so they're all just sitting in the lobby. My committee chair comes out and says, "She did it!" Everyone's like, "Yea!!!" We went out. That day, they helped me get through. I have a huge family.

Cailisha: Good.

Samantha: And so that was my support system.

Cailisha: Good, good.

Samantha: And IMSD here at SEU. Shayla, she just made sure I didn't fall through the cracks. I will say, SEU has a very good grip on diversity.

Cailisha: Okay.

Samantha: Sorry.

            [Still in tears]

Cailisha: It's fine. I always cry, too.

Samantha: Yes. Sorry. I just get really emotional about everything.

Cailisha: No, I understand.

Samantha: Everything's been a long, hard journey. But they really do have things in place for us because our experience is very different and I refuse to let anybody think otherwise.

            That's why I do the working with the undergrads because they need to know that you can do it. Nobody can keep you from doing it if you really want it. It's going to be hard, but you could do it.
            Yeah. IMSD has been . . . Shayla is just . . . I told you I was just sitting in my apartment crying and she came to see me.

Shayla paved the way for Samantha to finish her PhD. Samantha said, "I tell her all the time, 'I owe a piece of my PhD to you,' because I would not have it if not for her." In 2012, after graduating with her PhD in toxicology, Samantha applied to post-doctoral fellowships. When we met in June of 2015, she was at the end of her post-doc appointment. When deciding what kind of postdoctoral fellowship to apply for, she discussed that she discovered a love of teaching. She described to me the years after her doctoral program and what was next for her:

Cailisha: You finished in 2012 and then what next?

Samantha: I knew that I wanted to teach. I have felt the most confident as a scientist when I'm teaching because I would do stuff . . . We get these little announcements from the grad school about opportunities to teach and I would always just do that. People were like "You know, you're really good at this." I was like, "I like teaching." It made me feel the most confident as a scientist and everything.

I applied for the TEACH Fellowship here and I applied to other IRACDA programs, too. IRACDA (Institutional Research and Academic Career Development Awards) is the funding agency that funds those programs like TEACH. They are grants given to institutions to do teaching post-docs. They're all over the country. I applied for the one here. There's one at Emory I applied for because I was trying to figure out where I wanted to go and I don't want to go too far. People would tell "Well, if you stay in SEU it's going to ruin your career. You need the change, because it's going to look bad if you just stay here." And I was like "Whatever." I really wanted to stay here so I did.

I didn't get accepted to FIRST, which is the IRACDA at Emory but I did get accepted to TEACH. It's kind of funny because Tubman used to be a partner school of TEACH. Just like Douglass is. I first learned about TEACH when I was an undergrad. Even then people were telling me what a post-doc was and we're coming here to teach. I was like "This sounds really cool." I was taught by a TEACH fellow. She was a TEACH fellow at Tubman so I met her when I was an undergrad 2006 and I've known her now almost ten years.

It's kind of like I knew I went to grad school but I'm going to apply for this program and I applied and got in so it was just like full circle. I applied, came to work here, so I've been here since 2012. I did my teaching at Douglass for two semesters.

Cailisha: How long is that? You were there, you started 2012—

Samantha: I finished it, it's a three-year program so I started in September 2012 and I finish in August of 2015.

Cailisha: What are some of the things that they have you do as a post-doc in the program?

Samantha: We do traditional research so that's my role here in this lab is I study the immune response to burn injury and smoke inhalation. It's okay, I'm kind of over the whole research thing.

The best part of TEACH to me was all the teaching and pedagogy. We still do all these professional development, trying to make us better teachers because not everybody can teach, not everybody wants to do a good job at teaching. We have few people that really do it because they love it, not because they have to, and so I'm one of those people that really just enjoy what I do. We do lots of different like how to incorporate active learning into your classroom. We did lots of that before we actually went out to teach. We do all research the first year.

The second year is when you go out and do your teaching. Your third is when you come back full time and finish it. It's kind of a weird system because right in the middle when you finally get things going, you pretty much just disappear from the lab so that was a little difficult. People think when you want to do just teaching that you think you're not good enough to be like a scientist too, like I'm just choosing the easy way out. I wasn't here a lot in the lab because I was teaching and people had some strong feelings about it.

Cailisha: Are there other post-docs who were teaching and then spending a lot of time in—

Samantha: Not here. Not in my lab. I'm the only person that did that.

Cailisha: Okay, all right. That brings us to where we are now. What's your next step?

Samantha: My next step is faculty position at University of Freeman. I'm really into my faith and this thing, God just laid it out perfectly for how everything, like I don't even know this kind of job existed and then I . . . I was just showing everybody like, "This is what I've really want to do." Like God made this job just for me, so I was really excited. I'm going to get this job. I told my TEACH program admin, I was like "Listen, can you read over this? Look over my materials because I really want this job." I just put all of my energy into getting that position. It's kind of funny because the whole time I was teaching at Douglass, I just kept saying "I will come back here. I will come back here. I love it here," and I do and I did. It's just funny how things happened. They hadn't posted the position yet so I was getting discouraged, and then I just happened to check my email one day and saw the ad from the Freeman. I was like this is it.

Cailisha: What's the title of the position?

Samantha: Director of Biological Instruction. I had gone back and forth. I'm like tenure track versus not tenure track, and everybody was saying okay, those non-tenure track positions are dead end. You're not going to make a lot of money. There's no room for advancement. You need to go the tenure track. I just really thought like just the idea of having to run my own lab, write grants and papers. I'm like, "No, don't do it, I just want to teach, I don't care. I might not make as much money but at least I'll love what I'm doing."

Like "Oh, you'll get bored." I'm like no, because if you really enjoy what you do and you're committed to improvement, it never gets boring because you're always trying to improve and not just use your own techniques, the same ways you've been teaching for 10 years. That's when it gets boring, but I'm very excited about starting this new chapter and I'm leaving home finally a little bit. Going a little bit further away.

It's a non-tenure track 12-month appointment. I'll be teaching introductory biology for majors, so my job responsibilities are to basically help design the labs. That's what they really want help with to make the labs more inquiry-based versus than just basis cookbook biology labs that we used to do. It's a little bit more than a lecture position. I have a little bit more responsibility, but it was nice to feel like I was wanted. Like they actively recruited me there. After my interview, they were like "Your teaching demo was great." I got email after email from all the faculty there, like "We really want you to come. Please come. What can we do to get you here?" It was just

nice to feel like people really value my skills. I'm not having to beg for this job. They really are just doing . . . I mean it was just a great experience to really feel like your skills and what you can do are appreciated.

Samantha was extremely excited about her new position. It would mark the beginning of her career and finally starting her life with a fresh start in a new location. Samantha recalled her interview at Freeman as being one of the highlights of her life along with her dissertation defense:

Cailisha: Can you tell me about a time when you felt very comfortable and competent as an African-American woman in science?

Samantha: It would have to be my interview at Freeman, I really felt like I had just come into my own, like when I finally made it. People listened to me and they believe what I have to say. During my dissertation defense, like again hands-down best day of my life so far and like all these people sitting in the audience and listening to what I have to say and then afterwards people were like "That is the best defense talk I have heard." Granted, I practiced and practiced but it was really polished. I was confident and I could answer people's questions. People come up to me later asking questions so I'd say those two times I really felt confident in my science and my teaching.

Samantha felt good about the first career position. She had a great interview and the other professors were excited about her coming. She knew she wanted to continue working with students. It was one of the things that made her feel good about herself as a scientist. Working with students was what first came to mind when she discussed how she felt about science right now:

Cailisha: How do you feel about science right now? Do you have an experience lately that captures how you feel about science right now?

Samantha: Yeah, with my students in the lab. I was joking I still meet with my students from last year, so Sydney and Terrence I met when I was teaching at Douglass and I still have much with them here. I introduced them to my summer students, and Terrence was like "Dr. Johnson, you're just changing everybody's life, weren't you?" I started laughing. I really feel like I've seen direct impact of what I do so right now. One student as like, "I like working in this lab better than my lab," I shouldn't say that on tape but-

Cailisha: That's okay.

Samantha: —better than her lab at Douglass. She's like, "This is fun. Lab's not fun back at school." That's where I see the biggest impact. If I can get people excited about science, then I'm doing my job and I really feel like I'm paying it forward for the people that did it for me so this has been great. If I can just interact with students, that's the best part of my day.

I hate, hate, hate being in the lab. Hate it, but this . . . I do not want to go. They are in the lab and they need me so I'm going to go. That's what it's all about.

Cailisha: Good, good. You haven't had the experience of running your own lab—

Samantha: Nope. Don't plan to.

Cailisha: —and I know that that's *not* what you want *at all*.

Samantha: Not at all.

Cailisha: I guess would working with the students be what makes you feel especially good about yourself as a scientist?

Samantha: Mm-hmm (affirmative). Yup.

Samantha worried about her decision stop working as a laboratory scientist. She had no desire to run her own lab in her future positions. She simply hated being in the lab. I could certainly relate to her in that moment, but the realization for me came in my master's program before I even began a research project. I had anxiety about the entire

ordeal, and I then realized my disdain for lab research and switched to biology education.

Samantha did, however, recognize the value of training students and getting them excited

about science, but she could not fathom research being her life. She expressed her

concern about this choice when she started applying for jobs:

> Cailisha: Has there been a time being in the lab where you didn't really feel good about yourself as a scientist? Can you tell me about one of those times?
>
> Samantha: Yeah, when I was applying for jobs. Initially everything that I found was tenure track, like running your own lab. Of course, I had to get a recommendation so I approached my PI here and she was basically in a nutshell told me that I was not competitive for any of those jobs. My publications . . . I don't have any first . . . I have papers but I don't have any first author papers, which is what they look for so she pretty much told me any job I applied for I was not going to get it.
>
> She's like "You spent all your time teaching and not enough time in the lab, so sorry." I was kind of like . . . It felt like I just shot myself in the foot because I wasn't going to be able to get a job. Like I said, "People will make you feel like . . . because you want to be a teacher, you're not a good scientist." The time that people spend at the bench coming up with the experiments, I would rather spend that time coming up with better ways to teach my class and that's just what I'm going to choose every time. I'm not about the lab stuff. I had to do it to get where I am but she just made me feel like that wasn't important. Like all the time I spent in the TEACH program was just not going to pay off and I thought that way too until I got an interview for this job and I told her, I was like "Yeah, they want me there, so whatever."
>
> Cailisha: It's like something paid off.
>
> Samantha: Yeah.

Samantha was confident in her decision. She expressed to me her concerns as well

as why she wanted to pursue science education instead of scientific research:

Cailisha: I think we talked about your recent difficult and challenging experiences. Is there anything else?

Samantha: Oh gosh. No, just the whole work-life balance, personal life stuff. I guess as I get older that's just going to be in the forefront of my mind. I'll be 31 and felt like nothing has happened, but they'll pass I guess. I'll figure it out but that's pretty much what I'm dealing with right now. I feel good about where my career is going. It's just the other stuff, hoping it falls into place.

Cailisha: Your decision not to continue in the lab.

Samantha: The good thing about where I'm going is I can do research if I want to continue doing some stuff, there is bench space. I can work with other people in any event that I do decide that I do want to go the tenure track route. I can't imagine that I will but you'll never know.

            People tell me "Don't shut the door, you might want to come back," and I might but so there is opportunity. I really wanted to pursue science education and scholarship of teaching and learning because there's plenty of grants to be written and I really just like try to understand how students learn and really how minorities . . . like, "How do we decrease this gap in success rates of minority in the graduate students?"

            I won't be working with that many universities but they are there and I'm only the second African-American in the biology department. I'm only the black woman so I can imagine the students there that in the department, what it's going to mean to them to see somebody that looks like me in their department. I'm okay with leaving the bench behind. I'm okay with it.

I asked Samantha how she would sum up her experiences as an African American woman in science:

Cailisha: So what does it mean or how does it feel to be an African-American woman in science?

Samantha: It's a blessing and it's kind of a burden too. It's a blessing because I know that not many people can say that "Oh yes, I have a PhD in toxicology." I feel like I put on all of this work and it paid off like

something that no one can take away. I feel like I can be a role model for young people, especially people of color because it makes the difference when you see people that look like you doing things that you want to do, so not meaning my professors were black. I now know that I can be in a position where people can look to me and I could say "Yes, you can do it too. It's hard but you can do it too." I can say that because I did it, so I can be a role model and that means the world to me.

I used to be a Girl Scout leader in middle school aged girls. Their parents are always like "Our daughter's girl scout leader has a PhD." They love to brag about it and I love to talk to the girls about science because I'm like, this is what we need, people working to increase the number of us that get degrees and I just feel like I can now be on the list to say "Come on and do it, you can do it."

The burden is again people judging you as a group. One person does something and then automatically the whole group gets labeled. Happens mostly with minority so always thinking you can't do anything to mess up because if it does, it's going to look bad on all of us, that kind of thing. Overall, it's been a positive experience I'd say.

Samantha found a home in science education. She was confident in her ability to teach students and make a positive impact. Although her journey was a long and hard one, she was ready for the next chapter. I followed up with her about a month into her new position. She expressed how much she was enjoying her classes and students. She worked long days getting everything in place at Freeman and barely had time to explore her new city because she was too exhausted by the time the weekend arrived. In her new position, she was responsible for organizing and setting up the labs, as well as teaching introductory courses. Her classes were small, and she absolutely loved it. From where I was standing, Samantha's future in science education looked bright, and most importantly, she was excited about her new position and the potential it held to impact students' lives.

Dr. Skylar Dawson-Bennett: "There is No Substitute for Hard Work"

Dr. Skylar Dawson-Bennett graduated from Maya Angelou University in May of 1997 with a bachelor's degree in biology/pre-medicine. Her oldest daughter Asha was born in December of 1995 of her junior year in college. So when Skylar graduated, Asha was about 1 ½ years old. For the first time in her life, Skylar did not know her next step. Her daughter was her first priority. Motherhood changed her and every decision, every experience from then on was affected by that:

Cailisha: After, what were your experiences? What did you do after you finished college? What did you do next?

Skylar: At that point, I was actually in a place where I never thought I will be where I was just like, "*I don't know*." It was like a brief period for about six months or so. Maybe not quite that much. I was just like, "I'm really not sure." But I know I have to keep equipping . . . like tooling myself with what I need. That's when I actually made the decision to go to Douglass because at the time, immediately I found a research job at Whittaker because I knew I wanted to move to this area. My sister was here and I love this area when I came here over the summer. I got a research position at Whittaker University (PWI) and I was working because at the time, money is important too. So I was working. A couple minutes into that, I have to stay sharp. So I think I worked for about six months.

By spring semester, *somehow* . . . I'm a person of faith, *somehow*, some way, shape or form, I met or talked to Amber Parsons. I don't know how. To this day, I don't know how it happened. She was like, "Well, we have a graduate program here and it's set up for nontraditional students and you'll get a stipend." I was like, "*What*?" It was just so unbelievable. I was able to keep my research job and then become part of this graduate program. It just worked for me at that time. It was a great experience. I met some great people during that process.

However, I guess probably about two years in, it became one of those things where you know how you outgrow something? I felt like I outgrown it. I was still at Whittaker University. By that point, I was in a cancer biology lab so that shifted my interest. I definitely want to go in

the cancer research in some way. I was like, "I need to get out of here." It's like one of those things.

And at the time, I guess I could say it now, my research advisor at the time, we had a dysfunctional relationship. It was not working for me. It was not working for her, I felt. We're just two different types of people. This goes back to the mentor thing. The PI I was working for at the time, he's like my second daddy here. Crazy, Jewish guy. He didn't have to filter to say whatever. He went over to Douglass and talked to my advisor. He's just like, "Any work she needed to, she'll finish it over here. She's already accepted into the program. We got to get her done." I don't know. That was just so awesome to see someone go to bat for you like that. I finished everything up and defended there and started of course my program at Whittaker in the same class as Tami.

That was a learning experience in itself only because, like I said, my research advisor at Douglass at the time, she wasn't married. She didn't have kids. And it was just one of those things where . . . and it's fine. You make sacrifices and you do adapt things. Like I said, the other side of my experience from my undergrad, I was changed. I had my daughter and I had other things that were priority as well. And I made a decision back then that I wasn't going to have one of those lives where it was all geared towards work and work is going to jeopardize the relationship I have with my daughter and my family and stuff like that.

I think that's very important, to identify who you are. When you get into relationships with mentors or advisors and stuff, you need to make sure it's a good fit because everybody has different expectations. And me, I'm this person where I feel like I can do it all. I can have family. I can do my work effectively here and anything else I want to do. But some people don't feel that way. Some people feel that if you're going to be successful in STEM, in academia, or whatever it might be, you got to be totally devoted to that. It is true to an extent and there are certain things that I've had to kinda adjust, but you still need that healthy balance. And I guess that means I've had mentors or people like that who taught me that along the way. Understanding the good or bad. I don't remember if that's the question.

Cailisha: No, you're fine. You're absolutely fine.

Skylar: I'm just talking.

Cailisha: No, that's what I want you to do. I *want* you to talk.

Skylar's relationship with her master's research mentor, Dr. Nighting, was "dysfunctional" as she described it. She speculated that the tension might have been due to her personal needs and obligations to Asha and her job at Whittaker University. Her master's research mentor was an African American woman with a very focused science career. She didn't have outside obligations of family pulling her from the lab, and Skylar felt like it was source of tension between them. Over at Whittaker, however, Dr. Milton, the PI at Whittaker, was supportive and understanding. They were so close that she referred to him as a second father. When she needed help, he stepped in and helped her finish her master's degree and move into the doctoral program at Whittaker.

Cailisha: Immediately after you finished your master's at Douglass, you immediately went into the PhD program?

Skylar: Uh-huh (affirmative). In fact, I think I had already started my PhD program for some reason or I was getting ready to start, because for some reason, I feel like I defended . . . I can't remember but I know it was coming up where I need to be done. I immediately went into that program, but I felt I had already started basically because I was already in the lab I was going to be working in.

Cailisha: Were you already working in that lab because of your work that you had started after undergrad?

Skylar: Yeah. Like I said, I was interested in psychology. When I came on initially at Whittaker, I went to a cognitive studies lab where we were looking at primates and estrogen replacement therapy and if that impacted the cognition skills or whatever. I was doing stuff like that. And like things happen for a reason. Somehow I was tapped. I got an email where this professor was looking for a more advanced researcher to come into his campus. It's like, "Hmm, that sounds interesting and it pays more." I got in that lab and I was there for at least two years because I was in my master's program for two years. And so things just started to click. I started working on projects in a technical capacity. But the PI at the time, he knew my aspirations and I felt like he treated me much better than the lab before. Because you get into laboratories

like the cognitive labs and before, you are a *technical* person. You don't go on papers. You're just there in a support capacity. Even as a technical person in the cancer lab, I was going to meetings. I was on posters. I was already establishing a track record at that time. It just made sense that when I applied to Whittaker, I applied to the cancer program. I opted not to do the rotations because I wanted to stay in the lab that I was in. That's what worked for me because I felt like I knew all the different researchers at the time and I knew personalities. I knew projects. That would have been just a waste of time.

Skylar was certainly blessed to have a mentor who took an interest in supporting her even though she was only in the lab in a technical capacity. I believe this played a role in the ease with which she transitioned into the doctoral program. She already had an established relationship with her PI. She did not have to do rotations to find the right fit. She already knew what she wanted to do and that Dr. Milton was a great PI to work under.

I wanted to know about her experiences as both a single mother and a doctoral student. Because I was also a mother in college and then later in my master's program, I knew this was not the norm. In fact, when I entered my master's program, I had two little ones under the age of five. And during my master's program, I had my third and was expecting my fourth child. My oldest son had started school during this time, and he and Asha were almost exactly a year apart. I knew how divided my own time was, so I was curious about how Skylar handled it. How did she handle working, being a student, and having a young daughter? Most of my classmates, and hers as well, were single and childless. Our situations were unique, and I wanted to know how she managed it, so I asked:

Cailisha: How was it for you, because I guess it will be a completely different experience because you already have your daughter during the master's program and then when you're obtaining your PhD? What was that like or how did you manage it?

Skylar: I guess it goes back to my support system. Like I said, it worked out. My sister was here. At that time, she was married. And so really the type of family we are, everything she did included us. When we first moved here, she was married and they had an apartment. It's like, "Oh, my sister is here now with her little one. Let's get a house." We got a house with a basement apartment. We stayed there. She had a little girl, six months older than mine. So it just worked where we could really help each other. Unfortunately, while I was in my master's program at Douglass, her husband passed away. And so that really just brought us closer, where I was there for her and her daughter and she was there for me and Ashley.

And it just worked. Because if I need to stay in the lab, Asha had already gotten off the bus and was at home or whatever with her. We were able to put them in extracurricular activities. The lab situation I was a part of . . . I mean, he was very family-oriented even though was . . .

[Searching]

He had a *different* personality, and not everybody liked him. But he was that type of person where he made a point of getting to know your family and interacting. Having family cook-outs and things of that nature. So there would be times that Asha would come to the lab. She would be there on the weekends, pipetting water. You know what I'm saying?

Everything just worked. It just fell into place. And I would say that . . . I would just say that I was so *stupid,* at the time. I didn't realize how hard. It wasn't until you look back. I tried to . . . I'm in *everything* here. My hands were in everything. It's like "How are you even doing everything?" You don't stop. If you stop then you have a chance to be like, "Dang, what am I doing here?" You just don't stop and everything just works. The doors just keep opening and things happening the way they should.

I feel having Asha during that time made me more motivated because I had more to lose. I can say that there was one downside as far as certain opportunities. For instance, even now . . . If there is a meeting in

California, but I also have two additional little ones. If they're really way out . . . I don't do those sorts of things now. Maybe once they're grown up and out of the house, and I'll probably be close to retirement by then, but there are certain things I don't do. Certain conferences I'll do and I'll take the whole family or whatever. That's what works for me. I think some people would say that that probably limits you. To me, it keeps me sane. And it keeps my family intact and working a little better.

Skylar's narrative revealed the dedication she had to her family and how being a mother affected all of her decisions. Because Dr. Milton was family oriented, his personality aligned with what Skylar needed.

Skylar began the master's program in biology at Douglass in spring of 1998 and graduated in 2001. There was some overlap between when she finished her master's degree and began the doctoral program at Whittaker University in cancer biology/toxicology. A few years into her doctoral program, she married her husband. Skylar finished with her Ph.D. in 2007, with the help of new husband, her sister, and Dr. Milton. She had a wonderful support system, but she recalled some tough times during the end of the doctoral program:

Cailisha: Were there any times when you thought you wouldn't make it or thought you wouldn't continue?

Skylar: I think the closest I probably came was towards the end of the PhD program. Like writing that thesis, getting closer to the defend stage, literally I lost 15 pounds. I'd start out 5:00 in the morning. I'd go to labs. I can't work at home. I'm that type of person. It'll be dark outside. I'm typing and working. The next thing I know, it's 8:00, 9:00 at night, I'm typing and working. That became my life. It got to a point where I was like, "This has gotta *end.*" For a minute, I was just like, "I don't know if I'm going to make it." Because then you got to go in front of this committee where you got this handful of people that's going to tell you if you're deserving of all this work that you've done for the past

five years. That was probably the one time. There have been times recently where . . . I'll save that.

Cailisha: That's fine because we will talk about now. What made you stay when you thought about quitting then, or did you think about quitting when you were at the end of your PhD?

Skylar: I don't know if I was going to quit or if I was going to have a nervous breakdown. Actually, I would be honest. There was a second in my master's program. I don't think I was going to quit. I felt like I could walk away from it. I'm going to just forget it and go into my PhD program. I'm already in my PhD program. It's not contingent on me finishing my master's. For a second . . . but then I was like, I've invested almost three years. So that was when I really wanted to quit because I felt like my advisor was working against me, that it just was not working. I think for me, I don't think I would ever really quit because that's just not who I am. There were times I'm sure everybody will get frustrated and lose some hair and stuff like that.

Cailisha: In those moments . . . you never had a time where you felt like leaving, but what made you stay or made you push forward in those times of real frustration?

Skylar: I guess being stubborn. I'm that person. I was always want to win, not that I gotta be first but I got to cross the finish line. I guess it's one of those type things where I had to finish. It wasn't just for me, but to set an example for Asha at that time. Fortunately by that time, I was married, yeah, or pretty close to it I guess.

Cailisha: You got married?

Skylar: I got married in 2004. We'd been together years before. Stuff like that takes a toll. What was the question again?

Cailisha: What made you stay?

Skylar: I think I got to talking about him because he was my support at the time. He would come and be in the lab. And I would be working. He'll just sit there and eat, watch TV, or whatever. Just so I wouldn't be there at night by myself. Just stuff like that, just telling me I could do it. That was a support.

My parents too, even though they had no idea what I was doing, still to this day if you ask them. Like I still have to explain to them what it is I

went to school for. It's just for them, to hear them talk about what I do. My dad like, "You're still in school?" He just did not get it. Just to get to the end of that, to be able to say "I'm done, I'm not in school anymore and this is what I am." That really pushed me along. The folks right there because . . .

[Pointing to a framed picture in her office. I had noted the picture immediately when I entered her office. It was one of the first things I noticed among the pictures of her three children and other photos. It was a picture that I had seen before of Skylar, my friend, Tami, and about eight other African American men and women at their graduation. All dressed in academic regalia. I was there that day and I knew everyone in the photo except for two of them.]

Cailisha: Who are those people?

Skylar: These are . . . Really, we felt like our year was . . . I don't know. It may have changed since then. But this particular year, we felt like Whittaker was going to make their quota. They brought in . . . To me, it was a phenomenal number of black people across the programs. There were about three of us that were in Cancer Bio that's in the picture. And I think biochem and micro and neuroscience and maybe in computer science. It's a few others in that picture. We were all African-Americans and we all formed this network and we were supports for each other. We were hanging out. We taught each other, had study sessions.

That helped a whole lot, particularly if you're nontraditional, which I felt I was. Because when you start the program, you know some students that might come straight getting out of undergrad at 22. By the time I started, I was 25, 26, like I could rent a car. Even though it was only a few years difference, it still makes a difference in the end. Just having this group of people. I think really helped a lot because just seeing somebody like you going through it.

Not to make it about race or anything because while I was in graduate school, one of my best friends, we're still good friends today. She was in my wedding. She's not African-American. She was one of my biggest supports. She was a year ahead of me. She was constantly pulling me along. Anything she learned, she made sure I knew it technical-wise or whatever. So that being there for each other was really important.

Cailisha: She was a year ahead of you where?

Skylar: At Whittaker. She was a year ahead. I was actually able to see the process before I actually got to it, up close and personal. That really helped a lot. She was the one those "keep-it-real" type people. That really helped a lot.

Skylar had a great support system. The group of African American doctoral

students at Whittaker formed a strong network. The Black Student Graduate Association

at Whittaker was very active. They had a mentoring workshop annually for college

students and organized social events throughout the year to bring everyone together.

As I mentioned earlier, Samantha and Dahlia both became interested in studying

HIV and lupus because of the events that happened early in their lives. Skylar's

motivation to study a research topic came later in life. She shared with me the story in our

second interview when I asked if there was anything that she neglected to share:

Skylar: I guess one this is personal story, because like I'm in cancer biology. I don't know that we really talked about that at all, but that's my area and I really only thought about this recently. One of my aunt's just had a birthday and her sister, which I was really close to and I remember when I was making that transition into graduate school thinking about programs and things of that nature. That really influenced me because her sister passed from breast cancer. That was a really big . . . that really impacted me because up to that point nobody . . . people had died that I knew, but nobody really close to me had passed away before. That was my one big recollection of somebody close to me that had died.

That was totally, up to that point I thought was totally healthy. She's a beautiful lady, and I think that that was one of my big motivations too, in regards to going into cancer biology. And still to this day, it keeps me motivated to keep on that path as hard and as competitive as it is. I kind of thought about that a little bit but I don't know. That's the gist of it.

Cailisha: Yeah, I think that's excellent. That is your motivation for the research that you do.

Skylar: Yeah, and of course also in that time my dad, these things happened back-to-back. He was diagnosed with prostate cancer.

Cailisha: Okay.

Skylar: Which is weird, because everybody in my immediate family has just been super, super healthy. That was something that just really came out of nowhere and you just don't expect. Dealing with that was a little different as well, because at that point those two people it's like, oh, I never really to my knowledge had been impacted by cancer.

Cailisha: Yeah, yeah.

Skylar: That was my first sets of big exposure so that was a big deal. I think it helped shape me a lot or helped shape who I was at that time I guess.

Through tragic circumstances, Skylar became motivated in a particular research agenda—cancer biology. After finishing the PhD, Skylar immediately began a postdoctoral position at South East University (SEU) in a research lab focused in cancer biology, genomics, and bioinformatics. When she discussed her difficult experiences, she remembered the times she felt uncomfortable being the only African American person in the room:

Cailisha: Have you had any experiences that were especially difficult or challenging that you haven't already talked about?

Skylar: We're talking about pre-now?

Cailisha: Yeah, any that you can think of pre-now, because after you did finish at Whittaker, what did you do next?

Skylar: I went to a postdoc at SEU. I totally left that out. It was a great experience. I loved being in there. That also leads to the challenges because with both of those, I left HBCUs and went to majority

institutions. And so you try to ignore it but sometimes it takes a toll on you when you go to functions and you're the only one . . . all the time. And maybe everybody . . . maybe they're are not paying attention to it. But sometimes it makes you a little uncomfortable when you're the only minority at a certain function. For several years, that's how it was.

I think it changes you a little bit. In that, I think socially it changes you, at least for me. Only because, particularly if you're going back and forth from school to work to home. I felt like you lost some of your friends . . . If they weren't really good friends. You lose some of that because you're always in all these other places, doing these *other* things. And I think that was kinda difficult for me for a minute. I mean it was fine . . . great people.

But I think that's what brought me here to Tubman University because I wanted some of our students to see more people in positions like this that look like them. That was one of the things that was troublesome to me that I didn't see a lot of people like me, particularly females.

For instance, my doctoral advisor, my postdoc advisor, both white men. Great . . . in that I learned how to operate like a white man but then you miss certain things about how as a black female should you maneuver in this very difficult field. I think that was one of the biggest challenges for me, is not having mentors more like me. It made me more sensitive to that.

I think for a minute, like coming . . . Even in my postdoc, I used to tell my husband. I was like, "When are they going to figure out that I shouldn't be here?" It was always this insecurity, they're going to figure out I'm a fraud, I'm not as smart or I shouldn't be there. Every so often, that creeps in. I guess those were some of the bigger challenges for me. You still feel like that occasionally, but those are probably the biggest ones.

Cailisha: When you say you had to learn how to operate like a white man, what do you mean by that?

Skylar: For instance, I felt like when we went to conferences and things of that nature, it's like you will see the conversations that were going on. And the networking that will go on. Really we didn't have that. To be honest, even now when I'd go to things and there are more minorities present. We talk so much about what we're going to do. We're going to collaborate. We're going to do this. After the conference, so the meeting is over, you never talk to each other. The one thing I can say

. . . It says nothing about African-American professionals in STEM because I think there are some that do follow more than what I have seen.

One thing I can say about majority or white men is that they'd network. Even if they don't like the person, they network and they get things done. And I think a lot of times, we hold ourselves back by not taking opportunities or utilizing some of the opportunities we have. In some instances, we put ourselves in these little bubbles where we just want to do it ourselves. On one end, you're not networking enough. On the other end of the spectrum, that's all you want to do.

I've even had situations where certain collaborations have fallen through only because they might only want to work with minorities. You see stuff like that and it makes it hard. Because for me, I want to work with folks who are going to work and get the job done. I really don't care either way. You do see a lot of that. And you hear a lot of things where you're just like, hmm.

Cailisha: You don't care about their race or gender. You just want . . .

Skylar: I really don't. Of course I feel like if . . . That's particularly why I'm *here* at Tubman. I want to provide opportunities where there might not be otherwise. First and foremost, that's a big deal for me. However, part of that process might mean I need to bring other people to the table. And so you find even before that there are people that really they get this select group of people and that's all they'll work with. I think it limits us. And so, I think if we're going to be successful, we really have to move more towards being more inclusive. I think that's probably one of the biggest challenges I've seen since undergrad.

At the time of our interview, Skylar's current position was Assistant Professor in the department of biological sciences at Tubman and the Director of the Tubman's Women in Science Program. The two little ones that she added to her family were Adam, who was born in 2009, while she was completing her post-doc, and Amie, who was born in 2011, the first year of her appointment at Tubman. Actually, when we met for our interview in the summer of 2015, she had just found out a few months before that she

would be promoted to Associate Professor at the beginning of the next school year.

Skylar had gone up for tenure earlier than most people at her university and she learned a

lot about herself during the process:

Skylar: I just completed the tenure submission process and I guess it would be considered early? When did I start? 2010, 10, 11? I get confused. I went up my fourth year. They prefer you to do either fifth or sixth year. Here, really, your sixth year. I felt like I was ready. By the time I actually got approved I was actually finishing . . . or into my fifth year. That was pretty life-changing, because it's stressful and once you submit it. You try to forget that you submitted and go on with your life until you get responses back. It was okay. You can learn a lot about yourself during that time.

Cailisha: Umm-hmm (affirmative). What kind of things did you learn about yourself during that time?

Skylar: I learned that one . . . which I'm not sensitive but you have to have a tough skin. During that time you're constantly looking at how people see you and you have to, to the best of your ability convey that back to others in the best possible light. At the same time be honest. Everything's not always 100 percent and for somebody that always wants to get the best possible at everything.

I'm not saying I was bad, I think I had a very good tenure permission package however, particularly when you're going up early, you hear some of everything. That was a little different. You definitely find out about time management, because it's a very involved process. Fitting the whole product together and then the amount of time that goes into it. Editing and making sure it reads properly. It's pretty involved. The stress level is probably almost like a thesis.

Because you're putting years of your time and work into it and you sit down and you put this document together, and when you're done it's just like, okay. You feel good because you're done but at the same time it's a little nerve-wracking.

Time management like I said, definitely a biggie, and just not being sensitive in the process. You will hope anybody to involve that process they have your best interest at heart, to help you become better, to help

in that professional development. At least that's how I look at it. Yeah, I think I learned that I'm a pretty effective person.

Part of Skylar's motivation to go up for tenure early was because of the position that she felt like she was in as junior faculty. She explained how difficult it was and she described it as being a time when she felt invisible:

Skylar: From a professional aspect, coming into junior faculty is hard. You don't know your place. You don't know where you cross the line between contributing in a certain way that's going to be appreciated. Or if someone really doesn't want to hear your opinion. You've crossed some line. Sometimes that can be difficult because you feel like you just need to be quiet.

Or, if you give an opinion and it's really not taken seriously. I try to be . . . I'm one of those people that I tries to be strategic. I'll make sure that I've already kind of got stuff happening if it's something that I want to implement? It's like, "This is already almost done so we can just go ahead and do it." Sometimes, particularly, when you come into a situation that's been going the way it's going and people are kind of complacent with the status quo, it's like, "Why are you trying to rock the boat?" So it's like, "Just be quiet."

You feel that way in junior faculty and that was one of the things, one of the motivations that made me want to go early. I felt like I was contributing a lot. I felt like I was working really hard, and not to have a place at the table when important meetings were held that were making decisions about me. That can make you feel kind of bad and you really just want to be a part of it.

Cailisha: Yeah. Of course, yeah.

Skylar: That's probably from a professional aspect, one of the times I really felt like I needed more visibility. I felt like I was invisible.

Cailisha: Okay. You felt like being promoted then would help you?

Skylar: Look, I thought, but with that, like I said, the expectations now change. Now you no longer have that crutch of being junior faculty.

Cailisha: Yeah.

Skylar: "Oh, you're junior faculty. We've got to help them." You no longer have that.
Now you're senior faculty, in my eyes, how I feel, the expectations are that I have to help junior faculty now. I have to be even *more* productive because I'm supposed to be setting an example. Back to the other point. It never stops. It's just a constant . . . a constant obstacle course, I guess. That's how it feels like.

So now that Skylar has been promoted to a new position, she felt as if there are new pressures and another added level of expectations. The 'constantly proving yourself' never ends. I imagine this was what Samantha was talking about when she discussed not wanting to apply for tenure track positions. When I asked Skylar about how she felt about science right now, she immediately talked about the classroom:

Cailisha: Can you tell me about an experience at work that captures how you feel about science right now?

Skylar: Experience at work? It's always when . . . Not everything works in the classroom.

Cailisha: Hmm-hmm (affirmative).

Skylar: You try stuff. Man, you try stuff, and you're like "The kids *really* gonna love this," right?

Cailisha: Yeah.

Skylar: You try something new and they're looking at you like, "Why am I wasting time doing this? This is so crazy. I don't understand." But, every so often something will happen where . . . and I guess like last semester I taught a cancer biology class. I actually developed this class and it's the second time I taught it and I'm constantly tweaking it trying to make it better. I have a part of the syllabus or one of the requirements are these e-portfolios.

It's like the students, you tell them, "You need to start on it at the beginning of the semester. It's a collection of everything you've done throughout the course. You should have some good products." It didn't have to be where you're . . . the artifacts should be like a reflection. Something that shows you understand these processes. It really gives them a chance to be creative. It's always the same thing, both times I've done it. Where it's like, this is such a waste of time. We have done all this work and now we've got to do this at the end. When they should have been working on it the whole time.

Cailisha: Of course.

Skylar: It's just like they actually, once they started the process . . . they started putting the material together, and presented it at the end. A couple of them even said it. It's like, "Oh my God. I didn't understand why we were doing this in the beginning. Then after I started working on it . . . " They had fun, actually putting the scientific information together and then when they saw the finished product. They essentially have their own web page that reflected everything that they didn't realize they had learned this past semester.

I don't know it's kind of how I am, I guess . . . or how I feel about science right now is that sometimes I don't even understand all these hoops that we have to jump through. Writing grants, doing this, doing that, but then something happens where you just realize that if there is one student that benefits from something that you're doing. Or you find funding or money from someone to go and do something great . . . it's the whole big picture of sometimes you don't really understand why you're doing what you're doing on the front end. It's a lot of work. And it's nerve-wracking but the final product is so great. You know what I'm saying?

Cailisha: Hmm-hmm (affirmative).

Skylar: Even two proposals I recently submitted, both of them . . . Neither got funded but the final product when I was actually done? I was like, "You know what? I'm proud of this. It didn't get funded, but I'll just make it better."

Because it's a bigger picture. At some point something's going to get funded and hopefully I'll be able to come up with something great or understanding some pathways that leads to breast cancer. Or something like that. I don't know. That's kind of how I am. You just keep working

and keep working and hopefully something will pan out. And there will be a great finished product. I know I'm just it all over the place but-

Cailisha: No, no. It's good.

Skylar: Back to the students and their e-portfolios it's like, I went back and looked at them and then during that time, also, I had another faculty in the classroom and afterwards he's like, "That was so wonderful." You know? I felt great about that and so I just in regards to science I don't want the students to leave the class not as, "Okay, this just a class that I got to take," but take away something from it.

Then when they're out there and they're doing something, whatever it is. Graduate school or whatever it might be. They do something and then they reflect back on maybe some past experience with me and realize how it impacted them maybe? But it has, so that's how I feel about science right now. I don't understand everything. I don't know why I put myself through all this but in the end it's going to be some sort of prize.

Cailisha: Do you have more of an interest or are you equally as interested in science education, you mentioned what you're doing in the classroom? You're interested as interested in science education as you are science in the lab right now?

Skylar: That's the big question. I think, ultimately, I think my goal or my heart kind of lies with science education. When I saw science education in regards to getting more students involved or interested in STEM by whatever means. Whether it's hands on research experiences or innovative courses, whatever it might be. I think I am more, or leaning more that way. However, a part of that too is what I do, the cancer research, I think is important to expose students to that. Even if it's basic science as it relates to cancer research.

Which being here at an undergrad institution where a lot of students won't . . . when you get them they never even held a pipette before. The level at which you can take it is not the same as if you had graduate students or PhD's or post-docs or whatever, working on a project. I think because of the dynamics as to where I am, I've shifted and changed my focus a little bit. I think that might change at some point, but that's why I came to Tubman. I want to get research funding. However, it was not ever been my desire to be at a big institution trying to write grants to pay for people's lives. To me that's overwhelming. That's not for me.

The type of person that I am I just think I would probably burn out. If I didn't have a family or whatever it might be a different story but where I am in my life I think I'm really more of the STEM education program development side.

Cailisha: Okay.

Skylar: And the cancer research running a close second.

Skylar found a love for science education and it became her main focus. But her heart was still in research and exposing students to the lab because she knew the potential power it held to change the course of a student's life, as it did her own. Exposure to her research caused her to reconsider medicine as a profession. Her new main focus was STEM education development. When she talked about the highs and lows of her most recent experiences as a scientist, she spoke about her students:

Cailisha: Can you tell me about a time there that made you feel especially good about yourself as a scientist?

Skylar: Okay, it all goes back to students. It's not even necessarily the research . . . of course you get good data. That's great. I love getting good data. However, I think the thing that's probably made me feel most great has been recently. We had a scholarship day. I actually got Jenise, Dr. Waterford, to come be our guest speaker and during that day our students they present posters and do all of that. One of my students, he's been with me a couple semesters. He actually did the . . . we actually have a summer in the graduate research program.

That's where I got acquainted with him last summer. He came back to my lab and he signed up for a course where he would continue doing research. And this student he is one, if you tell him what to do, he'll do exactly what you tell him. He's not the one to sit there and try to figure things out well on his own. He's that student that you'd be scared to leave and walk away.

However, he has grown so much. He's done presentations. He was very awkward in the beginning. I was so worried. It was sometimes hard to

watch, and I kept working with him and working with him, and he presented for scholarship day at his posters and we had a competition. He won *first* place.

Cailisha: Oh, wow.

Skylar: He presented his research and he won first place. I got so overwhelmed, I swear I teared up. Because I remember where this boy started at. And how far he's come. I just don't . . . I feel like I would like to think that I'm a part of him one day being whatever scientist or whatever he chooses to be. I played a part in that. That made me feel really good. That made me feel really good.

Cailisha: Yeah. I'm sure. On the other end of that, has there been an instance recently where you felt the opposite? You have these highs as a scientist in your labs but what about the lows? Have you had any lows, recently in the lab?

Skylar: Yeah. Of course. You have those times where absolutely nothing works. Absolutely nothing works and you realize, okay, they've been doing something wrong the whole time. Wasted supplies, everything. Part is my fault, because I just assumed they were doing it right and I guess I wasn't watching them close enough. You have moments like that and I guess on the opposite end. I had this one student. He did great, presented and won a scholarship day.

End of semester it was two students. They were this was both of their first time in the lab, I think. And I worked with them. I tried to prepare them as much as possible, and because of the amount of data they put together. It was like it'd be better if you present posters together. So they up a poster together. At the end of the semester, they had to give a presentation because they were in this research course and both of them got up there and it was like they never learned a thing.

Cailisha: Oh, goodness.

Skylar: I was just sitting there like, "*Oh, my God*. This is a direct reflection of me." That felt bad. One of the major reasons were because one was a graduating senior and the other, she's a junior. This is the first time I really had a chance to put my hands on them but I just got thinking they're senior-level students. I feel like if you're in the science field . . . I feel like I failed and, for a little bit, the department's failed for that to happen so I really felt bad about that. That was probably one of my lowest moments.

Skylar's proudest moments were with her students, but on the other hand so were her lowest. She took training and preparing her students very seriously. When we discussed feeling good about herself as a scientist, she talked about her son, Adam's reaction to his realization that she was a "doctor":

Cailisha: What about at home with your family? Has there been a time where you felt especially good about yourself as a scientist?

Skylar: Probably most recently, I guess, because my son, in particular, he's at a point where he's asking lots of questions and figuring stuff out. It's like one day it was something just snapped and they turn into these little intelligent beings. He looked at me. He said, "Mommy, are you a *doctor*?" I don't know where this came from and he constantly talks about that now. And he talks about it as if it's something very important.

Cailisha: Okay.

Skylar: That makes me feel good. It's not something I talk about and it drives my husband crazy. We'll meet people or we'll talk to people. We'll be at certain functions and my husband, like it makes me uncomfortable. He'll come back, he'll stress that, "You should be proud. You should . . ." I'm like, "Well, you know . . . Yes, I have my doctorate. This is part of my profession but it does not define me."

And I don't want people to feel like it's something that makes me feel like I'm better, because it doesn't. It makes me uncomfortable. I know that's weird because you work so hard for it, but it really does.

Cailisha: No, it's understandable.

Skylar: But coming from your kid. My son. It makes me feel so good because he's like *really* thought about this thing. In kindergarten, he did a science fair project. He just finished kindergarten. He won, and he presented it at the county science fair. He didn't win there but he was so devastated but now that he knows that I'm a doctor and I do science. He came to me the other day and he was talking about how he wants to do plants for his next experiment. He's coming up with all these ideas himself. I think I feel like, or I hope it's all because he knows it's

something that I do. And he's proud that he wants to do it, too. So that's something that's kind of really making me feel good.

Skylar was proud of her son's accomplishment. Her entire face lit up as she talked about his science fair project and how seriously he had taken it. He was only in kindergarten and was already planning next year's science fair project. I could not help but go back and recall Skylar's own science fair project with the mice in the maze. I wondered if Adam would one day recreate that project. Skylar credited her husband for being her biggest cheerleader. In fact, her accomplishments motivated her husband and sister to return to school and pursue PhDs.

As faculty member at an HBCU, Tubman University, Skylar was aware of the ways in which sexism and racism were evident in her environment. She explained the ways that they manifested themselves:

Cailisha: Do you feel like any of the challenges or difficulties that you have here . . . you've mentioned previously in your other experiences that you would attribute some of those to racism or sexism. Do you think that that has any play here? Or it's more just . . . ?

Skylar: I would hate to think that. I try to be that person that I don't let, I try not to let the color of my skin or my sex deter me from stuff or to use that as an excuse. However you can check our salaries . . . our contract salaries are public knowledge. So my same position or you look at the males, they make more than we do. Why is that? That's troubling to me.

You find, particularly across campus, you'll see mostly female faculty doing a lot of work. A lot of the grunt work. Then you look at some of the leadership roles. Or people that get credit for things and you do find that men, typically, get a lot of credit. Or it could be a woman in a meeting saying the same thing fifty-million times and then you get a man come in there, particularly a white man comes in there and everybody stops and listens. Like something profound has been said.

Cailisha: Wow. Yeah.

Skylar: It's not all the time. I think particularly here is better than most places.

Cailisha: I'm sure.

Skylar: But I think we're all just kind of stuck in a mentality. I had a meeting with our dean yesterday. And it's about a grant that I want to be part of with Whittaker (a PWI nearby). I went to him to ask him for support, for a support letter. He definitely said he wanted to support it but some things he said where I just like, "You know what? He's *right*." He was like, "You're coming at this . . ." and granted, I wouldn't be the primary PI, but the majority institution is utilizing *us*. *Our* resources. They want to utilize *our* students. ". . . so we need to, you need to come out with a position of strength." Not necessarily like, "I'm just glad to be a part of this." When really, that was how I was. It's like wow. I'm flattered that Whittaker wants to work for me. I can be a part of this and get into the door. That was my approach. However, as he was speaking I was like "He's right." I've been doing this a long time and I deserve a certain level of respect. I'm not saying that they don't . . . I totally feel like they value me. But stuff like that it's true in all aspects. I think when we approach a situation, you can't be afraid or you can't undervalue yourself. You have to go ahead. Because, what's the worst somebody's going to do is say no. So you should always ask.

Skylar recognized the inequity in salaries among men and women. Women were pulling a large share of the load, but not getting financially compensated for their hard work. She recognized the ways that sexism and racism were both visible on the HBCU campus. Skylar learned that being an African American women in science meant things were not always going to be fair or even. When I asked her to articulate what being an African American woman in science meant to her, she described it as follows:

Cailisha: What does it mean to be an African-American woman in science?

Skylar: What does it mean?

Cailisha: Or how does it feel?

Skylar: Actually, it's *overwhelming* sometimes. It seems like a big responsibility. I don't know it's like one of these professions that you really cannot go into one for . . . I'm not saying you can't make money, because I'm blessed every day I think, particularly at Tubman. They do a really good job of making sure they pay you what you're worth.

It's definitely not something that you're going into particularly if it's, a part of what we do is STEM education, that you're *not* going into for a whole lot of praise and glory. Because you don't get it all the time and a lot of times, particularly with like the African-American community like if they hear doctor, they don't necessarily equate it to a PhD, and immediately somebody's asking me about different treatments. And medical conditions and stuff like that. That I mean, some of it is a real, *big responsibility* I think. For me it's always been about, okay, let me get somewhere so I can help someone else or pull someone else up. Unfortunately, you don't always see that, and it's kind of hard when you're in those circles and everybody's motivation isn't necessarily the same.

Particularly if you're working on certain projects and your goal is to maybe you want to impact X number of students. Or make sure they're doing this or that and you need help and everybody needs to chip in, but it's not always the case. I'm not saying that I do everything right, or always on point, but I really try to stay grounded and not forget why I'm here. I feel like it's so easy, particularly, in this area to get things taken away from you. Whether it be you get sick or you can't go to work or you know. Or in this day and age where jobs are being lost schools are being cut, shut-down, particularly HBCUs.

We're targets. I feel like you have to make some sort of impact to stay relevant, and so I feel that's where I am now. My husband says all the time. "Oh, it's always something else." Once you accomplish one thing, it's onto the next.

It's like no downtime. That can be frustrating I think for people around us, but I think it's even more frustrating for us, women in STEM. It's like even with recently being promoted it's like, okay, now the pressure's really on. Gotta get this grant, got to do that. I've got to prove that I'm worth giving that new contract to. I feel like people are watching me. It's overwhelming. To say the least.

Despite feeling overwhelmed by the level of responsibility, Skylar was motivated and inspired by the potential impact that she had on students. She knew that in STEM education she was not going to receive a lot of praise and glory, but she also knew that there was no substitute for hard work.

Dr. Cynthia Niema Anderson: "A Serious Scientist"

Dr. Cynthia Niema Anderson graduated from Ida B. Wells University in May of 1996 and began the PhD program at Washington Carver University (WCU), a Midwestern PWI, in Microbiology and immunology the in the fall. The PhD program was difficult, especially the first year. When she talked about her years in graduate school, she remembered having a very strong support system in her family, church, and friends. Niema described her support system:

Cailisha: Who or what supported you in your path into science?

Niema: My biggest supports have always been my family. And not just my mom and dad and my sister, but my grandparents, my aunts and uncles, my cousins. I mean everybody and its . . . to this day it still goes on this way. One of my favorite cousins his name is John. John is about maybe ten years younger than I am. And every now and then . . . when I was in school he would always call. "Are you still in school? . . . How ya doing? . . . You need anything?" It would just be out of the blue and even outside of that, friends. I had one of my best friends in undergrad when I was in graduate school. If she knew I was having a tough time on Friday she would drive from home to WCU and she would go back home on Sunday. What she was telling me was that she had to make sure that I stayed. And so, my support system has been . . . I can't even describe. It has been tremendous.

When I asked her to tell me about a time in particular that she remembered getting the support that she needed, Niema explained why it was so difficult during that first year:

Cailisha: Do you remember anytime in particular when you really needed support?

Niema: For me graduate school was very difficult. Specifically the first year.

Cailisha: And you were where?

Niema: I was at Washington Carver University. And I was in the immunology and microbiology PhD program and at WCU in school of medicine we had ten graduate programs in the school of medicine. Out of those ten programs, when I first got there, there were six African Americans period out of all ten programs and the level of insecurity that I had shot through the roof and it wasn't that like I had never been around Caucasians or anybody of other ethnic groups that wasn't the case. I had traveled I had been to Australia. I spent six months in Australia when I was in undergrad doing research. I went to two different research institutions when I was in undergrad before I went to Australia and these were all large majority institutions. But it was very different at the graduate level because I think as an undergrad I knew I was going back home. I was going back to Ida B. Wells where my support group was but in graduate school it was just very different the culture was different and that made it very, very difficult, but a lot of the pressure I realized during my second year I was putting on myself because in my program I was the only African American. The only other African American who had graduate from my program had graduated in the seventies.

Cailisha: Oh, wow!

Niema: Yes. And I actually got to meet her. She was awesome. She was teaching at WCU. But there was an African American male who had actually left the program the year that I was coming in and he found me on campus and he told me if there is anything that you need let me know. He said, "It is not going to be easy." He said, "People are different." But he said, "You have to figure out how to make it work for yourself." And he was right. And I think one of the things that helped me get through was when I was accepted to WCU I was also accepted to the MBRS (Ma program. I'm trying to remember what the acronym stood for at that time. It was the minority biomedical research support program. And that program supported both graduate and undergraduate students of color not just African American but any brown people pretty much. So one of the things that really helped me was that all of graduate students had to mentor the undergraduate students. So I felt like I had to get through . . . I had to figure out how to make this work

so I could help the undergraduates keep their motivation. And figure out that they could make it work too. So that really helped. And I got a chance to teach in that program. Which I *loved*. That was my favorite part.

Cailisha: Was that your first time teaching?

Niema: No, I actually taught when I was an undergrad. I taught in a couple of different summer program on campus. And then when I graduated from Ida B. Wells, I taught for a couple of months at the school called Hawthorne Middle school. Their science teacher . . . and I think it was physics. She had to leave during the middle of the school year and so I took her place. And I was teaching 13-year-olds, which convinced me to go to graduate school.

[Laughter]

It was no question there.

Cailisha: I understand.

Niema: I love them, but that was not the age group for me.

What a tremendous amount of pressure for Niema to deal with, knowing that the most recent graduate had been almost 20 years prior. Thankfully, she had the MBRS program as a support as well as the students whom she was teaching. Without them, she may not have made it. If she had not had such amazing people supporting her, Niema doesn't believe that she would have survived the first year. There were several times when she considered quitting:

Cailisha: Was there ever a time when you thought you would not make it? And what made you stay when you thought of leaving?

Niema: The first thing that comes to mind is when I was a first-year graduate student, and as an undergrad, we talked before about how I had an opportunity to do a lot of different things to get exposure to research. I really fell in love with it, but during my first year of graduate school,

two things happened that almost caused me not to go back the second year. The first thing that happened was, I was doing a rotation in our . . . she was actually the graduate advisor at the time, I was doing a rotation at her laboratory, and I really thought I was doing great.

I thought I was doing a good job, I was doing everything that I learned as an undergrad, and she walked over to me one day, and she said, "You know, I really don't know if you should be a scientist." She said, "You really think like a technician, so I don't think you know how to think like a scientist. You should probably think about being a technician." This was the graduate Advisor of our graduate program. So that was one thing that happened. Another thing that happened was, in the research lab that I was doing my work in, my PI came to me one day and he wanted me to make up a certain solution, like a three millimolar solution of something. And I remembered doing it in class. I remembered seeing other people doing it, but I just didn't have that much experience making that particular type of solution. And I just remember, I just froze. I couldn't think, I started sweating, I had to leave the lab. I was just so . . . it just blew my mind, and then I was upset with myself because I was thinking, "This is so irrational. Why am I having this issue?" And it took me a very long time to get over that, because I was afraid to go ask him for help; he was my superior. I didn't want him to think that he had led this person in the lab that couldn't even make a solution. I was afraid to ask my other colleagues in the lab for help, because, to me, they were like superstars. They came from these schools where they were, really, overly prepared, even before coming. They just seemed to never have any issues, but for me, I felt like I was the problem child in the laboratory. That made it very difficult and those two instances really caused me to think twice about whether I should even be in science, and it's sad, because they're such *minor* things. It was just really, *really* scary.

There were many, many times when I thought I wouldn't make it. Another one of the times I thought I wouldn't make it was that first biochemistry test in graduate school. I remember in my class, there were 94 students. I was the only African American out of those 94 people in that class. And in that class we had four different teachers and each teacher would test you on their section. Which meant that you had to be able to adjust to four different teaching styles. I never had that experience before, and it was horrible. And going through that class, I declare, it just killed my spirit. It was really bad. And I remember every day after class, I would be like, "What are they talking about? I know I've seen this before." But the way they described it. I had never heard that information before. And the whole first year of graduate school

was when I questioned whether or not this was what I was supposed to be doing. What kept me there was my support group. If I didn't have the students and faculty in the MBRS program, I probably wouldn't have made it.

I was very lucky because my roommate was actually one of my friends from undergrad. We found out when we were on campus one day. Both of us had to come get our transcripts at Ida B. Wells, and we ran into each other. And she was like "Oh, you know I'm getting my transcript." And I said, "I am, too." And I said, "Did you decide where you were going to school?" She said "Yeah, I'm going to Washington Carver University." And I said, "Uh-um! Me too!"

[Laughter]

So we ended up being roommates. She was wonderful. Her name is Dr. Vanessa Stewart. She is a phenomenal African American woman. She really is. But her support was . . . I can't even describe it. But she would threaten my life most of the time.

[Laughter]

She was like, "You aren't going anywhere." My best friend that I told you about. My sister, Sharon. She was awesome. Anything I needed, she would either mail it, or she would just show up. She knows me very well so she could hear it in my voice. If she knew I was down, she would just show up. Again my parents, extended family, my church family. They would send well wishes all the time. They actually had a church convention in Michigan, in Detroit. So two years, they came up and stayed. And so I got a chance to be with them, but it's really . . . at every step, it's the support. And for . . . I really bad for people who don't have that type of support system because I don't understand how you make it through.

Niema's support system was without a doubt her reason for staying. She credited the MBRS program with keeping her on the path, as well as Vanessa who would "threaten her life." She also had her sister and her friend who were willing to jump on the road and come see about her. Niema dealt with so many difficulties during her first year of graduate school. As she described the pressure she as under, it is the easier to

understand why she felt so insecure. Her own insecurity, however, was not the only

barrier that she had to struggle with:

Cailisha: So what would you say were all the barriers that you have had to contend with as you pursued science? You can just run down the list then we'll talk about some things specifically? So what were the barriers?

Niema: One barrier was my self-perception. The way I saw myself, especially in the beginning of graduate school . . . I was very unsure of my own capabilities at that time. And I remember asking myself several times, "Why did they let me into this program?" I just couldn't figure it out. And I knew that I was smart. That wasn't the question. I just couldn't figure out how to navigate the program and it was so hard. And everything just moved so fast. And I just . . . it took me a while. It took me that entire first year to figure out that I had to stop trying to do stuff by myself. Once I figured that out, the walls started coming down. Because I think that when I went in, of course because I knew that I was the only African American student. I knew that no one had graduated . . . no African American had graduated from that program in many, many years. And you know, I knew that people were counting on me to be successful. It was . . . it was just too much pressure and so that was a time that I really had to learn to lean other people. I had to learn how to study differently. I didn't know that I didn't know how to study for graduate school. I was very, very good in undergrad I always had great study habits. I meet a lot of people that say, "Oh, I never had to study." That was not me. I've always had to study and I've had study hard. So I knew I knew how to do that, but the amount of material that came in graduate school was so tremendous. I didn't know how to handle that. Once I started talking to other people and seeing how they were studying that's one thing that helped. Something else on the study side, another barrier, was again the culture. In grad school, because I realized very quickly that if you were not a part of the "in group," then you were gonna have a lot of trouble. Maybe about two months into my graduate program, I started figuring out how people were doing so well on the tests. They were getting copies of the old tests from other people. And the professors they didn't care they were like, "However you learn the information, we don't care." And so, since I wasn't a part of the group, I was being left out of that whole thing. And I remember this young lady who was in my program . . . her name was Linda. *Awesome person*. I love her to death. But I remember she called me one day and she was like, "Why aren't you studying with us?" And I told her, "I

didn't even know y'all were studying. Nobody told me." So she invited me to come to her house and she had copies of the test and she told me she said, "Ok, this is how we are going to study." And the good thing about meeting Linda; Linda was a teacher. I didn't know that, but this was the biochemistry class . . . the class I especially had issue in. Linda taught biochemistry and so she opened the book and she said, "Look this is what you are going to focus on and this is how we are going to review it." And dong that with her, my grades sky rocketed. But I had no idea. I just didn't know. So I think having to get over my idea of what I was supposed to be and figure out that there is nothing wrong with asking questions or working with other people. And that that was something that I was supposed to be doing. That really helped me get through. I didn't realize that.

Cailisha: So just to review so self-perception, learning how to study, dealing with the pressure and the culture. Do you remember any other barriers?

Niema: I know this sounds really weird, but I didn't realize how much weather played a part and I'll tell you why. So you know I was born and raised in the south. At home, we have four real seasons. Up north, they have two seasons: hot and cold. Winter stays around forever. And at WCU because it is right on the river we owed get a lot of lake effect snow. It would be cloudy a lot. And so I started suffering from seasonal depression. I didn't know what that was. And I would tell everybody, if you walked into my apartment . . . I had a thousand lamps in my apartment. It looked like a beacon because I would have all the lights on. And I didn't realize that the weather could affect you that way. And my sister told me. Because my sister went to school in the mountains. And she had some of the same issues so she told me about these lights that I need to buy so I bought a whole bunch of these lamps and it really started helping me in terms of my mood. I did not realize that weather could do that to you. And it affected my studies, my ability to study because I was so *sad*.

[Laughter]

I was like *"What is wrong?"*

Cailisha: That is something probably that no one would ever even . . .

Niema: . . . .think about. I never thought about that.

Cailisha: That's interesting. Can you expand upon whether or not those barriers were in place due to your gender, race, or ethnicity?

Niema: Definitely race and ethnicity. Not immediately being accepted into the bigger group. And I'll give you an example. My PI, the principal investigator, who I ended up working for. The last year of my PhD program we were . . . we had a very, very candid conversation because we were discussing my future career goals and he just blatantly told me. He said you know, "You are the first African American female I have ever worked with." He said, "When you first came into the lab; I didn't know really how to interact with you." And I said, "Yeah I could tell." It was very obvious, but I think he had to learn that African American women were just like everybody else. A lot of the stereotypes that are there, I think, a lot of times we're still having to break down. That was my experience.

Niema also shared another story about a time in graduate school when she knew her race

had played a factor in the way she was being treated:

Niema: I remember when I was in graduate school I went to a conference and I actually won first place in the conference for poster presentation. And I remember this guy coming up to me and he was like, "Oh, that was really good. You know I was really surprised." And I was like "Why?" Like, I'm here with all . . . I'm competing with all these other people. What's the . . . why would you be surprised at all. But it . . . it's tough.

Cailisha: In your mind, when he said that, 'being really surprised'. What did you think he meant by that?

Niema: Because I was the only African American student there it automatically made me think of race.

Cailisha: Ok.

Niema: Automatically. Because he was talking to other students. He didn't say anything like that to *those* students.

[Laughter]

I was like, "Oh!" And I remember also having somebody say, "Oh, well, you know you really do speak well." I'm like, "I'm supposed to speak well!"

[More laughter]

"I'm getting my PhD. I think I should be well-spoken."

Cailisha: Yes.

Niema: Thank you very much!

Cailisha: Yes. And I think sometimes people see that as a *compliment*.

Niema: Yes.

Cailisha: They're really thinking that it's a *compliment*. But it . . . it *isn't*.

Niema: [Laughter] It is not!

Despite the obstacles during her first year, Niema was able to complete her PhD

in Microbiology and Immunology at Washington Carver University. In 2002, she debated

whether or not she would move back home before graduation, but her mother insisted

that she stay and walk. It was an important moment for her mother. Earlier, Niema had

mentioned her mother's own experience with pursuing her PhD. She said:

Niema: My mom actually went to school for her PhD but she left early. They had no support system at her graduate school so she ended up leaving, but she never told me about it until I was in graduate school. Now I can understand why if I had an issue I would just go directly to her and she would be able to give me advice that I just thought was miraculous, but now I know it's because she went through it too.

In a later conversation, I followed-up with Niema specifically about her mother's

experience and the advice that she gave her:

Cailisha: You talked about the similarities between you and your mother with graduate school, could you expand on that a little?

Niema: When my mom finished the undergrad, she got into a PhD program at Prosperity University, and her program was very difficult. She was one of very few minorities, African Americans, in the program and this was back in the 60s. She graduated from Ida B. Wells in '68, and went to her PhD program right after. My mom came up against the same issues that I did, and as I said before, I didn't know about it until I went into my PhD program. She never told me that she even applied for graduate school in that area. She was going for her PhD in microbiology which is the same thing that I went for, and she had really no support system there. There were no programs in place like we have now. It was just her. She had a good friend there, but that was it. So in terms of some of her experiences during that time, there was still a lot of racism around so she did personally experience some racism while she was there. Another issue was that she was from the south. She was in the mid-west which is a completely different culture. And the course load, she found to be extremely difficult. She shared with me that a lot of times people wouldn't study with her. She was left to do a lot of things on her own, and it made it really, really difficult for her to be successful. So what I was saying about when I had issues, I always wondered why my mom was able to talk to me about how to get over . . . how to get past issues that I was having as a graduate student, and it was because she had gone through it. I just didn't know. She never told me.

Cailisha: Can you think of anything in particular regarding the advice that she gave?

Niema: One of the best pieces that she gave me was that once you are accepted to a PhD program, she said, "People already know that you are intelligent enough to complete the program. That's not the question. . . . Sometimes you have to treat it like an endurance test. If you can endure it, you will get through it." She and my grandma always had this thing about making sure that you listen. She said, "Don't start off talking. Start off listening. When you go to your program, make sure you listen. Listen to how people speak to each other. Listen to how they communicate with one another and the things that they do. And you kinda follow that model because that's how they're successful at that time in that program." She would always tell us to . . . "Start off listening. Look at how people are doing things and then work your way in." And that was good advice.

Cailisha: Can you think of any other advice that helped you to stay?

Niema: Mainly just her being a motivator. It's really what helped the most. If I called home crying, she would listen to me cry, and then she would say,

"Ok. Now what you are going to do about it?" She was never the "pat you on the back and tell you to come home" person. She would pat you on the back and tell you to pull your pants up and keep going. That's the type of person my mom is. She's very strong and I love that. I love that about her now. She's always helped keep me going that way.

Cailisha: Did your mother ever speak to you about how she felt about you being able to finish the PhD program and it being something that she wasn't able to do?

Niema: It was a point in her life where she was extremely proud because she always told me she feels like I lived her dream. And so, for her to be able to come to my graduation . . . I didn't realize at the time how important it was. I remember calling her. It was right before my thesis defense, and I was exhausted. I was just ready to go home. And I said, "Well mama, I don't think I'm going to stay for graduation. I think I'm going to go ahead and move back home." And she said, "I don't understand why you think that's your degree. This was a joint effort." She said, "That's my degree, too! So, yes ma'am, you're gonna walk across that stage." And so, I actually ended up moving out the day after graduation. If nothing else happened, she was going to see me march across that stage. And for me, to this day, it makes me teary-eyed because I know how important it was to her. And so, I feel like our paths have been so common, and to this day, I feel like I am really doing what she wanted me to do, but she would have never told me that she wanted me to do it. So I'm glad that I could do that for her.

Niema walked at graduation and moved the very next day. After returning home, she began the TEACH post-doctoral fellowship at South East University. It was the same fellowship program that Samantha participated in. She knew that she wanted to continue teaching because of her experiences teaching in the MBRS program. The TEACH program was a great training program, and she thoroughly enjoyed her experience. Niema began the program in 2002 and met her husband while in the program. He had earned his PhD from a school out west in Pharmacology and Toxicology. Her future husband was also a TEACH fellow and just a year ahead of her. They married in May of 2006. I asked

Niema if there was ever a time when she did not feel confident when she attended

conferences, and discussed an experience during her postdoctoral fellowship:

>Niema: I have been to conferences where I just felt completely uncomfortable the entire time. For example, when I was a post-doc I went to a conference in Ottawa, Canada. And I had to give a big presentation. This was the big presentation that I had given as a post-doc. And I will never forget there were 150 participants in that session. There was one other minority female and she was African. And the majority of them were men. I think we counted four women in the audience, period. And my friend who is French Canadian, she was also giving a talk. Luckily, we were able to give them back to back because we were there together. But that was one of the scariest times, and again . . . I . . . I mean . . . I had the same feeling in terms of feeling like I had to be over prepared. Just being prepared was not enough. I had to be super-duper prepared. And I'm glad I was because I received really great questions after my talk. And we had a conversation instead of it being one of those instances where people are just peppering you with questions just because they can. It was more of a conversation between the presenter and the audience. So that worked out great. But outside of that session, we were part of a huge conference. And it was just very . . . I don't know how to describe it. It can be a little off-pudding when you're walking around and there's *nobody* who looks like you. And there are not even other females around.
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>[Laughter]
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>And so it's been very interesting. But I love going to conferences. I always know that I'm going to get some stares because I do. It's just . . . I think, it's just a lay of the land because I think there are just so few minorities in upper level science. So now I'm not surprised, I just wish it wasn't that way.

In August 2006, Niema completed her postdoctoral fellowship and was hired as

an assistant professor in the Department of Biology at Douglass University. She

desperately wanted to return to her alma mater, but the newlyweds needed to find

positions in close proximity to one another. They settled on universities about an hour

from each other and bought a home just about in the middle of the two schools. After

interviewing at Douglass, she was confident that she had found the right fit because of

how she felt during the interview and how she feels about work right now:

Cailisha: How does it feel or what does it mean to be an African American woman in science in the workplace, in your workplace?

Niema: In my workplace, it actually feels great because I think this is probably the first time that I feel at my opinion is highly valued. When I was in my post-doc, every now and then I felt that the work that I was doing was valuable. And that my thoughts were valuable. But once I became a faculty member here at Douglass University, I felt like people were really interested in hearing my opinion. People really wanted to know. And that made me feel so good because I hadn't had that feeling probably since undergrad. And there was a *lot* of years between undergrad and my faculty position here.

Cailisha: Do you remember a time in particular when you first remember or first noticed that, you know, "my opinion is valuable here"?

Niema: Yes. I think it was even during my interview. And that was one reason that I selected Douglass University. I was interviewing with the department chair, the co-chair, and one other faculty member. All African American female scientists and I remember them asking me, "Oh, well, why are you interested in that research?" And when I gave my answer, their response was so positive. Instead of it being a mediocre response. It was *really positive*. And because of my love for students, they asked me, "Well, if you had a chance to work here, what types of things would you do with the students?" And everything I said was taken . . . it mean, it was just a positive environment. And that's what made me want to come here.

Cailisha: Good. What about being an African American woman scientist when you are running your laboratory? How does that *feel*?

Niema: *Here* in my faculty position it is great because at Douglass I have had the opportunity to work with a very diverse group of students. I've work with Caucasian men, African American men . . . .Caucasian women, lots of African American women. People from . . . I have two students now who are actually here . . . they are going back to their countries to visit their parents. So being able to work with really diverse

groups makes me feel great. And the fact that the students are very eager to learn. And knowing that they actually want the knowledge. And they want to *know* how to do something. That makes it wonderful.

Cailisha: Yeah. So currently, as you continue in science, who or what supports you as you continue in science now?

Niema: My family is my greatest means of support. My husband is a huge support because he's going through the same thing. So if I come home and complain, or if I come home and I'm happy, he knows why. He understands it. So he is huge support in my life. My parents. They cheer both of us along all the way. They are just very happy that were doing what we do. And that we do everything that we can to still help our families. And my department at my institution. The people in my department are very, very supportive. And a lot of these are people that have no idea what research I'm doing, but they're still very supportive about everything. And even the students. My students are some of my biggest cheerleaders. If they know that I'm going to present somewhere, they're like, "Oh, well, Dr. Anderson, do you want us to look at your presentation first? Do you want us to give you come pointers?" Which I think is really cool.

Even though Niema has had an overwhelmingly positive experience at Douglass in her faculty position she has dealt with a few barriers. She described them to me:

Cailisha: So currently, are there any barriers that you have to contend right now?

Niema: I think there are still barriers there. I think one of the biggest barriers is the way that I perceive myself. Sometimes I am extremely hard on myself because I know that I'm female. Because I know that I'm an African American woman. A lot of times I feel like I have to be so far above the mark. And I still strive for that. And I know that there's no such thing as perfection. I'd never strive for that because if know I could never reach it. But I do want to be the best at what I do. So I think really getting to the point where I can be happy with what I'm doing . . . I can be happy with myself. I'm always working on that. Another barrier again, just being an African American female. And I think . . . I hope things are changing but I still know that whatever I do it has to be extremely good. I just know it does. Whether it's true . . . I don't know if other people perceive it that way. But the way I think

about it I know that I have to be above the bar. There's just no other way to do it.

Cailisha: You already talked about this a little, but do you think that way you feel, having to be over prepared or the dialogue that you have with yourself . . . Do you think those are in place because of your gender, race or ethnicity? Just for clarity, do you think those contribute to the way that you think about who you are?

Niema: I think so. And I think it will always be there for me. It's always going to be in the back of my mind regardless if someone else is thinking if, I'll be thinking it. And I really think that for me this started back in graduate school. Because I think I mentioned in our first interview that out of ten people . . . ten students that were accepted into my graduate program the year that I entered I was the only African American and there were just not . . . and there are still just not many African Americans in the pipeline. So feeling like . . . whether it's true or not. Feeling like we're representing every African American *ever!*

[Laughter]

Especially anybody that wants to come into the program after us. Or at that time after me. That was really tough, but . . . yeah. That was really tough.

I think the biggest challenge that I still have is getting over things that have happened in my past, because they seem to always be in the back of my mind, so they really do shape how I interact with people sometimes. I'm always very friendly, because that's just my personality, but I am a lot more cautious, and I think about how my husband, who is an African-American researcher, how he interacts with people versus how I interact with other scientists. If we go to a conference together, which we try to do at least once a year. We try to do a conference together. I just look at him and he has this demeanor. He's just strolling around, talking to people, shaking hands, and I'm sitting back there thinking, "Man, it must be great to be a guy."

I wish I had that, and it's not just confidence, it's almost like . . . I don't even know how to describe it, it's like being in the same pack. I think, as a female scientist, I'm much more comfortable with other female scientists than I am with other male scientists, unless I know the male scientist really well. He can talk to anybody, male, female, he doesn't care. And he's just strolling around like it's him. It's all about him.

All these years later, Niema still carried the burden of feeling as if she needed to be over-prepared and that she is representing the entire race. She saw the confidence that her husband displayed when they were at conferences together, the way he worked the room, and she envied that. The insecurity was still there, but she did believe that she was getting to the point where she was happy with herself. At the time of our first interview in the summer of 2014, Niema had become a mother. Her first daughter, April, was born in 2012. In the fall of 2012, she completed her tenure and promotion package and was promoted to Associate Professor. That was a tough period in her life. Niema had a very difficult pregnancy and was sick pretty must the entire time, but she still had teaching duties, academic advisees, and students in the lab. By our final interview in the fall of 2015, her second daughter, Maria, was just about six months old. Being a mother changed her life and changed how Niema saw her future in science:

Cailisha: So, I know, you have a lot of support now. Are there ever times now when you think about leaving science?

Niema: *Yes*! [Very emphatically]

Cailisha: Ok. [Laughter]

Niema: [Laughter]

I talk to my husband about this all the time. Because I love being a researcher, but researching is not my main love. I think that the reason that I've always been interested in research period is because I'm very nosy. I love to see . . . you know I was one of those kids. "Oh, I wanna see what happens if you put baking soda in this." You know . . . "Can I blow something up?" But now, my interests have changed. And it's hard trying to balance my passion now with my training from before. Because I know what I was hired for, and that is not exactly to what my passion is now. But I think that's the biggest issue. Another issue that I have with science is that in the research arena, it is not very conducive

for women who have families. I don't think it is. I don't think . . . having to have thick-skin is one thing, but dealing with some of the politics in science. I just think it's ridiculous. And I don't like the business side of science at all. And I didn't realize that when I was working on my PhD and falling in love with research. But a lot of times I wonder, "Is this what I should be doing at this point in my life?" Because, you know, to really be productive in the laboratory you have to have time. As a faculty member at this size HBCU, is very difficult because your teaching responsibilities, even reduced teaching responsibilities, are still more than any teaching responsibilities that you would usually have at a predominantly white institution. So teaching three classes and then being expected to advising 50 plus students. And then being expected to serve on committees. I mean it's just completely overwhelming. So that can make it a huge challenge but I'm still very glad that's I'm here because this is where I want to be. I would not leave here to go to a large research institution because that's not where my passion is.

Cailisha: So where is your passion now?

Niema: My passion now is really with students. Trying to make sure that students are well prepared well in advance. So that they can follow their own dreams. When I first came to Douglass, one of the things I realized was that if students wanted to go into research, there were a lot of avenues they could take. If they wanted to go into some other profession, there was nothing. The support was not there. And I just thought that was terrible. So I had the opportunity to start working with students, and to start helping them figure out what they needed to do in order to be productive while they were in undergrad. To be competitive and competent for whatever is it is that they wanted to do once they left Douglass. And to be successful once they got into the advanced programs that they wanted to be in. And all it took as one graduating and that did it for me.

[Laughter]

I was like "Oh, I gotta keep doing this!" But yeah, that's my passion, but I still love research. I love science. But there are so many aspects of it, that just turned me off at this point in my life.

It was different before I had children. One of the things I was going to mention before is that in order to be really productive in the laboratory, you have to be there. And so when I was in my post-doc, and before I had a baby, you know I would be in the lab 8 or 9 at night. And my

husband would too because he's doing the same thing. We would call each other and say "Ok, I'll be leaving in 30 minutes." And an hour later, we would be in the car. But now, having to balance everything between 9 and 5 is completely impossible. Because nothing else has changed. The course load is still the same. The advising responsibilities. The service piece has actually increased. Because in the beginning just doing departmental service was fine, but as you go further you have to do college service and then university service on top of all of that. And I haven't been able to add any extra hours in my day. My hours have been cut because of daycare. At 5:00, I have to be on the road. And that's just how it is.

Cailisha: You mentioned some of the policies that aren't conducive for women in science. What are some of those that you feel are barriers?

Niema: I think in terms of women who want to have families. As I mentioned, it can be very difficult if you have a research laboratory. Especially, if you don't have the type of support that you need in order to successfully run a research program. A lot of schools, not specifically HBCUs but smaller schools that are not Research I institutions don't usually have the level of support that is honestly required to have a successful program. For example, trying to do travel for a conference. We don't have anyone we can call up and say "Hey, I need to go to this conference. Here's my grant information. I want to fly out and come back on this date." That's all on you. This is on top of all those other duties that you have. It makes it really hard. And luckily a lot of the schools are working on infrastructure for research which is great. But trying to manage grants once you get them. Trying to get people paid. It's another fulltime job and as a PhD you are not trained to do this. You are trained to be a problem solver and to be innovative and to think. Not to do paperwork, and that can be a serious, serious barrier.

I wanted to make sure I captured her experience correctly and understood how the policies affected her now that she has a family, so in a follow-up conversation, we discussed it specifically:

Cailisha: You said that the policies that are in place are not conducive to women with families. Could you explain what you meant and how that impacted your life?

Niema: As a faculty member one of the scariest things is trying to get tenure. Depending on the university that tenure clock may stop. It may stop for certain amount of time, it all depends on the institution. Here we actually have the ability to halt the clock but it won't halt for like a year. We can take maternity leave, they'll give us paid maternity leave for I think it's 12 weeks. If you need to go beyond that then you have some issues.

The way science is setup as a whole it really is not setup for women with children or people with children period. Because if you have to take time off for a sick child, let's say you get a call from daycare today. If you are a bench research scientist your experiments don't care. You're still expected to get the same number of publications, you're expected to have the same level of productivity. There are no differences there.

Whether you have a family or not you're still expected to reach that same bar. Depending on your level of support that bar can be impossible. It's really tough especially for people who have kids. In addition to that I do want to bring up our requirements for service in terms of serving on committees, advising students, things like that. Nothing changes if you have kids and you have 60 advisees then you're still responsible for those 60 advisees plus your children.

It can be really tough if you have mentees in the research laboratory they become your children. It's a lot of responsibility and it can really be tough if there's no flexibility in the rules.

Cailisha: At least there was some flexibility at Douglass as far as your tenure clock stopping and do you remember how long it stopped?

Niema: For me, I ended up having my first child right before the summer of the year that I wanted for tenure. My tenure clock wasn't affected because since I'm a nine-month employee I went off contract right after I had her. There was nothing there and I just came back in the fall and kept going. I was still expected to have everything.

Cailisha: When did you submit? Was it before or after she was born?

Niema: It was after.

Cailisha: It was after okay.

Niema: I had her at the end of April and I submitted that following fall. The interesting thing was that during the summer at that time I was running a summer program. My program kept going so it's not . . . I really wasn't able to skip a bit. I had a few weeks where I wasn't . . . I had some downtime with her and I could recuperate. But right after that I had to get back on the ball because things were still moving.

Niema found a new passion that she wants to pursue. She wanted to promote student professional development and their ability to go to the next level and pursue various professions. Therefore, she developed a campus wide professional development program. Niema also said that several members of her family have been inspired to further their education because of her accomplishments and she feels good about that. Her family was a big support for her in graduate school and they still played an important role in her life:

Cailisha: What about being an African American woman scientist in your family. What does that mean?

Niema: In my family, it's awesome because we don't have a lot of people who have gone on to professional school. Especially beyond the masters. So having a PhD has been great. Especially because it's influenced other family members to go back to school to continue their education. So that's been really wonderful. And also being a scientist, it makes life very interesting because I get phone calls from family members that I haven't seen in years. And they may have some strange illness or something. And they're like, "Well, can you find somebody for me?" [Laughter] I'm like, "Well, I don't know people in that area, but let me look 'em up. Let me see who I can find for you." So in that respect it's been great. Also, it's been very useful. Because, for example, when my mom was diagnosed with breast cancer, my husband and I . . . my husband is also an African American scientist. But because we knew people who were cancer researchers, and we knew some oncologists we were able to connect my mom with some people that she would not have ever even known about. So she was able to get second and third opinions. She didn't have to pay for it. People were doing favors. So it makes a huge difference. And the same thing with my father. He has a

cancer scare recently. And just knowing people, being able to call people up. And say you know, "This is going on. They think it's at stage such and such. What would you recommend to a patient?" And so these are people that do this for a living every day. And if we weren't in science, we wouldn't have these connections. So the connections have been extremely important for us.

Cailisha: I understand. You told me about how it feels being in your family and at home, being a scientist, how really good it is. Do you ever have any feelings that are the opposite of that with your family or at home, being a scientist now?

Niema: Nope. I really loved it, and I think my family members have come to really embrace that idea, and a lot of my little cousins, I'm the youngest child. My sister and I are the only two in our immediate family, but we have about 50 cousins around. It's been really great, because when they've seen that I've been able to stay in science this long, it makes them feel good about trying. So I have one cousin who actually went to HBCU to pursue her BS. She wants to be a forensic pathologist. And she was saying that she would have never even thought about that if she hadn't come to my laboratory and met the students and really realized that you can do this, that it's possible.

As Niema embarked on perhaps a new direction in her career, she described what being an African American women in science meant to her:

Cailisha: How would you answer this question: What does it mean to be an African American woman in science?

Niema: That's a very difficult question.

[Laughter]

That's a very good question. I think that it means that you . . . you have to be a very strong person. You have to be thick-skinned. I am not thick-skinned naturally. This is something that I really had to develop over time. But I think because of how we may be seen by others or how we may be perceived before people really know us. I think that is means that you have to be on your Ps and Qs. And still science is a very male dominated. And non-minority dominated field, if you really think about the research area. And so I just think that it's really important

because I've had people . . . I've spoken to other scientists before mainly Caucasian American scientists and I tend to get these looks like "Oh, she actually knows this."

But I do have to remind myself that I have to be comfortable with who I am. And that who I am is just fine. This is who I'm supposed to be. I'm not supposed to be somebody else. And I try to remind my female students, regardless of their ethnicity . . . I try to remind them of that because it can be hard to move through this world and not really know how you are being perceived. And that to me is really difficult. On the science side, I'm honestly not really sure of what people think an African American female scientist is supposed to be because everywhere I've gone people have seemed surprised. So I don't know what they think we're supposed to look like, or sound like, or how we are supposed to act. I don't know. So, I just always try to remind myself that every experience is a chance to educate other people. So if somebody is surprised at the way I speak, then I'll talk some more. You know, and I'll let them know that all of my students speak exactly this way all the time. Or all of my friends speak this way. Or if we're talking about something on the research side, I just make sure to let people know that I actually do know what I'm talking about. That I'm not about fluff I don't have time for that but that I try to be extremely straight forward and professional at all times because I figure that if people don't really know about African American female scientist this is my chance to teach them about African American female scientist. I'm always thinking . . . it's lots of work.

When I think back to the time in Australia and the Little Pickaninny book that I told you about. And wondering if he saw me that way. I think I have carried that with me all my life. So when I go out of the country or when I just go out of NC. I'm always . . . or when I go off our campus (Douglass). I'm always wondering how I'm being perceived. That's why I'm so careful about being very professional and making sure that I really, really know what I'm talking about. Because I want people to look past my exterior. I don't want them to see a woman. I don't want them to see my ethnicity. I don't want them to even see my nationality. I want them to see that I am a serious scientist who knows what I'm talking about.

Dr. Grace S. Williams: "I Gave It My Best"

Dr. Grace S. Williams graduated from Frederick Douglass University in 1978 with bachelor's degrees in both biology and secondary education. She got married in 1980 and followed her husband to McNair College of Medicine, an HBCU a few states over. He was already there working on his medical degree. She met her husband in Douglass University where he majored in chemistry. Grace finished the program in 1986, earning her doctorate in Microbial Genetics and Physiology. She remembered feeling a bit insecure at the beginning of graduate school since straight out of undergrad. It was one of the barriers that she encountered:

> Grace: As a PhD. student, once I got to graduate school, I felt like I was a pretty good student but I felt like, "Ah, I'm not sure I have what I need," because I hadn't taken biochemistry. And that was one big thing. And I went straight from the undergrad to the PhD. I didn't get the master's in between. So my class came . . . some of them had master's degrees, some of them had started on a PhD, and so there was just . . . there was a myriad of levels of experiences and expertise in education. There were times when I truly felt like I was not ready once I got there.
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> Then there was the barrier of my research mentor left and so I had to start over, so it extended my time. Then in the lab, there were . . . With my first mentor, he was chauvinistic and the guys got the goods and the females sort of, "Well, if you can, you can . . . " You know? But the guys were clearly his choice in terms of providing opportunity, so we had to create opportunity for ourselves. We had to really beat the bushes.
>
> There were some real issues around the PhD process. The good thing about the PhD process with my second mentor is that I could *write*, and he *liked that*, and he helped me to develop that further and he wanted me to learn how to write proposals and learn how to write manuscripts. He was really hard on me because he felt like I could and he wanted to make sure I was . . . I'm still in touch with him because that's a skill that I truly appreciate to this day. And he didn't do that for everybody. He really didn't. But he knew that I could and he insisted that I write. So that was good.

After she finished her doctoral program, Grace took a postdoctoral position at McNair from about 1986 until 1987. I asked if she remembered any barriers early in her career or during the postdoctoral appointment and she replied:

Cailisha: Any barriers after the PHD in your postdoc or early career?

Grace: Yeah. In early career, I . . . Not in postdoc, but in early career I had begun to have my family, and it's actually after postdoc . . . I did a year-and-a-half of postdoc and then decided to just come out of science altogether and go home and have babies, so I stayed out of work to raise my children. There, of course, are disadvantages to that, even within my family. My daddy was like, "You're going to do *what* after all these years of school?" I even had family members question the wisdom of coming totally out. But for me, that was important and to this day I don't regret a day that I spent doing that. But what that did once I decided to go back into the workforce, I had to go back and get retooled. I did that and I took about six months and worked in a laboratory at SEU to just get my mind back into the sync because when I was out having babies, I did not read science magazines and journals.

Cailisha: I wouldn't imagine you would have had time to.

Grace: No. I did not do that.

Cailisha: How long was that time frame that you were out of the workforce?

Grace: About three years. Because I had one while I was in postdoc and I had number two and I wanted to just stay home for a while. A little over three years.

Cailisha: Okay. Why was that important to you? Staying home with your children?

Grace: Because I felt like nobody else could raise them as well as I could.

Cailisha: I understand.

Grace: I had the opportunity. . . . we could afford it financially and I decided that that's what I wanted to do, something that was different. And that really had validity. I knew I was taking a chance though.

Because I was in science and that could have been the kiss of death of my career. And I didn't focus on science. I focused on them. So when I came back, I decided to go back and get retooled and went over to South East University (SEU). And took some time over there, and got back in the lab.

Cailisha: Was there something that you being like staying home with your children, if you had the opportunity is that something that you'd always thought you would do or was it like after the birth of . . . ?

Grace: It was after the birth.

Cailisha: Okay.

Grace: It was after the birth. Kids are always vulnerable when you leave them with someone and they fall in love with you, but . . . It was just, it was something that happened after they . . . I didn't expect it . . . The first one, after about three months I went back. But it was between the first and second child that I decided to step away.

Once Grace made the decision to walk away from science and focus on her babies, she knew she would need to "re-tool" before re-entering to science fully. She decided to take a second postdoc position at South East University in the area of microbial genetics. Grace was then hired in her first faculty position. She was appointed assistant professor at Southern Central University (SCU), a medium sized southern HBCU, in 1990, and while there she earned tenure and was promoted to associate professor. Grace remained at SCU until 2002. When we continued our conversation and the discussion of barriers, she described having the support of her chairperson early in her career:

Grace: Then there were some barriers when I went into . . . Because the youngest was about two, and so when I went into the workforce, I had to explain to my chairperson that I had little bitty kids. And if the school called, I needed to go. I think that probably set up some low salary, but I had a

really *great* chairperson and mentor, and he said, "I understand." He had children of his own and he said, "Well, I'll work with you on your schedule." And then I felt like I needed to work twice as hard so that my colleagues wouldn't feel like I was getting an advantage over them. I remember distinctly that I was . . . I wouldn't let that keep me from succeeding. So that's a barrier because I was not going to be staying late at night as I did as they got older, but I didn't when they were small. That's a barrier in some ways. I was lucky that I did make it up through the academic ranks, but that's a barrier. In some environments, it would have been a tremendous barrier. Definitely.

From 2002 to 2003, Grace chose to leave her faculty position and work full-time completing a research sabbatical at Banneker University Medical Center. This was right around the time of Human Genome Project, and she wanted to learn more about what was happening in the field. Her research sabbatical was in Center for Human Genetics. She made critical connections with top researchers doing research with genetics and health disparities. She would carry these relationships with her into her next position as she transitioned into her first administrative role as a departmental chairperson at Frederick Douglass University. She returned to the same institution and department where she received her undergraduate education. During our conversation, we discussed various barriers that she encountered during her journey in science, and I asked what she attributed them to:

Cailisha: Can you expand on whether or not you think any of those barriers . . . Well, I kinda know, but if you could just explain if any of them were due to your gender, race, or ethnicity?

Grace: Yes. I think in certain . . . Particularly in my first mentor's case, certainly gender was an issue. In terms of race, I have worked at historically black universities all my working career. I've done a lot of my training outside at the majority of the institutions I've worked, and

so I don't feel like race has been such a barrier except when I did a sabbatical about 11 years ago, 12 years now.

I wanted to do this research project in Black people, and when I went to the person that I wanted to work with, because she was one of the top genetics people in the country in this area. And I wanted to do the work in blacks and she laughed me out of the room, because she didn't think we could get enough people in the study to get it done.

I guess that's not a barrier though. I guess maybe she approved it because maybe I was Black and she felt like I could get into the black community. Maybe it was reverse racism.

Cailisha: It gave you an advantage?

Grace: Yeah.

Cailisha: That you might not have otherwise had. Was it a conscious decision to stay within HBCUs?

Grace: Yes. As a matter of fact, I've been recruited twice to go to a majority institution, and chose not to.

Cailisha: And why not?

Grace: You know, every time I would go away, whether it's for leadership training or research training or pedagogical training, I've always wanted to go and bring it back to the institution that I felt like needed it more. And that has been my hold to the HBCU. Whether or not I will retire from one, I'm not sure, but that has been my thinking. And I knew that I would be able to connect with a lot of people external and I would be able to understand how certain systems work in different environments. And where I felt like those systems would be useful at the HBCU, I wanted to bring those systems back. I've done a lot of that, you know.

I've learned a lot from other people and other races and other ethnicities and people think I'm very creative. It's not that, it's just that I'm exposed to a lot of people in different circles and I want to bring some of the best practices back and implement where I can. That's been what I've been about.

Sometimes it hasn't been appreciated, but it is what it is. Oh, that's sidebar. But that has been my thinking that my best energies and skills and capabilities needed to be at these institutions.

Cailisha: I think that's important.

Grace: But now that I've put in, I'm not sure where we'll end.

Grace continued in her position as departmental chairperson and full professor at Douglass until 2009. After leaving her administrative position, she continued at the university in as an Endowed Distinguished Professor from 2008 to 2011. During this time, she began to focus on her research collaboration studying the genetics of a health disparity in African Americans. In 2011, she accepted a higher administrative position at Douglass. It was in her office suite that we met in the summer of 2014, and then again in 2015, and she openly shared her experiences with me. I asked if there was ever a time that she thought about leaving science:

Cailisha: Was there ever a time where you thought you wouldn't continue or make it in science?

Grace: No. There was never a time in science that I thought I couldn't make it. No. There were times when I was discouraged about my environment or some things that weren't going right or even when the experiments wouldn't go right, but there was never a time that I can remember that I didn't think I could make it. But I think that's a part of my makeup. I think that's part of growing up in the country.

Cailisha: Having to make it?

Grace: Yeah. That's exactly right. You said it. Exactly.

Grace never considered leaving even though there were times when she was discouraged. She was certainly discouraged by the shortage of women in science and her

concern with the low numbers motivated her to do something about it. She explained her

desire to help other women:

Cailisha: Is there anything else you want to tell me about kind of your beginning or early years in science as far as being a black woman in science?

Grace: You know, I just didn't even view it that way early on. That became important I think at my first faculty position as a black woman in science because you didn't see many of us, *period*. In my department in my first job, I remember there were only two of us. *Two*. And then when I left that department, there were four women, one was Iranian, one was African, one was African American, and the other was white. So there still weren't that many.

Cailisha: And there still isn't.

Grace: And there is such a shortage. It's amazing because there are more of us in school, but when you look at those of us who are conducting research, who are scholarly, who are getting grants to support programs . . . We just fall off. And that's why we just got the new grant. You should come back and run that for us. You know, it's a 3.6 million dollar grant to support basically women in science.

Cailisha: Wow, Okay.

Grace: So as people have helped me to navigate this journey, now I have a chance to help other people, and that's just been so dynamic. That's just been so really wonderful. It really has been.

Grace's commitment to helping others was evident over and over again during our

conversations. It was one of things she mentioned when I asked her what she does best as

a scientist in various arenas:

Cailisha: When have you felt the most comfortable or competent as an African American woman in science? Like, "This is what I do best."

Grace: Well, the most, that means one, but there are several.

Cailisha: There could be several, yes.

Grace: One is when you can conduct research and get it published in high tier journals, whether you are at an HBCU or you're at Duke or Harvard, that's one thing. When you can train students and motivate them to pursue science, particularly women, that's huge because that's the next generation. When you can tackle a research project like the one I have, and you can navigate that at a quality level. At such a level that funding agencies will say, "I want to support you in doing this." When you can take science and link it to the community of people who need to know about the science. So linking the science to the community to make an impact, that is *huge*.

Then again when you are recognized as being a scientist, and in my case, a scientist and an administrator, that's really huge because that's hard work. So a number of things. I'm very . . . I don't know if I'm so comfortable as I am excited and grateful that the science background, the science training, has allowed me to make impacts on a number of different levels. So I am most satisfied when I'm able to a number of different kinds of things.
I gave you four or five.

Cailisha: How did you feel or what did it mean to you to be an African American woman in science when you were running your laboratory?

Grace: *Awesome*!! Gosh . . . because again I had the time to really work alongside of students. So I dressed up on days when I was in the classroom, and other days I wore jeans. I was actually *in the lab* training and teaching, and these students . . . About 95% of the students who trained with me went on either to get an MD or PhD or they continued on in science. These were the students who were my TAs, my teaching assistants, because they were trained by me. So there was so much pride in that. It was just . . . These were the kids who would go to the ABRCMS meetings and to the ASM, American Society of Microbiology meetings and win awards, so that was the cat's meow!

Cailisha: And that's your proudest . . . because that's where you *lit up*. Is that your proudest moment in science is?

Grace: Training students? It probably is. Yeah. And so now I'm not in the lab . . . I guess I did *light up*.

Cailisha: *You did!*

Grace: So now, you know, I support students in a different way.

Cailisha: Do you miss the lab, though?

Grace: I do. I miss the classroom too, though, but I know that I'm supporting in a different way. You can't get to do all the ways. You can't have your cake and eat it too, as they say. You have to make some priority decisions. But that was a good time, you know? We could take master's students who, you know, may or may not have an opportunity in other places, and they come out with a great GPA and they come out with presentations at the master's level or a paper and a thesis. And they get up and defend that thesis and they know their stuff. Nobody can knock them off course. That was just *great* stuff! *That was great stuff!* Yeah!

Cailisha: Can you tell me about a time in particular, perhaps with one of your most memorable students when you were running your lab that made you feel especially good about yourself?

Grace: Yeah. It was . . . Gosh, I have so many great stories, I should put them in a book . . . But my most memorable ones was working with a guy who was from the Bronx. Big ol' burly guy. And smart as a whip, but he was just wasting time in the lab, just wasting time. And I kicked him out. I kicked him out. I was about half scared of him. I kicked him out. "Clinton, go get my keys, man and put them right here. Go get my notebook, go get my keys, and get out of my lab. And you can come back when you get ready to be a student. But right now, you're not, so get out." And Clinton was just *brilliant*, but he was playing around and he wasting his time and mine and I knew he was going to fool around and get in trouble, because he just came from that background. And he finally came back in about a month and asked me to come back in the lab, promised me, and gave me his plan what he's going to do.

Clinton is one of the . . . just a very successful physician right now. And we often laugh about that. He was very protective of the ladies in the lab. And it was just a good culture in my lab. I think that . . . We had a really nice setup because they knew we meant business and they had to do their work, but they . . . our students bonded. I have some who are chairing departments now, some who are physicians, and some who are faculty. And I'm very proud of the students. They worked hard. They were my TAs, nobody could TA for me but my students. It was a *good time*. It was a good time.

Cailisha: Do you have any other stories?

Grace: I have *many*, but I don't have a lot of time. But I will tell you that not too long ago one of my former students, I was having lunch with a couple of them, and they both were looking for new positions, and I gave them some ideas and they're pursuing them. And they're going to be successful, both of them. And that's always good. That's good stuff.

Cailisha: You were definitely proud in the lab. What about at conferences, ever? How did you feel as an African American woman in science when you would go to conferences?

Grace: That's a great one, particularly now because our work has been presented in eight different countries and we've been invited to present work. And in a few weeks I'll be going to University of Washington, and I just presented at Duke and then at Carolina. I mean, I've presented at the big research one institutions and you go knowing that they're going to be critics out there, and people who are experts and have been experts forever and people who think research all the time. My time is now split between research and administration.

So I prepare like crazy and you learn to frame your responses in such a way that you're open for criticism, you're open to advice and recommendations. And I always go presenting knowing that I'm going to learn something, I'm going to bring something back. I'm most concerned about the criticism now than I used to be. I guess that comes with age, but it's just amazing that several times a year I get invited to the big research one institutions. Though I'm not employed there, I have an adjunct position at Banneker University Medical Center, but I am employed at an HBCU and yet I get a chance to present at research one institutions. I do memorial lectures, I do distinguished lectures. I've had a *good* run in science.

Cailisha: Was there ever a time when you attended a conference, was there ever a time when you felt like who you were as a woman, especially an African American woman, you were treated differently or has that ever been the case that you can remember?

Grace: Usually at a conference, no. No. When I began the health disparities work, it happened at one of our conceptualization meetings and I felt very insecure because at a certain point we had to move from the person I was working with and myself to a bigger consortium. And you go in these big meetings and you're the only black face and maybe 10%

of the people are female. And you think, "Wow!" It's usually not so much how they treated me, it's just how you feel walking in the door.

Now, I just rotated off of the North Carolina Board of Science and Technology and it's a big group of people who are mostly they are scientists and they are business owners, and they were very conservative. I hated that board because they always had so much voice and they had so much power and they actually drove agendas. More and more in science, the big corporations, they are driving the science agenda because that's where the money is.

There were times when I felt like I didn't have a voice in it, yeah. I'm so glad to be off of that board, I don't know what to do. But I could . . . But I did speak up! Initially I didn't, I just sat there. And then I'm like, "Oh, wow." And so I began to feel more comfortable.
But yeah, initially . . . You got this whole group of men, very powerful men, and like two or three women and then one black person. That was a board . . . The Board of Science and Technology, we were appointed by the governor, and the board was sponsored by taxpayer dollars. I had every right to be there. That was an interesting and uncomfortable situation. So when my term was up, I exited. I did say to them, "Will other HBCUs be represented on this board?" And it was an uncomfortable conversation with the chair of the board. Yeah, you get some very uncomfortable situations in the stint.

Dr. Williams described her journey as "a great run in science." She recognized that she was able to contribute in so many different ways and at so many different levels because of her science background and training. Her most recent funded endeavors have allowed her two start two centers: one that connects the community to health disparities in African Americans and another that promotes STEM education. Dr. Williams's grant promoted women in science and demonstrated her commitment to making sure other women were supported as they pursued careers in science. Dr. Williams's career in science has been very successful, but we also discussed times during her journey when

she felt alone and unappreciated. She explained that she believed her race and gender

probably played a role in it:

> Cailisha: Have you ever felt invisible or alone in your journey?
>
> Grace: No. I would love to be sometimes. I guess I've felt most alone I guess when I'm trying to accomplish something, and particularly at my institution or at my unit, and the administration doesn't see the value or does not provide the support. As an example, we're opening a community center for health disparities, and to get the support to get the doors open and to establish that center has been minimal. And it leaves you and your staff to do all kinds of things that we shouldn't be doing . . . Either, I've not made the case well enough or somebody in the big houses don't see the value of what we're doing, and typically they don't see it until *way* after the hard work is done. When it's time, to put it in the paper.
>
> It's times like that when you feel like, "Oh, gosh. Nobody is listening." Or you wonder, "If I were male," or, "If I were not black, would they approach this differently?" There are times when I do wonder, but it doesn't stop me. It only helps me to see that if I ascend to a different level in academia, it only helps me to see that people who are trying to do some things that are worthwhile to make sure that it gets completed. And so I flip-flop between wanting to do something and higher administration or not.
>
> I don't think I answered your question, but there are times when individuals will try to silence you. It's intentional, and it feels like it, but it doesn't stop me.
>
> You probably knew that about me.
>
> Cailisha: Yes. I certainly do. You mentioned barriers early in your career. Were there any others that came to mind or we pretty much covered them?
>
> Grace: In terms of my career? I do think that sometimes there is resentment. It's almost like, "the nerve of her as a female." I do think in certain cases when people are trying to do some of the kinds of big initiatives that if I were male it would be different. I really do because most of the upper administration is male and one of the reasons we're doing the program to promote women in science is because of that very issue there. And when you look at, and particularly in STEM disciplines,

when you look at the level of, we call it scud work in departments, the women do most of the scud work. It's important work, but the men are getting their tenure and they're getting . . . And so there's a stark difference.

We actually did a climate survey where we actually looked at workloads and we looked at time to tenure and we looked at just the general culture for women in the STEM disciplines. It is very real. It's not rhetorical or anecdotal. We have the data to show that women are treated differently in STEM. Sometimes it's intentional and sometimes it's just historical. It's just, "This is what we do." We look at advising loads, we look at class loads, we look at surface loads. Women in STEM shoulder more of the burden. That's real. It's real and we have the data on the time to tenure, time to full professor. It's longer for women. Yet, women will have fewer publications, fewer grants. That's why we wrote that proposal, to try to bring some equality to our names.

Cailisha: And then as far as family, when you said that about time to tenure and full professor, you were able to stay home for that period of time, but even after that—

Grace: My clock started.

Cailisha: Yeah. Being a woman in science, like before, as far as your relationships with your children, was there ever a time when you were pulled too much to be where you needed to be?

Grace: Oh, yes. There were times, yes. But I decided that I would make it up late at night rather than not go to the soccer game or not go to the recital. I decided internally that I only had one chance at that. I was fortunate that my husband had a good job all the way, but so many women don't have that opportunity for whatever reason. So I took a lower-paying job initially because of the kid thing and because I knew that I was going to be there, where they were. It was just an internal . . . A lot of women think that I've been this staunch scientist, but I'm a *momma first*.

Cailisha: Yes.

Grace: I really am.

Cailisha: Yes, I know.

Grace: I'm very happy about it.

Cailisha: Yeah. You can tell that in your decision to stay when it came time.

Grace: And to take a lower-paying job when I went . . . A job that I knew I was not . . . And I was very honest with my chair at that time. And right now for women who can't be honest with their chair back then for fear of retaliation, that happens more often than I . . . I was very fortunate because I could have really been punished for that, and so many women are.

As we closed our interview, Dr. Williams shared her feelings about being an

African American woman in science. Her answers were powerful:

Cailisha: You receive messages from society about who you are in science and who you should be as an African American woman. How do you respond internally to messages from society about whom or what you should be?

Grace: That's an interesting question and I would probably have a different answer 20 years ago. One of the things that I got from growing up in the country and with the parents that I had is that we didn't focus a lot on what people thought we should be. They were focused on, "You got to work hard. You have to be *smarter*. You have to be *better*. You have to use your head all the time." My mother used to have this saying, "Allow yourself to think."

I am sure that when I made the decision to come out, the decision to go to a historically black university for my first job, and then for my career. I am sure that there were people who said, "*What*? Are you kidding?" But I had enough internal compass to say, "This is what I want." It's just kind of been like that, Cailisha. I'm sorry.

Cailisha: And you feel like it was the way you were raised?

Grace: If I had to do it again . . . Yeah, I do. I think that was something that my parents gave us. We knew for sure that there was a lot of racism and sexism out here, and that the road would be difficult, but we always felt like we had to work harder. We had to, you know, do it better. There's a problem with that, though.

Cailisha: And what is that?

Grace: Well, because that's what you do. You just work hard. But confidence is something that they kind of instilled in us. And I can say, we . . . all six of us, we've got it. Because I wasn't too far off from the Jim Crowe times, and certainly my parents were. And so anything you did, you had to . . . We believe you had to do it better.

There's so much racism in this country now, irrespective of your career path. It's there. It's just there. There's been a level of comfort in working at the HBCU and there's been a level of discomfort, because I think it's harder when you get the wrath from your own people. You expect people who didn't grow up with the same culture to have certain ideas that are distinct from yours, but when you get it from your own. And particularly when you are trying to accomplish something good, something that could be very valuable, in our people sometimes you feel like they are saying, "Let's just keep the status quo. Let's just do this little bit and we'll be all right." The truth of the matter is we're not all right because many people think our schools should close, period. To expect equality and excellence and achievement, sometimes in environments that don't welcome that is difficult. There has been comfort and there has been discomfort to continuing to work in this environment.

Cailisha: And finally, what does it mean or what does it mean to you? How do you feel as an African-American woman in science?

Grace: I don't think about it that way. It's important for me to be a scientist. It is important for me to do excellent work. It's important for me to help other people get where they need to be. The fact that I'm African-American, I wouldn't want to be anything else, but I hardly ever think about it. I mean, I really don't think about it. I think more of . . . I need to do this as well as I can. I need to . . . The legacy that I want to leave is that I . . . You give it your best. Whatever that means, you give it your best. And you help get other people where they need to be. But, I'm *glad* I'm African-American. There's a *burden* there because when you walk in a room, you . . . and they're 35 people and maybe one or two African-Americans that are scientists . . . The expectation is that . . . You may or may not know what you're talking about. Particularly if you graduated from HBCU, and I graduated from two . . . It's always been incumbent upon me to make sure that I come to the table with something of quality. So there's a burden scientifically with that . . . There's so many opportunities though because other women see you as a person who could be a scientist or be an administrator, or both in my

case. My hope is that there will be something about what I do that inspires other people and helps them to see that they can do whatever they want to do.

Unexpected Barriers: Storylines of Tension

The narratives revealed several important storylines that illustrated the unexpected barriers women faced. There was enough shared through their experiences to write an entire book just about the barriers, but in this section I have chosen to pull out the most dominant storylines. I present what I call four "storylines of tension." These are storylines highlight common experiences women shared that hindered their progress in science, that ran counter to their current and aspiring scientific selves: storylines of feeling insecure, invisible, and alone; storylines of racism and sexism; storylines of overwhelming burdens; and, storylines of children and families.

Storylines of Feeling Insecure, Invisible, and Alone

All of the women had moments when they felt insecure and unsure of themselves and their abilities. The examples spread across the trajectory and at different levels in their careers, but the women mentioned graduate school as prompting feelings of doubt and anxiety. Niema, Grace, Samantha, and Dahlia all began doctoral programs right after finishing undergrad. There was an initial level of insecurity because they felt unsure about their preparation. There were other students with more education and life experiences in their programs. In addition, there was an added level of insecurity by being the only one or one of a few African Americans in the room. Samantha and Dahlia picked up the term "imposter syndrome" and used it to define what they were experiencing. Samantha said, ". . . that whole imposter syndrome just never goes away

where they're going to figure out that I'm not good enough to do this." Niema and Skylar did not use the term, but they both described the feeling. Niema stated, "I was very unsure of my own capabilities at that time. And I remember asking myself several times, 'Why did they let me into this program?'" Skylar echoed the same sentiment when she said, "When are they going to figure out that I shouldn't be here? It was always this insecurity, they're going to figure out I'm a fraud, I'm not as smart or I shouldn't be there. Every so often, that creeps in." The level of insecurity intensified exponentially by being the only or one of a few African Americans in the room. Niema was in a program where the last African American graduated had finished almost 20 years prior. If so few were able to reach the finish line, how could she be confident that she would be able to do so?

As the sole or one of few African American women in their academic preparation and professional settings, they existed in lonely environments. The women described feeling alone at different times. A few of the women mentioned this feeling as most pronounced when they began their doctoral programs. They were not invited to study sessions, and they were left to fend for themselves. Dahlia, Samantha, and Niema all experienced depression. Niema attributed her depression to the weather. She experienced seasonal depression and was able to counter it with turning her apartment into a beacon of a thousand lights. Samantha eventually sought counseling for her depression, after resisting at first. She found it helpful. Dahlia knew that she needed to get away from the "cold weather and cold people" at NSU. Her remedy to her depression was to get back home and pull herself out of the hole in which she found herself.

As Skylar and Grace discussed their careers in academia, they also described times when they felt invisible. Skylar's motivation to go up early for tenure was because, as junior faculty, she felt unsure about being able to speak up and contribute in meetings or if it was best to just hold her tongue. She did not like that feeling at all. Grace remembered feeling invisible at meetings and saying to herself "Oh, gosh. Nobody is listening. Or you wonder, 'If I were male,' or, 'If I were not black, would they approach this differently?'" Grace's statement leads to the next barrier: sexism and racism.

Storylines of Sexism and Racism

All of the women faced racism and sexism. I chose not to pull out each separately because, as African American women, we are both simultaneously, and as Evelyn Hammond pointed out, it is tiresome to try to determine what is racist versus sexist. Several of the women echoed her sentiment. All of women encountered persons whom said or did something that made them feel uneasy. The women were all aware of the white, male culture of science, and they stated such. Samantha noted, "[T]his system wasn't built for us. We have other needs that you don't even know about, like you don't have to go to work and worry about what your PI thinks of you just based on how you look." Skylar recognized that she had learned how to operate like a white male. Learning to operate like a white male was how she was able to succeed as a scientist.

When she described sexism, Grace recalled a chauvinistic research mentor early in graduate school who favored the males over females. She also remembered times when the air was filled with an unpleasantness when she was in meetings attempting to push certain projects: "It's almost like, 'The nerve of her as a female.' I do think in certain

cases when people are trying to do some of the kinds of big initiatives that if I were male it would be different." Skylar had a similar feeling in situations where it seemed like white male voices were more privileged. Even though both women were faculty at HBCUs, they still felt as if white, males got more acknowledgment. Skylar also voiced her frustration about the salary discrepancy between males and females. She was displeased with how much more males made versus females at the same level and the fact that men filled many of the upper level administration positions. She said, "[Y]ou can check our salaries . . . our contract salaries are public knowledge. So my same position or you look at the males, they make more than we do. Why is that? That's troubling to me."

Additionally, Dahlia remembered feeling as if she was treated differently because she was black and female. Samantha's experience with racism was from her first PI who stated that he didn't believe in the work that "those black students" were doing. That same PI also had a problem with women. She had been told about a white female who left the lab before she came in. Contending with a racist mentor affected her ability to continue in the lab. She stated, "Once you get that in your mind, how can you stay in an environment like that? When you know that someone is looking at you and they already think that you're inferior?" And of course, Niema contended with racism on several different occasions such as the comment about her parents being smart when naming her; the little pickaninny book; comments related to her "speaking well"; and, her research mentor had stated that she thought more like a technician. When Niema saw the way her husband interacted with other scientists, she wondered how different it is to be a male scientist.

Storylines of Overwhelming Burdens

One of the most dominant storylines was of overwhelming burdens. All of the

women felt the burden of representing their race. Niema stated, "Feeling like we're

representing every African American *ever!*" Because of this burden, the women felt like

they always had to be extremely good at whatever they did. They knew that others would

watch and judge their performances not as individual actions, but as representations of

their race and gender. With so few African American women in science, they felt the

burden of needing to be among the few who made it. If they did not make it, it would

reinforce the stereotype that black people do not belong or cannot make it in science.

They were burdened with that massive responsibility. Samantha summed it up like this:

> Samantha: If one person makes a mistake, and they're black, from now on all
> black people do that, but it's not the same for them. You take on this
> whole burden for your group of people that's just not fair . . . My
> success doesn't mean anything about success of all black people, but I
> feel like it does. If I don't make it, then they're going to say, "Oh,
> there's just another one you couldn't cut it." They don't have to
> worry about that. White men and white women, they . . . you know
> . . . Of course they're going to make it anyways because they don't
> have to deal with all this extra stuff . . . I'm carrying all this weight to
> prove a point, and that's pretty much what got me through to the end
> because I was like, "I'm not going to give them the satisfaction of
> quitting."

For women in academia, there was an added burden of responsibility as Grace

noted, "Women in STEM shoulder more of the burden." Across campus, women did

more of the work, but did not get compensated fairly, nor did they get other forms of

credit for the work that they did. Skylar stated her frustrations this way: "[Y]ou do find

that men, typically, get a lot of credit. Or it could be a woman in a meeting saying the

same thing fifty-million times and then you get a man come in there, particularly a white man comes in there and everybody stops and listens. Like something profound has been said." Grace recently surveyed the faculty at Douglass and had data to prove that women in STEM were burdened with a disproportionate share of the workload. In summary, African American women in science shoulder a burden of representing the race, being the best, and carrying disproportionate workloads once they enter academia as professors. On top of all of the university workloads, if a woman in science wants to have a family, there is added tension because the life of a research scientist is not conducive to women with families.

Storylines of Children and Family

Grace made the decision to come out of science all together for three years to be a mother. She knew no one would be able raise her children the way she could, and she financially had the means to do so. She knew the risk she was taking, "Because I was in science and that could have been the kiss of death of my career. And I didn't focus on science. I focused on them." Grace was aware of how taking time off to stay home could affect her career, but it was a risk she was willing to take and a decision that she made for her family that she is proud of. She said that she did not regret that time one bit. When I asked what she was most proud of in her life, she said it was her children. When she returned to science, she was fortunate enough to have a chairperson who was understanding. She recalled, "I had little bitty kids. And if the school called, I needed to go. I think that probably set up some low salary, but I had a really *great* chairperson and mentor, and he said, 'I understand.'"

Grace and Skylar both had children before entering academia. Niema, on the other hand, had the unique experience among the women in the study of having her first daughter while her tenure clock was ticking. She was at least able to stop the clock briefly after her daughter was born, but she truly felt that science was not conducive to women with families. Skylar chose to continue as a research scientist, but she made decisions that put her family first, such as not traveling too far or being away from home too late in the evening. As women in science shoulder the burden of workloads, pregnancy, and children; it seems as if it is almost impossible to continue at the bench and have a family as well. Grace summed up her feeling on the matter when she stated, "A lot of women think that I've been this staunch scientist, but I'm a *momma first*."

Confidence and Competence: Storylines of Cooperation

Despite the various challenges and barriers, all of the women have successfully persisted in science. When a few of our heroines considered leaving, they had enough support externally and enough internal motivation to not give up. Skylar and Dahlia both credited their "stubbornness" to persist despite the odds. The positive experiences have reinforced their confidence in their scientific ability and contributed to what makes them feel good about being a scientist.

Storyline of Serious Scientists

All of the women have been successful thus far in their academic and professional careers. Their collective success was evident in their CVs by the vast amount of awards, publications, and presentations they have done. As professors in academia, Grace, Niema, and Skylar have all been promoted and recognized for their contributions to science.

Grace won funding for large grants and has been recognized nationally and internationally for her scientific research. She founded two centers and continued to work hard to contribute to connecting science to the community. She stated, "I've had a *good* run in science." Niema and Skylar both continue to work at the bench, but they became focused more on educating and supporting students rather than finding the next biggest breakthrough in research.

Storyline of Training and Educating Students

All of the women expressed a passion for teaching and training students. Grace stated that she was most confident running the lab when she was with her students. It was a point of pride for her when she discussed how her students went on to have great careers. Other than her own children, she was extremely proud of the students she mentored. She said of her students, "These were the kids who would go to the ABRCMS meetings and to the ASM meetings and win awards, so that was the cat's meow! These were the students who were my TAs, my teaching assistants, because they were trained by me. So there was so much pride in that."

Skylar also recalled one of her proudest moments as watching the transformation of one of her students. She explained, "He was very awkward in the beginning. It was sometimes hard to watch, and I kept working with him and working with him, and he presented for scholarship day at his posters and . . . He won first place. I feel like I would like to think that I'm a part of him one day being whatever scientist or whatever he chooses to be. I played a part in that." Skylar was passionately invested in science education now and knew that it is where her heart lies.

Samantha's new position focused on improving the science education in the biology department at Freeman. She realized her passion for science education when she was in the TEACH program and found herself more interested in creating engaging science lessons than her research. Niema also had a new passion for preparing students professionally. She realized the need at Douglass for supporting students' successful admission into professional schools and began a campus-wide program connecting and promoting professional development. Dahlia's commitment and passion for education was evident in her career choice as a high school teacher when she left her doctoral program for a few months. She enjoyed teaching and she loved her students.

Despite the many barriers and challenges they faced along the way, our heroines all persisted. Not only they did they persist, but they did so with a strong work ethic, a commitment to excellence, and passion for helping others. In the Chapter VI: Lift as We Climb, I take a closer look at their narratives of supporting and lifting as they journeyed through science.

CHAPTER VI

LIFT AS WE CLIMB

Cailisha: Do you think that your stories and experiences are important?

Grace: You're bad.

Cailisha: Really? [Laughter]

Grace: Sure. I think experiences . . . You mean telling my stories?

Cailisha: Yeah, telling your stories.

Grace: I do. I do. And you're kind of helping me to tell my story because you're making me think about things that I don't think about often. But yeah. I think we tend to get so busy that we fail to do that. I've got to figure out how better to tell my story I suppose, because it would be great for people to understand the challenges and the uphill battles as well as the successes. I think it's important. And I don't hide them. I don't hide them. People ask me and I tell them about the lashes on my back for just deciding that I want to be a scholar and an administrator. Trust me, and I've had attacks on that in all kinds of ways. But you . . . Even that story would be a good one, for another woman particularly who decides you want to do both. So telling . . . That's a great question . . . So telling the story is important in helping people understand that there are many successes but there are also challenges and barriers. The racism and sexism piece is *huge*. That's *huge*! And people think that we are all one big happy family if we have the HBCU. Oh no. Data shows that we are not, by a long shot. We are not.

Cailisha: Why are you . . . You said you're not afraid to tell your stories or you don't mind sharing your lashes.

Grace: No.

Cailisha: Why? Why is that?

Grace: Because if it can help somebody else, it may not prevent them from getting their own lashes, but it may help them to navigate.

This vignette captures the spirit of this chapter. After interviewing the first two women, Niema and Grace, I remembered being struck by their sense of commitment to helping those around them, and especially to those coming behind them. Both women spoke over and over again about how important it was for them to not just make it themselves, but to also ensure that others were able to reach success. As I interviewed the other three women, a passion for helping others was expressed over and over again. A strong storyline of helping others was clearly evident. In the midst of interviewing, I came across the phrase "Lift as We Climb," one afternoon while reading and I instantly felt as if the phrase described what I was seeing across the narratives of my participants. In her book, *Women, Culture, and Politics*, Angela Davis (1989) used the motto of the National Association of Colored Women's Clubs (founded in 1896) to express the drive for social justice by scholars:

> We must strive to "lift as we climb." In other words, we must climb in such a way as to guarantee that all our sisters, regardless of social class, and indeed all of our brothers, climb with us. This must be the essential dynamic of our quest for power- a principle that must not only determine our struggles as Afro-American women, but also govern all authentic struggles of disposed people. Indeed, the overall battle for equality can be profoundly enhanced by embracing this principle. (p. 5)

As I completed the final interviews, I went back and found where I first discovered the phrase. The sentiment expressed by the phrase, "Lift as We Climb" stayed with me and I searched back through my notes to where I originally saw it. I re-read the passage and knew that it perfectly described the commitment to help others threaded through each woman's narrative. This chapter consists of two sections. In the first section, I present

how the women expressed their passion for mentoring and supporting others. The second

section, *Dear Little Black Girl*, is an epistolary composed by each participant and

dedicated to the next generation of African American female scientists.

Lifting and Climbing: Storyline of Cooperation

The storyline of helping others was very clear after the first set of interviews, so I

was paying attention when it came up in each of the other interviews. I was not

completely surprised by the passion the women shared, but I was not expecting them to

express it so strongly. Dr. Grace Williams, nearing the end of her career, discussed her

commitment quite often during her interviews. She believed in helping others in science

whenever she had the chance because she received help. She stated,

> Grace: I've had help along the way. That's another thing we got to learn how to do is *help* each other out when we're doing it. So someone calls me and says, "I know you have the research grant, can I look at your application?" "*Sure*, you can look at it." It's that kind of thing that . . . There's a bureaucracy around success in science. And we just have to help our institutions to see what that is because all the proposals other people write, white people write, are not great either. I've read a lot of those as well.

Not only did she think in terms of helping individuals, but she also described institutional

support:

> Grace: I've done quite a bit of work, quite frankly, helping other institutions to understand that and help them see that you have to put in a quality application and these are some of the things you need to look for. So not only am I doing work here at Douglass, I've also done quite a bit of consulting around the country to help HBCUs understand that, in order for you to get "X," there's some things you have to invest in, in terms of time and quality.

Now, as an administrator, Dr. Williams understood that her position provided her with

the opportunity to do more:

> Grace: I also think it's the empathy piece of looking at, again, where are the needs. How do you help people get to where they need to be? That's exciting for me at this stage in my career because I don't really need any more papers, I don't need to raise any more money, I don't really need another position, quite frankly. But now it's this stage in my life . . . If I can influence getting you to where you need to be . . . That's good stuff right now . . . So as people have helped me to navigate this journey, now I have a chance to help other people, and that's just been so dynamic. That's just been so really wonderful. It really has been.

Dr. Williams intentionally spent her entire professional career at HBCUs. Even when

opportunities to work at predominantly white institutions presented themselves, she did

not entertain them. She explained, "I have worked at historically black universities all my

working career. I've always wanted to go and bring it back to the institution that I felt

like needed it more." Dr. Williams completed two research sabbaticals and she brought

back practices and strategies to improve her university and work with faculty collectively

to secure funding for resources to conduct research and build capacity.

> Grace: It's always been incumbent upon me to make sure that I come to the table with something of quality. So there's a burden scientifically with that . . . There's so many opportunities though because other women see you as a person who could be a scientist or be an administrator, or both in my case. My hope is that there will be something about what I do that inspires other people and helps them to see that they can do whatever they want to do.
>
> People need help. We're all human and at the end of the day, it's human beings. At the beginning of the day, that's what it's all about it. We get lost in a lot bureaucracy, but helping people individually and collectively to manage or navigate an issue or challenge is exciting to me. I think that's what it should be about.

Dr. Williams's commitment to others was rooted in her gratitude, appreciation, and

acknowledgement of those who did the same for her. She stated, "I'm getting old. I'm in

a good spot. Just being able to think on how people have helped me to get here, it's

incredibly wonderful."

Niema's passion took her in a new direction, focusing more on helping students

professionally than scientifically. She recognized a need to support and mentor students

who wanted to leave the Department of Biology and pursue something other than

research. She said:

> Niema: If you wanted to go into some other profession than research, there was nothing. The support was not there. And I just thought that was terrible. So I had the opportunity to start working with students, and to start helping them figure out what they needed to do in order to be productive while they were in undergrad. To be competitive and competent for whatever is it is that they wanted to do once they left Douglass. And to be successful once they got into the advanced programs that they wanted to be in. And all it took as one graduating and that did it for me. [Laughter] I was like "Oh, I gotta keep doing this!"

As she built her program for professional development, she was also committed to

mentoring and spoke candidly about her experiences to the research students whom she

trains in her lab:

> Niema: My goal is to make sure that my students understand that you don't have to be a Caucasian male to be a successful scientist. I think when people still think of, what does a scientist look like, I think that's what they think of. I was talking to my students earlier about going to a conference, and when they go to conferences I know what they're going to see. They're going to see very few African-American scientists, because that's just how it is. They'll see a lot of women, but they're not going to know if those women are scientists. Are they students who want to be scientists? Are they working at the venue? But when you see a

male at a research conference, those thoughts don't usually come into mind.

I try to make sure to share my experiences so if they ever have a similar experience, they will have already thought about it before they get into that situation. One of my students who is currently in graduate school, she's in her second year now, we talked a lot during her first year because she was not going to stay. I talked to her the same way I talk to my current students, and I told her about my first year, about how *tough* it was, about how isolated I felt. And I tried to help her put some things in place before she even went to school that would help her get past some of those barriers.

She still found it very difficult. Her biggest complaint still is that she felt incredibly isolated as an African-American female. And when I listen to her, I just can't believe it. It feel like it's a loop, it's like a time loop. Because she was telling me about how there would be study groups, nobody would tell her about them, or how students would share information with each other and leave her out. If the other graduate students went out to dinner, they would all go but wouldn't tell her they were going.

It's just trying to figure out how to stay in the setting that is not very welcoming. That's *tough*. And I try to let them know that it's not a guarantee at all that that's going to happen to you. You might have a wonderful experience, but just in case they do come across a situation like that, they'll at least have thought about it before they get into it.

Near the end of our conversation, Niema expressed her gratitude for being reminded of what was important. She stated, "Just thank you for letting me participate. It's great to go down memory lane. And it really reminds me of why it's important to keep going because it not about just me. It's about the people who are coming behind me as well."

Dahlia's commitment to helping other was directly connected to her experience of being isolated and left to fend for herself. She took the time to talk to students and teach them when they need help. As a result, students come to her frequently to get assistance,

and she takes to time to stop and help. She said, "I feel like there's these two points where if you're entering grad school and you're leaving grad school and in both instances you need to reach for help or to offer help to people . . ." She did not get that and recognized how critical it was for new students. She stated it simply as, "If somebody is reaching out for help, you help them."

Shayla had been Samantha's role model of support. She stated, "I really want to be like her for other people because it's so important for us to stick with it. And I just want to be an example." In her new position at Freeman University, she knew her sheer presence as an African American female scientist could make a difference for Black students. She said, "I think about the ones that are there and all they see is just one Black guy in the department. Like 'No!,' it doesn't have to be that way, so I just want to be an example and Shayla was that for me; just somebody in your ear just telling you, 'Just ignore that stuff. Just keep going.'"

Skylar proclaimed, "For me it's always been about, okay, let me get somewhere so I can help someone else or pull someone else up." Her commitment to science education was directly connected to her passion for supporting her students. She said, "Sometimes I don't even understand all these hoops that we have to jump through. Writing grants, doing this, doing that, but then something happens where you just realize that if there is one student that benefits from something that you're doing . . ." She recognized that her job required a lot of work, but the reward is in the successes of her students. Skylar was on the verge of tears after the young man who she worked with won first place in the poster competition on scholarship day. She remembered how awkward

he was when she first began working with him, how painful it was to watch him present.

The student's growth was evidence of the benefits of mentoring. About this young man

student, she commented, "I feel like I would like to think that I'm a part of him one day

being whatever scientist or whatever he chooses to be. I played a part in that."

Skylar also feels strongly about helping other women in science along the way.

She stated,

> Skylar: I went to this woman's STEM conclave. I just felt . . . and I had gone before, and I always seemed to have gotten stuff out of it? I learned so much from other people. I really felt this time that I was able to impart or pass stuff on to other people. And it's like to be able to provide some of your experiences and they walk away like you provided some sort of assistance. . . . That's probably something that's made me feel pretty good is forming those new connections and bonds with other women that are like me. Feeling like I helped contribute to them going back to their institutions and approaching things a little bit differently.

Ultimately, Skylar's goal was to impact the next generation. She explained about

mentoring and why sharing her story was important:

> Skylar: Because I guess just dealing with particularly, like young ladies or even the young men that we see each day. They really think we're so much different than them. They need to see the similarities, they need to see some of the obstacles. Some of the times we fail, and how we overcame it. I think those things are very important. To let the next generation be better, and that's my goal. I want my kids to be better than me. You know what I'm saying?

I understood completely what Skylar was saying. Their passion for helping

students aligned with my own personal goal and commitment to not only teach my

students, but to nurture and support them. With the next generation in mind, in the next

section my participants share letters of encouragement, advice, and support to the next generation.

"Dear Little Black Girl"

In this section, I utilized an epistolic format (Solórzano, 2013) to share the women's responses to the questions: "What advice would you give a young black girl interested in pursuing a career in science? What do you wish someone had told you?" Epistolary compositions are written in the form of letters. The women responded with words of advice and wisdom that I used to compose letters to the next generation of African American female scientists. I composed the initial greeting and closing sentences, but the rest of the letters are their own words from the answers they provided to the stated questions. In some of the letters, I wove in other quotes from our conversations if I felt that spoke to theme. I emailed the first draft of letters to each woman and asked that she review it and edit it freely. Dahlia loved her letter that we co-composed from the start. She loved the idea and believed the letter captured her feeling exactly. Samantha edited the letter only slightly and replied with the same sentiment as Dahlia. Skylar and Niema took a little more time to edit and carefully crafted the letter to make them their own.

Below are women's the five epistolary compositions which I collectively title "Dear Little Black Girl." I have chosen to dedicate the letters to my two daughters: Cemeré and Layla, and also my three Goddaughters: Jya, Jada, and Jmya. I use their names to represent every little black girl, everywhere who possess a budding love and passion for science.

Dear Layla,

As I understand it, you have a passion and love for science, and I heard that you are seriously considering becoming a scientist. Well, get ready for an awesomely wonderful roller coaster ride. I wanted to give you a few words of advice and wisdom as you begin on this journey. Remember, you cannot plan everything. That has probably been one of the biggest let downs or stressors that I have had to come to terms with. I am, without a doubt, a very big TYPE A personality planner. At this very moment, I've got this little pink binder I carry around in my purse that I write everything I need to do in. I think if were to lose it I would go completely crazy! However, with time an experience I have come to learn that you just cannot plan everything. You have to be able to roll with the punches sometimes. If you forget to do something every now and then, or fail at a task, it's ok. In fact, it's probably going to be a blessing that you have that set back, because it becomes a teachable moment. You learn how to adapt and hope for better outcomes next time. I'm an optimist. I truly believe that what is meant to be is what is going to be, and everything happens for a divine reason. Your job is to live the life that you've been given the best you can and make the best decisions you can along the way. There will be hard times, and to be honest, there will be times you completely fail. I have had many times in my life that things didn't go exactly the way I planned or even may have been a complete disaster. However, I lived through it, and became a better and stronger person because of it. In regards to becoming a scientist? If that is what is meant for your life, you be the best scientist you can be. How do you do that? Here are some characteristics that all good scientists should possess: (1) never lose your curiosity, (2) always be open minded without bias when approaching a problem, (3) be a keen observer, (4) be resourceful and purposeful in your actions, (5) communicate clearly, (6) be a critical thinker, and most importantly (5) be persistent and courageous in all you do. I know I don't have to worry about you being a successful scientist, because I believe you are already well on your way!

Best wishes,
Skylar Dawson-Bennett, PhD

Dear Jmya,

I hear that we have something in common: we both love science! It took me a little while to be ok admitting it, but I am definitely just a nerd who enjoys learning about nature and the world around me. As you begin to think about following your passion for science, I wanted to give you a few words of advice. As I think about you, I am reminded of a conversation I had with one of the younger scientists at my lab at North State University who is really struggling. I told her and I want to tell you that you've gotta be tough. You will meet people

that like to hear themselves talk and get a kick out of tearing other people down. For some odd reason, they just want to ruin somebody's day. But don't let them get you down. When you are afraid, or you're scared, or you're not as confident in yourself as you think you should be, just put on a poker face and don't let anybody see it. There will certainly be times when you are scared and questioning yourself. Don't worry, the feelings are completely normal. I have felt that way more times than I care to mention. But stay strong and be tough. You can make it! And in the case that you really don't know something, again, keep your poker face on but take in what these people are saying because you can learn from them. And definitely ask for help if you need help. Some people are scared or embarrassed to ask questions but you can't be. If you don't know, you just don't know. But you will never know if you don't ask.

No matter how you try to approach it, science is going to be tough but you can get through it. Anybody can get through it, it's just a process. Just do it! Like the Nike commercial. My grandmother used to say when I didn't want to clean up or something, she would always tell me, "Just do it. It ain't going to take you but a minute, just do it." Now, I tell myself that every day as I work to finish my doctoral program. I don't have much further to go before I'm done and able to graduate with my PhD. There are many days that I get tired and I think to myself, 'I don't want to get up and work today'. But then I remember what my grandmother used to say and I'm like," Nope, just get yourself on up and just do it, it ain't going to take you but a minute, *just do it*!"
You can do it, too! I believe in you!

Best regards,
Dahlia Rhodes, PhD Candidate

Dear Jada,

I'm so excited to hear that you are interested in science and are thinking about becoming a researcher. This makes me reflect on my beginnings as a scientist, and I just want to offer some advice. First, understand that it's a tough one. What I wish somebody had told me that. It's going to be hard in ways you can't even imagine, but with the right support system, strong faith, and self-confidence you can make it. Your confidence will waiver sometimes but if you don't believe in you, and you don't see the good in you, then how can anybody else? I've struggled with self-confidence for a variety of reasons all my life. My looks, everything. I've struggled with it but I learned that God made me to be who I am—special. I am special. Never lose sight of your value. You are smart. You are beautiful because God made you that way. No matter what people tell you, just hold on to that. It is possible; with God, all things are possible. It sounds cliché but it's so true. Next month, I begin a new position as a professor at the

University of Freeman. If someone had told me, "Okay, in a month or so you're going to be heading off to this job and it's the perfect job," I wouldn't have believed it. Nobody but God did that. Just hold on to your faith and you can accomplish anything.

Also, one of the most important choices that I made was deciding to attend an HBCU for undergrad. I recommend the HBCU experience to all black students. For me it was the nurturing environment that was most important. You can't find that at a majority institution. It's also about a sense of pride, and an experience that just can be matched. I developed real connections with my professors and this gave me the foundation that I needed to succeed in graduate school. Because of my strong foundation, I gained an inner strength that couldn't be broken. Because of that I was able to "stand up" after being repeatedly "knocked down" in grad school. It was one of the best decisions that I ever made and something that I advise you to consider.

And next, leave the boys alone! I'm just kidding. Well, kind of. ☺ Also, please, please don't be afraid to step out of your comfort zone. I was afraid to leave home. I wish I had done this study abroad that I was offered to do, but I didn't because I was too scared to leave home. Just don't be afraid to step out of your comfort zone. You've got a safety net with your family and other supporters. It might feel like you don't, but you do. You will need a strong support system because you can do it, but you absolutely *cannot* do it alone. That's my biggest piece of advice. Don't for a second think that you can do it alone because I didn't. I owe my PhD to several people and God. I wish you the best of luck in the future!

May God be with you always,
Samantha Johnson, PhD

Dear Jya,

There have been some really important lessons that I have learned throughout my career as a women in science. First, I want you to know that there is great value in an HBCU experience. There is a family and community dynamic unlike anyplace else in the world, but I want to make sure that you understand the importance of doing mainstream things even if you are at an HBCU. Step outside of what is comfortable and push yourself to have new experiences. As you begin a career, don't relegate yourself to embracing a belief of putting limits on yourself. Especially when it comes to research. Look for opportunities to conduct research at top tier universities. Pursue a high level of excellence. And then just work hard. Next, always be sure to work with a team of people, don't try to do things in a vacuum. Get help. Get the *right* kind of help. I often go out and speak, and I

repeatedly talk about the team of people that I work with. We have a strong team of people who are great at what they do. The team has so many different and various levels of expertise. No one person could do it. Finally, make sure to maintain integrity around whatever you do. You can work for 40 years and do everything right, and then you do one big wrong thing and it could be devastating to your career. Your record follows you. You can see examples of that in the news. Always maintain a high level of integrity in everything that you do. And always give it your very best.

Lastly, I want to give you the same advice that my parents gave me. One of the more important things that I got from growing up in the country is that I learned not to focus a lot on what people thought about us. My parents always told me, "You have to work hard. You have to be smarter. You have to be better. You have to use your head all the time." My mother used to have this saying, "Allow yourself to think." I am passing this advice on to you. Work hard, be smart, use your head, and make sure you never stop allowing yourself to think and learn. I know you will be successful and I look forward to hearing of your accomplishments.

Wishing you the best,
Grace S. Williams, PhD

Dear Cemeré,

Someone told me that you have a true passion and love for science. What a wonderful goal to pursue! As a fellow female scientist, I want to give you a few words of advice as you begin your exciting journey. Number one, make sure science is your *passion*. Your passion will always drive you to learn more and more. Number two, if it is your passion, explore it with your whole heart. Do not be afraid of making mistakes or discovering new things about yourself as you go. This type of education is like no other and will lead you to more questions and to search for more answers. Number three, make sure that as you travel on this journey you keep your support group intact. Your family, friends, teachers, community, and peers will cheer you on during the good times and the tough times. Number four, use this time in your life to explore! Keep in mind that you may not attend a college or graduate program close to your home. That's okay, step out of your comfort zone and challenge yourself to be better than you were yesterday. Number five, do not ever forget about all of the people who are in your corner and support your efforts every day. Don't forget about the family member who helped finance your education or the high school teacher who told you could do it! Don't forget those who told you that you could be a woman of influence and a producer of novel and important ideas. Stay in touch with them. As you travel on your journey, build a new support group to add to those already in place.

It is okay to extend your family beyond the one in which you were born into. Remember that in the African-American community, we are about building community. We have very strong church families. We have very strong immediate and extended families, and a lot of times when you go to the graduate level you're pulled away from that community support. It is easy for your family to move into the second seat, because you're so busy focusing on trying to get through school and learn everything that you can about science and exploring and asking questions. I request that you do not ever let go of your family and your support group, because one thing I have learned, is that you will need them every step of the way.

Although I have enjoyed my journey, I wish someone could have made it very clear to me that although being a scientist can be very rewarding, the world of science is not always a warm and welcoming place. I have to admit that sometimes I wish I would have gotten my PhD in another area where people are more often supportive. At times, the road can be very difficult. If you don't have the drive and the passion for doing good work, you will not remain competitive as a scientist. Although it can be tough, I love the challenge! It drives me to do better, to *be* better every day. Do not let the harshness that can come as a result of the competitive scientific atmosphere deter you or affect your self-worth. You can do it! You can now go forth with the knowledge that even though your journey will often challenge you beyond your imagination, you are capable, you are intelligent, you are passionate about science, and you can be successful!
You have an amazingly bright future ahead of you! It's going to be awesome!

Respectfully yours,
Cynthia Niema Anderson, PhD

CHAPTER VII

CONCLUSIONS AND IMPLICATIONS

> Narrative inquiry is a way of understanding experience. It is collaboration
> between researcher and participants, over time, in a place or a series of places,
> and in social interaction with milieus. An inquirer enters this matrix in the midst
> and progresses in the same spirit, concluding the inquiry still in the midst of living
> and telling, reliving and retelling, the stories of the experiences that make up
> people's lives both individual and social. (Clandinin & Connelly, 2000, p. 20)

After I completed the chapters that comprised the stories relived and retold by my

participants, I revisited my research questions to remind myself of my original motivation

for narratively inquiring into their lives of successful African American women in

science. At the core, my original intent was simple: I was just nosy and curious. I wanted

to understand their experiences. I was struck deeply by Evelyn Hammond's story and her

decision to leave MIT (Sands, 1993). Unfortunately, very few African American women

have been able to defeat the antagonistic forces that rose up against them during their

journey into science and heroically triumph. Therefore, I wanted to hear their stories of

success, from them, in their own words. As I entered the research inquiry space, entering

in the midst, I didn't know where my participants would take me or what I might find,

but I was curious, so I followed where they led me. As I look back at my research

questions and line them up against the narratives, I can begin to better understand not just

the stories and experiences that they shared, but more importantly, the meanings each

woman made of the experiences and the effects on their lives.

My first research question was, "What are the lifestories of successful African American women in science?" From their narratives, I discovered various storylines of cooperation and tension. Storylines of cooperation were experiences that aligned with who they were and who they were becoming as scientists. For example, "influential teacher" and "mentoring and support" were storylines of cooperation. On the other hand, storylines of tension were the experiences that butted up against who they were and challenged their goal of becoming scientists. Examples would include storylines of "overwhelming burdens" and "feeling invisible, insecure, and alone." The storylines of cooperation and tension helped to me address the following research questions: "What have been the facilitators and barriers encountered by successful African American women in science?" and, "What have been the systems of support for African American women in science?" By attending to the storylines and the meanings the women made of their experiences, I began to articulate the many influences which contributed to their success, as well as describe those which were potentially damaging distractions. Finally, I also asked, "How do successful African American women in science define themselves? (Self-definition)." Self-definition is one of the tenets of Black Feminist Thought. As the women shared their narratives and described their experiences, they also revealed the attributes of their character that undeniably contributed to their success. I will discuss self-definition in more detail as I attend to my theoretical positions, Black Feminist Thought (BFT) and Critical Race Theory (CRT), and discuss the insights revealed by the narratives.

In the remainder of this chapter, I will revisit the storylines of cooperation and tension, and focus attention on the insights gained from their stories. I will then discuss how my participants defined themselves, as well as attend to the theoretical positions within which the study was grounded, Black Feminist Thought and Critical Race Theory. In the final two sections of this chapter, I will share implications and the direction of future research.

Revisiting Storylines of Cooperation

I define storylines of cooperation as the narratives which aligned with the women's interest and desire to learn more about science and to become scientists. These storylines were in cooperation with their identity as African American women in science. From an early age, the women told stories of being curious and connecting with science. There were three main settings for their stories: home, school, and out-of-school enrichment programs. As young girls, the participants were in environments that allowed them the opportunity to explore and develop as emerging scientists. Interestingly, all the women described connections with nature, except for Dahlia. Because Dahlia was raised in a large urban city during her childhood, she did not have to same access to nature and the ability to play and explore like the other women. She remembered being forced to play on the balcony. I suspect that there were no woods to play in or fireflies to chase.

Influential Teacher

The storyline of influential teacher was consistent across the women's narratives of classrooms and schools. There was at least one science teacher who made a strong impact on each of them. In fact, they can recall their names and credited them with

further developing their emerging interests in science. The narratives remind me of the study in which some students described "doing science" as "doing school" (Varelas et al., 2011). What made the expreinces of my participants so signficant was that the teachers they deemed as significant encouraged them to "do science" and not just "do school." Varelas et al. (2011) explained that some students in their study described "doing science" as staying in their seats, working hard, and not talking too much. These descriptions align with a "pedagogy of control" and compliance rather than engaging students in "doing science" (Varelas et al., 2011). Authentically engaging in science can be messy, loud and discorganized. The science teachers whom the women credited for engaging them in science allowed them dissect, complete projects, and connected them to science through real world examples, discussions, and activities. The young girls conducted science fair experiments and were given the opportunity to allow their curious young minds to expand scientifically.

Illness in the Family

I also found that, although tragic, the storyline of the impact of illness was signifcant for Dahlia and Samantha. Samanth's was present when her aunt had a seizure the first learned that she had lupus. Dahlia's never really met her mother because she died of AIDS when she was two. Both women were motivated to study the disease that had touched their lives personally. The impact of illness was significant and I wondered in what ways, if any, this topic might need to be explored and expanded to understand how students' experiences with death and illness impact their career aspirations.

Mentoring and Support at Historically Black Colleges and Universities

Because all women attended Historically Black Colleges and Universities (HBCUs) for their undergraduate education, there was a consistent storyline of the mentoring and support at HBCUs. Furthermore, Grace received her PhD and Skylar obtained her master's degree from an HBCU as well. Not all of their mentors were African American, so it does not appear that race played a factor in the identities of those who supported and mentored them. However, because they were in environments where they were comfortable, there was not the added pressure that they described when they entered other environments where they were the clear racial minority. They did not have to contend with that weight. Their experiences echoed findings reported in Ong and colleagues' (2011) literature review about African American women's experiences in science. Several studies they described in their review illustrated that supportive environments in STEM are found in miniority serving instiutions, specially historically Black colleges and univerisities (HBCUs). The key characteristics found in these institutions were openness, lack of stigma when remidiation is required, high expectations, and supportive faculty student relationships (Ong et al., 2011). Furthermore, HBCUs and women's colleges produced far greater numbers of African American female PhDs in biological and physical sciences "because of their deliberate efforts to establish an infrastructure to recruit and retain students in these fields. Infrastructure included supportive faculty, strong sense of community, curricula that encouraged collaboration and real-world applications, and programs designed to promote success" (Ong et al., 2011, p. 191).

Undergraduate Research

The storyline of the importance of undergraduate research experiences was supported throughout and across the women's narratives. All of the women received opporutnities to conduct research during their undergrauate education. For all of them, this was the first time that they were able to get their "feet wet" in research. The importance of these experiences was supported by multiple studies which identified post-secondary experiences in science that postitively impact engagement and achievment. These expereinces included developing competence through participaton in authentic science practices (Hurtado et al., 2009) and the support and recognition of "scientific" others (Brickhouse & Potter, 2001; Carlone & Johnson, 2007; Hurtado et al., 2009; Lewis, 2003; Malone & Barabino, 2009; Rao & Flores, 2007). Participation in research experiences allowed the women to develop competence by obtaining scientific research skills as well as developing relationships with, and receiving support and recognition from, research mentors. Hurtado et al. (2009) also discussed how student research experiences afforded through participation in early intervention programs contributed to their increasingly feeling more self-assured in the classroom setting which, in turn, allowed them to demonstrate competence. Some of the women described their research experiences as prompting competence and confidence in themselves as scientists. This feeling was magnified when their mentors or professors recognized and praised their talent and ability.

Research Training and Enrichment Programs

In addition, research training and enrichment programs designed to increase minority partipation in science provided the women with support and access to research that contributed to their success. Niema and Dahlia both participated in MARC (Maximizing Access to Research Careers) during their undergraduate years, and they credited the program for providing them with opportunities to conduct research and receive mentoring, as well as, finanical support. Grace talked about participating in MBRS (Minority Biomedical Research Support) during her undergraduate years. She was provided with the opportunity to attend ABRCMS (Annual Biomedical Research Conference for Minority Students) and present her research. Also, Niema attributed her mentoring of undergraduate students during her doctoral program as a motivating force. She knew that they were watching her, and she wanted to succeed and show them that they could do it also. Although Skylar did not participate in research programs such as MARC and MBRS, the honor's program at Angelou University provided her with a mentored research experience that she appreciated and noted as impactful for her science trajectory. Samantha recalled having to do everything on her own during her undergraduate years at Tubman. There were no programs like RISE and MARC in place for her there. However, she did pariticipate in IMSD (Initiative for Maximizing Student Development) at South East University and she knew that she would not have stayed without the support of the director, Shayla Foster. During her postdocoral fellowship, Samantha had the opportunity to mentor and train MARC and RISE scholars when she completed her internship at Douglass. She did not have the kind of support that they had,

and she would tell the students how fortunate they were to have a program in place designed to help them get into graduate school.

The research literature about women of color in science demonsrates the importance of research training and mentoring programs (Carlone & Johnson, 2007; Espinosa, 2011). Ong (2005) found programs designed to recruit and retain women of color in physics had positive impacts. When involved in programs at PWIs, these kinds of programs provided a critical safe place for women of color to:

> 1) belong to a supportive community of scholars who looked like them; 2) reject negative stereotypes; 3) validate their identities as emergent scientists; 4) learn how to address microaggressions (subtle offenses) from faculty and peers; and 5) grow their subcommunity by serving as role models, mentors, and teachers. (Ong et al., 2011, p. 184)

Samantha was exposed to the term "imposter syndrome" and incoporated it into her vobaculary because of an IMSD seminar that she attended. Samantha recalled that understanding why she was experiencing feeling of insecurity helped her to cope and process it. She understood that her feeling were valid and not uncommon.

Support, Recognition, and "Lift as We Climb"

The women attriubuted their success and confidence in themselves as scientists to the support and recognition received as well as their ability to mentor, train, and motivate others. Ong (2005) found fostering supportive relationships helped bolster confidence and learning for women of color in STEM. These include relationships with peers, administrators, faculty members, family members, and student groups. Interestingly, it was not necessarily the case that role models and peers were shared the same gender

and/or racial/ethnic backgrounds. Strong student-faculty experiences with the research mentor relationship are critical, a finding that has been reported in numerous studies (MacLachlan, 2006; Ong, 2005; Ong et al., 2011). For example, Skylar was recognized for her potential while working as a research technician in Dr. Milton's lab at Whittaker. He allowed her be an author on papers and attend conferences. This recognition and support impacted her decision to continue in science and apply for the doctoral program. Carlone and Johnson (2007) found that women who had successfully entered science careers, such as doctoral students and those holding Ph.Ds., all consistently received recognition from established members of the science community. This recognition came in the form of summer research fellowships, co-authoring articles, and presenting at conferences. Recognition from others reinforced their own self recognition and further reinforced their science identities.

The support from Niema's mother was extremely important in her journey. All of the women had families that supported their goals. Even though they may not have understood the research or why school was taking so long, they were never-the-less supportive of their goals. Other research shows that family and community support may be the most influential factor that encourages women of color in STEM (Russell & Atwater, 2005). Russell and Atwater's (2005) research of senior African American biology students identified three factors of parental influence: encouragement, acceptance, and high expectations. Studies have also shown the influence of mothers as a strong, consistent, supportive force (Ong et al., 2011).

Revisiting Storylines of Tension

Feeling Insecure, Alone, and Invisible

I define storylines of tension as experiences that challenged and created barriers for the women's goals of becoming scientists. At one time or another, all of the women faced obstacles that distracted them for being able to fully commit all of their energy to being successful scientists. To begin, my participants all described experiences of feeling insecure, alone and invisible. This storyline was consistent across all participants. All of the women attended HBCUs for their undergraduate education. Not only were they entering a new environment in which they were unfamiliar when attending graduate school, they were doing so alone. They encountered feelings of insecurity by simply recognizing that they were the only or one of a few African Americans females in their programs. Ong and colleagues (2011) found that women of color encountered problems because they were coming from environments filled with encouragement and support into environments where they experienced social isolation and academic difficulties. Furthermore, feelings of loneliness and not being accepted affects a woman's sense of self and can lead to social stratification and low expectations (Ong et al., 2011). Being "the only one" did not end with doctoral programs. After obtaining the PhD and becoming scientists, the women found themselves alone at conferences and in meetings. With such a small percentage of African American PhDs in science, it is a lonely road. Black women are both highly visible (phenotypically) and highly invisible in academic and professional setting. They are treated as invisible because they are made to feel as if

their opinions and ideas are not valued. Several of the women discussed feeling as if they were not being heard and acknowledged in various settings.

Overwhelming Burdens

Storylines of overwhelming burdens were quite evident throughout all narratives. Racialization is described by Malone and Barabino (2009) as "related to stereotype and never being able to escape being seen as a Black (or minority) person" (p. 495). All of the women expressed the overwhelming burden of having to represent "every black person, everywhere." This was an extra weight that they carried with them. It is as if they were running a race and literally carrying an extra 40–50 pounds on their backs. Meanwhile, others started out at the same time, running unburdened. Carrying that amount of weight for even a few minutes could prove to be too much to bear. Niema discussed still feeling that way even now when she attends conferences or meetings. She feels the need to be over-prepared. She wants to leave no room for criticism. Grace also voiced the same sentiment. She recognizes the importance of producing at the highest level of quality in everything that she does. Several studies have found that feelings of competence and confidence are affected when students feel as if they are constantly proving themselves because of their race (Brickhouse & Potter, 2001; Hurtado et al., 2009; Malone & Barabino, 2009). Constantly proving oneself does not end with graduation or completing a degree. For the women in my study, it was incessant.

Family and Children

The women expressed feeling the burden of family and children as well as shouldering an imbalanced workload in their professions. Previous literature reports that

when women are present in higher education, they are largely concentrated in lower level positions, such as assistant professor, and at a lower pay rate (Easterly & Ricard, 2011; Eisenhart & Finkel, 1998). One of the reasons noted for lower pay and the concentration of women in lower level positions is that very often, for men, there is less pressure to negotiate both home and work responsibilities (Easterly & Ricard, 2011; Eisenhart & Finkel, 1998; Heilbronner, 2012).

Sexism and Racism

Lastly, the narratives revealed storylines of sexism and racism. The participants described contending with blatant or subtle racism and sexism. In some instances, they were left with a just a feeling, not being quite sure if a comment or action was meant to be racist. In other instances, they were quite sure. In either regard, it was exhausting and distracting. Racism and sexism were barriers that could have resulted in the women leaving science. Studies have found that the prevelant cultural belief in White male superiority played out as microaggressions in everyday practices which affect the experiences of women of color (Ong, 2005). As a coping strategy to downplay their differences, women of color in these enviroments altered their mode of thinking, dress, speech, and behavior. Just as Samantha chose to change her wardrobe to avoid comments from her research advisor, one woman in Ong's (2005) study purposely wore drab clothing and reserved her pink warbrode for events outside of the lab.

Revisiting Black Feminist Thought & Critical Race Theory

I chose to utilize Black Feminist Thought (BFT) and Critical Race Theory (CRT) as the theoretical positions within which to ground my study because, in combination,

they allow me to attend to both racism and sexism as well the intersection of both as encountered by African American women in science. I used the frameworks to guide the research questions and my choice of narrative inquiry to capture participants' counterstories. As frameworks, both theoretical positions require that, within my study, I recognize racism, sexism, and other forms of oppression and name them as such. I must be unafraid to recognize and confirm the multiple forms oppression identified within participants' narratives. Once named and identified, there is a responsibility to contest and combat oppressive structures.

Below, I revisit six themes from BFT and CRT in light of the storylines revealed by the women's narratives. Also, as I attended more closely to the women's stories, I modified my original figure in which I depicted the intersection of BFT and CRT to highlight the themes that were clearly seen within the data (see Appendix C). Below, I discuss the data categorized by the most significant themes.

Racism is Endemic

All of the women experienced racism at some point during their journeys. For Dahlia, Samantha, and Niema the experiences were the most blatant and offensive. These three women graduated from HBCUs and immediately attended PWIs for graduate school. Within these highly racialized environments, they discussed contending with racism and how it adversely affected them. It is interesting to note that Skylar and Grace did not focus racism in the same manner as the other three women. Grace spoke of contending with racism as a professional well after graduate school, and Skylar discussed these experiences during her postdoctoral position. I was surprised by these finding,

especially because Grace attended graduate school in the 1970s. When I thought about it more closely, I realized that Grace attended HBCUs for her undergraduate and graduate academic career. She did not leave the supportive environment provided by Douglass and McNair until many years later. She finished graduate school, a postdoctoral program, and stayed home with her children for several years before completing a second postdoctoral appointment at a PWI. Skylar attended Douglass, an HBCU, before attending a PWI. She was a mother and worked at a PWI with a very supportive mentor. By the time they entered predominantly white environments, they were mature and confident in themselves. Dahlia, Samantha, and Niema graduated from HBCUs and entered programs where they left home alone and were quite young. I believe the isolating environment as well as their level of maturity and confidence caused the racist encounters to significantly affect them.

Role of Black Women Intellectuals

As educated African American women, the women in my study all expressed a commitment to contributing to the success of those around them. They felt a since of responsibility and voiced how the support received from significant others direclty influenced their sense of obligation to help others succeed as well.

Interest Convergence

Samantha shared the story of the conversation she had with a researcher who wanted her to join the lab because of her status as an African American women. He stated that he could get more money with her in the lab. In that moment, she felt reduced to a piece of property. He did not speak of her ability, he spoke of her race and gender. In

other instances, the women spoke of being asked to participate or serve on committees because of their status as female and/or African American. They felt as if they were not legitimately being asked to participate. Their participation was only a token position and served the interest of the dominant culture and not their own.

Counternarratives

"Stories can name a type of discrimination; once named, it can be combated" (Delgado & Stefancic, 2001, p. 43). The women's stories serve as an illustration of instances of racism and sexism faced by African American women in science. The stories describe the ways in which racism and sexism manifest and persist within these environments. By continuing the reveal such encounters, we can begin to combat as we share stories. By sharing stories, there is potential for the oppressor to be transformed by recognizing their offensive behaviors. The women's stories also serve as a point of inspiration and celebration for those that are able to succeed despite the many barriers. Therefore, the women's stories have the potential to be a guide for other African American women as they travel the same path.

Intersectionality

The significance of combating oppression in its multiple forms is defined as intersectionality. By not identifying the multiple, overlapping, intersecting forms of oppression, Black women will never be fully empowered (Collins, 2000; Parsons & Mensah, 2010). Samantha stated, "It's never all about the science." Within this statement, she expressed her frustration with contending with factors outside of her scientific competence and ability. Within their storylines of cooperation and tension, the women

revealed the complexity and competition of their multiple identities as women, African Americans, scientists, academicians, mothers, etc. The women struggled with internal and external influences that affected their ability to focus their energy and attention on science. Ultimately, the women succeeded and effectively negotiated spaces where their multiple identities could flourish. As professionals, Niema, Grace and Skylar crafted spaces as science professionals at HBCUs, in a sense returning the kind of nurturing environment they were familiar with from their own undergraduate years.

Self-definition

One way that African American women have stood up against oppression has been in the form of self-definition, one of the tenets of BFT (Collins, 2000). As an act of boldness against racism and sexism, it has been found that personal drive and agency attribute to persistence in STEM for many women of color (Carlone & Johnson, 2007; Ong et al., 2011). "Despite marginalization, women of color often use their status as member of two underrepresented groups—as a woman and as a person of color—to empower themselves (Ong et al., 2011, p. 188). Hanson (2004) pointed out that personal characteristics such as high self-esteem, independence, assertiveness, and high educational and occupational goals are attributes often instilled in African American women and are also needed for success in science. So how did the women in my study define themselves? What about them has contributed to their success thus far?

Rather than tease apart how each individual woman described and defined herself, I present self-definition of my participants as a collective. As I think back across the narratives and stories that were shared with me, the descriptions that strike me as the

most powerful and dominant were words like curious, smart, hardworking, driven, persistant, strong, and nurturing.

As little girls, they were naturally curious about the world; asked questions and sought to find answers. As one of them put it *"Like drinking water."* In school, they were smart and unashamed to describe themselves as nerds or geeks. *"See, I told you I'm a nerd"* summarizes the mindset they accepted and embraced over time. They were 'science nerds'. Academically and professionally, they have been unafraid to do what was necessary to succeed. *"No, I have to succeed because they think that we can't do it."* *"I felt I needed to work twice as hard."* was the tone and rhetoric they used and time after time and they recognized that hard work was essential. Furthermore, because they were hyper-polarized by being both Black and female, they understood that working hard was just the beginning. They knew that whatever they did; whenever they spoke; and, anytime they had a seat at the table, they would be representing all African Americans. With the tremendous burden was an overwhelming sense of responsibility to perform at the highest level of excellence. There was no room for mediocrity. They represented those who came before and those who would come after; therefore, a strong work ethic and sense of integrity was of the utmost importance.

"One of the things that I got from growing up in the country and with the parents that I had is that we didn't focus a lot on what people thought we should be." Not letting others define or determine who or what they could become was also a contributing characteristic in their path to success. In time, they developed a keen sense of self. And even when they weren't naturally tough, they learned to be as resonated in this particular

reflection *"You have to be a very strong person. You have to be thick-skinned. I am not thick-skinned naturally."* They were also driven and determined to stay even when they felt insecure and alone. *"I'm not going to give them the satisfaction of quitting."* They voiced a "stubbornness" and being unwilling to quit despite encountering cold, unwelcoming people and unbearably, harsh conditions. *"My stubbornness is the root of my self-motivation."*

 "I'm mama first." As mothers, they were nurturing and committed to their children as their highest priority and willing to make professional decisions that placed their children first. *"I'm this person where I feel like I can do it all. I can have family. I can do my work effectively here and anything else I want to do."* They believed as mother, wife, *and* scientist, they could continue to be successful. As scientists, they were competent and confident in their ability and committed to lifting others as they climbed to higher levels of achievement. Overwhelming was the sense of gratitude and appreciation for those who supported and lifted them. *"So as people have helped me to navigate this journey, now I have a chance to help other people, and that's just been so dynamic. That's just been so really wonderful. It really has been."* Therefore, the charge was accepted and the understanding that: "with great privilege comes great responsibility."

Implications

> . . . the focus remains on lives as lived and told throughout the inquiry. The knowledge developed from narrative inquiries is textured by particularity and incompleteness- knowledge that leads less to generalizations and certainties and more toward wondering about and imagining alternative possibilities. (Clandinin, 2013, p. 52)

In the following section, I present four implications for practice. Although the suggestions I present in the following sections are not new to science and science education, the recommendations are more pressing, real, and urgent because of the women's stories. Recommendations from previous literature are renewed by the raw and visceral accounts of their experiences.

Enhance Teacher Education

The women's stories revealed several recommendations for teacher education. The women described science teachers that provided opportunities for them to "do science" as opposed to simply "doing school" (Varelas, et al., 2010). Their teachers provided them with opportunities to participate in meaningful scientific activities. Similarly, Carlone, Scott, and Lowder (2014) found that "students from all kinds of backgrounds and with widely varying previous science experiences and interests, are capable of and interested in performing themselves scientifically when given robust opportunities to do so" (p. 858). The narratives reinforce the necessity of training teachers who recognize how significantly important is it to provide authentic science experiences. Authentic science activities often require more planning time and are messy, disorganized, and loud. However, they are extremely effective in motivating students to perform scientifically. Carlone and colleagues (2014) found that these experiences benefited students greatly as they were able to leverage who they were on an individual and social level with who they were within school science. Students able to perform confidently when given robust science experiences.

Teachers education could also benefit from hearing the stories of former students that credit their science teachers with connecting them to science even several decades after leaving their classrooms. As a former seventh-grade teacher, hearing the stories the women told about how science teachers impacted their lives called me to question my own teaching. I wondered if any of my former students would remember me in the same fashion. Had I ever tap into a student's budding scientific curiosity when the entered my classroom door? I was deeply affected by the stories and it called to me question my own practice as I teacher educator. I believe aspiring teacher can benefit from hearing first-hand accounts of the impact teachers can have in a student's life.

Sustain and Enhance Supportive Structures

The women's narratives provide directions for an evolved post-secondary experience for African American women science majors. Research enrichment program like MARC and MBRS provided the women with the opportunity to experience science and also receive mentoring and support. One way to enhance the effectiveness of these programs might be to ensure that students are connected to a larger network of scientist of color. Ong (2005) recommended that departments "should provide opportunities for multiplicity by structurally and financially supporting these members' (female and minority) participation in local associations, such as formal groups for women and minorities" (p. 612). She recommends conference events sponsored by national associations for underrepresented members, such as the American Physical Society's Committee on the Status of Women in Physics, the National Association of Black Engineers, and the National Conference of Black Physics Students. Similarly, Espinosa

(2011) noted that academic relationships formed through organizations like these are important because when women of color attend Predominantly White Institutions (PWIs), they struggle to connect with their White and/or male peers. Memberships in academic organizations may help women of color feel more connected to the STEM community at large.

Additionally, program directors and those involved with training program such as MARC and MBRS should provide students with resources to help them feel more equipped to succeed before they leave and enter graduate school. Dahlia voiced her frustration with not being told "the truth." When I questioned about what she meant, she said that she wished she would have known that she was going to be alone when she got there and that she would encounter people that did not like her and did not want her there. From an academic standpoint, she wished she were given a detailed account of the journey, the specifics of the procedures and processes (e.g., such as qualifying exams). She said,

> Dahlia: You don't say, "Oh, you'll get through. I did it, you can do it too." That's not what somebody wants to hear when they're struggling through trying to qualify. They want to hear, "Hey, this is what I did. I've been through the same thing you've been through and this is what I did to get through it."

It would be helpful if a time and space were created to allow professors the opportunity to candidly share their experiences. By sharing their experiences, students may be better equipped for the journey ahead.

One of the most important displays of support for Niema and Samantha was when a friend or mentor showed up physically and supported them. Niema's sister and friends would jump in the car and drive 12 hours to come and check on her. Because of this kind of support, when Niema became the MARC director at Douglass for a few years, she visited her students when they were in summer research programs at various schools across the country. I asked her why visiting and physically checking on the students was important to her, and she replied:

> That's really important because number one, I know the culture of science. I know the culture of research laboratories. Every place is different and it's very important for students to be placed in a situation where they can feel that they're going to be successful and where they are *actually* going to be successful. It's also important so that the people who are over the programs can see us. They need to know that we are that student's support and that if something goes wrong we're going to pull those students out. So it's really important for that to happen. I recommend that for everybody who's working with students.

I believe that this kind of support should be provided more often. Programs should financially fund visits to institutions where their students are placed so that we know the type of environments where students are being trained and to ensure they are being supported.

Reform Hiring, Recruitment, and Retention Practices

"Being the only woman or racial/ethnic minority, or even one of a few, often creates a sense of non-ordinariness—of not belonging and of feeling incompetent—which demands that students devote time and energy socially performative strategies" (Ong, 2005, p. 612). When energy is wasted in contending with the burden of racialization,

women of color are not able work up to their full potential. Ong (2005) suggested that science departments change their hiring and recruiting practices to build a 'critical mass' of potential mentors and role models among their faculty. I believe that building a 'critical mass' should be implemented across all levels from the undergraduate level through faculty positions. Espinosa (2011) noted, "The literature is clear on the gendered environment found in engineering classrooms, departments, and laboratories for women of all backgrounds, in part is due to the lack of progress enrolling women over the last several decades" (p. 233). Therefore, this information suggests that increasing the number of faculty begins with increasing the number of women of color enrolled in undergraduate STEM programs. By increasing the number of female students of color, there is the possibility of decreasing the burden felt by of being "the only one."

Along with increasing student participation, departments would need to restructure their hiring, promotion, and tenure practices. Another implication from the women's stories is need for a change in policy that addresses the inequity in workload and salaries. Women are often burdened with more of the work in departments across STEM without fair compensation. Additionally, although different institutions have various policies related to the "tenure clock" and maternity leave, in most cases women struggle with policies that seem to penalize them for taking leave during their pregnancy or after the baby is born.

Williams, Phillips, and Hall (2015), in their extensive study of gender bias faced by women of color in STEM, identified many of the same struggles identified in my participants' narratives. The major implication for the report is that women leave STEM

in response to pervasive and persistent gender bias (Williams et al., 2015). The report

introduces a new approach to institutional change to disrupt gender bias called Metrics-

Based Interrupters developed by Professor Joan Williams. Bias Interrupters involves a

four-step iterative process: (a) survey women to find out whether they think gender bias

is playing out across the institution (recruiting, assignments, evaluations, tenure,

promotion,etc.);(b) develop objective metrics to test whether women's perceptions are

accurate; (c) implement "Bias Interrupters" to interrupt bias in real time; and (d) see

whether the relevant metric improves, and if it doesn't, strengthen or modify the

intervention. Perhaps, if on an instutional level gender bias is addressed and corrected,

there will be more opportunities for women of color to persist in all disciplines. Williams

et al.'s recommentations are just being introduced in higher education. In time, we will be

able access the effectiveness of her recommendation.

Challenge Oppressive Structures

> When she started graduate school, Niema's mother told her:

> Don't start off talking. Start off listening. When you go to your program, make
> sure you listen. Listen to how people speak to each other. Listen to how they
> communicate with one another and the things that they do. And you kinda follow
> that model because that's how they're successful at that time in that program."
> She would always tell us to . . . "Start off listening. Look at how people are doing
> things and then work your way in." And that was good advice.

Niema's mother was teaching her how to equip herself with the tools required to

challenge the system by first observing and learning it. She knew that for Niema to be

successful, she would have to observe and understand the unfamiliar culture and

environment first, and then appropriately respond to it. Johnson, Brown, Carlone, &

Cuevas (2011) describe this kind of reading and responding as *la facultad.* The authors

quote Anzaldúa: "*La facultad* is the capacity to see in surface phenomena the meaning of

deeper realities, to see the deeper structure below the surface. It is an instant 'sensing,' a

quick perception arrived without conscious reasoning" (Johnson et al., 2011, p. 361).

Niema's mother recognized that her daughter's success in science would require more

than being smart and doing well in her classes. She knew the underlying structures that

were at work. Additionally, Samantha eventually became cognizant of the underlying

structures when she stated, "Everybody told me it would be hard, but it was not the hard

that I thought. It was just a personal attack at some point. It is never all about the science.

I'm okay with the science being hard, but this other stuff, I shouldn't have to deal with."

The other stuff is what required *la facultad.* Johnson and colleagues (2011) suggest the

following approach to challenging oppressive structures: "So perhaps a viable strategy

for preparing women of color to persist in science includes not only offering them

opportunities to engage in particularly challenging math and science, not only teaching

them the rules of scientific discourse, to assist them in putting together credible identity

bids, but doing so in overtly political context, one which will help them sharpen la

facultad" (Johnson et al., 2011, p. 363)

Espinosa (2011) also suggests challenging oppressive structures by "encouraging

students to question the role of power in the creation of science" (page number).

Samantha stated it clearly when she said "It's never all about the science." A strategy for

combating oppression is to identify and confront it individually. Another strategy is to

challenge gender bias and racist practices systematically. Ong (2005) recommends

training for professor, graduate students, and tutors to recognize and disrupt discriminatory practices; both subtle and blatant. She also suggests setting a tone of "zero-tolerance" for such behavior in classrooms and informal settings.

I recognize that the women's narratives provided more insight than what I presented here. I discussed what I believe are three most salient implications that arise from the urgency and power of their narratives.

Future Directions of Research

As I think about the stories of the women who have successfully continued in science, I also think there are lessons to be learned from the women who did not continue. Whether leaving doctoral programs early because the barriers became too much to bear or leaving science after being trained as a research scientist, I believe there are lessons to be learned from the counternarratives that capture multiple experiences. Also, there is value in also researching the experiences of African American males who travel the same path into science. How might their experiences be similar or different from African American women? What can we learn from their narratives? Additionally, all of the women in this study received their undergraduate education at HBCUs. I think we could also benefit from researching the experiences of women who were received their undergraduate education from PWIs. As we look across the experiences of multiple narratives, we can begin to reimagine the possibilities and design structures that support women in science and allow them to excel.

Final Thoughts/Reflection

These texts are intended to engage audiences to rethink and reimagine the ways in which they practice and the ways they relate to each other. (Clandinin, 2013, p. 51)

I was in the library at UNCG one afternoon working on analyzing the narratives. In middle of Samantha's, I stopped as I finished my cream cheese muffin to discard the crumbs, and I noticed a set of very striking black and white photos with quotes printed on them lining the back wall on the basement floor. I remembered seeing these pictures in the School of Education building and from time to time, and I would read them in passing. I rarely have a moment when I am not in motion; I feel as if I am always in constant transition. But in this moment, however, I stopped to appreciate the photos and give them my full attention. On the second photo, I read the following: "Imagine what you can become when you can be who you are." I smiled to myself and thought, "Oh wow! I really, really like that. What a powerful statement." I returned to Samantha's narratives and about five minutes later, I came to the part in her story where she talked about dealing with the negative perceptions of HBCUs and finding it necessary to adjust her choice in clothing to avoid negative comments. And I read the line where she described "not feeling comfortable enough to just be myself." I turned behind me to find the photo and make sure I captured the quote accurately. In that moment, I began to imagine all of the possibilities of success for young African American women who aspire to be scientists if only the system did not require that "they learn how to operate like a white man" (Skylar).

I began to rethink and reimagine not just my own practice, but the practices and policies in multiple locales. These are places and spaces where there is a possibility for creating nurturing and empowering environments where African American women can be who they are and thrive scientifically. Just imagine possibilities and the heights she can climb if only she is equipped and prepared for the journey ahead. What if she knew the dragons that she might meet along the way? And what if she knew just how to defeat them? But what if, there were no dragons at all?

Imagine what you can become when you can be who you are.

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APPENDIX A

INTERVIEW PROTOCOL

"Thank you so much for agreeing to participate in my research study. I am grateful to you for the time that you are giving me today. In this first interview, I am going to ask you questions about your past experiences and how they have brought you to where you are now. In the second interview that we will complete at a later date, I am going to focus on who and where you are currently. I am going to be recording this interview. Do you agree to have your voice recorded? ----- Thank you. Let's get started"

Interview I - History in Science

1. When did you first become interested in science?

2. Tell me about a time when you first became interested in science.

3. Describe some your earliest experiences with science.

4. Tell me about a time when you felt like science was a possibility for you.

5. What about as you got older (*specify depending on earlier responses*), do you remember a time really feeling connected to science?

6. Who or what supported you in your path into science?
   a. Tell me about a time you remember getting the support you needed.

7. Have you had any experiences that were especially difficult or challenges?
   a. If yes, can you tell me about a time you remember really being difficult?
   b. To what do you attribute these challenging experiences?

8. Were there ever any times when you thought you would not make it?
   a. If yes, can you tell me about a time that comes to mind that you remember the most?
   b. What made you stay when you thought of leaving?

9. Is there anything else you want to tell me about the beginning of your interest and pursuit of science?

Interview II

"Thank you again for agreeing to participate in my research study. I am grateful to you for your willingness to talk with me. In the first interview, I asked you questions about your past experiences and how they have brought you to where you are now. Today, I am going to focus on who and where you are currently. I am going to be recording this interview. Do you agree to have your voice recorded? ----- Thank you. Let's get started"

1. Are there any experiences or stories that you want to share that you were not able to share in the first interview about your path into science?

2. What does it mean to be an African American woman in science? Can you tell me about a time when you . . .
    a. felt comfortable and competent?
    b. felt invisible or alone?

3. Can you tell me about an experience at work that captures how you feel about science right now?

4. Can you tell me about a time when you are/were running your laboratory that made you feel especially good about yourself as a scientist?
    a. Has there ever been an instance of feeling the opposite? If so, could you describe it?

5. Can you tell me about a time when you were at a conference that made you feel especially good about yourself scientist?
    a. Has there ever been an instance of feeling the opposite? If so, could you describe it?

6. Can you tell me about a time at home or with your family that made you feel especially good about yourself as a scientist?
    a. Has there ever been an instance of feeling the opposite? If so, could you describe it?

7. Who or what supports you as you endeavor in science?
    a. Tell me about a time you remember getting the support you needed.

8. Have you had any recent experiences that were especially difficult or challenges?
    a. If yes, can you tell me about a time you remember really being difficult?
    b. To what do you attribute these challenging experiences?

9. Are there ever any times when you think you want to leave science?
   a. If yes, can you tell me about a time that comes to mind that you remember the most?
   b. What makes you stay when you think of leaving?

10. You receive messages from society about being who you are in science and who you should be as an African American woman. How do you respond internally to messages from society about who you are or what you should be?

11. Do you think your stories are important?
    a. How so?
    b. Why not?

12. What advice would you give to a young black girl interested in pursuing a career in science? What do you wish someone had told you?

APPPENDIX B

COLLEGE AND UNIVERSITY INFORMATION TABLE

Institution	Description
Banneker University	Southern PWI
Frederick Douglass University	Southern HBCU
George Washington Carver University	Southern HBCU
Harriet Tubman University	Southern HBCU
Henrietta Lacks University	Northeastern PWI
Ida B. Wells University	Southern HBCU
John Hope Franklin University	Southern HBCU
Mae Jemison University	Southern PWI
Maya Angelou University	Southern HBCU
McNair College of Medicine	Southern HBCU
North State University	Northeastern PWI
Parks State University	Northeastern PWI
Prosperity University	Midwestern PWI
South East University	Southern PWI
Southern Central University	Southern HBCU
University of Freeman	Southern PWI
Whittaker University	Southern PWI

APPENDIX C

MODIFIED THEORETICAL POSITIONS DIAGRAM

"Lift As We Climb" The women were committed to uplifting those around and coming behind them.

Black Feminist Thought

Heterogeneous collective

Collective knowledge

Black women intellectuals

Justice for all; everywhere

Self-definition

Critical Race Theory

Racism is endemic

Race as social construct

Differential racialization

Interest convergence

Counter narrative

Intersectionality

All of the women experienced racism.

Some of the women experienced marginal and token participation.

The women possessed a strong sense of self and high level of confidence in their ability and intellect allowing them to succeed despite the barriers.

Within their storylines of cooperation and tension, the women revealed the complexity and competition of their multiple identities as women, African Americans, scientists, academicians, mothers, etc.

The women's stories are used a tool to combat racism and expose a contrasting storyline to the dominant narrative.