WHAT ABOUT ME? SUCCESSFUL AFRICAN AMERICAN MALES IN MATHEMATICS

by

NICHOLAS ANTON CLUSTER

(Under the Direction of Denise A. Spangler)

ABSTRACT

There are few studies that investigate successful African American males in mathematics. Using phenomenology and narrative inquiry as research approaches, I gave 11 African American males who excelled in mathematics the opportunity to discuss the experiences that contributed to their mathematical success. The purpose of this study was to identify the factors and experiences that contributed to their success in school and mathematics and also identify any challenges these young men faced and how they overcame them. Data was collected using biographical questionnaires, an on-line discussion board, and individual closing interviews. Thematic analysis (Braun & Clarke, 2006) was then used to analyze the data. The participants identified several personal and schooling factors as having an impact on their mathematics achievement. Personal factors such as parents, mentors, peers, and siblings were identified as being major contributors to their success. The schooling factors included high expectations from teachers, academic environment, and academic enrichment programs.

INDEX WORDS: African American males, Mathematics success, Academic success, Phenomenology, Thematic analysis

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DEDICATION

This dissertation is dedicated to my late grandparents, Mildred Cassell, Jacquelyn Cluster Hill, and Charles Hill. I love and miss you all very much.

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I would like to begin by thanking my mom, Ernestine Cluster, for instilling in me the importance of getting an education. Ma, I am truly grateful and blessed to have you in my corner, cheering me on every step of the way. Thank you for believing in me and for always being there for me. I would also like to thank my entire family, near and far. Particularly my sister, KeNetha Martin and my grandparents, Amanda and William Harrison, Sr. Your encouragement for me to "get my lesson" during this process really helped me to stay focused and certain that this goal would be achieved.

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CHAPTER ONE

INTRODUCTION

This is the story of 11 academically successful African American males who were successful in mathematics. Using a phenomenological and narrative inquiry approach, I examined their academic experiences and gave them voice by recounting their process of becoming successful in mathematics. I also identified and described the factors that contributed to their mathematics success.

Many of my own experiences as an academically successful African American mathematics major, mathematics teacher, mathematics teacher educator, and father of a son, as well as the research literature, shaped the conceptual framework for this study. While growing up in a predominately African American neighborhood and attending a predominately African American high school, I saw few students who expressed an interest in mathematics and even fewer who achieved in this discipline. As an undergraduate at a historically Black college and university (HBCU), I pursued a degree in mathematics. Despite the challenges I faced from being a first-generation college student, I believed and understood that studying mathematics was important and essential to my becoming successful as a mathematics teacher. I often wondered if there were other students who shared my success and drive in this discipline and if so, how they achieved it.

As a mathematics teacher, I always believed that all of my students could not only learn mathematics but also be proficient in it. By *proficient* I mean being able to understand and apply concepts they learned. I knew if I was going to be an effective mathematics teacher, I had to

know and understand mathematics, know and understand my students not only as learners of mathematics but personally, be able to apply appropriate pedagogical strategies during instruction, and provide a classroom environment that promoted serious mathematical discourse. I also believed I should remain engaged in professional development activities that integrated mathematics, student thinking, and pedagogical techniques.

During the 2009-2010 school year, I was awarded an assistantship through the Department of Mathematics and Science Education at the University of Georgia to assist teachers through Project ISMAC (Improving Students' Mathematics Achievement through a Professional Learning Community). Project ISMAC was hired by the Clarke County (Georgia) School District to help build professional learning communities and support teachers with their mathematics instruction at each of the four middle schools in the district. Building these professional learning communities was a way for us to address the issues teachers were facing in changing their instruction to be aligned with standards-based pedagogies (NCTM, 2000) and also provide professional development for the school. I was assigned to one of the four schools and assisted the mathematics teachers there with their classroom instruction. My duties included assisting teachers during mathematics planning meetings, analyzing students' mathematical thinking, and using that knowledge to improve mathematics teaching and student achievement.

During that school year, I observed the continued challenges many of the African American students faced daily. Similar to the African American students during the time of desegregation (Bell, 2004; Irvine & Irvine, 1983; Johnson, 1954; Sowell, 1976), low expectations from teachers, tracking, teachers' lack of content knowledge and respect for their students, and minimal parental involvement were all issues these students faced. Although this school was diverse in ethnicity, anyone could determine the type of mathematics class (gifted,

advanced, on-level, or special education) he or she was observing by simply looking at the students in the class. The gifted classes consisted of mostly White and Asian students. The advanced classes were still mostly White and Asian but did have one or two Blacks, who were females. The on-level classes were predominantly Black, Hispanic, and had one or two White students. The special education classes were majority Black and mostly males. The alarming thing about this situation is that not only was the same thing happening across the school district, it was happening in many of the public schools throughout the United States (Kunjufu, 2004; Morris, 2009; Oakes, 1985).

As I reflected on my own experiences, I realized that several factors were at the heart of my success in mathematics. First, my mother valued education and insisted that I do well in school. She instilled in me the importance of achieving academically and would not allow me to bring home "bad" grades. I always thought of my mom and teachers as teammates in the sense of making sure I obtained the knowledge and skills I needed to be successful. Throughout my elementary schooling, I was always made aware of the importance of understanding African American history and the plight of Blacks in the South. I was also taught that African Americans were a proud people and to fight racism, injustices, and doubters of my capabilities because of my skin color through education.

One particular memory that stands out to me about my mom stressing the importance of education was when she threatened to take me off the little league football team because the games interfered with an enrichment program at one of the local colleges for which I was nominated. Football was and still is my favorite sport, so I was obviously upset that I would not be able to play. After telling my coach this news, he assured my mom that I would get to the program on time and to my games if she let me stay on the team. She agreed, and life was not

completely over for me as I had known it. At the end of the enrichment program, there was an awards ceremony honoring those students who had done an outstanding job in the different classes that were offered by the program. As my mom normally does, she and my sister sat on the front row so that she could have a close-up view in case I earned any awards. At the conclusion of the ceremony, I needed help carrying all of my trophies to the car! I will never forget how thrilled my mom was about my success and how she beamed with pride as my name was called over and over. Although I can recall her being proud of me after football games, it was not even close to her pride in my academic achievements.

When I was in the eighth grade, I was blessed to have a mathematics teacher who challenged, encouraged, and motivated me to excel in mathematics. In his presence, I was expected to excel, and I strove to do just that. From eighth grade on, I had mathematics teachers who were instrumental to my success. During my freshman year in high school, my algebra teacher invited me to attend a mathematics competition, even though I was not a member of the mathematics club. Although I only observed and did not compete, it was great exposure to the types of activities and enrichment programs other academically successful students participated in.

Upon entering college, I did not know what I wanted to do after graduation. I did not do as well as I thought I should have done on my first pre-calculus quiz as an undergraduate. So I took the professor's advice and went to his office hours for more assistance. After he explained the topics that I did not understand, we began talking about things that I could do to be successful in his course and what I needed to consider when choosing a major. The things that stand out to me about that conversation were the lengthy time we spent talking and his genuine interest in wanting me to be successful in not only his class, but in all of my courses and

throughout my academic career. His advice was to choose something that I enjoyed doing and would continue enjoying. This very simple advice proved to be instrumental in my decision to major in mathematics and to later become a mathematics teacher. Although he moved on to become president of a university and is no longer a mathematics professor, it still amazes me how many of his former students acknowledge him as one of their favorite mathematics teachers because he was excellent in explaining the concepts and because he respected and treated them as intelligent mathematicians. What is even more amazing is that many of those students hated mathematics share the same sentiments.

When my son was born, it was one of the proudest moments of my life. However, it was also one of the scariest as well. When I saw him for the first time, I knew that the life that I had known had come to a screeching halt. It still amazes me how his well-being and his success in life instantly became my number one priority. I knew the sacrifices my mom made for my sister and me, and I wanted to do the same for him. I knew that I had to make sure he understood that education should and would be his top priority. I take a very active approach when it comes to his education. Volunteering in his classes, attending parent-teacher conferences, assisting with homework on a daily basis, and attending extra-curricular activities are examples of some of the things I do to assist in his success as a student. Admittedly, when I volunteer in his class, I do not focus all of my attention on him. I understand the importance of the phrase "it takes a village to raise a child," so I work with all of the students that day. During the summer break, I usually review many of the mathematics standards he learned the previous year and cover many of the topics he will see in the upcoming school year. Education is year-round.

My home and school experiences convinced me that those of us who succeeded in mathematics could not have done so without support from our families and caring teachers.

Hence, I brought to this research the assumption that parents and caring teachers who hold high expectations have a significant positive impact on African American males' success in mathematics.

Background

Much of the research about African Americans' participation in mathematics has used a deficit model in which researchers investigated the factors affecting students' lack of success and resilience in mathematics or a mathematics-related field. However, there are a few research studies that have investigated African American male students who excel in mathematics.

Stinson (2004) provided an in-depth analysis of four of his former African American male students who demonstrated achievement and persistence in school mathematics. He found that these young men acquired strong mathematics identities that positively affected their sense of agency. Because each participant attended the same mathematics and science magnet high school, located in an affluent, predominantly African American community, Stinson suggested that future research should examine successful African American males who attended less affluent schools and achieved school, academic, and mathematics success.

Berry (2005) used critical race theory as a theoretical framework to provide an in-depth analysis of two mathematically successful African American male middle school students. Berry suggested a critical need for education research "to focus on the success stories of those African American men and boys who are successful to identify the strengths, skills, and other significant factors it takes to foster success" (p. 61).

Jett (2009) also used critical race theory as a theoretical framework to investigate the mathematical, schooling, and racial experiences of four African American male college graduates. Like Morris and Monroe (2009), Jett suggested that given the South's African

American population as well as its rich African American history and culture, the South is a critical place for investigating the educational achievements of African American students.

The studies by Stinson (2004), Berry (2005), and Jett (2009) are unique in providing a different, yet refreshing, perspective for researching the mathematics education of African American males who were successful in mathematics. Each stressed the importance of researching African American males who were successful with school mathematics while identifying common factors or influences that had a positive impact on these young men's mathematics and schooling experiences. In each of these studies, the participants had some form of support system, either from parents, extended family, or teachers who had high expectations for them. For some, it was a parent who made it clear that education was his or her top priority; and for others, it was an extended family member who reviewed report cards, assisted with homework, and served as a role model. This support system also provided a resource for those young men that advocated for their access and participation in advanced mathematics classes. One of the more enlightening commonalities of these studies is the participants' self-motivation to be successful in mathematics. All of the participants not only wanted to be, but also believed they would be, successful in academics and mathematics.

Although these studies sought to identify factors that contributed to the success of African American males in mathematics, they, along with other studies, identified challenges these students faced as well. Because of cultural differences and misdiagnoses, the students in these studies often had teachers with low expectations for their academic attainment (Berry, 2005; Harper, 2006). Denbo (2002) identified the following institutional practices that discourage the achievement of African American students: (a) unequal funding and lack of comparable resources; (b) inaccurate and misused assessments; (c) less-qualified and less-

experienced teachers; (d) lack of a rigorous school curriculum and lower teacher expectations; (e) tracking and disproportional placement in special education; (f) disproportional retention, expulsion, and suspension; and (g) segregation. Steele (2004) acknowledged several of these same obstacles when describing the schooling experiences of African American students. He also observed that African American students are much more likely than other students to encounter a considerably distracting peer culture in junior high or high school, attend schools with few or no Advanced Placement courses, and experience stereotype threat.

The present study was designed to add to the limited literature on successful African American males in mathematics by using a different theoretical framework. In addition, I used a larger sample than in the previous studies on successful African American males in mathematics, (e.g., Berry, 2005; Jett, 2009; Stinson, 2004).

Rationale

For nearly three decades, empirical studies have analyzed national data provided by the National Assessment of Education Progress (NAEP) and have reported the mathematics achievement of students in Grades 4, 8, and 12. From analyses of NAEP data, several reports indicate that there is a pattern of underachievement and *under-participation* of African Americans in mathematics. These reports document that the mathematics achievement gap between African Americans and Whites has also grown in recent years (Gewertz, 2003; Lubenski & Shelley, 2003).

In 2003, an Education Trust study used NAEP data to show that although the nation's students were improving over time in academic performance, the gaps between Black and White students were growing (Gewertz, 2003). This growth was apparent in the eighth-grade NAEP mathematics test, where the Black-White gap grew from 33 points in 1990 to 39 points in 2000

(Gewertz, 2003). According to the National Center for Education Statistics, in the 2005 NAEP assessment, Whites still outperformed Blacks by 30 points in mathematics in both the eighth and twelfth grades. Although male students scored higher on average in mathematics than female students in Grade 12, Black male students scored lower than any of the other ethnic groups reported. In 2009 and 2011, there was a difference of 32 and 31 points, respectively, between White and Black eighth grade males.

A report using NAEP data from 2008 highlighted the graduation rate of Black males from high school throughout the United States. This report provided the graduation gaps between Black and White males for each state. It also ranked graduation rates for school districts with enrollments of 10,000 or more Black male students. According to *Yes We Can: The Schott 50 State Report on Public Education and Black Males* (Schott Foundation for Public Education, 2010), in the 2007–2008 school year, 78 percent of White males graduated from high school with their cohort, whereas only 47 percent of black males graduated with theirs, thus showing a 31-point gap across the country. The Black male graduation rates in the southern states of Mississippi, Alabama, Georgia, South Carolina, Florida, North Carolina, and Louisiana were lower than the national average. When the districts are ranked by the size of the gap between graduation rates for White and Black male students, most of the districts that had higher graduation rates for Black male students than for White male students had very few White student enrollments. Two glaring notable gaps from this ranking are the Atlanta and Fulton County School Systems. Both were ranked in the bottom four, with Fulton being ranked fourth from last with a gap of 35 percent, and Atlanta being ranked last with a graduation gap of 36 percent. The only state with significant Black male enrollment (more than 100,000) and a greater than a 65 percent Black male graduation rate was New Jersey. The report attributes New Jersey's

success across most districts rich and poor alike to an increase in funding for schools in low-income communities and high quality preschool programs. One New Jersey district in particular invests in its children by providing them with increased hours of education each day, on weekends, and in the summer.

Mathematics education researchers must continue to examine the experiences of successful African Americans as well as successful students from other ethnic groups in order to understand the types of mathematical experiences that have a positive impact on their success in mathematics. From the experiences of these successful students, we can work to create best practices for these students and apply our understanding to students who are not as successful in mathematics with the intention of raising the mathematics achievement of *all* students.

Research Questions

In an attempt to increase discussion of the achievement gap and the lack of African American men in mathematics or mathematics related fields, I examined the schooling experiences of mathematically successful African American male students. In this study, I investigated the following questions:

1. What personal and schooling factors do academically successful African American men identify as contributing to their mathematics achievement?
2. What types of mathematical experiences do they identify as contributing to their mathematical success?
3. What challenges do African American men who excel in mathematics face, and how do these men use the success factors they identify to overcome their challenges?

CHAPTER TWO

LITERATURE REVIEW

As I mentioned in the previous chapter, there are few studies that focus on the academic achievement of successful African American students and even fewer studies on successful African American males, especially in mathematics. Much of the research on African Americans' participation in mathematics has used a deficit model. The purpose of this chapter is to summarize the available research that highlights successful African American males, the factors that lead to their success, and the challenges they face. Specifically, I highlight those bodies of literature that identified personal factors such as parenting, self-efficacy, peers/siblings, and mentoring/role models, as well as schooling factors such as teachers and academic enrichment programs that have an impact on the academic and mathematical achievement of African American students and African American males in particular.

Personal Factors

Parenting. To provide details of the past and current events that might shape mathematics achievement and persistence among African American students, Strutchens (1993) presented six case studies of sixth-grade African American students in which she examined societal and ethnic factors that affected their performance in mathematics. Two of the societal factors that she identified were family status (including socioeconomic status, parents' education, and community standing) and parents' involvement and expectations. Strutchens found that the parental levels of education were determinants in the types of interactions that occurred between the teacher and the parents. She also found that all of the parents were concerned about their

children's education and doing well in school both academically and socially. Parents also stressed the importance of mathematics and held high expectations for them to be successful. She suggested that researchers should conduct additional studies to examine the interaction of societal factors and mathematics performance, undertake a longitudinal study of African American students who are successful in mathematics, and examine the effects of individual agency and peer pressure on the mathematics success and failure of African American students.

Berry's (2005) study highlighted the perceptions and mathematical experiences of two African American male middle school students who were successful in school mathematics. This study also shed light on the parents' perceptions of their sons' schooling and mathematics experiences. Berry found that parents stressed the importance of providing education materials to their son at an early age to ensure that they were prepared to be successful academically. One of his major findings was the importance of support systems. Two of the five components of the support system theme were parents being an academic resource and parents being advocates. Both of the participants' parents were capable to assist their sons with their mathematics homework and were very involved in school-related activities, such as participating in fundraisers and chaperoning field trips.

Moody (1997) also found that the two African American females in her study considered their parents to be major contributors to their success in mathematics. She reported that although both parents of one of her participants provided support, the roles of the mother and father were different. Because the mother had earned a master's degree in mathematics, she was a "model" of someone—more specifically, a female—who had become successful in mathematics. In contrast, her father provided encouragement and had expectations for her to do her best.

Hrabowski, Maton, and Grief's (1998) study focused on the voices of high achieving Black males and their parents. Besides giving voice to two groups rarely studied, one of their major purposes was to identify the strategies and roles parents have in their sons becoming academically successful. Mothers in both single- and two-parent households were considered the central figure in the son's life. Mothers were also reported to be the chief academic advocates using strategies such as making sure their sons were placed in appropriate levels of classes; helping with homework; encouraging daily reading; holding conferences with teachers when academic or behavior problems arose; supporting their son's involvement in extracurricular activities; transferring their sons to a different school, if the need arose; and holding high expectations by demanding academic excellence. Hrabowski et al. added: "The mothers were very connected to their sons and knew the importance of listening to them in order to understand them while, at the same time, demanding a great deal from them" (p. 191). They reported that the fathers' main focus besides academics was discipline. Fathers were more likely than mothers to monitor free time, which included time spent with friends, watching television, and playing video games. Fathers also believed it was their responsibility to prepare their sons to handle challenges faced by African American males in society and know how to handle the possibility of mistreatment. The researchers found that the higher the fathers' educational level, the more likely they were to be academic guides and mentors. They added:

> Regardless of the fathers' level of education, however, the majority served as role models in helping their sons thrive in a predominantly White society. In fact, most were involved with their sons' teachers in middle school, and half continued to be involved when their sons advanced to high school. (p. 194)

Self-efficacy. Martin (2000) conducted a study in which he highlighted 7 of the 35 high-achieving African American seventh, eighth, and ninth graders who participated in a prior study. He was particularly interested in giving voice to these students, who took advantage of their

opportunities to learn and achieve academic and mathematics success. Martin's study showed that all the students displayed strong personal identities that contributed to their achievement-oriented individual agency, and most of them were confident in their mathematical abilities. Martin found that these high-achieving students had a positive mathematics identity. The four tenets of a mathematics identity proposed by Martin include: "(a) their ability to perform in mathematical contexts, (b) the instrumental importance of mathematical knowledge, (c) constraints and opportunities in mathematical contexts, and (d) the resulting motivations and strategies used to obtain mathematics knowledge" (p. 19). From this study, Martin constructed a multilevel, contextual-based framework for analyzing mathematics socialization and identity among African Americans. His framework consisted of four themes: (a) sociohistorical, (b) community, (c) school, and (d) agency and mathematics success among African American students.

Similarly, Berry's (2008) investigation of eight middle grades young African American men who experienced success in mathematics found that almost all of them had positive mathematical and academic identities. Three of the components that composed these identities were as follows: "(a) they were motivated to succeed in mathematics and school; (b) they expressed strong beliefs in their mathematical ability; and (c) they engaged in positive self-definition" (p. 481). He stated that they exhibited their positive mathematical and academic identities by maintaining high expectations of themselves, having a positive attitude about their mathematical abilities, and being motivated to be among the smart students.

Sheppard's (2006) study of high-achieving mathematics students enrolled in academically low-performing schools examined how they were able to overcome disadvantages and be successful in spite of the obstacles they faced in attending those schools. He found that

one reason these students were able to succeed was personal character traits such as their determination, will to succeed, and focus. All of the participants had a strong belief in themselves and acknowledged that believing they could succeed was also a contributing factor to their being successful in mathematics. Resiliency and self confidence were traits that at least one participant displayed to triumph over the challenges he faced in order to be successful.

Peers/Siblings. There are studies that argue that peers of high-achieving African American students negatively affect their academic achievement (Fordham, 1988; Fordham & Ogbu, 1986; Ogbu, 2003). Other studies, however, contend the opposite. According to Harper's (2006) study on the role of peers in the collegiate experiences of high-achieving African American males at predominately White universities, peer support from other African American students played a significant role in their collegiate successes. Their peers not only enhanced the quality of their experiences in their respective learning environments but also embraced them as campus leaders. Harper added, "Though different from the majority of their same-race male peers, the participants' achievements were not deemed abnormal or characteristically White" (p. 355).

Ellington and Frederic (2010) used case studies to examine the experiences of eight Black high-achieving college junior and senior mathematics majors to determine the social and cultural factors that aided in their success and persistence in mathematics. Similar to Harper (2006), they found peer support systems, mostly consisting of other African American students participating in the same scholarship programs, to be essential to their success and persistence as mathematics majors. They also highlighted the fact that many of the participants thought having other African Americans in their programs helped them feel less isolated and kept them motivated and encouraged.

Similarly, one of Fries-Britt's (1998) major findings from her interviews with students in the Meyeroff Program, a "same-race" academic program for high-achieving students majoring in mathematics or a science, was that membership in the program helped them form peer groups and lessen the feeling of isolation they had experienced at some point in their schooling. She examined the academic, social, and racial experiences of high-achieving Black students on campus and in the program. She found that many of her participants did not have much interaction while in high school with other Black students who excelled academically. Even for those high-achieving students who attended majority Black schools, their classmates in the honors and accelerated classes were majority White, thus limiting their interaction with Black students. She explained the effect this circumstance had on those students:

> This lack of contact throughout high school with other Black students who were academically talented formed an image for students that they were alone and belonged to a small minority of Black students who had high academic ability. Subsequent experiences in the Meyeroff Program, with other Black achievers, provided these students with a new awareness and esteem for the intellectual talents of Blacks. Meeting and studying with other talented Black students established a new expectation and encouraged the students to study harder. (p. 563)

She continued: "For all of the students the Meyeroff program represented the first time that they were surrounded by a large number of high-achieving Blacks who were striving toward the same goal of academic excellence" (p. 564).

Mentoring/Role Models. Although it has been reported that a reason for the limited achievement and disinterest in mathematics of African American students is the lack of role models (Moody, 2004), few empirical studies have investigated the impact or influence mentors or role models have on African American students' mathematics success. According to Thompson and Lewis (2005), this limited research may be due to the fact that there is not a clear definition or description of the role model concept. Thompson and Lewis sought to explore the

contextual factors that influenced the academic success of an African American male who was successful in high school mathematics. They identified three types of *socializers* as either passive, active, or image and the different effects that each may have on a students' success in mathematics.

Socializers were defined as "a person or group of people that serve to shape, direct, and define the social world of students either directly or directly" (Thompson & Lewis, 2005, p. 14). A *passive* socializer was defined as a role model in the traditional sense who provided students a vision of what they could be and achieve in life. Thompson and Lewis added, "As mentioned, the effect of passive socializers (traditionally referred to as role models) on the mathematics achievement of African American students has yet to be explained" (p. 14). *Active* socializers were described as mentors in the traditional sense in that they were seen as gatekeepers and worked to actively direct the student's social world by their active involvement. In Thompson and Lewis's study, active socializers included the participant's school principal, mathematics teachers, and a visiting professor from a local university. Each of these socializers played a significant role in adding an additional advanced mathematics course to the school's curriculum at the request of the participant. *Image* socializers were different from the other two types of socializers in that they neither provided a vision nor actively manipulated the student's social world. They were described as individuals who established an image in the minds of students to which the students could attach a value claim. Such socializers are often individuals such as hip hop artists, professional athletes, and neighborhood drug dealers. Of the three types of socializers, image socializers have the potential to be the least positive influentially in regard to academic achievement. The participant in this study used their presence as more of a reminder of what he did not want to become.

Moody (2004) critically examined two African American female students' perceptions of and responses to their mathematical experiences. From these results, one of her main conclusions was the need for role models in African American student's success in mathematics. Similar to the roles of a passive socializer as defined by Thompson and Lewis (2005), in Moody's study the participants' mathematics teachers helped them to succeed in mathematics by providing models of someone who had been successful in mathematics and served as evidence that mathematics was not limited to certain groups or genders. Moody noted, "Perhaps having role models for doing mathematics will help African American students who face the dilemma of 'acting White' or those African American students who need 'reinforcing agents' to remind them the mathematics is not limited to White students" (p. 145).

Hughes (2010) described her observations of a summer-long Bridge Program that was intended for collegiate African American males that focused on improving their educational success. The program was composed of three components: heterogeneous and homogeneous balance, African American male mentoring, and anticipatory advising. The African American mentoring component sought to provide the students with connections to successful African American male faculty and staff members at the university. A key feature of the program required that each student be matched with an African American professional mentor, such as someone at the university or in the city. During the first few days, the mentors and students established a bond through panel discussions, which allowed both groups opportunities to share their educational stories. Through these types of informal sessions, valuable kinships were formed between them. More importantly, the mentors conveyed to the students that they believed in their ability to succeed and that they were in this together.

Schooling Factors

Teachers. Without question, teachers are a critical component of the educational achievement of students. Wiggan (2008) used phenomenological and grounded theory strategies to explore the schooling factors that seven high achieving African American students identified as contributing to their academic success. All of the participants had recently graduated from a public high school with at least a 3.0 grade point average and were enrolled at the same university. Of the seven participants, however, there was only one male. Engaging pedagogy from teachers was one of the most influential school factors affecting the students' academic success. *Engaging pedagogy* was described as teachers who cared, stressed the importance of teamwork and self-direction, used interactive teaching and demanded student involvement, and encouraged critical thinking.

Walker (2006) had a similar finding when she examined the academic communities of 21 mathematically high-achieving African American and Latino/a high school students in New York City. She reported that several of the participants acknowledged their success in mathematics was because they thought that the teachers cared about them. The participants in the study also credited their teachers for having high expectations of them. Walker found, too, that sometimes the participants' teachers' expectations were higher than their own. For example, one of the participants' mathematics teachers recommended him for an advanced course even though, because of his lack of confidence in his own mathematical abilities, he did not take the test.

Stinson (2004) found the caring teacher-student relationship was a factor in the success of the participants in his study. As stated previously, his study highlighted the influential factors identified by African American males who demonstrated achievement and persistence in school

mathematics. Stinson reported that the caring and committed teachers and school personnel who established high academic expectations for all students and developed relationships with students that reached beyond the school and academics were the most influential.

Academic Enrichment Programs. Hrabowski et al. (1998) discussed the components, key needs, and impact of the Meyerhoff Scholars Program at the University of Maryland, Baltimore County, on the academically successful African American male students who participated in the program. This program consisted of thirteen components and is based on a strengths model, which assumes that the students chosen are capable of succeeding in a science major. The 13 components were as follows: recruitment; summer bridge program; scholarship support; study groups; program values; program community; personal advising and counseling; tutoring; summer research internships; faculty involvement; administrative involvement and public support; mentors; and family involvement. A significant finding in this study was that the Meyeroff students were much more likely to continue as science majors and maintain a 3.0 or higher grade point average in science courses when compared to other groups of equally talented students. Another interesting finding was that about one half of the science majors who were accepted into the Meyeroff Program but declined and attended other universities switched out of the discipline and became nonscience majors.

A major finding from Fries-Britt's (1998) study was that being in a "race-specific" program was indeed a factor in the Meyeroff scholars' success, academically and socially. All of the participants believed there were benefits to participating in this program, and these benefits included resources such as scholarship money and tutoring offered in the program, a support network of other high-ability Black students with whom they could relate, and faculty members who were aware of their academic abilities. Fries-Britt also said that all of the participants

thought their collegiate experience would have been very different if they had not participated in the Meyeroff Program, mainly because of the tremendous amount of support they received as members.

Ellington and Frederic (2010) found that academic programs played a significant role in their participants' success. All participants agreed that participating in their respective scholarship programs provided access to other resources that supported their academic success. Because the programs provided financial support, none of the participants acknowledged having any financial challenges. Another resource, and arguably the most important, was that the participants had access to faculty members who provided encouragement, support, and advisement. This access allowed for some participants to have more opportunities to engage in other scholarly activities such as internships and professional conferences.

CHAPTER THREE

METHODOLOGY

The purpose of this study was to identify the factors that aided African American men who have been successful in mathematics by allowing them to speak for themselves about their schooling, mathematical experiences, their process of becoming successful, and how they overcame any obstacles in their schooling and with mathematics. I described and interpreted these young men's voices.

Using phenomenological and narrative inquiry research approaches enabled the construction of meaning to come from the words and stories of the study participants. According to deMarrais (2004), phenomenology allows researchers to investigate everyday human experience in in-depth ways. The phenomenological approach allows researchers to create contexts in which participants are asked and encouraged to reflect retrospectively on an experience they have already had (van Manen, 1990). DeMarrais further explains, phenomenology asks, "What is this or that kind of experience like?" (p. 9). Referring to Kvale (1983), deMarris (2004) describes the "lived experience" as one of the central elements of the phenomenological approach. Another key element of this approach is its focus on interpretive understanding and describing individual experiences from the perspective of the individual (Tesch, 1987).

Titchen and Hobson (2005) discussed and described the differences in the research methods of the *direct* and *indirect* approaches to phenomenology. When using the direct approach, researchers ask participants to reflect on and discuss their subjective experiences in

interviews. “Researchers then convert these subjective constructions through interpretation to re-present them as objective constructions” (p. 122). Conversely, when researchers use the indirect approach, they “adopt an involved, connected observer stance and immerse themselves in the everyday world they are studying so they can understand the participants’ insights” (p. 123).

In Moody’s (1997) study of two African American females who had been successful with school mathematics, she sought to give them voice and have them speak for themselves about their schooling and mathematical experiences. She also wanted to describe their process of becoming successful. Moody used a phenomenological research strategy to achieve her goal of describing, explicating and interpreting the participants’ voices. Data were collected in the form of initial surveys, autobiographies, and interviews. Like Moody, I used a biographical questionnaire, focus group interviews, and interviews to give voice to African American males who had been successful in school and mathematics by allowing them to speak for themselves about their schooling and mathematical experiences. Hence, my use of the direct phenomenological approach is consistent with my goal of allowing and encouraging participants to reflect retrospectively on experiences they have already lived through.

Kramp (2004) explained that stories are a culturally transmitted means of articulating experience. The story, in a narrative inquiry approach to research, is a “way of knowing” (p.108). A story reflects the perspective of the narrator, who determines the plot, characters, context, and goal of the experience. These elements—plot, characters, context or setting, and goal—are the formal elements of narrative, using a literary criticism paradigm. According to Kramp, the narrator “not only ‘tells’ the story from a particular point of view, but also situates it in particular social, cultural, and political context” (p. 109). The context set up by the narrator allows the researcher to interpret and understand the meaning of the experience. Narrative inquiry also

allows personal involvement of the researcher. In fact, it assumes that this personal involvement is what has made the research possible.

In short, Kramp (2004) posited that narrative inquiry is an appropriate approach to gather data about lived experience. Because this study concerned the experiences of successful African American males in mathematics, using the narrative inquiry approach during data collection was also suitable for this study. The on-line discussion and closing interviews allowed the participants to tell their stories. It also permitted me to understand their thoughts, feelings, and ideas about what contributed to their mathematical success.

Participants

I used purposeful and snowball sampling to select the 11 participants for this study. Purposeful sampling allows the researcher to select people for a study based on the belief that this sample can contribute to or expand the knowledge base (Maykut & Morehouse, 1994). As Merriam (1998) explained, purposeful sampling is used when an investigator wants to "discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (p. 61). Snowball sampling is a technique used when one research participant leads to or recruits another participant (Bogdan & Biklen, 2006). I used the following criteria to select the participants for this study:

1. Is a self-identified African American male born and educated in the United States whose parents were also born and educated in the United States.
2. A college graduate or senior at a college or university.
3. Have or hashad a cumulative GPA of 3.6 or better upon graduation from college.
4. Have or hashad a cumulative mathematics GPA of 3.5.

5. Is majoring or majored in one of the following fields: science, technology, engineering, or mathematics (STEM).

6. Is at least 21 years old.

Scholars (Goodwin, 2002; Ogbu, 1991) argue that African American students who were born and educated in the United States and whose parents were also born and educated in the United States have very different experiences than those students who have migrated to the United States from other countries. In particular, the experience of being an "involuntary minority" is different from the experience of being a "voluntary minority" (or immigrant). Hence, when conducting research on African Americans, researchers often draw a distinction between these groups. For purposes of this study, I was interested in the experiences of students who are not considered immigrants. The other selection criteria were intended to insure that the male students were far enough into their collegiate STEM experience to be able to reflect on it meaningfully.

To recruit participants, I emailed letters and biographical questionnaires to the directors at each of the Alliance for Minority Participation (AMP) programs in Georgia and South Carolina to be distributed to their listservs. This email also asked the directors (and students) to suggest young men for this study. Participants did not have to be AMP Scholars to participate. Similar emails were also sent to faculty members that were suggested by colleauges and other faculty familiar with my study, that teach at historically Black colleges and universities (HBCU) who could possibly recommend potential participants. After receiving names of potential participants, I then sent an email or called the young men who were suggested. If a young man met all of the requirements to participate, he was notified of his selection via email or phone and asked to sign a consent form.

Of the 11 selected participants, 6 were AMP Scholars and the remaining 5 received some form of financial support from their respective universities. The participants' ages ranged from 28 to 34 years. With the exception of one participant, they were college graduates from a HBCU. They held graduate degrees,were enrolled in graduate school, or had completed professional degrees in either medicine or dentistry. Table 1 provides a list of the names (pseudonyms) of the participants, their undergraduate major, and their occupation (at the time of data collection).

Table 1. List of participants

Name	**Age**	**Undergraduate major**	**Occupation**
Jamison Ford	31	Mathematics education	Mathematics teacher
Jaden Wallace	32	Mechanical engineering	Engineer
Willis Evans	31	Biology	Marine biologist
Charles Andrews	30	Computer science	Software web developer
Deangelo Hill	30	Mathematics & Statistics	Mathematics teacher
Jacob Burgess	34	Mathematics education	High school guidance counselor
Dwayne Walker	32	Biology	Medical school resident
Nathan Bright	28	Engineering	Graduate student
Earl Vinson	31	Biology	Postdoctoral fellow
John Burgess	28	Biology	Pediatric dentist resident
Richard Benjamin	29	Biology	Medical school resident

Data Sources and Procedures

The goal of this study was to identify and understand the factors that influenced academically successful African American men in mathematics. Data for this study were collected through a biographical questionnaire, focus group interviews (using an electronic mail

discussion board), individual electronic mail correspondence, and an individual closing telephone interview.

Biographical questionnaire. The main purpose of the biographical questionnaire was to determine whether a young man was eligible for this study. The first page asked 6 questions that mirror the selection criteria listed above. If a potential participant answered yes to each question, he was asked to turn to the second page and complete the questionnaire. The first five lines of the biographical questionnaire asked for his name, age, race, local address, and permanent address. Lines 6 through 8 ask for an email address, and how often he accessed his email and the web. Lines 9 through 12 asked for major, whether he considered his major to be mathematically related, a list of all final grades for each mathematics course taken, and the name of any exempted mathematics courses. The final line asked for any other information that he thought might be of importance to his eligibility or interest in this study.

*Focus group and electronic mail***.** Using the social network Facebook, I posted questions for the participants to answer. Only members belonging to the focus group had access to this Facebook group, and individuals could only be invited to join by me. The online discussion took place over a 12-week period. Participants were asked to log on to an online discussion board a minimum of twice a week: once to respond to questions I posted and once to respond to another participant's response. However, they were allowed and encouraged to post or respond to the other participants' posts as often as they wished. Each response took about 10 minutes. I also asked each participant to check his electronic mail in order to answer any specific questions I had about any comment he made on the discussion board.

Around the midpoint of this phase of data collection, I had some trouble getting participants to respond to the questions or the other participants' responses. I would more often

than not have to remind participants to post their responses. At times, I posted my own answers to the questions to try to get the conversation started and give the participants a sense of what I was looking for in a response. For example, after posting the fifth question, which asked the participants to describe the relationship they perceived between their past college mathematics success and their past, present, and future success in society, I posted the following response to that prompt to give them an idea of what I was asking:

> For me, my success in college mathematics taught me the importance of being disciplined and persevering when faced with challenges. Before college, I rarely studied mathematics because it always came fairly easy to me. However, after entering college and taking several mathematics courses with some very difficult topics, I learned that if I was going to be the successful person I envisioned, I would have to push myself in my studies and giving up could and would never be an option. That same mindset of being disciplined and persevering is something that I feel has undoubtedly aided in my success in life thus far. (Discussion response)

I also provided a response to the sixth question that asked: How did your teachers' expectations, attitudes and actions have an impact on your mathematics learning? After giving the participants examples, many of them followed with their own response. At other times, I had to email and or call participants who had not responded by the end of the week. Because of reasons such as family vacations and job obligations, a few of the participants submitted all or most of their responses at the end of the study, which reduced the opportunity for others to comment on those responses.

Gieger (2002), who did a similar study on academically talented women, reported that the use of pseudonyms gave her participants an extra sense of security but may also have inhibited their ability to connect on a friendlier, personal level. She posited that the possibility of the participants staying in touch with one another after the study would have surely been an added benefit, given that previous research indicates that women and minorities feel isolated in

mathematics and science departments. For that reason, I did not use pseudonyms while collecting data (but did so in reporting the results).

Individual closing interview. The closing interviews were conducted by telephone at the completion of the 12-week discussion group. The interviews, which lasted about an hour, were based on a comprehensive list of questions developed from the data already gathered via the online portion of the study. Before each interview, I tailored the list to focus on topics relevant to the interviewee's responses during the discussion board. None of the participants had to be contacted for follow-up questions after the closing interview.

Data Analysis

I used thematic analysis to analyze the data after they were collected. Braun and Clarke (2010) defined the *thematic analysis method* of analyzing qualitative data as a method of searching across an entire data set to identify, analyze and report themes within the data. They also provided a six-phase guide to effectively perform thematic analysis: (1) familiarize yourself with your data; (2) generate initial codes; (3) search for themes; (4) review themes; (5) define and name themes; and (6) produce the report. They noted that this list is only a guide and that analysis is not a linear process of moving from phase to phase. Instead, movement between the phases should be recursive, moving back and forth throughout the phases as needed.

Specifically, I used categories from Martin's (2000) multilevel framework for coding my data with respect to the mathematics socialization and identity among African-Americans and and Harper's (2012) anti-deficit achievement framework to code the participants' responses and place them in their respective themes. I used Martin's categories of community, school, and agency and mathematics success among African American students. I did not use the sociohistorical theme because it focuses more on the beliefs of the parents and teachers of those

students. My study focused on the students and not the parents or teachers. Along with Martin's descriptors, I also used Harper's descriptors of his three main themes of pre-college socialization and readiness, college achievement, and post college succcess as my initial codes, expanding and collapsing codes and adding new ones as needed, and then I grouped the codes under their themes.

CHAPTER FOUR

RESULTS

This chapter presents an analysis of the data collected on the schooling and mathematical experiences of the academically successful African American male students who participated in this study. The results of the research questions that guided this study are provided in this chapter using as organizers categories found in the literature. Those research questions were the following:

1. What personal and schooling factors do academically successful African American men identify as contributing to their mathematics achievement?
2. What types of mathematical experiences do they identify as contributing to their success in mathematics?
3. What challenges do African American men who excel in mathematics face, and how do these men use the success factors they identify to overcome their challenges?

Factors Contributing to Mathematics Achievement

In this section I report the findings from the first research question: *What personal and schooling factors do academically successful African American men identify as contributing to their mathematics achievement?* For each factor, I provide evidence from the participants' experiences and connect these findings to the literature.

Personal Factors

The following discussion highlights the participants' perspectives of the personal factors that contributed to their mathematics achievement. My analysis of the data reveals that there

were many factors that the participants identified as having an impact on their achievement. Personal factors included parents, mentors, peers, and siblings. Each factor is discussed using analyses of the participants' discussion board and interview responses. Table 2 provides a list of the personal factors each participant identified either during the on-line discussion or individual closing interviews. An X indicates the participant recognized that factor. If the factor was not mentioned or discussed, it was left blank.

Table 2. Personal factors identified by each participant

Participant	Parents	Peers/Siblings	Mentors
Jamison	X	X	X
Jaden	X	X	X
Willis	X	X	X
Charles	X	X	X
Deangelo	X	X	X
Jacob	X	X	
Dwayne	X	X	X
Nathan	X	X	
Earl	X	X	X
John	X	X	X
Richard	X	X	

Parents. All of the participants acknowledged their parents as being a very important factor in their academic and mathematics success. Although each credited his parents, the participants gave different reasons for why and how their parents were a factor in their successes. Jaden believed both of his parents were a factor in his success because they provided early exposure to mathematics for him by enrolling him in academic programs at an early age, which he thought allowed him to further build on his growing aptitude for mathematics and the sciences. Jaden said the exposure initially afforded by his parents was the starting point, noting, "Those type of exposures you know feeds my aptitude, and then that affords other opportunities"

(Interview). Jaden also believed that because the exposure started at an early age, he was able to gain more success:

> Me being able to be in a discovery program in elementary school and my parents exposing me, and what that exposed me to, as well as my parents exposing me to, you know, the programs at [institution] and [science and technology center] and stuff like that building robots, I think ultimately led to me having a certain aptitude in high school and an aptitude noticed by [male math teacher], which then would expose me to additional things, like the math team, and, you know, which allowed me to grow with the confidence in me being good in math and then that leads to other exposures. So it's a cycle of exposure and growing your aptitude and you having that heightened aptitude, then it allowed you to get exposed to more opportunities. (Interview)

Like Jaden, Willis credited his parents as being one of the major contributing factors to his mathematical success. However, unlike Jaden, Willis discussed the different roles each parent had and their impact on his academic achievements. He thought both went above and beyond as far as stressing the importance of education, stating, "The sacrifices that they have both had to make I think was extremely significant as far as my success all the way around in education. Definitely my parents were the two primary factors in my education success" (Interview). Willis believed that because his mother was an educator, she was the main driving force in promoting education at home:

> My parents were, I guess, in relative terms as I see it, they were very involved in my education. You know it started from my mom. She was an educator, so it was always stressed in the home and even in the summertime. You know, because she was an educator, she could be at home with us over the summer. And every summer every single day, there was time during the day where there was reading and math being taught inside the home. (Interview)

Willis saw his dad's role in his success differently from that of his mom. His father also stressed education but for different reasons:

> My dad, like, he did attend college, but he didn't complete his bachelor degree. But it was still, I think, his experience having gone to college and not finishing and seeing, like, where it left him. It instilled in him that education is important, and he wanted better for me and my sibling. You know, so it helped. (Interview)

Willis thought the sacrifices his dad made by working long hours to afford the tuition to send him and his sister to an affluent private school implicitly spoke volumes about his dad's views on education. He felt that any parents who were willing to go above and beyond for their child's education would and should have an impact on their success:

> And for him to—and I'm sure my mom influenced him—look for anybody to make that kind of sacrifice. You know, to go to work, you know, ten at night till eight in the morning and followed by another week from 3:30 till 10 at night, then another week of seven in the morning to six in the afternoon. You know, anybody that worked that kind of schedule for the money just for their child to learn, you know that's a major sacrifice. You know what I'm saying? I think, you know, that's where he had to value education to be willing to make that sacrifice. (Interview)

Similar to Jaden and Willis, Richard stated that his parents stressed education at an early age: "It's been long taught throughout the African-American community that there is least bias on the mathematics and science portions of standardized [tests]. So what did my parents do? At an early age I was sent to math and science camps" (Discussion response). However, Richard's father was responsible for pushing him to excel in academics, especially mathematics:

> My father is an educator and he definitely set a tone that resounded with me. He stressed that as a young African-American male, there would be always certain things society would continue to assess in all levels of my education, [with] mathematics and science being one of those thing less influenced by subjectivity of the Examiner. (Discussion response)

At an early age, Richard was told that his only job at that time was to focus on his education and grades: "My mom would say, 'We pay the bills; it's your job to go to school and educate yourself.' and … that was my duty as a child. That's the only responsibility I had; they wanted to impress that to me." (Discussion response) He readily admitted that because of this direction he wanted to succeed in mathematics, and the sciences became second nature to him.

Like Richard, Dwayne came from a family of educators. Dwayne's mother was a kindergarten teacher, so education was definitely stressed at an early age. However, Dwayne

credited his father as being more of the major contributing factor in his success with mathematics. Dwayne stated that because his father was a mathematics major who went on to retire from BellSouth as a project manager, he did not have a choice but to excel in this subject. Although Dwayne's father stressed the importance of having a strong mathematics foundation in the classroom, he equally stressed the importance of being able to use mathematics outside of school:

> There were times he would challenge me when I was 10-12 years old to calculate what time we would get to "Grandma's house" if we left at a certain time and travel a certain speed. Since we both enjoyed sports, he would ask me as we were watching the basketball game, "What is Michael Jordan's field goal shooting percentage?" "And what is his percentage if he makes his next 5 shots." That taught me to think and use calculation and logical reasoning for daily activities, outside of school. And even today I still do those same calculations in the same situations. (Discussion response)

Though the participants considered their parents major contributing factors to their mathematical achievements, there were some differences in how the participants viewed those contributions. Early exposure to mathematics by their mother or father, sacrifices made by parents to send them to a high-performing school, and stressing the usefulness and importance of understanding mathematics and how it can be used in the real world were all considered by the participants to be vital to their mathematics achievement. These findings are consistent with previous literature on academically successful African American students in mathematics. Research studies show that parental involvement is a key component to African American students' academic and mathematical achievement (e.g., Ellington, 2006, Harper, 2012, Hrabowski et al., 1998, Martin, 2000, Moody, 2000). Similar to the present study, Ellington (2006) found that mothers and fathers of the participants were credited as being key factors for different roles in their academic and mathematics success. Mothers of the participants had a significant role in providing early exposure and positive educational experiences that helped

shape the participants' interest in learning. Fathers, on the hand, were identified as providing early interest in the sciences, as well as encouraging the participants to develop positive beliefs about mathematics and value the importance of the discipline.

Mentors. Although most of the participants acknowledged their parents as being major contributing factors to their success in mathematics, some also recognized mentors as being a factor. It is important to note that many of the mentors were recognized as having a dual role as tutor and mentor or teacher and mentor. Along with his parents, John thought that two of his former college professors, turned mentors, were strong contributing factors to his mathematics and academic success. He said both were influential because, like his stepfather, they were living examples of what hard work and dedication to your craft could get you. They also pushed him and held high expectations for him:

> A key part in being successful is being exposed to someone doing the very thing you are ATTEMPTING to do. As a SCAMPee[1] I had the opportunity to cross paths with [two professors], who pushed me to take Calculus III as a freshmen, when I definitely didn't need it as a science major. Fortunate enough to attend [institution] while [one of these professors] progressed from professor to president [of the institution]. I saw these people moving up the ladder and I wanted to do the same when my time came. (Discussion response)

Earl credited his high school guidance counselor, turned mentor, as contributing to his academic success. When Earl started high school, he considered himself to be smart. He thought he did not have to worry or even think about getting a scholarship to attend college. It was not until his high school guidance counselor explained the importance of applying for scholarships that he began to view things differently:

> She was like, "No, Earl, you need to make sure you have scholarships and stuff as well because you want someone to actually pay for you to go to school and that's not going to be like a burden on your parents." So I feel very blessed in regards to that I can say that I have not had to take out a loan on something like my education from, you know,

[1] This term is discussed later in this chapter.

> undergrad, graduate school and even my PhD have all been paid for by someone else other than me not having to get a loan. (Interview)

Not only did the counselor expose Earl to the importance of scholarships, she also exposed him to options besides the military and community college when he graduated from high school, options that many of the students at his school did not know about. She took him on campus tours, which helped to discredit his belief that historically black colleges and universities (HBCU) were party schools and inferior to majority schools:

> I remember she came at like the end of my freshman year in high school, and a lot of the black students prior to [that] were talking about, you know, what kind of schools they were planning on going to and what they would want to do after high school. And for a lot of the black students it was like, "Ok, well, I may go into the military or I may go to community college." When she came there, the whole mindset sort of changed. (Interview)

With her influence, Earl applied to a HBCU, was awarded a scholarship, and successfully matriculated to college, graduating with honors. He thought so much of his counselor that he added, "I even consider her to be one of my mentors that I stay in contact with even today" (Interview).

Like some of the parents of the participants, mentors provided exposure as well as support for the participants' academic and mathematics achievement. By demanding excellence and holding them to high expectations, the participants saw their mentors as role models because they provided an example of success, such as being promoted from professor to president of the institution. These young men followed and learned from their mentors' successes. Many of the relationships that began in high school or college were very influential in the participants' academic success, and those relationships have continued. These findings are parallel to the research on mentors and their impact on the academic success of African American males.

To address the educational and social plight of Black male adolescents, Whiting (2006), provided a *scholar identity model* grounded in achievement-based theories. In her suggestions for educators to promote a scholar identity in the school setting, she identified mentors having a positive impact on the scholar identity and academic success of African American male students. On the list of activities included for mentors to do when working with Black males were providing strategies for improving learning strategies and techniques, networking, motivating, and exposure to college settings, all of which were expressed by the participants in the present study as having a major influence on their academic success.

Peers and siblings. Some of the participants recognized both peers and siblings as being contributing factors for their mathematics success. For example, Richard thought he benefited greatly from his older sisters and his friends. He stated, "Others were able to help me continue to build on my success, to include my older sisters, by allowing me to learn math techniques grade levels above my own, and my friends offering that competition in the classroom" (Interview). From his older sisters he was able to learn higher-level mathematical topics, which provided him an avenue to learn those concepts earlier than most of his peers did. In addition, his friends provided him with the positive competition that researchers have associated with having a positive effect on successful African Americans' mathematics success (Fordham, 1991; Martin, 2000).

Although Deangelo recognized his brother as being a contributing factor to his academic and mathematics success, his reason was very different from Richard's. Because he was the oldest child in his family, he wanted to be a positive influence for his brother, who was only a few years younger than him. Their closeness in age had an impact on the pressure that he felt. He

believed he had to do well in school because his brother would soon face the same things he encountered:

> I felt pressure to do as well as possible because I can't tell him to do well if I'm not being the example for him. … 'Cause he's three and half years younger than me, so whatever I'm doing at any grade level, pretty soon he's going to be doing the same thing. ... So when I graduated high school, he got to the high school right after that. So I knew what he was getting into. So me trying to tell him what I think he should be doing, it's not going to be relevant. It's not going to really matter to him if I didn't go before him and actually try to do the best I could at that. So I tell him how to get better. (Interview)

Deangelo stated that because his brother was willing to listen to him, he was obligated to do his best in school to show him the benefits of valuing education. He concluded, "I only felt that my education was important if it influenced my brother to continue his" (Discussion response).

The participants considered peers and siblings to be contributing factors to their success. Peers were acknowledged as providing competition, support, and encouragement in the classroom, whereas siblings provided additional academic support at home. Participants were also grateful for their younger siblings who were willing to listen and follow their blueprint for academic success. Research has shown that many African American students who are successful in academics are mocked by their peers and seen as 'acting White' because of their academic talents and made to feel ashamed because of their success (Fordham, 1988; Fordahm & Ogbu, 1986; Ogbu, 1986). Although some of the participants were teased and mocked, none of the participants in this study felt ashamed because of their success and none ever thought about not trying his best in order to fit in with those peers who were teasing him. In fact, most of the participants were recognized and encouraged by their peers because of their academic success. This finding is very similar to that of Walker (2006), who found that peer groups as well as siblings have a positive influence on high-achieving minority students.

Schooling Factors

The following discussion highlights the participants' perspectives on the schooling factors that contributed to their mathematics achievement. My analysis of the data reveals that the schooling factors included high expectations from teachers, academic enrichment programs, and academic environment. The influential teachers ranged from preschool teachers to college professors. The academic enrichment programs included summer camps, gifted programs, and scholarship programs. The academic environments described by the participants were very supportive and provided rigorous academic curricula. Table 3 shows the schooling factors each participant identified either during the on-line discussion or closing interviews as contributing to his mathematical success. An X beside the participant's name indicates he discussed that factor. If he did not, the space was left blank.

Table 3. Schooling factors identified by each participant

Participant	Teachers	Academic Enrichment Programs	Academic Environment
Jamison	X		
Jaden	X	X	
Willis	X	X	X
Charles	X	X	X
Deangelo	X		
Jacob	X		X
Dwayne	X	X	X
Nathan	X	X	
Earl	X	X	X
John	X	X	X
Richard	X	X	X

Teachers. Jamison credited his parents for instilling a strong work ethic in him and making sure that he understood the importance of education. Besides his parents, he also recognized two of his former teachers who he thought contributed greatly to his academic success but also inspired him to become a mathematics teacher as well:

> The most influential of those two was my Algebra 1 teacher. I told the story in my last post about some struggles I was having in math in middle school, I was not able to take Algebra like most of my friends did. So I decided that I would take it over the summer so that I could catch up with them. Everything changed for me then. Because of the outstanding teaching methods of my instructor, I began to excel and fall in love with mathematics. (Discussion response)

Jamison's love for and success in mathematics continued on into high school. His love for mathematics and appreciation for what his teachers had done for him when it came to mathematics played a key role in James deciding to become a mathematics teacher:

> During my high school years I continued to excel in mathematics and surpass many of my peers. By my senior year my AP Calculus teacher inspired me to become a math teacher. I decided that I wanted to attend [institution] and major in mathematics education to fulfill my dream. (Discussion response)

Like Jamison, Charles said that his teachers had played an instrumental part in his success in mathematics. He also credited both a middle and high school mathematics teacher for contributing to his success in mathematics. Charles thought that his teachers had helped him by offering to spend extra time with him after school and later exposing him to higher-level mathematics.

> When I got to middle school, I found that I was behind in math and I had a teacher who tutored me after school until I got up to par. Once I grasped a firm footing in the subject, I gained confidence and at the request of my mentor and math teacher, [male teacher], I was placed in advanced pre-calculus and joined the math team. (Discussion response)

Though Charles was not a mathematics major, he believed he was able to use his success in mathematics to help him throughout his undergraduate career and on into his current profession. He explained, "When I chose to major in computer science, I found that I was able to leverage my foundational background in math to navigate the computer science curriculum" (Discussion response).

Along with his parents, Deangelo also said his preschool teacher and fifth-grade mathematics teacher were influential in his success in mathematics. He thought his preschool

teacher was an early influence who showed him the importance of mathematics beyond his preschool years:

> Even though my preschool teacher only lasted [as my teacher] from the ages 3–5, we developed a great educational relationship throughout my elementary [school] years. When I would visit her, she would give me analytical problems to solve that would be on my level and above. Aside from my parents, she was that early influence to me that led me to believe that there was great reward for understanding mathematics.

Deangelo thought his fifth-grade mathematics teacher showed him how problem solving can be used as a cross-curriculum skill and that mastering this skill in different disciplines could strengthen his mathematical abilities. He continued, "Though she taught math and science, writing was always a challenge for me. She taught me that I should use the drive that I have for mathematics to develop my calligraphy and my writing style" (Interview).

Going into his freshman year of high school, Jacob thought his former high school geometry teacher was providing him with a challenge, which became motivation for him to succeed in her class. This particular teacher was known to be very difficult and even told him that getting a grade of A would be almost impossible.

> I can also remember going into my freshman year of high school, and one of my good friend's mothers was slated to be our geometry teacher. I remember talking on the phone with [my friend], and she said, "My mom wants to speak with you." The teacher asked if I was prepared for her class, and my response was, "Of course." Her next statement was "I don't give A's!" My response was "Well, you will change your policy this year." Needless to say, I had an A average all year! (Interview)

This challenge became a strong foundation for him to be successful not only in his mathematics classes but in all of his classes. He admitted that it was a difficult task, but getting that A was a huge confidence booster for him.

Teachers were a very important contributing schooling factor for the academic and mathematical success of all of the participants. In particular, mathematics teachers were very influential in inspiring many of the participants in different ways, such as continuing in a STEM

field or even becoming mathematics teachers. Mathematics teachers were also considered contributing factors because they offered to spend extra time before and after school assisting students to make sure they understood mathematics concepts. Most of the participants also thought their mathematics teachers exposed them to higher-level mathematics and its everyday use. These same participants said they had benefited from responding to personal challenges by the mathematics teachers to motivate their students. These findings are consistent with studies conducted by Ellington (2006) and Hrabowski, Maton, and Grief (1998). Hrabowski et al. found that young men in their study recognized a teacher as a primary influence on their interest or aptitude in mathematics and science. Mathematics and science teachers were also acknowledged for their encouragement and positive influence on the participants. Stinson (2004) had a similar finding. Caring and committed teachers as well as school personnel who established high academic expectations for all students and developed relationships with students that reached beyond the school and academics was one of three themes that the participants shared in his study.

Academic enrichment programs. Some of the participants were Louis Stokes South Carolina Alliance for Minority Participation (SCAMP) scholars, and many of them thought that program had been monumental in its contribution to their success in mathematics and academics in general. The main objective of the SCAMP program is to increase the number of minority students completing baccalaureate degrees in the STEM fields. SCAMP scholars, or SCAMPEEs, are awarded scholarships based on their high school academic records and SAT Reasoning Test scores. Those awarded scholarships are given the opportunity to participate in a so-called Summer Bridge Program, where they enroll in two undergraduate courses, usually mathematics and statistics, the summer before the fall semester of their freshman year. In an

attempt to increase undergraduate minority research involvement, the SCAMP program also encourages and aids its scholars in participating in summer research internships at local graduate research centers at research institutions and national laboratories across the southeastern United States.

Both Willis and Earl thought the SCAMP program had provided them with the opportunity to work with like-minded peers, something that neither of them was afforded in high school. Willis explained:

> You know, coming from where I did, I was—. I mean, we weren't rich or anything like that, but I was in educational environments where I was the minority or one of few in anything. And even then, I was in a percentage that was minority because there were even less that really valued education and wanted to succeed educationally. So the SCAMP program put me in a situation where I was surrounded by other minorities who were gifted and also who were there to learn and wanted to learn. (Interview)

Earl had a similar view on the impact of the SCAMP program and what it provided him:

> My pre-college experiences were in public schools that were ethnically very diverse; however the upper level math (and honors) courses that I predominately took were very much segregated. I was often one of only 3 or 4 minorities and sometimes the only black student. … It was not until college where I attended a Historically Black College/University (HBCU) and participated in the SCAMP program that I could fully appreciate that I was not as unique or different mathematically than other students (black or otherwise, but especially black). (Discussion response)

Willis thought the SCAMP program had provided him with the opportunity to really understand what it took to succeed academically on the collegiate level. The program also helped him to see the importance of establishing a regular pattern of studying daily:

> My participation in the SCAMP program at [university] was a major factor in my success in Math on a college level. It allowed me to be introduced to college level math in a more intimate learning environment during the summer leading into my freshman year, but more importantly, the daily study halls laid the foundation for what it takes commitment wise to be successful in not only Math, but all subjects at the college level. (Discussion response)

When Nathan was in middle school he participated in a gifted program. It was during this time that his love for mathematics began to emerge. The gifted program provided him regular material that tested his skills in deductive reasoning, something he said was needed to be successful in mathematics. He noted, "Participants in the Gifted student program, were allocated time for self-guided exploration of topics that were interesting to that individual. With that said, I delve into topics related to mathematics and science" (Discussion response).

Being in a so-called Discovery Program in elementary school and attending summer camps most summers at one of the top universities for engineering and mathematics was something Jaden definitely thought had contributed to his success in mathematics. These programs exposed him to different uses and levels of mathematics, which he thought increased his aptitude. He explained, "I can recall going to summer camps at [institution] when I was in elementary/middle school. This is what provided the initial spark and interest in mathematics/science, which in turn drove me and my parents to seek out more opportunities each summer" (Discussion response). These programs also led Jaden to more opportunities, something he referred to as a "cycle of exposure":

> Me being able to be in a discovery program in elementary school and my parents exposing me and what that exposed me to—as well as my parents exposing me to, you know, the programs at [institution] and stuff like that, building robots—I think ultimately led to me having a certain aptitude in high school and an aptitude noticed by [teachers], which then would expose me to additional things like the math team. And, you know, which allowed me to grow with the confidence in me being good in math, and then that leads to other exposures. So it's a cycle that exposure—growing your aptitude—and you having that heightened aptitude, then it allowed you to get exposed to more opportunities.

Academic enrichment programs such as SCAMP and the Discovery Program offered all of the participants the opportunity to work with and learn from like-minded peers. It also helped them to understand what would be required of them to succeed academically. These programs provided exposure not only to different uses of mathematics but also to higher-level mathematics

that many of the participants did not have access to otherwise. These findings are consistent with the literature on the impact of academic enrichment programs and African American males. Similar to the SCAMP program, the Meyerhoff Scholars Program at the University of Maryland, Baltimore County, was shown by Hrabowski et al. (1998) to have a positive impact on academically successful African American male students. Like the participants in this study, many of the young men in the Meyerhoff Scholars Program acknowledged several aspects of the program that afforded them the opportunity to be successful throughout their collegiate careers, such as the summer bridge program, financial assistance, study groups, a close-knit community, and peer support.

Academic learning environment. Willis credited his parents for their sacrifices in enrolling him in one of the top schools in the city, which was affiliated with one of the local universities. He also thought the academic environment provided at that school was vital to his academic success and helped him to succeed academically. He stated, "As a result of the academic environment experienced at that school I was advanced enough to skip the first grade and matriculate to second grade a year early" (Discussion response). This advancement at such a young age allowed him to establish the confidence he needed throughout his schooling.

Nathan said the academic environment in his college preparatory classes in middle school had provided him with a challenging environment, which ultimately helped him to be successful in mathematics. While taking the advanced classes, he was provided with a learning environment that was both supportive and encouraging: "The support in my mathematics classes obviously had a positive effect on my productivity and my general feelings toward mathematics" (Discussion response). From this foundation, he realized at a young age that he wanted a career in a STEM field. On entering high school, he "took the hardest science and mathematics courses

available" (Discussion response). That choice led him to other opportunities such as the math team and the academic quiz bowl.

Some of the participants noted that the rigor, support, challenges, and encouragement from these academic learning environments helped them to be successful in mathematics. For three of them, the early experiences they had with these learning environments helped boost their academic achievement.

Contributing Mathematical Experiences for Mathematics Success

In this section I report the findings for the second research question: *What types of mathematical experiences do academically successful African American men identify as contributing to their success?* For each factor, I provide evidence from the participants' mathematical experiences and connect those findings to the research literature.

Mathematical experiences

The following discussion highlights the mathematical experiences that the participants thought had contributed to their success in mathematics. Early success in mathematics classes or on a mathematics tests, teacher praise and positive feedback, resilience from a challenging experience in mathematics, being selected for academic enrichment programs, and giving back in the form of tutoring and/or mentoring were all identified as contributing factors by the participants. Table 4 shows the mathematical experiences each participant identified as contributing to his mathematical success either during the on-line discussion or closing interviews. An X beside the participant's name indicates he discussed that factor. If he did not, the space was left blank.

Table 4. Contributing mathematical experiences identified by each participant

Participant	Success in mathematics class/test	Teacher praise/ feedback	Resilience with mathematics	Academic enrichment programs	Giving back
Jamison	X	X	X		
Jaden	X	X	X	X	X
Willis		X	X	X	X
Charles	X	X	X	X	X
Deangelo	X	X	X		
Jacob	X	X	X		
Dwayne	X			X	X
Nathan	X	X	X		
Earl	X	X	X	X	X
John	X	X	X	X	X
Richard	X	X	X	X	X

Success in a mathematics class or on tests. Early success in mathematics classes or on mathematics tests were key mathematical experiences that participants thought contributed to their mathematics success. The participants described the success they experienced in their mathematics classes as being very important to their self-confidence. When Charles was recommended for an advanced precalculus class, he was not sure if he would be able to handle the mathematical rigor the course would require:

> When I was placed in advanced pre-calculus in the 12th grade I was intimidated because I had never been a class that moved so quickly. However, I scored the best in our first exam and realized that I was able to not only sustain but excel in the subject. I was honored when several people sought me out for tutoring and this collective experience gave me the confidence I needed to embrace that I actually enjoyed the subject. (Discussion response)

Passing that first test gave Charles the confidence that propelled him to excel in not only that course but future mathematics courses as well. He had a similar experience when he got to college. Charles was a SCAMP scholar, and like many of those scholars, he participated in the summer bridge program. The summer before the fall semester of his freshman year was to begin,

Charles took a statistics course that he said broadened his understanding of how mathematics can be used in the real world—something he said was a definitely a first for him. He explained:

> I took a statistic course, and it was so interesting. It was so intriguing to me, and I felt like he [the teacher] really just made the concepts make sense. He put numbers in perspective and used them in a way that I had not seen before. Now I really hadn't thought about math as being a tool. In that class, I learned this math is a tool that you can use in your everyday life—like in your business to solve problems. In the type of examples that we were given, [they] just sort of made me want to do more homework and make me want to study harder. As a result, I ended up getting one of the highest grades in the course.

Charles continued:

> That really, really fired me up because the semester hadn't even started yet for regular students, and here I was in a summer program really excited and really enthused about math. And from there I knew [that] whatever career I would choose I knew it would be math based. (Interview)

Jamison had a similar experience in one of his mathematics classes the summer after his eighth-grade school year. That school year he was not allowed to take algebra with his peers because his seventh-grade teacher did not think he was ready mathematically for the concepts in that class. However, after passing algebra that summer, Jamison believed the success he experienced in his algebra class did wonders for his self-confidence in being able to succeed in mathematics. He stated:

> A very rewarding mathematical experience for me was passing Algebra 1 with an A the summer before my freshman year of high school. It was great for me to be able to prove to myself that I could be successful in math. Not only did I have great success, but I also fell in love with the subject. (Discussion response)

This confidence and renewed love for mathematics would sustain Jamison through a few hardships and eventually led him to become a mathematics teacher. It also helped him understand the importance of persevering when faced with difficult circumstances.

Jacob thought the experience of understanding a difficult mathematical concept in his geometry class and then explaining it to his classmates was significant to his success in

mathematics. As mentioned in a previous section of this chapter, this teacher challenged Jacob to earn an A in the course the summer before the class began. He explained:

> I remember being in geometry class in 9th grade and for some reason, my classmates were struggling with solving systems of equations. Our teacher became so upset, that she told us that she wasn't teaching us anymore until we knew how to do it. We had a small class, so some students visited other teachers, while I stayed in the class. The teacher asked me why I didn't leave and my response was "Because I know how to do this." After she drilled me with about 5 problems, and I got them all right! She was jokingly upset with me for not saying anything and once the class got back, she made me explain the concept to my classmates. This memory sticks out in my head and [was] probably the first time I ever thought that I would be a math teacher. (Discussion response)

This experience was significant to Jacob because at that time he was not very confident in his mathematics abilities. Although he believed in himself, this experience provided him assurance that he could be successful in mathematics. He also admitted, "It made me feel good, being the only African American male in a class full of females, and I understood the concept they were struggling with. What made it sweeter is, I got to explain it to them" (Interview).

Whether it was earning the highest or a good grade on a test, or just being able to explain a difficult mathematics concept to their classmates, for these young men the success they experienced in mathematics classes pushed them to continue to excel in the discipline. This finding is consistent with the literature on the impact of success in mathematics classes has on African American students. Berry (2005) found that early successful experiences in mathematics help lead his participants to future success in the discipline.

Teacher praise and positive feedback. Teacher praise and positive feedback also contributed to the participants' success. The participants used teacher praise as an inspiration to work hard in their mathematics classes. John found the feedback he received from his teachers to be very motivating for him to strive for excellence in his mathematics classes. Although he was

accustomed to earning good grades, he still thought the praise was confirmation that he was doing what was expected of him. He said:

> I did enjoy the satisfaction of hearing the teacher acknowledge in front of the class that one student scored a 97 on an exam that most thought was extremely difficult. I admit that this "student" was not me every single time. But it still felt good when it was me though! (Discussion response)

Like John, Nathan thought the positive praise he received from his mathematics teachers motivated him to want to succeed. This praise included grades on assignments or tests and verbal praise during class discussions. The most important of these was the feedback he received from his test grades. He explained:

> Probably the biggest reward I experienced that contributed to my success in mathematics was the feedback I received on tests through my grades. My good scores on my tests left me with good feelings about my capability. Though I received good scores on tests in my other classes, it didn't have the same effect as it did in my math classes. This general experience followed me throughout my academic career. I liked mathematics and the fact that I was succeeding made me like it even more. (Discussion response)

Both participants identified teacher praise and positive feedback as being mathematical experiences that contributed to their success in mathematics. Whether it was verbally expressed to them or scores they earned on a test, the praise they received from their teachers gave them a sense of accomplishment and motivated them to keep succeeding. Nguyen (2007) found that all participants in her study, both low- and high-achieving Black males, acknowledged the importance of connecting to a teacher and its impact on their academic achievement. She also found that they all worked harder, which resulted in them doing better academically, in the classrooms of teachers where there was a mutual respect shared between them.

Resilience from a challenging experience with mathematics. The participants also considered resilience from a challenging experience with mathematics a mathematics experience that contributed to their success. The participants discussed experiences in which they learned

from their hardships. Earl said not getting a passing score on the AP Calculus exam was a very humbling, yet rewarding, experience for him. He was able to look beyond what some would deem as a failure, instead turning the experience into something he could use and apply throughout his life. He explained:

> Although I did not score well enough to pass the AP exam, I still passed my high school Calculus class and was still able to exempt a math course in college. What might have been a set-back, was actually a set-up for my future success. By taking the AP course I developed skills, abilities, and content knowledge I would need to succeed in mathematics and college. By not passing the AP exam, but using the skills and knowledge learned in the classroom in future classes, I shored up my personal confidence that my success in mathematics and college is defined and measured by more than a grade on a single exam, but by the knowledge gained and applied throughout life. I may not have passed the AP exam, but I still retained the knowledge from the course. (Discussion response)

When asked to elaborate further on this experience. he described the impact once he reached college:

> When I started, I was taking calculus with upperclassmen and some freshmen, so I felt really good. And it was, like, "Ok, yes, this is what I thought initially as a setback for me in not passing the AP exam," actually; you know, helped me later in life. Like, when I got to college, I was able to still show that, "Hey, I know this information. I have the knowledge or whatever, and I can do the problems, and I can perform with these upperclassmen." (Interview)

Richard's eighth-grade experience in his algebra class was somewhat similar to Earl's. Although he did not fail that class, he admitted he came close. He stated:

> The most rewarding experience in mathematics came from the hardest class I have ever taken to date, consequently, also the most important, my eighth grade Algebra class. The true reward of this experience is sweetened by the near failure, as this was the first class I almost didn't pass. Before this class, I never studied, I never struggled and more importantly, I never had a teacher like [male teacher]. (Discussion response)

When asked what besides the near failure of the class made this mathematics experience rewarding for him, Richard confessed that the lesson he learned was not the mathematical content at all. He learned the true meaning of what persevering can do for you when faced with a

tough task or difficult situation. He wrote, "What I developed in that eighth grade class was an understanding of critical analysis and the worth of self-determination" (Discussion response). When asked for further elaboration, he said:

> That's the hardest C I ever worked for in my life, man. You know it's times in life where I think you learn a lot about yourself and times when you learn what you can and can't do. And that's what that eighth-grade algebra class was for me. (Interview)

The resilience Richard and Earl had when faced with adversity is something they both said contributed not only to their mathematics success but also to their overall academic success. These young men used what could have been negative experiences and turned them into positives. They understood and learned from these experiences; they could persevere when things got tough. This finding is similar to research on the impact resiliency and persistence has on academically successful African American students in mathematics (Ellington, 2006). Ellington found that when the participants in her study were faced with the challenge of learning difficult mathematical concepts in their first theoretical mathematics course, they relied on faculty and peers in their peer support networks.

Academic enrichment programs. Selection into academic enrichment programs was also a positive experience the participants said contributed to their mathematics success. Whether it was applying to or being nominated for these programs, the participants said they gained valuable mathematical experiences from participating. Willis and Dwayne specifically acknowledged that their selection into the SCAMP program provided them with rewarding mathematical experiences. Although Willis believed the SCAMP program was a contributing factor in his mathematics success, he also thought his being selected into the program alone provided him with an environment that allowed him to thrive academically and socially. In particular, it provided him with like-minded peers, which he did not have in high school.

> During my high school years I found that I was different from most black males that I went to school with because there was a level of academic success that was expected of me that many others did not have to strive for. I found that I was "alone" in many of my classes and that in many ways placed me in a social bubble that I had to work hard to reach outside of. The SCAMP program placed me in close proximity to others with similar ability and goals. This more than anything else allowed for me to flourish academically and socially. I was surrounded by peers who had goals. They found studying to be an important part of success in college and had the ability to perform at a high academic level. This pushed me to academic levels that I before was unsure that I could achieve. (Discussion response)

Dwayne believed that being selected for the SCAMP program provided him with priceless experience to do summer research at a major research institution analyzing statistical data. He was able to apply some of the mathematical concepts he had learned to a research project.

> I did research like at [institution] in the department of plant physiology, where I studied [isoflavonoid] in soybeans that were precancerous. I spent time in that laboratory, like I said, analyzing my statistics and my results. I was able to present my findings at a conference. (Interview)

Selection into the SCAMP program provided both participants with mathematical experiences that they thought benefited their academic and mathematics success enormously. Whether it was providing an environment to collaborate and bond with peers who were academically successful or providing other opportunities to work on research teams during the summer, this program gave these young men mathematical experiences that proved to be life changing. As mentioned in an earlier section of this chapter, research has shown that selection and participation in academic programs such as the SCAMP program has several benefits.

Giving back. Giving back in the form of tutoring or mentoring was seen as a rewarding mathematics experience that helped the participants with their mathematics success. These experiences were very fulfilling and gratifying for the participants because they were able to share their knowledge of and experience with mathematics with someone in need. When Jaden

was in college, he got the opportunity to tutor and mentor students at the local middle and high schools. He thought tutoring mathematics was his most rewarding experience because he was able to help younger students learn mathematics. He explained:

> There is nothing more rewarding than taking the same time and effort that someone put into me, into someone else. During that time, I also found that I was able to teach and explain the information in a different way than the students were learning in school. These memories stay top of mind especially as I consider a career back in academia. (Discussion response)

Jaden wanted to make himself available to be a mentor or tutor to someone else because he benefited from having a mentor that explained his profession to him. He said:

> If I can expose them to that method of success through mathematics, then, you know, hopefully I can help save a life or at least not necessarily save it but at least steer a life. I think all kids grow up trying to emulate different models of success around them. You know, me, I had one of my mom's friends was a civil engineer, and I remember being in a bridge-building contest and him coming over, her calling him over to come and help me. And me going over there several times to just try to understand. And you know, I would have never, I'm telling you, I would have never been an engineer without him. You know, without being exposed to that type of career field. So I think it's important for us to give back and just to be that light for these kids. And try to be the flame that gets their fire started. (Interview)

Like Jaden, Dwayne also found tutoring and mentoring to be a rewarding mathematical experience that contributed to his success. Through the SCAMP program and his fraternity, Dwayne had the opportunity to tutor and mentor several local students. He said it was rewarding to him because he was thankful for the many volunteers that helped him when he was young; this was his way of saying thank you to them. He also wanted the students to know that someone besides their primary caregivers cared about them and wanted them to succeed.

> Well, that was very important to me because I felt like growing up I was a part of a lot of programs, and whether it be education or athletics, people volunteered their time. I felt like other people did care about me. So, I did spend a lot of time volunteering in the community going over homework and even classwork sometimes, preparing them for school the next day. It was more so of showing them that we care and that indication is important, I think. I wanted to instill in the kids [at] an early age that people really do care about them. (Interview)

Dwayne thought these were good learning experiences because he got a chance to review some of the mathematics topics that he learned. He stated, "It was a very good learning experience for me as far as knowing the information, but sometimes as a teacher, it is kind of difficult to relay and make sure that they get the information" (Interview). Dwayne also thought that by volunteering at schools he could influence students to continue striving for excellence:

> When I was in medical school, I went out to the surrounding communities and the local high schools and some colleges, and I talked to the students who were interested in pre-medicine, particularly the African American males. Me knowing that aren't a lot of us in the field, I wanted them to know that it is possible, and they can do it. It wasn't that I had a background that was, you know, quite different from their background at all. I felt that it was important for me to show them that if I can do it, they can definitely do it with hard work. (Interview)

These participants thought that tutoring and mentoring were very rewarding mathematical experiences. They thought that by tutoring and mentoring young students, they could help steer them to work hard. They also thought it was their duty to give back because of the positive experiences they had with tutors and mentors. This finding is parallel with the literature in that academically successful African American students benefit from being tutors and mentors. Harper (2005) found that the high-achieving African American males in his study chose to give back as a way to pay homage to the young men that reached out to them their first years and encouraged them to join campus organizations.

Challenges

In this section, I report the findings for the third research question: *What challenges do African American men who excel in mathematics face, and how do they use their success factors to overcome those challenges?* For each challenge, I provide evidence from the participants' experiences and connect those findings to the research literature.

Academic Challenges

The following discussion focuses on the participants' perspectives on the academic challenges they faced and how they overcame those challenges during their schooling. My analysis of the data reveals that the academic challenges were lack of preparation; different expectations; failing a mathematics test or class; difficult mathematics content; different learning environments. The success factors used to overcome those challenges were caring parents; peers; a caring teacher, mentor, or tutor; and perseverance. Each challenge and how they overcame them will be discussed using analyses of the participants' discussion board and interview responses. It is important to note that many of the participants identified more than one challenge. Table 5 shows the academic challenges each participant identified either during the on-line discussion or closing interviews. Table 6 shows the success factors each participant identified either during the on-line discussion or closing interviews as helping him to overcome his challenges. For both tables an X beside the participant's name indicates he discussed that factor. If he did not, the space was left blank.

Table 5. Academic challenges identified by each participant

Participant	Lack of preparation	Different expectations	Failing a math test/course	Difficult math content	Different learning environment
Jamison			X		
Jaden	X	X			X
Willis		X	X		X
Charles	X	X		X	
Deangelo			X	X	
Jacob				X	
Dwayne				X	
Nathan		X		X	
Earl	X	X	X		
John		X			X
Richard		X	X		X

Table 6. Overcoming academic challenges identified by each participant

Participant	Teachers	Mentors	Tutor	Peers	Parents	Perseverance
Jamison		X		X	X	X
Jaden	X			X		X
Willis	X	X	X		X	X
Charles	X	X		X	X	X
Deangelo	X			X	X	X
Jacob	X			X		X
Dwayne	X		X		X	X
Nathan	X		X			X
Earl				X	X	X
John				X	X	X
Richard	X			X	X	X

Lack of preparation. Three of the participants thought their lack of preparation in an earlier portion of their schooling had resulted in a major challenge later in their academic careers. Charles thought his elementary and middle schools did not adequately prepare him mathematically for the rigor required by the middle school he transferred to. He said, "After I switched school systems, I lacked rudimentary math skills that left me exposed" (Discussion response). The elementary school Charles attended was located in the middle of the housing projects in which he lived. The neighborhood was very impoverished and saturated with illegal drug activity, which had a major impact on the lives of the students at that school. Charles added:

> I got a bunch of bumps and bruises in elementary school in terms of academics. But it was a very nurturing place because there were a lot of problems that students were having in terms of family and social issues. Primarily just the income levels in that community didn't allow for parents to care for their kids like they should have. (Interview)

Although he thought this school was not the best for academics, he did understand why the focus of most of the teachers at his elementary school was to be more like parents in that they provided a loving and nurturing environment for students. In the eighth grade, when he moved to a more affluent neighborhood and a different school system, he found himself being challenged academically:

> There was a huge difference in the type of classes I was taking. I went from a mixed school, that was about 50-50 White–Black, and transferred to an all-Black middle school. And it was much more challenging because they didn't just drop me into a class. They made me take an assessment and actually put me in my appropriate class. Work wasn't easy any more, and I was challenged. (Interview)

Charles said that by tutoring him, his teacher played a key role in helping him to overcome his challenge of being behind in the mathematics content after transferring to his new school. After telling his teacher that he was behind in his work because he was not familiar with several of the mathematics concepts they were covering in class, Charles's teacher provided him with a couple of solutions to help him. Charles explained:

> I told my teacher that I hadn't covered material and he was able to provide supplemental exercises to help fill the gap and tutor me before and after school. In a matter of two weeks, I was up to speed. At the end of that school year, I was recommended to move to the next course (Algebra). (Discussion response)

Jaden discussed a similar experience when he entered college and graduate school. He thought he was not as prepared academically as many of his peers were. When asked to further explain, Jaden stated:

> Although somewhat advanced when compared to my peers in high school, when I got to [institution], I found that I still lacked some of the fundamentals that many of my peers knew second-hand. It wasn't an aptitude thing—but exposure. (Discussion response)

He thought that because his high school had a rich tradition in athletics and their band was known nationally, academics were not stressed as much as they should have been. When Jaden was in high school, the football team won a state championship and was ranked in the top five in the national polls. The track team also won three or four state championships. The band participated or performed in national parades and events and received a lot of exposure for its participation. Many of the student athletes went on to play on Division 1 college sports teams or get band scholarships. However, several of those students did not complete their degree requirements. Jaden explained:

> Again, we weren't known for our academics, and when it came time, it really boiled down to when you look at how many people graduated and actually got college degrees or went on to college, the statistics are staggering. I think maybe only 10% of my friends, you know, finished with a college degree. So, you know, we had a lot of people go to college; probably 30% of the class or 40% of the class went to college, but probably only 10% graduated. (Interview)

Jaden was able to overcome this challenge of not feeling prepared by working hard and building a support system consisting of peers that faced the same or similar challenge.

> Getting through took hard work and a good support system. As soon as I scored my first high score on a test at [graduate institution], it was over. I became confident in my abilities to out-work my peers and I began to value what my educational experiences taught me, things that my peers did not get. During this time, I also relied heavily on my [institution] brothers and [institution] sisters that transferred over with me. All the late night study sessions and after class reviews did a lot to both help supplement some of the areas where I was deficient and allowed me to teach others and strengthen the knowledge I did have. (Discussion response)

When asked to elaborate on his support system, Jaden said, "There were probably six or seven people in your major, and we all tried to take all of the courses together so you would have that study group. For me, that ended up being my foundation, my rock" (Interview).

Earl believed that lack of proper study habits was one challenge he faced during middle and high school. He thought his poor study habits kept him from getting the grades he desired on mathematics exams and tests. He said, "My studying consisted of skimming my notes from class and most often I only 'studied' a day or two prior to an exam" (Discussion response). That kind of studying led him to not fully understanding the material. Nonetheless, he did admit he would do well on tests, earning high B's or low A's. He continued:

> I would notice small mistakes where I gave points away for careless errors and lack of recalling information that I would see later in my notes when checking my answers. I also had to spend a lot of time in new courses reviewing material from previous classes. (Discussion response)

Earl was not learning conceptually the mathematics material that was being covered in his classes. Rather, he was depending on memorization and focusing on procedures. He was able

to overcome the challenge of poor study habits by working harder to conceptually understand the mathematic topics as well as developing a better study regimen.

> I began a routine of consistent small segments of studying throughout the school term and even some during the summers. This strengthened my foundation with some match concepts, especially in geometry and pre-calculus. This allowed me to dedicate less time to extensive studying or cramming before exams and reviewing a lot of material. I think this also assisted me with increasing my performance in math courses and advancing to AP Calculus. (Discussion response)

These young men identified their lack of preparation as a challenge they faced during their schooling. Whether it was not being prepared for a rigorous mathematics curriculum or thinking their school focused more on athletics and not academics, both believed their lack of preparation was an obstacle they had to overcome. According to Denbo (2002), there is a lack of rigor in schools with large numbers of low-income minority students. She stated that their curricula are geared toward slower learners—repetitive and unexciting. These same students tend to take fewer and less rigorous academic courses.

Different expectations. Some of the participants identified having to overcome either low or high expectations from their teachers as a challenge they faced during their schooling. When Charles was in high school, he experienced a mathematics teacher who had low expectations of his mathematical abilities. He stated, "When I was in the 10th grade my Geometry teacher told me I wasn't gifted enough to be in Advanced Geometry" (Discussion response). He took this news very hard, but he did not orally make a big deal out of it or even complain. He internalized this misfortune, however, and used the teacher's low expectation of him as motivation to work harder. When asked how he got through this situation, Charles said, "I was able to overcome this challenge by joining the math team and entering advanced Pre-Calculus the following year based on my own recommendation" (Discussion response). Charles also said his friends played a significant role in helping him during this time. He stated, "I had friends that encouraged me to

take this step. But I excelled by creating a study regimen and having open discussion about math problems informally" (Interview).

Earl also had a high school mathematics teacher who he thought had low expectations of his mathematical abilities. As in most of his core curriculum classes, Earl was the only minority student in his mathematics class. He explained, "My AP Calculus instructor was not totally supportive at the time and would challenge me constantly by requiring me to write out all of my work to show how I came to an answer, even if the answer was correct" (Discussion response). When asked to further explain why he felt challenged, he said, "[Mathematics teacher] would ask me point blank if I thought I could keep up with everyone else in the class. That just tore me up inside, and I was like 'I am going to show you'" (Interview). This situation challenged Earl to work harder and prove to not only his teacher but himself that he did belong in the class. He added:

> I don't think some teachers realize the power they really have in shaping the life course and trajectory of their students. If a teacher invests in a student, rather [whether] it is extra time working out a math problem or giving a student additional problems beyond what everyone else may be doing because you notice the potential in the student to achieve more, it can lead to some amazing results and a greater number of 'successful' mathematicians. (Discussion response)

In contrast to Charles and Earl, Willis thought his teachers' high expectations of him were a challenge. After transferring from a public to an affluent private school, Willis's grades began to slip. He stated, "The level of the math being taught was much higher than what I had been exposed to in fifth grade. In addition, the work load and expectations were something I wasn't accustomed to" (Discussion response). Although Willis was not used to the rigorous curriculum his new school provided, he was able to pull his grades up by working hard. Willis praised his teachers because he knew they could have made exceptions for him and lowered their expectations. But they did not. They continued to challenge him.

Expectations from teachers were not the only source for this type of challenge. Jaden, for example, thought self-doubt was a challenge he faced as well. As I discussed in a previous section, Jaden did not think that his high school prepared him for college. Because of this lack of preparation, he did not think he had been exposed to the more rigorous problem-solving curricula his peers received, which caused him to doubt his abilities. He said, "There was a bit of the 'stereotype effect' going on, where I felt as though I was inadequate and that thinking leads to lower performance" (Discussion response). Although he had been fairly confident in his abilities before college and graduate school, he found that many of his peers had been exposed to many of the concepts they were currently covering in his classes in high school. He continued:

> You know, if you look even at the courses that are offered at my old high school and compare it to my wife's who went to [high school], you know it's vastly different. I think some of our more advanced classes were just basic electives for them. (Interview)

Jaden was able to overcome this challenge as well by working with his peers:

> You know, we just sort of teamed up, and we got each other through it. It was definitely something special, and I think when you deal with the whole stereotype effect or as, you know, you feel like a minority, you think that you're inadequate, and that ends up lowering your performance, I think that helps you working in those groups. And you have these familiar things around you that helps overcome effects like the stereotype effect. (Interview)

These findings are comparable to those studies on the effect of teacher expectations on student achievement. The Equity Principle (NCTM, 2000) calls for high expectations and strong support for all students:

> Holding high expectations begins with the fundamental assumption of equity—the belief that all students can learn and should be given rich and challenging opportunities to do so. Holding high expectations means assuming that all students, from prekindergarten through college, are able to handle complexity and engage in mathematical reasoning and problem solving. It is through tasks that challenge students to stretch and develop their reasoning and problem-solving skills that they learn more. Furthermore, holding high expectations involves recognizing that different students emerge as talented on different types of mathematical problems and in different topics in mathematics.

McKinley (2010) found that one successful strategy teachers used in narrowing the White-Black academic achievement gap in their school district was expressing to students and their parents their high expectations and confidence in their students. As a result, the teachers' goal to make a positive difference in the students' educational careers became much clearer to the students and evident in the teachers' actions.

Failing a mathematics test or course. Although these young men were successful in mathematics, a few of them considered passing a mathematics test or course a challenge. For Jamison, obtaining a passing score on his state's certification examination was a major obstacle. In order for him to student teach and graduate with a bachelor's degree in mathematics education from his university, he had to earn the required score on the certification test. That was indeed a nerve-wrecking time for him because "failing" was something he was not used to. He explained why this was such a challenging experience for him:

> It took me three tries. It was the first time in my life that I had "failed" anything math related. And it also prevented me from graduating at my expected time. It was a very tough period for me. I had to watch many of my friends go on to graduate and begin the lives we all thought we would start together. (Discussion response)

Jamison admitted that the most puzzling part of this experience was that part of his work-study job on campus was to tutor and help prepare several of his peers to take and pass the same test that he himself could not pass. He was ready to give up on his dream of becoming a mathematics teacher and change his major from mathematics education to mathematics because he could not pass his state's teacher certification test. After partially mentioning his plans to his mentor, however, she stopped him before he could finish. She considered the idea so unheard of that she did not let him finish with the plan. He stated:

> I went to her to tell her that I was no longer going to major in education, and you would have thought I told her I was going to blow up the world. 'Cause she yelled at me like I was crazy. She was, like, "There is no way in the world that you are going to change your

> major. You are going to sit there, and you are going to take that test, and you're going to pass it." (Interview)

Although Jamison was ready to quit, his mentor did not think that was even an option for him. Instead, she offered to help him. Jamison explained:

> She had me come in over the summer to work for her. She also brought in one of her former students to help me prepare for the exam. After that I took the test again and earned the score I needed to begin my student teaching. I graduated the next semester and began teaching immediately after. (Discussion response)

As I mentioned in a previous section of this chapter, Richard thought his resilience in his eighth-grade algebra class was definitely a rewarding experience that contributed to his academic and mathematical success. Richard considered this same experience, however, to be a significant challenge in his academic career. This experience brought up a couple of firsts for Richard. It was the first time in Richard's young academic career that understanding and mastering mathematics topics did not come easily for him and almost caused him to fail the class. It was also his first time having an African American male mathematics teacher who held him to high expectations. When asked to further explain these experiences, he added:

> I had this teacher who was a little bit, was definitely different than any teacher I ever had before. He was an African American male teacher as I spoke of in one of my responses. I hadn't had an African American teacher who wasn't a gym teacher or a music teacher before who taught a curriculum class before this grade year. So he was the type of guy in one that he expected the most from me and basically didn't take any [expletive], and he had a low tolerance for excuses. In a sense, he was able to get through to me. I mean, it wasn't like he didn't take it easy on me at all. (Interview)

Although Richard saw the end result as a rewarding experience, getting through the course was certainly not a "walk in the park." Richard said, "School was always easy for me until I met this class. I had to take some time actually working my brain some" (Interview). He credited working hard, his parents, and his teacher for helping to pass this class. When asked to elaborate he said:

> My parents helped instill in me the will to overcome challenges, and my teacher who was one of the first to impress on me that my education was my responsibility. But it

> definitely took a lot of quick growth and maturity on my part to understand what failing a class ultimately meant for my academic future. (Interview)

Earning a qualifying score on a mathematics test and barely passing a mathematics course were challenges that participants identified as having to face during their schooling. Both Jamison and Richard were faced with "first time" experiences that really pushed them to overcome their respective challenges. According to Ellington (2006), for high achieving African American students who were faced with these types of challenges, persistence and a high self-efficacy were critical components for them in overcoming those challenges. Many of Ellington's participants said they experienced several academic challenges, particularly during their first theoretical mathematics course, one in which they had to construct mathematical proofs as opposed to using formulas or algorithms to perform mathematical operations. She stated that they expressed frustration when they first encountered doing proofs. Like the participants in my study, her participants said they overcame this challenge by relying on peers and instructors. They also said that their belief in God helped them. These factors also contributed to them becoming more confident and competent in their mathematical abilities.

Difficult mathematics content. Three of the participants found some of the mathematics concepts covered in their classes to be challenging for them. When Dwayne was introduced to variables in one of his middle school mathematics classes, it took him quite a while to grasp. He stated, "When I was in middle school, sixth or seventh grade, and being introduced to variables, and being totally confused. It was probably the first topic in grade school that I felt was totally impossible for me to understand" (Discussion response). What made this concept so challenging for Dwayne was that it was his first time having to think about mathematics abstractly. With the help of his teacher and working harder, Dwayne was able to overcome this challenge. He had to

learn to think critically about the problems being asked and apply new and different problem-solving skills to solve them.

Like Dwayne, Nathan found some of the content in one of his mathematics courses challenging. Prior to taking this course the fall of his sophomore year in college, Nathen admitted that he was generally pretty good in mathematics and never had any real challenges learning or understanding mathematics content in his classes. He said, "One challenge that comes to mind occurred when I was taking Set Theory my sophomore year at [institution]. I believe it was my first major test and I ended up with a C" (Discussion response). For the first time in his academic career, he struggled. After receiving that disappointing grade on his test, Nathan knew he would have to make some changes in order to improve his grade and understanding of the material. He was able to overcome this challenge by working harder. He was so determined to earn better grades in the class that he revamped his study regimen. When asked what changes he made, Nathan stated:

> I decided to spend much more time studying Set Theory principles. I practiced a lot of problems and remember trekking through the [university] library for additional books. I would do practice problems out of these books too. I spent an exorbitant amount of time reviewing concepts ad nauseam. It paid off because through the rest of the class I scored A's on all my tests. (Discussion response)

Jacob thought he was pretty good in mathematics also and did not have many challenges with mathematics. However, he did admit to having difficulties with one mathematics topic. He stated, "I do remember 'tripping' for a little when I was introduced to the concept of imaginary numbers. It wasn't that the operations were difficult to me, but rather, it just made no sense" (Discussion response). When asked to elaborate further on why this was such a tough topic for him, he stated, "It was just the literal sense of it. Imaginary numbers? What is an imaginary number? Either it's real, or it's nothing. I was taking it [literally] and not looking at it from a logical standpoint" (Interview).

Although the participants considered themselves to be successful in mathematics, there were times in their schooling when the mathematical content challenged them to be critical thinkers and use other problem-solving skills to understand the material. It is important to note that none of the participants blamed or criticized their teachers because they did not understand the material. Each of them understood his role as a student and took responsibility for making sure to master the concepts that were challenging to him. Like the students in Martin's (2000) study, these students were respectful of their teachers and appreciated their efforts. Though there were times when they were critical of the classroom activities, they still believed their teachers were helpful to them. "This was in stark contrast to many of the less successful students observed in the study. Many of them frequently complained about teachers and often engaged in disrespectful or disruptive behaviors in their teacher's presence" (Martin, 2000, p. 167). Although both successful and unsuccesful students were exposed to similar obstacles in their communities and at school, the successful students exhibited positive academic and mathematics identities that enabled them to negotiate these obstacles.

Different learning environment. After transferring from a public to a private school in the fifth grade, Willis said that his new learning environment was a challenge for him. Although he was used to being one of very few minorities in his classes, he was the only minority in his class at his new school. He said, "This proved to be a very challenging time in my life. The level of the math being taught was much higher than what I had been exposed to in 5th grade" (Discussion response). As I explained in a previous section, the workload and higher expectations from his teacher also made him uncomfortable in his new learning environment. This situation, coupled with the fact that there was a huge difference socioeconomically between him and his new peers, created a rough transition academically and socially for Willis. Although

he was a relative young man at that time, he understood that he was the minority in his class on two separate levels. He added, "Most of the other students were from the 'other' side of town, where parents were members of the Country Club and had hired help in their homes" (Discussion response). When asked to elaborate, Willis said:

> Not only was I the only minority, just like economically they were on different playing field than my parents. These kids were coming to school in the newest BMW and Mercedes and Rovers, this, that, and the other. And I'm being dropped off in a beat-up Nissan Dotson. It was just barely hanging on. (Interview)

When Willis's grades began to slip in mathematics, his mother hired a tutor. He believed his tutor helped him tremendously. Willis said, "I ended up working with one of the most well known and respected minority math instructors in the area. This allowed me to learn and grow my confidence in my mathematical abilities in a more comfortable environment" (Discussion esponse). Although he was being tutored in mathematics, Willis thought he gained a lot more from that experience. When asked to elaborate on why his tutor was able to have such an impact on helping to gain confidence, he stated:

> He was very down-to-earth and very easy to work with. He was very intelligent, and very well spoken, but he pushed me. I believe working with him became more about not disappointing him more than anything because I respected who he was. I respected what he stood for. And he is one of those people you look up to, and you don't want to disappoint. So I think his presence played a great deal in me overcoming that time. (Interview)

CHAPTER FIVE

SUMMARY AND CONCLUSIONS

Several researchers have used a deficit model to examine and identify reasons that African American students do not perform as well as their peers of other ethnicities in mathematics. Few studies, however, have focused on those African American students who have been successful in the discipline. To add to the limited research that examines academically successful African Americans, I studied 11 African American males who excelled in mathematics and gave them an opportunity to discuss the academic and mathematics experiences that contributed to their mathematics success. The purpose of this study was to identify the factors, as well as experiences, that contributed to their success in school and mathematics. I also sought to identify any challenges these young men faced and how they overcame them. My impetus for this study derived from my own experiences as a student, teacher, and father of a young son. The research questions I investigated were as follows:

1. What personal and schooling factors do academically successful African American men identify as contributing to their mathematics achievement?
2. What types of mathematical experiences do they identify as contributing to their success?
3. What challenges do African American men who excel in mathematics face, and how do these men use the success factors they identify to overcome their challenges?

Phenomenology and narrative inquiry were the research approaches I used for this study because I wanted to examine the experiences of academically successful African American males in mathematics by allowing them to speak for themselves about their schooling and

mathematical experiences. The *direct* phenomenology approach (Titchen & Hobson, 2005) was used so these men could reflect on their experiences. Narrative inquiry is also an appropriate approach to gathering data about experiences. I used a biographical questionnaire, online asynchronous focus group interviews using a social media site, and interviews to give voice to these young men. Hence, both approaches are also consistent with my goal of allowing and encouraging the participants to reflect retrospectively on their experiences.

Similar to Geiger (2002), I recruited the 11 participants via electronic mail using purposeful and snowball sampling techniques (Bogdan & Biklen, 2006). Each participant self-identified as an African American male born and educated in the United States whose parents were also born and educated in the United States; was a college graduate; had a cumulative GPA of at least 3.6; had a cumulative mathematics GPA of at least 3.5; majored in a STEM field; and was at least 21 years of age. All of the participants received financial support from their respective universities and most graduated from a historically Black college or university (HBCU) in either Georgia or South Carolina.

Using the social network Facebook, the participants engaged in a 12-week online focus group discussion. Participants logged on twice a week—once to respond to questions I posted and once to respond to another participant's response. They were allowed and encouraged to post or respond to the other participants' responses as often as they wished. At the completion of the online focus group discussion, I conducted a closing interview with each participant individually via telephone that focused on his individual responses to the questions I posted. Most of the research studies that have investigated the schooling and mathematical experiences of successful African American males used critical race theory as a theoretical framework. Similar to Strutchens (1993), I did not want to influence or bias the participants' responses during the

online discussion by indicating that their race or ethnicity may have affected their success or contributed to a challenge. When a participant mentioned such factors, however, I did ask follow-up questions during the interview to gain further understanding.

Many researchers used case studies and investigated a small number of participants in their studies on successful African American males in mathematics. I used thematic analysis to allow me to use a larger sample in which I searched across the entire data set to identify, analyze, and report themes using Martin's (2000) multilevel framework and other published studies to guide my analysis. This framework was used for coding data with respect to the mathematics socialization and identity among African-Americans and to code participants' responses and place them in their respective themes. I used Martin's categories of community, school, agency, and mathematics success among African American students.

Conclusions

There were several factors that the participants identified as having an impact on their mathematics achievement. Personal factors such as parents, mentors, peers, and siblings were identified as being major contributors to their success. All of the participants however, identified either one or both parents as their most influential factor. The schooling factors included high expectations from teachers, academic environment, and academic enrichment programs. The participants identified influential teachers from as early as preschool until as late as graduate school. Mathematics teachers were considered influential because they inspired and encouraged the participants to continue in a STEM discipline. The academic enrichment programs included summer camps, gifted programs, and scholarship programs. The participants described the academic environments as being very instrumental in providing a positive learning environment and rigorous academic curricula. The academic programs that many of the participants were

members of provided them with support from their peers and opportunities to collaborate and study with other high-achieving students.

The participants identified several different mathematical experiences that they thought contributed to their success in mathematics. Those experiences included early success in mathematics classes or on mathematics tests, teacher praise and positive feedback, resilience from a challenging experience in mathematics, being selected for academic enrichment programs, and giving back in the form of tutoring or mentoring. Many of the participants who experienced early success in mathematics acknowledged that that success motivated them to continue excelling in the discipline. Selection into programs such as the Alliance for Minority Participation (AMP) offered at several universities provided them with other educational opportunities such as summer research experiences that they might not have received otherwise.

Many of the participants identified more than one academic challenge and discussed multiple factors used to overcome them. The challenges the participants faced were lack of preparation, different expectations, failing a mathematics test or class, difficult mathematics content, and different learning environments. The success factors used to overcome their challenges were caring parents; peers; a caring teacher, mentor, or tutor; and perseverance.

Implications

Implications that can be drawn from this study include: preparing mathematics teachers (both preservice and inservice) to teach diverse student populations; getting and keeping African American parents actively involved in the education of their children; recruiting African American male mathematics teachers; and the need for academic programs like the Alliance for Minority Participation (AMP).

It has been documented that the populations in the United States public schools are becoming increasingly more diverse while their teachers are remaining predominately middle-class, white females (Leonard, 2008; White, 2002). Therefore, it is imperative that mathematics teacher educators prepare preservice teachers to meet the needs of their students. Including equity and diversity as key topics in their coursework can help "prepare secondary-level mathematics teachers to both implicitly and explicitly incorporate socially, culturally, and politically equitable instructional strategies in their classrooms, that is teach for diversity" (Kitchen, 2005, p. 33). It is without question that several preservice (and inservice) teachers will experience classroom environments that are much different from their own (White, 2002). Therefore, helping preservice teachers understand and learn how to "affirm their students' cultural backgrounds, while challenging them to engage their students in learning challenging mathematical content" (Kitchen, 2005, p. 36) is essential. Ways to address this issue include discussing equity and diversity issues in mathematics education, as well as making sure teachers examine their own racial or ethnic identities so that they will be more likely to be respectful of their students and be better prepared to effectively teach in multiracial and diverse settings.

Mathematics teacher educators should also continue to stress the importance of maintaining high expectations as well as include opportunities for preservice teachers to reflect on and confront their beliefs about mathematics teaching, mathematics learning, and diverse students. All of the participants in this study acknowledged that at least one teacher pushed them by holding them to high expectations. Mathematics teacher educators should also include different pedagogies that are considered to be effective for teaching for diverse students such as incorporating multiculturalism into the classroom (Kitchen, 2005), culturally relevant pedagogy (Jones, 2004; Ladson-Billings, 2000, 1997), culturally responsive teaching (Gay, 2000), teaching

for social justice (Gutstein, 2003), or effectively implementing reform-oriented pedagogy (Boaler, 2002). Lastly, mathematics educators should provide field experiences in the languages, cultures, and socioeconomic circumstances of diverse students (Kitchen, 2005) as well as in urban settings (Ladson-Billings, 2000). Those field experiences will allow preservice teachers to confront any biases they may have, think about strategies to successfully work with different minority students, and challenge any preconceived notions they may have about the mathematical abilities of minority students. According to Nieto (2005), if preservice teachers have an opportunity to develop strong and meaningful relationships with students different from themselves, they will be forced to address their biases.

Another implication drawn from this study is the importance of getting and keeping African American parents involved with their child's education. Several researchers have found parental involvement to be an essential contributing factor to the academic achievement of African American students. Several of the young men in this study shared their beliefs about the importance of being exposed to educational material by their mothers and fathers at an early age and how those experiences were the initial launch for their academic success. When they became school age, those parents then became very involved in their sons' educations. Despite research detailing the importance of parental involvement in student achievement and evidence that parents of African American students are committed to the academic success of their children, schools are often viewed as unwelcoming or hostile to these parents and do not include them in the planning of school events and academic decisions about their children (Delpit, 1995). In particular, school officials have pointed to low rates of attendance on parent teacher nights, particularly in urban schools, as an indicator of parents' disinterest in their children's education. Parents whose socioeconomic and ethnic backgrounds differ from those of administrators should

not find themselves outside of important decision-making processes involving their own children. Their opinions should be considered and valued just as much as the well-connected, affluent parents who are often valued by schools (Valenzuela, 1999). Although research shows that parents of color and parents who are of low socioeconomic status may be less likely than other parents to question school decisions about their children and more likely to believe the teacher knows best (Lareau, 2003), communication about those decisions with those parents must continue. As the push for more reformed-based mathematics curriculum continues, it is vital that mathematics teachers inform parents of the changes that are occurring. Teachers and administrators should not only be trained on ways to keep the lines of communication open between home and school but also on ways to actively involve parents during school and how to engage them in visits to mathematics classes. Peressini (1998) posited that mathematics teachers should create and emphasize an open door policy that encourages parents to not only observe during classroom visits but also become actively engaged during mathematics classroom visits by allowing them to assist students with their assignments. He added, "Encouraging parents to become active in the mathematics classroom is a powerful way of helping them understand the changes that are occurring in their children's mathematics education" (p. 323).

The third implication from this study is the importance of recruiting African American male students to teach mathematics. Many of the participants in this study said that they never took a mathematics course from an African American teacher during their K–12 schooling, let alone an African American male. Some of them did have at least one African American male teacher by the end of their collegiate careers. The lack of African American male teachers is definitely an issue that should be addressed by institutions of higher education. One way to tackle this issue is to assist school districts in dealing with the African American male high

school dropout rate that I discussed in a previous chapter. As Graham and Erwin (2011) discussed, it is impossible to increase the number of African American male teachers without increasing the number of African American male students who graduate from high school. They also discussed the importance of faculty in schools and colleges of education at four-year institutions working with public schools to implement teacher education encouragement programs, such as the Teacher Cadet Program, to help expose minority students to the teaching profession.

Another way colleges of education can assist in recruiting African American males to the teaching profession is to offer financial assistance. Initiatives such as the Call Me MISTER (Mentors Instructing Students Toward Effective Role Models) program offers financial assistance and specifically targets African American males to pursue a career in teaching. It not only provides tuition assistance through loan forgiveness programs for admitted students, but it also provides academic and cohort support systems to assist them academically and socially to assure their success. Call Me MISTER is housed at Clemson University and is a collaboration with four historically Black colleges in South Carolina: Benedict College, Claflin University, Morris College, and South Carolina State University.

The fourth and final implication of this study is the importance of and need for programs like the Alliance for Minority Participation (AMP) programs at colleges and universities. All of the young men in this study who participated in an academic enrichment program (i.e., the South Carolina Alliance for Minority Participation) spoke glowingly and emphatically about the contribution that program made to their academic success and careers. Many of them said the key element that this program provided was the support they received from their peers. The peer relationships they formed as members of this program were extremely instrumental for those

who did not have that same type of peer interaction during high school. Being able to bond and collaborate with other high-achieving African American males pushed them to be better students. All of the participants that were members of these programs said the bonds that they formed with their peers during that time were so strong that several of them remain close friends and colleagues. It is important to note that AMP programs exist at both historically Black colleges and universities (HBCU) and majority White universities; attending an HBCU does not guarantee that a male student will find a ready-made support group in STEM fields. In addition to peer support, AMP programs provided summer internships that allowed the participants to work with leading researchers in their respective fields. It is without question that programs like SCAMP were beneficial to the academic success of the African American students who participated in this study and should definitely continue with their mission of increasing the number of baccalaureate degrees awarded to minority students in STEM fields.

Recommendations for Future Research

The recommendations for future research are the replication this study with the inclusion of parents of successful African American males in mathematics, other minority groups that are successful in mathematics, and a younger sample of African American males that also includes classroom, home, and community observations. One glaring omission from the research literature on successful African American students, including this study, is the voice of the parents of those students. As was evident in this study, parents were critical in the participants' success. Allowing parents to voice their strategies and the things they thought were necessary to their sons' success could be valuable to other parents of African American males as well as teachers. Replication of this study with other minority groups could also help shine light on the factors that are contributing to their success. Many of the young men in this study were well into

their careers and had been out of school for some time. Using a younger sample of African American males, as well as observations at school, home and in the community, would be useful in understanding the day-to-day lives of these young men. It would be interesting to see if there are differences between the two age groups.

Closing Thought

The valedictorian at my younger cousin's graduation read the following quotation: "A man who wants to lead the orchestra must learn to turn his back on the crowd." This quotation really resonated with me and made me reflect even further on the participants in this study and the factors that contributed to my and their mathematical and academic success. Like many of the young men in this study, I did not want to be a follower or the "cool-kid" in school. We dared to be different. We wanted more for our families and ourselves. In essence, we wanted to be leaders of our own orchestras. Whether it was biology, mathematics, computer science, or mathematics education, we wanted to be trendsetters and successful in our respective disciplines. We believed whole heartedly when our parents and teachers told us that if we worked hard, we could do and become anything we wanted. We appreciated the high expectations they set and the knowledge they imparted to us. As a father of a young son, uncle to young nephews, and teacher to several African American males, I have and will always have a mission to pass those same words of encouragement on to them. Parents, teachers, and teacher educators of African American males, please join me and do the same.

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APPENDIX A

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105 Aderhold Hall
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Dear Potential Participant,

I hope this email finds you are doing well and having a productive summer.

My name is Nicholas Cluster and I am a doctoral candidate majoring in Mathematics Education. I am contacting you to tell you about my research study and to ask you to consider being a participant. My research project is entitled "*What About Me? Stories of African American men who are successful in mathematics*." The focus of this study is to identify and understand the factors that influenced academically successful African American men in mathematics.

To participate in this study, I ask that you meet the following criteria: (1) African American male born and educated in the United States whose parents were also born and educated in the United States, (2) college graduate or senior at a college/university, (3) cumulative GPA of 3.3 or better, (4) majoring or majored in one of the following fields: science, technology, engineering, or mathematics (STEM), and (5) at least 21 years old.

If you are interested in participating, I will ask you to complete a brief questionnaire. Following the questionnaire, I will send you a consent form that will need to be signed and returned. I will then invite you to join a private group via Facebook and ask that you post at least twice a week: once to respond to questions posted by me and once to respond to another participant's response, for the duration of the study. The online discussion will take place for approximately eight weeks. After the online discussion, I will conduct closing interviews by phone. During this interview, I will ask you some open-ended questions about your responses.

With your help and participation in this study, I hope to increase the discussion of the achievement gap and the lack of African American men in mathematics. The questions that I hope to answer with this study are: "How, if, at all, do parents, teachers, and peers contribute to the mathematics achievement of academically successful African American men? What are other factors that contribute to the success of these young men? What are the challenges faced by African American men who excel in mathematics?"

Your participation is greatly appreciated and I look forward to hearing from you! If you have any further questions about the study, requested participation, or questions to be asked, please do not hesitate to contact me at ncluster@uga.edu.

Thank you very much for your consideration and attention.

Sincerely,

Nicholas Cluster
Doctoral Candidate
Mathematics and Science Education
University of Georgia

APPENDIX B

BIOGRAPHICAL QUESTIONNAIRE

Are you a…

1) self-identified, African American male born and educated in the United States whose parents were also born and educated in the United States?

YES NO

2) college graduate or senior at a college/university.

YES NO

3) cumulative GPA of 3.6 or better.

YES NO

4) cumulative mathematics GPA of 3.5.

YES NO

5) majoring or majored in science, technology, engineering, or mathematics (STEM).

YES NO

6) at least 21 years old.

YES NO

If so, please complete this biographical questionnaire!

- Name:
- Age:
- Race:
- College(s) Attended:
- Home mailing address and phone number:
- E-mail address:
- Approximately how often do you check your e-mail?

- Approximately how often do you access the Web?

- College major(s): (If you have changed your major at any time during college, list all previously intended majors, ending with your currently declared major.)

- Do you consider your currently declared major to be in a mathematical field?

- List all mathematics courses taken in college, along with your letter grade for that course.

- Have you ever been exempted from a college mathematics course? If so, give the course name and the reason for exemption.

- Is there any other information that you think I should know about your eligibility or interest in participating in this study?

APPENDIX C

Discussion Prompts

1. Do you consider yourself successful in mathematics? Why or why not? [Q1]

2. What factors, events, individuals, and/or organizations led to you to being successful in mathematics (provide in the order of influence/impact if possible)? Please describe some of these key elements in depth, including how old you were, who was involved, what happened, and why this was significant to you. [Q2]

3. Describe any rewarding mathematical experience(s) that contributed to your success in mathematics. Please describe the key elements in depth, including grade level, what happened, and why this experience was so rewarding. [Q3]

4. Describe one or two significant challenge(s) you faced with mathematics during your schooling years. Please provide all of the key elements in depth, including grade level(s), what happened, and how you overcame it (them). [Q4]

5. Describe the relationship you perceive between your past college mathematics success and past, present, and future success in society? [Q5]

6. How did your teachers' expectations, attitudes, and actions have an impact on your mathematics learning? [Q6]

7. Do you believe that being African American affected your mathematical experiences? Why or why not? [Q7]

8. You are no doubt aware that you are fairly unique as an African American male who has been successful in mathematics. What do you think explains the lack of African American males who have been successful in mathematics? [Q8]

APPENDIX D

Sample Interview Protocol

Would you please state your name for me?

Would you tell me a little bit about yourself, as far as your age, where you are from, what high school and college you attended, what was your major, and what is your current occupation?

Would you tell me about your schooling as far as K-16 plus as far as start with elementary you know middle and high school and tell me about the school climate how involved were your parents and tell me about your teachers and once you get in middle school and high school and college tell me about your mathematics teachers?

Will you discuss your parental involvement during your schooling?

I want you to tell me a little bit about the community you grew up in.

From your response to question #1, will you please elaborate on how you see your mathematics skills as a strength in your success in the workplace?

From question #2, you spoke of your mom being the biggest single reason for any success in academics. Did your father, siblings, or any other family have an impact on your success? If so, how?

Also from question #2, you spoke of your affiliation with music playing a major part of your success in mathematics. Would you please elaborate on how?

Lastly from question #2, you spoke of the SCAMP program at SC State having a major factor in your success in mathematics on the college level. Would you please elaborate on how the SCAMP program aided you in your success?

From question #3, you spoke of being selected to participate in academic enrichment programs without having to apply. Once when you were in elementary school and the other when you were in high school. Did you get in "automatically" because you are Black? In other words, was this an affirmative action sort of thing? Or were you just so obviously bright that you didn't have to test in to these programs? During either of these times did your peers treat you differently because you were selected to participate in these programs? If so, how?

Also from question # 3, would you please elaborate on how the SCAMP program surrounded you with like-minded peers who had goals and pushed you to academic levels that you were unsure that you could achieve?

Lastly from question #3, would you please elaborate on what you mean by the statement "During my high school years I found that I was different from most black males that I went to school

with because there was a level of academic success that was expected of me that many others did not have to strive for"?

From question #4, would you elaborate on the impact your tutor had on helping you build confidence?

Also from question #4, would you elaborate on going from being one of a few minorities to the ONLY one in your class and how you were able to make the adjustment?

From question #5, would you explain why you felt like your confidence and your belief in yourself increased when you got to college?

Also from question #5, would you explain the impact your success in academics, including mathematics, had on your confidence and ability to be successful in your career?

From question # 6, Were all of the minority teachers who took a special interest in you Black? Males? Did they appear to take a special interest in ALL Black students or just you? In what ways did they convey their support? Expectations? Interest? Concern for you? To what extent do you think you "manufactured" their expectations and put pressure on yourself to perform because you were Black and you felt the need to "represent" your race?

From question #7, were you ever teased/mocked by peers because you were taking upper level math courses or for your success in mathematics/academics?

As a follow-up to question #8, what do you think can or should be done to increase the number of African American male teachers?