The Impact of Self-efficacy on the Mathematics Achievement of African American Males in Postsecondary Education

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This study presents positive depictions of African American men within higher education mathematics. Using social cognitive theory and culturally appropriate research methods, this qualitative study investigated reasons why some African American men are able to achieve academic success in mathematics at the postsecondary level. Six African American men were given opportunities to define, discuss, and reflect on their beliefs in their mathematics abilities, the sources of their beliefs, and the impact of their beliefs on their motivation and subsequent academic achievement in mathematics.

The autobiographies and interviews revealed seven themes: 1) teacher influence; 2) family influence; 3) peer influence; 4) perception of mathematics; 5) problem solving approach; 6) African American male teachers; and 7) prior experiences. Responses to certain themes were consistent, but there were also variations among participants’ responses, which offer different alternatives for future research. The teacher influence theme represents the feedback that teachers gave to these participants through verbal cues or the creation of a supportive environment. The family influence theme represents the role that parents, siblings, or other family members portrayed in developing the participants’ self-efficacy. The perception of mathematics theme represents the participants’ identification of how other African American men view mathematics and therefore avoid the subject. The problem solving approach theme represents one aspect of perseverance demonstrated by the
participants. The African American male teachers theme represents the participants’
opinions on the benefits of more visibility of these potential role models. The prior
experiences theme represents the early achievements in mathematics that encouraged further
pursuits in the subject.

All of the participants’ articulated highly optimistic beliefs concerning their mathematics
self-efficacy. The sources that these African American men identified as being conducive to
their mathematics self-efficacy were enactive attainment, verbal persuasion, and vicarious
experience, which had the most significant influence. These African American men’s
choices of classes were positively influenced by their beliefs in their abilities and their
willingness to persist in mathematics was also positively inspired by their beliefs in their
abilities. Finally, through observation of appropriate behaviors and through suitable
comparisons, African American male thinking about and behavior towards mathematics was
altered.
To Lionel.
I love you, and I miss you.
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Table of Contents

Chapter                                                                 Page
1. INTRODUCTION.................................................................................................1
   A. Statement of Problem.................................................................................2
   B. Theoretical Framework.............................................................................3
   C. Significance.............................................................................................5
   D. Summary..................................................................................................8
   E. Description of Chapters........................................................................8
2. REVIEW OF LITERATURE..............................................................................9
   A. Introduction.............................................................................................9
   B. African American Men and Higher Education........................................12
   C. Facilitators of Academic Success............................................................16
   D. Mathematics Participation.....................................................................19
   E. Motivation...............................................................................................22
   F. Issues in Research...................................................................................26
   G. Social Cognitive Theory.........................................................................32
   H. Summary..................................................................................................43
3. METHODOLOGY...............................................................................................44
   A. Research Design.......................................................................................44
   B. Research Strategy.....................................................................................46
C. Implications for Teachers of African American Male Students.......................99
D. Implications for Parents of African American Male Students.....................100
E. Implications for African American Male Students......................................100
F. Recommendations for Future Research..................................................102
G. Limitations of the Study............................................................................103
H. Closing Remarks........................................................................................104

6. APPENDICES
   A. Appendix A: Mathematics Autobiography.............................................106
   B. Appendix B: Individual Interview Protocol..........................................107
   C. Appendix C: Sports Probability Chart..................................................108
   D. Appendix D: Consent Form.................................................................109

7. REFERENCES..............................................................................................113
CHAPTER 1
INTRODUCTION

There are a number of challenges in the educational system of the United States. Some include access to quality teachers (Angrist & Guryan, 2008; Darling-Hammond, 1997), teacher shortages (Howard, 2003; Ingersoll, 2001), disproportionate access to technology (Valadez & Duran, 2007; Warschauer, Knobel, & Stone, 2004), students’ academic performance (Hrabowski, Maton, & Greif, 1998; Ladson-Billings, 1994; Riegle-Crumb, 2006), and gender bias (Buchmann, DiPrete, & McDaniel, 2008; Li, 1999). Another challenge is the underrepresentation and underperformance of African American men in education. This dissertation addresses that issue by examining a more positive status of this group within education, specifically in higher education mathematics. Consequently, this study investigated six African American men’s beliefs in their mathematics abilities in an effort to uncover motivational characteristics that contributed to their academic success in mathematics at the postsecondary level.

The remainder of this chapter establishes the background of this study in five sections. The first section provides the statement of the problem. The second section introduces the theoretical framework. The third section illustrates the significance of the study. The fourth section provides a summary of this chapter. The last section outlines the remaining chapters.
Statement of Problem

The status of African American men in education, particularly postsecondary education, can be characterized as questionable and their status within the disciplines of science, technology, engineering, and mathematics (STEM) fields can be viewed in the same light. In general, there are not an overwhelming number of African American men pursuing education beyond high school (Bailey, 2003; Wilds, 2000). Statistics show that although approximately 63.5% of African American men complete high school, only 31.9% of men in this group go on to attend a college or university (Wilds, 2000). Additionally, those percentages had been in steady decline during the late 1980s through the 1990s (Bailey, 2003).

Furthermore, among African American men 25 to 29 years old, approximately 77.5% have completed four or more years of high school; with only 12.8% of that number completing four or more years of college (Wilds, 2000). However, these results should come as no surprise given some of the factors that affect the relationship between this group and academics. One such factor is African American men being often found at “the bottom of almost every academic performance indicator” (Ellis, 2004, p. 1).

To compound the educational participation issue, several authors (Hill, 2007; Hines, 1997; Hrabowski, Maton, & Greif, 1998; Moore, 2006) have also referenced a lack of African Americans, both undergraduates and graduates, who pursue careers in STEM fields. Specifically, Hill (2007) states that of all the bachelor’s degrees awarded in science and engineering, only 8.4% were awarded to African Americans and 6.1% were awarded to African American men. Also, of all the master’s degrees awarded in science and mathematics, only 6.3% were awarded to African Americans and 4% were awarded to
As a result of some of the aforementioned statistics, it seems important for African American men, educators, and researchers to better understand how those African American men who are successful in mathematics achieve success in an area not widely known for African American male achievement. For that reason, the primary objective of this study was to investigate specific reasons why some African American men are able to achieve academic success in mathematics at postsecondary institutions. Using qualitative methods, I explored the personal stories of members of this group who are effectively performing in postsecondary mathematics courses in an effort to articulate and define their beliefs about their mathematics abilities, identify the sources of their beliefs, and better understand the impact of their beliefs on their motivation and subsequent achievement.

**Theoretical Framework**

Many factors can affect student’s academic success. Motivation, which has relevance to academic achievement (Dweck, 1986; Locke & Latham, 1990; Pintrich & Schunk, 2002), is one such factor. As more understanding of this broad concept has been generated and as a result of varying perspectives, researchers of this construct and terms related to it differ on meanings (Gilman & Anderman, 2006). However, some commonly referenced characteristics of motivation include goals, drive, and persistence (Murphy & Alexander,
Motivation has and can be influenced by a variety of factors. Within the domain of academic achievement motivation, several motivational theories—self-efficacy (Bandura, 1986; Pajares, 1996); attribution theory (Weiner, 1985); and expectancy-value theory (Atkinson, 1964; Eccles, 1993; Eccles et al., 1983)—have emerged that focus on facilitators of motivation (Gilman & Anderman, 2006; Urdan & Maehr, 1995). Of these three, I have chosen self-efficacy, defined as students’ “judgments of their capabilities to organize and execute courses of action required to attain designated types of performances” (Bandura, 1986, p. 391).

Self-efficacy was chosen for a fundamental reason. Many African American students hold a less than positive perception of mathematics or their place in it (Johnson, 1984; Maholmes, 2001; Matthews, 1984; Rech, 1994). This mindset has persisted for at least two decades and clearly must be transformed before it worsens, if it has not already. For that transformation to be realized, students must be equipped with an assortment of mechanisms that could assist in their implementing some measure of control over circumstances, low teacher expectations for example, that affect their lives. Bandura (1989b) claims that the mechanism of self-efficacy has the most pervasive influence, especially for people who want to stimulate change in self and situations on their own. Due to the focus on self-efficacy, the theoretical framework that I have chosen for this study is Bandura’s (1986) social cognitive theory.
Significance

For approximately the last twenty years, scholars have noted the continued economic, social, and academic decline of African American men. Reports that associate African American men with low status across many of these domains (Ellis, 2004; Garibaldi, 1992) and others are increasingly becoming more and more commonplace. Moreover, the effects of such low performance inevitably have a resounding impact on, among other things, the economy (Ellis, 2004), which is felt in one of several ways. If left uneducated, these young men will most likely encounter unemployment and possibly resort to illegal activities. Some consequences of coping with these options include incarceration or shorter life spans. If relegated to lower levels of employment, unemployment or incarceration, then these young men will be more reliant on social services (Hrabowski et al., 1998).

However, from the perspective of those who want to see different perceptions of and outcomes for members of this group, a wider lens is necessary in order to make the reversal of such trends a reality. For some, a major question that probably needs addressing is, “Why focus on African American men?” A few scholars have posed this same question and offered their responses to it. Ellis (2004) appealed to the economic, civic, and social responsibilities of our society to change the trends among a group who is considered high-risk and at-risk. Ladson-Billings (1997) views education, specifically higher education, as the means of overturning the unemployment and incarceration tendencies. I argue that if postsecondary education is pursued, reached, and completed (with a major emphasis on completed), then the impact could be profound—a boost to our society’s economy is just one example (Polite & Davis, 1999).
The primary reason for this study’s focus on African American men is due to the need for a shift away from the deficit and negative foci that exacerbate the conditions of African American men in education by addressing more positive aspects of their capabilities in an attempt to confront and redirect the future of this group both within education and society. Education has generally been considered and promoted as the key to upward mobility, or as Hefner (2004) characterizes it, “the key to living the ‘American Dream’” (2004, p. 70). It improves both economic and social conditions (Jackson & Moore, 2006; Locke, 1999). As technological advances increase and become more sophisticated, there is a high probability that certain groups, African American men in particular, will be left behind because of their underperformance and underrepresentation in STEM fields. Although the United States is the wealthiest country in the world, its educational system has been called into question on several levels, particularly on its ineffectiveness to provide the same quality education to all of its citizens (Haycock, 2002; Russell, 2005; Steen, 1987).

Although far more students attend college, some (Education Trust, 1999) have argued that the educational system is designed to develop the minds of only a select few while the remaining are left to develop and rely on their physical attributes. Calls have been made by groups such as the National Council of Teachers of Mathematics (NCTM) for higher standards and expectations, yet those changes are not being made at a rate that is comparable to the transformations that our economy, society and world are experiencing. A glaring example of this is seen with African American men, who are more likely to be suspended or expelled (Garibaldi, 1992; Meier, Stewart, & England, 1989; Raffaele Mendez & Knoff, 2003), drop out (Garibaldi, 1992; Grantham, 2004; Pettit & Western, 2004), or find
themselves in a penal institution opposed to an academic institution (Grantham, 2004; Hefner, 2004; Pettit & Western, 2004).

Individuals who plan to engage the technological demands and advances of tomorrow must be endowed with a sound mathematical background, which establishes the foundation for those demands and advances in fields such as science and engineering as well. Yet, the possibility exists that far too many African American men may miss out on opportunities to participate and thrive in these fields. It has been well documented that White men dominate fields such as engineering and science (Hrabowski & Maton, 1995; Moore, Madison-Colmore, & Smith, 2003). In addition, their salaries outperform Black men’s by nearly $16,900 per year (Parson & Kritsonis, 2006). As a result, it is imperative that some attention turn towards disparities in education and opportunity such as these for groups such as this.

One approach to addressing disparities is to look more closely at models of success. Thus, to uncover reasons why some African American men are not missing out on opportunities to participate in STEM fields, this research investigated the question, “What is the influence of self-efficacy on the motivation of African American males and how does this influence affect their academic achievement in mathematics at the collegiate level?”

Questions guiding this investigation are:

1. How do African American males articulate their beliefs about their mathematics self-efficacy?
2. What sources do African American males identify as being conducive to their mathematics self-efficacy?
3. How do African American males explain and/or use self-efficacy’s influence on their motivation to achieve academic success in mathematics?
4. How can self-reflection be effectively incorporated into the evaluation and alteration of African American males’ thinking about and behavior towards mathematics?
Summary

This chapter has established the context for this study. In section one, I stated the problem—African American men are underrepresented and underperform in STEM fields. Section two introduced the theoretical framework, social cognitive theory, which this study used. Section three discussed the study’s significance, to address disparities in education and opportunity for African American men. Section four explicitly defined the primary research question, “What is the influence of self-efficacy on the motivation of African American males and how does this influence affect their academic achievement in mathematics at the collegiate level?”

Description of Chapters

Chapter 2 of the dissertation reviews the literature and discusses the theoretical framework. Chapter 3 describes the procedures. Chapter 4 presents the findings. Finally, Chapter 5 of the dissertation summarizes the study, discusses the findings, offers implications, addresses limitations, and presents concluding remarks.
CHAPTER 2
REVIEW OF LITERATURE

Introduction

Educating students, in general, presents its sets of challenges; however, educating African American students, and men in particular, seems to be exceptionally challenging and, in some cases, distinctive. In the area of mathematics education, a variety of factors has been identified that make educating African American men such an exceptional enterprise. Ford, Grantham, and Bailey (1999) articulated this phenomenon as follows:

Black males have unique needs and concerns that cannot be ignored or minimized. These needs differ from those of Black females, other minority groups, and White students. Too many black males experience educational disengagement because their abilities and potential have not been adequately recognized and assessed. Stereotypes, misperceptions, and fears hinder the ability of school personnel to meet the academic and socioemotional needs of gifted Black males. Equally delimiting is the use of traditional measures of intelligence and achievement, and a heavy reliance on teacher recommendation and referral. (p. 226)

Despite the challenges outlined by Ford, Grantham, and Bailey, many African American men are finding ways to persevere and achieve in the face of numerous challenges. Before devising interventions or programs intended to assist African American men, it seems important that African American men, educators, and researchers become more aware of the facilitators of success, understand the facilitators of success, test the facilitators of success, and then apply these facilitators of success. This dissertation is an attempt at the first component—establishing an awareness of some of the facilitators of success.
Probably the best way to understand why some African American men experience success in mathematics is to ask some who are achieving how they have managed to do so although statistics and literature suggest that they are at a distinctive disadvantage for success. Also, it is essential that one keep in mind that there is no single prescription for meeting the needs of all African American men. As a result, this study and its results are not to be considered the answer to reversing the academic achievement trends of all African American men, but it does support the foundation of work that has begun to examine success among this group.

African American students’ status in mathematics and science began to generate some attention during the 1970s (Johnson, 1984) and the low achievement among this group became a primary object of attention during the late 1980s (Garibaldi, 1992; Strutchens, 2000). The general focus of the low achievement research is the existence of the “achievement gap” and how to close it. Some would look at this gap in achievement and deduce an array of conclusions, some with validity and some without. A valid conclusion is that the achievement gap does provide us with some information, such as differences in achievement exist and vary. Furthermore, the achievement gap does provide perspective as to which students are prepared, or unprepared, for college and work (Education Trust, 2003); however, an invalid conclusion is that the achievement gap tells us why the differences in achievement exist. A major reason that it is impossible to tell why the differences exist is because of the assortment of factors that contribute to the gap. As a result, there is a significant amount of speculation on the gap’s evolution and continuation (Gordon & Bridglall, 2004).
Theories that have been espoused to explain why African American students do not fulfill their academic potential include a disconnect between the languages of mathematics and African American students’ language (Orr, 1987); a disconnect between the curriculum and students’ culture (Gordon & Bridglall, 2004; Tate, 1994); parents’ level of educational attainment, prejudice from schools and teachers, which may lead to differences in the quantity and quality of education received (Flowers, Milner, & Moore, 2003; Gordon & Bridglall, 2004; Sciarra, 1995); and inadequate resources, both economic and academic (Gordon & Bridglall, 2004). Yet, for African American men, the separation between them and the fulfillment of their academic potential seems more complex. In view of that, many scholars—including sociologists and educators interested in racial equity in education—are both concerned and confused on how to engage this group as it relates to educational endeavors (Hefner, 2004; Polite & Davis, 1999). It is, therefore, necessary to enhance the literature by finding, discussing, and including effective ways for meeting the academic needs of African American men. This study attempts to add to the research by identifying some of those ways through an examination of relationships between perceived ability, motivation, and academic achievement in mathematics.

The remainder of this chapter develops the agenda that guides this study. The first section discusses African American men in higher education. The second section outlines factors that have promoted academic success. The third section illustrates the mathematics participation of African American men. The fourth section discusses the motivation of African Americans men. The fifth section outlines issues in research. The sixth section describes the theoretical framework. The last section provides a summary of this chapter.
African American Men and Higher Education

Research on African American students in higher education has usually focused on two issues (Davis, 1999). The first issue concerns variations between the academic and social experiences in comparison to those of White students. The second issue concerns variations in the career and educational outcomes between students who attend an HBCU (Historically Black College and University) versus students who attend predominantly White institutions (PWI). On the other hand, little has been done that addresses gender issues in higher education or how gender impacts African American men’s experiences. Also, even less has been done that addresses the achievement of African American men in STEM fields, although there has been a shift towards research of this nature.

Pressing higher education issues for African Americans are the decision to attend and retention. It has been recognized that more African Americans are attending college and receiving degrees than in past years (Nettles & Perna, 1997; Swail, Redd, & Perna, 2003); however, they are still underrepresented in undergraduate participation and bachelor’s degrees received (Perna, 2000). With respect to gender differences among African Americans, Harvey and Anderson (2005) found that the college participation rate of African American women increased by two percentage points between 1997-99 and 2000-02; conversely, the college participation of African American men declined by two percentage points over the same period of time. Thus, some have begun to qualify this trend as the ‘feminization’ of the academy (Hefner, 2004). While it is the case that postsecondary institutions are no longer male dominated, women are also still underrepresented within certain fields, such as engineering, math, and computer science (Charles & Bradley, 2002).
In the literature that has specifically examined college enrollment behaviors across different racial/ethnic groups, some of the stated factors that affect college attendance among students of color include student support services (Thomas, Farrow, & Martinez, 1998), social climate on campus (Davis, 1994; Swail et al., 2003), academic backgrounds (Hurtado, Inkelas, Briggs, & Rhee, 1997; Jackson, 1990; Russell, 2005), academic reputation of the college or university (McDonough, Antonio, & Trent, 1997) and financial aid packages offered (Jackson, 1990). Freeman (1997), who focused primarily on African American students, conducted a qualitative study that explored the perceptions of African American high school students concerning two issues in higher education: 1) the barriers they faced in deciding to participate and 2) the solutions they would offer to augment African American participation.

Participants, n=70, came from sixteen high schools in five cities with large African American populations. Of the 70 participants, 31 were boys, 39 girls, 38 were 12th graders, 17 were 11th graders, and 15 were 10th graders. Students reported five barriers to attending college. They were: 1) lack of money to attend, 2) after completion, salaries would not be appropriate to their education level, 3) college was never presented as an option, 4) hope was loss, and 5) intimidation. To offset these barriers, students also offered the following solutions: 1) improvement of school conditions, 2) make available more interested teachers and counselors, 3) encourage possibilities earlier, and 4) enhance cultural awareness.

While Freeman did not address any similarities or differences between boys and girls, Hall and Rowan (2000) conducted focus groups that only targeted college aged, African American men in an effort to identify reasons for declines in both enrollment and graduation from postsecondary institutions. The number one responses to the five questions that the
researchers posed included the following: 1) these men were encouraged to attend college based on personal factors (n=543); 2) an overwhelming majority felt that race was the major issue faced by African American men in higher education (n=809); 3) campus environment was the biggest obstacle to enrolling and staying in college (n=215); 4) universities should diversify their populations in order to attract more African American men (n=188); and 5) mentoring would assist the academic success of African American men (n=40). As the numbers suggest, participant consistency dropped off considerably for the last three responses. Consequently, a closer examination must be taken to find alternative causes for the low participation and graduation rates of African American men from postsecondary institutions.

While the two previously mentioned studies offer some suggestions about future research directions, there is still a significant amount of work required to effectively address the higher education participation rate of African American men. Until that happens, the label of crisis still remains (Bailey, 2003; Cross & Slater, 2000; Davis, 1994; Hall & Rowan, 2000). If African American men are not participating in higher education, then they can not participate in STEM programs. The intent of this research is to develop a core understanding of how some African American men have managed success in mathematics at the postsecondary level, but it will not construct a model that illuminates differences between African American men and African American women or White men. A long-term goal of this research is to manage and alleviate the growing decline in participation.

Garibaldi (1992) has argued that one means of managing and alleviating the decline in participation is to reward academic achievement in the same manner that athletic performance is rewarded. Because of the abundance of attention that athletic performance
receives and lack of attention that academic performance receives among this group, it is clear why many African American men choose to pursue the former over the latter. A conjecture is that the allure of capital gain is a leading cause of those choices; nonetheless, it is still interesting to observe the vigor and doggedness with which these individuals pursue careers in sports where chances of success are relatively small (See Appendix C for some of the estimated probabilities of competing in athletics beyond the high school interscholastic level.). This mentality, which is so pervasive among many African American men, needs critical examination. To better understand the impact of this mentality on the academic pursuits of African American men, one only has to look at the perceptions of this group, how those perceptions come about and how those perceptions are planted and manifested in the psyche of what seems, a growing majority, of these individuals.

Many of the perceptions of African American men are a result of the media and popular culture’s portrayal. Society is frequently inundated with unconstructive, African American male images—underserved, hopeless, dysfunctional, uneducable, dangerous, endangered, highly incarcerated, highly unemployed, and incapable of being salvaged (Ellis, 2004; Entman & Rojecki, 2000; Garibaldi, 1992; Majors & Billson, 1992; Murrell, 1994; Pettit & Western, 2004). The effects of such perceptions are profound, particularly for younger, more impressionable African American boys.

These images inform African American men’s decisions as to who they can and should become, how they should behave, how they should speak, and how they should dress. Few, if any, of these images are conducive to an academic appearance; consequently, it is not surprising then that the numbers of African American men performing at optimal academic levels is so inadequate and that so many avoid academic environments (Flowers et al., 2003;
Jackson, 2003; Jackson & Moore, 2006; Okagaki, 2001), thereby missing opportunities for the development and nourishment of academic excellence. But there are some who do fulfill their academic potential in spite of the many obstacles that exist, and some very specific factors have been identified that facilitate African American male academic success.

**Facilitators of Academic Success**

In an examination of academic participation, some commonly mentioned factors that contribute to the academic achievement of African American students are family influence, peers, role models, and motivation. Family factors has been widely and generally accepted as a powerful dynamic (Johnson, 1992) on academic achievement, and numerous authors (Hrabowski et al., 1998; Johnson & Prom-Jackson, 1984; Prom-Jackson, Johnson & Wallace, 1987; Scott-Jones, 1984) have examined and found an unquestionable relationship between family factors and academic achievement. Parents’ and other family members’ attitudes and behaviors provide cues that influence the personalities of students. Familial influences set the tone for the student’s attitudes and behaviors toward academic pursuits. However, how the influence plays out can be unpredictable because while one student may adopt a parent’s negative perspective on the value of education, another may decide to reject the negative perspective and pursue educational endeavors as a means of uplifting their condition.

Literature suggests that peers also play a major role in the development of attitudes toward academics, and this is especially true for African American men. Kunjufu (1986) and Taylor (1989) reported that African American men demonstrate a tendency to deeply embed themselves in their peer groups. In fact, peer groups are the sources that African American men generally look to for support and validation (Hrabowski & Maton, 1995; Hrabowski et al., 1998). Unfortunately, among members of this group, academic excellence carries
negative connotations, is often labeled as a non-ethnic and/or feminine trait, and is vehemently rejected (Hare, 1987; Powell, 1990).

Corbin and Pruitt (1999) concur with this sentiment, but add that this phenomenon is true relative to peer groups. In other words, Corbin and Pruitt believe that different peer groups define success based on different criteria. For example, while one peer group might find value in academic achievement, another might find value in negative behaviors such as skipping class or an overall apathetic approach to education. These more negative behaviors are acceptable alternatives to the mocking and embarrassment that would come from aligning oneself with academic success (Harris & Majors, 1993).

A major theme that emerged from the literature on African American men’s success in college was the presence of a role model (Gordon & Bridglall, 2004; Hrabowski et al., 1998; Ross, 1998). African American teachers could possibly serve as the most influential role model; however, very few African Americans pursue careers in education (Rech, 1994). Taylor and Howard-Hamilton (1995) generally found that the most significant role model for this group was familial role models, specifically fathers at this stage of their lives. Mothers served as role models as well, but their influence was felt more during the earlier years (early childhood and early adolescence). Research has demonstrated that the existence of role models outside of the familial ones is sorely lacking, especially in professional fields and the university professorate (Gordon & Bridglall, 2004).

A number of factors influence men’s selection of a role model including “age, race, gender, future goals, and similarities with the model” (Corbin & Pruitt, 1999, p. 71). Taylor (1989) created a classification system for role models initially separating them into two categories: exemplary and symbolic. The exemplary role model is someone one who
provides the youth with demonstrations of how skills should be used and how jobs should be done, while the symbolic model is viewed more as a hero with specific values. Two other categories of role models were also described as having a major impact on college aged African American men; work-related and value-related models. The work-related model is someone who holds a job that the youth admires while the value-related model is someone who provides motivation and inspiration. Youth, according to Taylor, take something from each role model classification and create what she calls an ideal identity.

Hrabowski, Maton, and Greif (1998) also found role models to be a facilitating factor when observing the specific academic domain of collegiate mathematics. These authors found that parents were the biggest models because they impressed upon and demonstrated to the young men the necessity and value of education. Some of the ways that this was done was by reading to sons at an early age and having close relationships with their sons’ teachers. Again, Hrabowski, Maton, and Greif’s findings must be interpreted within the context of their setting (i.e. his specially designed math/science programs). It seems important that their findings are interpreted with reservation and give consideration to those men who are achieving without such programs.

Of the motivational factors, personal motivation has been identified as a fundamental contributor to the academic progress of African American students (Dorsey & Jackson, 1995). The motivational factors incorporated are usually in response to African American students’ awareness of the obstacles to educational attainment, racial inequalities within education, or sense of obligation to others who have supported their pursuits of educational endeavors (Flowers et al., 2003; Moore et al., 2003; Parson & Kritsonis, 2006; Sanders, 1997). For example, in Moore, Madison-Colmore, and Smith’s (2003) prove-them-wrong
syndrome, African American male engineering majors at a predominantly white university dedicated themselves to doing well in an effort to avoid disappointing members of their support systems, who were viewed as people who sacrificed and struggled to open opportunities for these young men, and as a means of disproving doubters with regard to the capabilities of African American men in engineering.

Two familiar features of the African American male experience within education include: 1) African American men are more often pushed into remedial or special education tracks (Harry & Anderson, 1995; Jones & Menchetti, 2001) and 2) African American men are significantly less likely to receive positive feedback and encouragement from the secondary education system and therefore are more likely to inflate the unpromising outlook of their current and future place in American society (Harris, 1998). Consequently, the dysfunctional and uneducable assessments (Majors & Billson, 1992) of these young boys and future men are reinforced and permeate their thoughts and actions. However, it has been shown that African American boys do want to achieve and be challenged academically (Garibaldi, 1992). Therefore, the motivation of this group is real and must be taken more seriously. To show the relevance of motivation with respect to STEM fields, I will briefly consider the participation of African American men within these domains.

Mathematics Participation

If one examines the mathematics participation of African Americans, one can quickly and easily see reasons why they are excluded from STEM fields. One reason that researchers have noted is that African American students do not participate in mathematics at the same levels as other students. They take fewer and less advanced mathematics courses in high school than White students (Catsambis, 1994; Hrabowski et al., 1998; Johnson, 1984; Stiff &
Harvey, 1988). The significance of this result is dramatic and in some cases severe (Johnson, 1984) because without the necessary foundation in college preparatory classes, such as Algebra II and pre-calculus, the options available to African American students are extremely limited once they reach college.

Revisiting some previously mentioned statistics, 6.1% of all bachelor’s degrees in science and engineering and 4% of all master’s degrees in science and mathematics were awarded to African American men (Hill, 2007). The pool is shallow, to say the least, but this can be put into a clearer context when we look at the mathematics participation in preceding years where preparation for college, math, and science are most crucial (Hrabowski, 1991; Hrabowski & Pearson, 1993). The pipeline to higher education mathematics and science has gaping holes, and, as Oakes (1990c) found, begins as early as elementary school for many African American students.

According to the 2007 mathematics National Assessment of Educational Progress (NAEP) results, among public school students, 37% of African American 4th graders are below basic and 53% of African American 8th graders are below basic; on the other hand, 15% of African American 4th graders are at or above proficient, 11% of African American 8th graders are at or above proficient, and only 1% from each group are at an advanced level. Furthermore, across five demographic groups, Black students maintained the lowest average scale score in both the 4th and 8th grades, and Black boys maintained the lowest average scale scores across gender and race/ethnicity in both the 4th and 8th grades. These tendencies persist throughout middle and high school (Oakes, 1990c). As a result, by the time these students get to high school, where they have more choice and where they can free themselves from low achievement, they are off the track to college mathematics and other mathematics
based fields. Consequently, many of them choose to pursue fields such as business, the social sciences, psychology, or health professions (Hoffman & Llagas, 2003).

However, even for those African American students who do go on to participate in higher education mathematics, they usually repeat previously taken classes because they are unprepared to manage the academic mandates and challenges of collegiate courses in general (Cuyjet, 1997). In addition, they are more likely to be placed in remedial courses, which take the form of an intervention program whose intent is to strengthen the mathematical weaknesses of these students. The primary strategy used by these programs is a concentrated focus on problem solving skills and less attention to procedural knowledge and rote memorization. However, a major shortcoming of intervention programs is that they often identify students who would benefit from these programs, but do not always identify students who are exceptionally gifted (Gordon & Bridglall, 2004) and who would do well without these programs. As a result, it is not certain whether these programs actually assist African American students, or African American men for that matter, to increase their mathematics ability or increase their confidence in their abilities (Fullilove & Treisman, 1990).

Initiatives must be put in place that will help underrepresented cultures both realize and comprehend the impact of mathematics upon potential career alternatives (Anderson, 1990). Too many students do not fully understand how mathematics serves as a doorkeeper to both college and lucrative employment opportunities (Polite & Davis, 1999) and that shortcomings in mathematics lead to shortcomings in other areas (Haycock, 2002). This is especially true for African American men. Without the necessary exposure to and preparation in mathematics, African American men will drastically reduce their chances of becoming scientists, engineers, physicians, or economists. In addition, as society changes,
possibilities in other non-science and mathematics related fields will be greatly reduced as well because of a lack of the analytical reasoning skills, which mathematics develops, that are required in those professions (Seels, 1980). It is here where motivation is relevant.

Motivation

In mathematics, which has been characterized as a difficult and problematic domain, suggestions have been made that understanding students’ motivational dimensions within such a domain could help expose developments in learning (Murphy & Alexander, 2000). What is known for certain about African American men in mathematics is that this group is not performing as well as they could or should. This does not have to remain the standard, however, because other perceptions of this group can be generated using different methods, different perspectives, and a focus on individuals before making more global generalizations about the capacities and possibilities of this group as a whole.

Underperformance, at times, is a reflection of the amount of effort that an individual puts into an endeavor. That effort is largely influenced by the individual’s motivation, which, for African American men, comes from different sources—race (Fries-Britt, 1998), perceptions (Flowers et al., 2003), and qualified teachers coupled with adequate resources (Gordon & Bridglall, 2004). Other explorations into motivation reveal that it not only exposes reasons for academic persistence, but academic abstinence as well. In the case of African American men, many abstain because it is not socially acceptable. For this segment, education is “an unnecessary barrier that stands between them and making fast money” (Hefner, 2004, p. 70). Still others abstain because they doubt their abilities.

Additional explanations that have been offered include early childhood experiences, lack of encouragement (Cooper, 1983; Johnson & Kritsonis, 2006; Reyes & Stanic, 1985),
academic and career counseling received in high school, their teachers’ preparation, and lack of exposure to a college-prep curriculum (Hefner, 2004). Whatever the cause(s) may be, ultimately, motivation is the product of an individual’s belief in their abilities to engage a task and complete that task or as Bandura (1989a) claims, “…to exercise control over events that affect their lives” (p. 1175). Thus, the question to ask at this juncture is the following, “What is known about the motivational dimensions of African Americans?”

Graham (1994) reviewed approximately 140 empirical studies on the motivation of African American students and found that the conclusions were not consistent with the assumptions. One assumption was that African Americans lack key personality traits required for achievement. This assumption yields inconsistent findings as a result of the markers used to measure achievement (Kaplan & Maehr, 1999b). For example, while indicators such as grades and graduation rates have suggested that African Americans’ achievement is low in comparison to Whites (Allen, 1988), other indicators such as an individual’s willingness to master the skills required for academic tasks, known as learning goal orientation (Pintrich, 2000), show a positive relationship to African Americans’ achievement (Kaplan & Maehr, 1999a). Kaplan (1998) and Maehr (1998) have argued for increased emphasis on task goals as a catalyst for motivation, particularly among students in culturally diverse environments where perception (Fordham, 1988; Fordham & Ogbu, 1986; Ogbu, 1992) and social context (Steele, 1992; Steele & Aronson, 1995) have a significant impact on motivation and achievement.

A second assumption was that African Americans believe less in internal or external controls of outcomes. Locus of control is a person’s beliefs about the effects of outcomes, successes and failures (Rotter, 1966). Internal locus of control refers to an individual’s belief
that outcomes are dependent on their actions, such as effort or preparation; however, external locus of control refers to an individual’s belief that outcomes are dependent on outside circumstances, such as fairness or difficulty of an assignment.

There is no consensus among social scientists about the influence of locus of control on academic achievement (Mickelson, 1990). It also appears that the direction of causality is uncertain. Using Rotter’s locus of control scale, Farley, Cohen, and Foster (1976) compared the perceived locus of control of 30 undergraduate men (fifteen Black, fifteen White). They examined the relationship between the predictive variables (income, need-for-approval, and field dependence) and locus of control. The researchers concluded that the variables income and need-for-approval held the most predictive power for Blacks, but none for Whites; moreover, need-for-approval, surprisingly, was associated with internal locus of control. While Farley et al. used locus of control as the dependent variable, Gifford, Briceno-Perriott, and Mianzo (2006) used it as the independent variable to predict academic success for 3,066 college freshmen (1,448 men, 1,618 women, 2,580 Whites, 484 minorities, 2 other). They found that male undergraduates were more motivated internally than female undergraduates, and White freshmen were more motivated internally than the students of color. However, this information does not yield a definitive response regarding the locus of control of African Americans nor African American male undergraduates.

A third assumption was that African Americans possess negative self-views about their ability. This assumption has been resoundingly refuted. Remarkably, it has been shown that even when African American students receive low scores in mathematics, some demonstrate an extremely positive perception of their abilities in mathematics (Clewell & Anderson, 1991; Graham, 1994; Mickelson, 1990; Oakes, 1990c; Pajares & Kranzler, 1995). In a study
designed to outline gender differences in mathematics learning opportunities, achievement, and choice among White, African American, and Latino students, Catsambis (1994) used data taken from the National Educational Longitudinal Study of 1988 on a sample of eighth-grade students who were resurveyed as tenth-graders. Catsambis found that, although African American men experienced the biggest drop in mathematics test scores from eighth to tenth grade, over 70% of those in this study stated that mathematics was their favorite subject and that they had always done well in it. However, Catsambis was unable to identify reasons for differences among groups and looked to socioeconomic status and parental involvement as possible explanations.

Due to the inconclusiveness as it pertains to the motivational dimensions of African Americans, Graham (1994) articulated six principles, which were to guide future directions in research on the motivational psychology of African Americans. Hence, Graham states, a motivational psychology for African Americans 1) must incorporate a range of cognitive and affective determinants of behavior, 2) must be particularly sensitive to the dynamics of failure, 3) must acknowledge the complex relations between race and social class in this society, 4) should address the socialization (childrearing) antecedents of achievement strivings, 5) should be able to contribute to the understanding of general principles of human behavior, and 6) explicitly be concerned with the self. For this research, the concern with self is the principle of choice.

Graham (1994) asserts that an abundance of psychological research involving African American populations is centered on the concept of self. Research has discussed, among other self concepts, self-esteem (Constantine & Blackmon, 2002; Owens, Mortimer, & Finch, 1996; Schmader, Major, & Granzow, 2002), racial identity (Bonner, 1997; Johnson, Crosnoe,
& Elder, 2001; Resnicow & Ross-Gaddy, 1997; Thompson, 2001), and perception of ability (Kaplan & Maehr, 1999b; Snead & Young, 2003). I contend that self-perception of ability is a key principle that provides a lens, which may capture rich information, on the motivation of African Americans, boys and men in particular. My reasoning is based on Bandura’s (1986; 1989a) claim that a positive sense of personal perception of ability is a necessary condition for human achievement and constructive interests.

This is because ordinary social realities are strewn with difficulties. They are full of impediments, failures, adversities, setbacks, frustrations, and inequities. People must have a robust sense of personal efficacy to sustain the perseverant effort needed to succeed. …Because the acquisition of knowledge and competencies usually requires sustained effort in the face of difficulties and setbacks, it is resiliency of self-belief that counts. (Bandura, 1989a, p. 1176)

The social realities of African American men are far from ordinary and overly rife with difficulties. Consequently, their impediments, failures, adversities, setbacks, frustrations, and inequities are magnified. For a group that faces possibly the greatest challenges in education, research should be conducted, and made readily available, that offers feasible solutions to neutralize the negative perceptions of, what seems, a growing majority of this group’s members.

Issues in Research

In the literature that addresses African American male issues within education, there are several concerns that deserve instant attention. First, the focus of the research must change. Too often the concentration of research on African American men is on failure (Thompson & Lewis, 2005) or deficit (Ross, 1998). This concentration leads to perceptions that African American men in conjunction with positive academic achievement, which is given little attention (Spurgeon & Myers, 2004), is an anomaly.
In an effort to examine the quantity of literature on gifted minority students, Ford, Baytops, and Harmon (1997) searched the Educational Resources Information Center (ERIC) database and found that between 1966 and 1996, 795 out of 9,801 (approximately 8%) articles focused on giftedness among minority students. A deeper examination revealed that of these articles, only 491 (approximately 5%) focused on African American students.

This genre of research has minimal or significant benefits to the conditions that infect and erode African American male pursuits of academic achievement or any other aspect of their academic development. It actually helps perpetuate the feelings of futility that these young men have concerning their futures in academics in general and STEM fields in particular. However, there has been a call for more research that encourages empowerment among this group (Parson & Kritsonis, 2006). This is necessary at all levels of the educational pipeline, including higher education.

A second issue in research is the absence of literature that specifically targets African American men. Of the few researchers who have provided in depth analysis of African American male achievement in collegiate mathematics, Hrabowski and Maton (1995) and Hrabowski, Maton, and Greif (1998), provide one of the most thorough explanations of the barriers to achievement and factors of success for this group. Beginning with barriers to achievement, Hrabowski, Maton, and Greif (1998) cited four major obstacles for the participants in their study. First was poor academic preparation. A number of these students came to college deficient in the problem solving skills necessary to be effective in collegiate mathematics. Second, these students lacked individual motivation, held no basic interest in mathematics, and were not accustomed to having any academic support. Third, the students lacked appropriate monitoring and advising. Students were enrolled in the wrong courses or
in too many courses simultaneously, which negatively impacted their abilities to manage their time effectively. Finally, these students lacked the adaptive social and academic integration skills that are essential to forming strong and positive relationships with their peers.

Conversely, Hrabowski, Maton, and Greif stated five areas, which they viewed as facilitators of African American male academic achievement in mathematics at the collegiate level. Those facilitators included the following: 1) parents reading to their sons at an early age, 2) parents’ view that education is both necessary and valuable, 3) a close relationship between the parents and the teachers, 4) considerable verbal praise, and 5) strong parental support for their son’s homework.

In a separate attempt to address the calculus performance of African American students, but not men explicitly, Treisman (1992) suggested that studying in isolation was a major challenge to performing well in mathematics at the collegiate level; however, he went on to attribute African American students’ poor performance to factors internal to the students (like poor academic preparation, low income, lack of parental support, and lack of motivation) as opposed to any systemic, external factors. There is a fundamental difference between the work of Treisman and Hrabowski, Maton, and Greif. Stated succinctly, despite highlighting similar barriers to success, Treisman refers to them as intrinsic problems while Hrabowski, Maton, and Greif acknowledge them as extrinsic, institutional challenges to student learning.

A third issue is the hypothesis that African American men can not perform in mathematics. A major assumption that sets the foundation of this research is that African American men are capable of performing well in mathematics. Whether this is possible or whether it exists is not a question. Scholars such as Ladson-Billings (1994), Martin (2000),
Hrabowski, Maton, and Greif (1998), Jackson (2003), and Moore, Madison-Colmore, and Smith (2003) have provided examples of success in an effort to make these individuals and their stories more accessible to researchers, educators, and students. Within this more unconventional body of literature, which seeks to examine the positives among African American men, researchers have uncovered a source of information that could significantly balance the negative literature that is produced, significantly alter the future of young black boys, and significantly impact every aspect of American society as we know it. And that information comes from the experiences and voices of African American men who are, as Hrabowski et al. (1998) claim, “beating the odds.”

Obviously, some situations will be unique to individuals; however, the combined stories of these young men can serve as counterexamples to the proliferation of negative outcomes in research on African American men (Ross, 1998). In addition, the stories of these young men may serve as positive models from which future generations of African American men might evolve. Consequently, these future generations can be outfitted with a powerful knowledge base to use to neutralize the more prevalent negative perceptions of their group.

One prevailing negative perception is the manner in which socioeconomic status and motivation are used to describe academic achievement. In developing his study, Treisman (1992) used the assumptions that African American students were failing because they were from lower income families and unmotivated; however, he discovered that the students wanted to learn and low income was inconsequential to that occurring. These were, as Hilliard (2003) pointed out, challenges to the opportunity to learn and not problems with the students’ capacity to learn. Furthermore, with regard to the low income assumption, both
Hilliard and Steele (2003; 1999) point out that there is a significant segment of the African American middle-class student population that is underperforming.

It is widely known that African American men are not lacking in motivation, as demonstrated by their drive and determination in pursuing non-academic pursuits. But these young men must be shown how their motivation in those areas is transferable to academic pursuits as well. Yet, this transfer is not occurring for various reasons, such as low expectations; acceptance of low performance as the norm; and lowering of standards that are already minimal at best. More should be required from the students by their parents, their educators, researchers, and the students as well. Whiting (2006) summarizes this idea with the following point:

Just as many Black males find their self-efficacy in nonacademic settings (sports, music, and entertainment settings), they are equally capable of finding their identity in school settings. To break the cycle of poor achievement and school apathy, these young men can and must find their identity—their niche and pride—in school settings. (p. 226)

Although attention is being brought to the issue of African American men in STEM programs (Jackson & Moore, 2006; Moore, 2005; Moore et al., 2003), few, if any, works have specifically investigated the role of self-efficacy’s influence on these young men’s motivation to achieve academic success within mathematics. Accordingly, natural questions that arise include some of the following: What are some distinguishing characteristics of academically successful African American male self-efficacy? Do African American men consider the impact of their mathematics self-efficacy on their academic achievement? If so, how is this beneficial to their continued success? Can reflection on their mathematics self-efficacy be used to empower these young men within this discipline?
There is a growing need to address the academic conditions of African American men. Parson and Kritsonis (2006) state, “In order to progress, young African American males must be offered ways of thinking above and beyond their current dilemma and taught to refuse to accept definitions of them within a paradigm that seeks their self-destruction” (p. 3). Self-efficacy offers a framework because it has been demonstrated to have a great impact on individuals’ success; moreover, evidence suggests that individuals with high self-efficacy seek and persist until they succeed (Bandura, 1986, 1989b).

Like the growing body of research that examines women’s self-efficacy in math and science, careful examination of African American men in math and science should be given attention as well. This research does so by investigating how self-efficacy among mathematically successful African American men has impacted their motivation to succeed. I used the experiences and descriptions given by African American men to help generate ideas. Like Moore (2006), an aim of this investigation is to provide useful data to individuals who work with African American male students in an effort to encourage and enhance the interest of members of this group in mathematics and/or mathematics-related fields. In addition, it seeks to provide an opportunity for role models, which literature suggests are sorely missing, to emerge. Bandura (1982) has shown that self-efficacy can be enhanced through exposure to preferred, modeled behavior, which could come from role models and peers. In view of that, if a goal of future research is to assist African American men in fulfilling their academic potential in mathematics and if it is known that African American men are influenced by role models and peers, then it seems that the examination of self-efficacy would help in this endeavor.
Social Cognitive Theory

The theoretical framework guiding this study is Bandura’s (1986) social cognitive theory, which asserts the following:

…people are neither driven by inner forces nor automatically shaped and controlled by external stimuli. Rather, human functioning is explained in terms of a model of triadic reciprocality in which behavior, cognitive and other personal factors, and environmental events all operate as interacting determinants of each other. (p. 18)

Humans do not acquire knowledge through their own actions alone, but learn their behavior by observing the behaviors of others, the consequences of others’ behavior, and modeling, which “has always been acknowledged to be one of the most powerful means of transmitting values, attitudes, and patterns of thought and behavior” (Bandura, 1986, pp. 47-48).

Modeling has been conceptualized as imitation (Rosenthal & Zimmerman, 1978), a process where the actions of one organism are mimicked by another. The Greeks used imitation (mimesis) to represent learning that was the direct product of emulating observed behaviors. However, in the framework of social learning, Bandura (1965) made a distinction between imitative performance and observational learning, or vicarious acquisition. He concluded that acquisition is a result of both observation and cognitive processing, while imitative performance is induced by directly observed and self-generated outcomes.

Observational learning involves four subprocesses: attention, retention, production, and motivation (Bandura, 1986; Rotter, Chance, & Phares, 1972). Attention allows an observer to explore and perceive modeled activities. Unless a person can selectively attend to and accurately extract the crucial components of overt events, then they cannot learn much. Retention refers to an observer’s ability to recognize and recall information about some activity that has been modeled. In the absence of the modeled person, observers must be able
to somehow represent the modeled behavior a symbolic form in their memory. Production refers to the conversion of the symbolic forms to suitable actions. Finally, motivation refers to the idea that people never use all of the skills they acquire through observation, but will translate previously unexpressed knowledge into action if positive incentives are provided.

In an effort to describe, in intricate social situations, human behavior, Rotter (1954) provides a theory of social learning, which claims, “The major or basic modes of behaving are learned in social situations and are inextricably fused with needs requiring for their satisfaction the mediation of other persons” (Rotter, 1954, p. 84). Originally, Rotter identified three basic components of social learning theory. They were behavior potential, expectancy, and reinforcement value. However, he discusses a fourth, the psychological situation, in a broader context, and Rotter, Chance, and Phares (1972) discuss the four together as the components of social learning theory.

Behavior potential is “the potentiality of any behavior’s occurring in any given situation or situations as calculated in relation to any single reinforcement or set of reinforcements” (p. 12). Expectancy is “the probability held by the individual that a particular reinforcement will occur as a function of a specific behavior on his part in a specific situation or situations” (p. 12). Reinforcement value is “the degree of the person’s preference for that reinforcement to occur if the possibilities of occurrence of all alternatives are equal” (p. 12), which is the degree to which an individual values one outcome over others. The final component is the psychological situation, which refers to the ways in which individuals view a particular context. A person selectively responds to different stimuli, and the reaction is usually in conjunction with that person’s past experiences; in addition, the different stimuli, internal or external, influence each other.
From Rotter’s theory, insights can be obtained into motivational influences (Schunk et al., 2008). In addition to many of the concepts included in social learning theory, social cognitive theory expands social learning theory and also incorporates self-efficacy and self-regulatory processes. Social cognitive theory is based on a conceptual model of triadic reciprocality, in which behavior, cognitive and other personal factors, and environmental factors all act as determinants of each other (Bandura, 1977). The relationships between behavior, personal factors, and environment are represented in the following diagram:

![Diagram](image)

An important feature of this schema is that all three relationships are not of equal strength and all three relationships do not necessarily occur at the same time (Bandura, 1989b).

This theoretical perspective characterizes people in terms of five basic capabilities—symbolizing, vicarious, forethought, self-regulatory, or self-reflective. Symbolizing capability refers to an individual’s use of symbols to understand and manage their
environments. Vicarious capability refers to an individual’s expansion of their knowledge and skills through observing and modeling others’ behaviors. Forethought capability refers to the process an individual engages when they anticipate the consequences of actions, set goals, and plan courses that will achieve a desired outcome. Self-regulatory capability refers to an individual’s shift in focus from meeting external demands to meeting internal demands, which then serve as the primary source of motivation. Self-reflective capability refers to an individual’s analysis of their experiences and thought processes.

In social cognitive theory, there are three mechanisms of motivation—self-efficacy, goals, and self-evaluation (Bandura, 1986). For this research, I was interested in self-efficacy and its influence on the motivation of African American men to achieve academically in collegiate mathematics. Bandura (1989b) primarily discusses self-efficacy within three of the five capabilities—vicarious, self-regulatory, and self-reflective. Schunk and Pajares (2002) have shown that self-efficacy influences the types of tasks chosen, perseverance with tasks, and expenditure of effort on tasks. When students perform tasks successfully and come closer to obtaining a goal, their self-efficacy is enhanced (Schunk et al., 2008). A fundamental characteristic of this process is that students are able to assess their progress. Bandura (1989b) claims that “accurate appraisal of one’s own capabilities is highly advantageous and often essential for effective functioning” (p. 61).

Bandura’s (1986) concept of self-efficacy has been used within the field of educational research as a means of exploring, among other things, the relationships that exist between it and motivation, academic performance, and achievement (Betz & Hackett, 1983b; O’Brien, Martinez-Pons, & Kopala, 1999). Specifically, this research is interested in African American male mathematics self-efficacy, which will be described as the assessments of
their abilities to construct and implement an action plan that pursues and accomplishes academic achievement within the discipline of mathematics.

Bandura (1989a) has outlined self-efficacy’s profound impact on several self processes—cognitive (thought patterns), affective (stress and depression), selection (choice and construction of environments), and motivational (amount of effort exerted and persistence despite impediments). In cognitive processes, more efficacious individuals can visualize themselves successfully completing an activity, which consequently improves future outcomes (Bandura, 1986; Corbin, 1972). In affective processes, less efficacious individuals experience distress, which impairs their functioning levels (Lazarus & Folkman, 1984). In selection processes, more efficacious individuals prepare better educationally and deem themselves capable in a broader array of career alternatives (Betz & Hackett, 1986; Lent & Hackett, 1987). In motivational processes, more efficacious individuals demonstrate more advanced efforts to overcome challenges (Cervone & Peake, 1986; Jacobs, Prentice-Dunn, & Rogers, 1984).

Social cognitive theory outlines four sources of information on self-efficacy. They are enactive attainments, vicarious experience, verbal persuasion, and physiological state. Enactive attainments refer to the effects of experiences on efficacy; accordingly, prior success can elevate efficacy while prior failure can lower efficacy. However, individuals must balance several factors—ability, non-ability, achievement success/failure, effort, task difficulty—before judging their self-efficacy. Another attribute that has an impact on one’s self-efficacy is the manner in which the individual monitors their own performances. If one selectively chooses, for example, to focus on good performances, then there exists the potential to increase perceptions of their self-efficacy and vice versa.
Vicarious experience occurs when an individual believes in their ability to achieve certain results after observing other people, similar to them, who have engaged in the same activity and have acquired success. Vicarious experiences may have profound influence(s) on an individual’s performance. Social comparisons are a fundamental feature of vicarious experience and greatly affect the choice and proficiency of models. From these models, strategies, such as coping, are learned that help increase efficacy. Moreover, models are very useful when learning more complex skills.

Verbal persuasion is used to convince people that they possess the characteristics necessary to achieve a certain outcome. This influences whether an individual sustains efforts to achieve a desired goal. Those who provide the verbal persuasion have to be deemed competent enough, by the person who is receiving the persuasion, to evaluate the characteristics.

A person’s physiological state provides arousal cues which the person uses to infer their ability to achieve a particular outcome. The inference is based on that individual’s judgment and also factors in things such as circumstances involved in the arousal, past experiences on the relationship between certain arousals and performance attainment, and evaluation of the arousal source.

There have been three primary areas in which self-efficacy researchers have focused their attentions (Pajares, 1997). They include: exploring the relationship between efficacy beliefs and choice of majors (Betz & Hackett, 1983a), exploring the relationship between teachers’ efficacy and their instructional practices and student outcomes (Ashton & Webb, 1986), and exploring the relationships between self-efficacy and motivation, academic performance,
Research conducted on self-efficacy has made several revelations. First, self-efficacy positively influences academic classroom achievement and performance on math exams (Pajares, 1996; Pajares & Graham, 1999; Pajares & Kranzler, 1995). Using multiple regression analyses, Pajares and Graham controlled for other motivation variables—such as anxiety, value, and bias—that are known to predict math performance. In their study, the researchers found that self-efficacy independently contributed to the prediction of math performance. The influence of self-efficacy on mathematics performance was consistent at varying grade levels—sixth grade students for Pajares and Graham and high school students for Pajares and Kranzler.

These findings support Bandura’s (1986) claim that perceived self-efficacy can operate as a principal contributor to students’ academic progress because, as Bandura (1989b) further asserts, people assume an active role in their motivation and a major influencing factor to motivation is an individual’s perceived self-efficacy. Bandura’s claim is based on work done by Csikszentmihalyi (1979) who concluded that lasting self-motivation is greatly affected by personal challenges that are in tune with perceived capabilities. Moreover, what an individual desires to know in conjunction with their self-efficacy selectively influences which activities an individual will actively pursue (Bandura, 1989b). Hence, if an individual has a desire to understand mathematics and has positive mathematics self-efficacy, then theory suggests that this person could potentially choose and pursue academic achievement in mathematics.
Second, the source that has the strongest contribution on self-efficacy is enactive attainments (Lopez & Lent, 1992), which also supports Bandura’s claim that past experience is the most important of the four sources of self-efficacy. However, there has been conflict in the findings on the effects of self-efficacy across gender and ethnicity (Caraway, Tucker, Reinke, & Hall, 2003; Stevens et al., 2004). Some studies (Betz & Hackett, 1983b; O’Brien et al., 1999) have shown that the self-efficacy of male undergraduates is higher than that of female undergraduates. However, Hall and Ponton (2005) found, using independent t-tests, no significant difference based on gender, and their results were consistent across two subjects—Calculus I and Intermediate Algebra.

Research specifically designed for African American populations is still developing; appropriately, it is rather inconclusive. Although Post, Stewart, and Smith (1991) generated support for the claim that the self-efficacy of African American male undergraduates is higher than that of African American female undergraduates, the sources of African Americans’ self-efficacy is still unclear and other studies have only been able to suggest directions in which this research should proceed. For example, using descriptive statistics and correlational matrix analysis, Attaway and Bry (2004) examined the association between parenting style and academic achievement. They found that there was a significant relationship between the GPAs of adolescents, age 11 to 19, and parents, specifically mothers, with high beliefs in control. The researchers could only infer that complete parent control with minimal child input may lead to reduction in self-efficacy. This relationship leads to low engagement, and, in turn, leads to low academic achievement. Conversely, they were uncertain of the direction of causality for the relationship between parental belief in
control and low achievement. Furthermore, fathers were excluded from the study, thereby creating a void in the study, its findings, and any conclusions made.

The magnitude of African American students’ self-efficacy and its influence are also unclear. When compared across race, Graham (1994) has demonstrated that African American students are highly optimistic and have positive self-regard when it comes to their expectancy beliefs. Furthermore, this is the case even when these students encounter academic failure. Yet, research reveals that African Americans who are positive about their math self-concepts can still demonstrate lower mathematics self-efficacy (Pajares & Kranzler, 1995).

Although Graham (1994) has called for more research studies on self-efficacy’s effects on motivational factors in regard to race, little has been done. As the attention to the representation of African American men in academics becomes more focused, one must recognize that there are a variety of perspectives from which to examine this phenomenon. Whiting (2006) brings some of these issues to light by asking questions such as, “Why do so many Black men attempt to find their identities on the athletic field and in the entertainment industry? Why do so few find their identities, their self-efficacy, and sources of pride in academic settings?” (pp. 223-224).

To address such questions, Whiting hypothesized that in order to understand African American men’s lack of achievement and representation in gifted programs, one needs to examine their scholar identity—the perception of themselves as students. Moreover, in Whiting’s conceptual model of scholar identity (see Figure 1 below), self-efficacy is the foundation of the existence of a positive scholar identity.
Whiting further maintains that self-efficacy assists African American men in deconstructing and rejecting stereotypes, assists their perseverance in the face of challenges or impediments, and encourages their quest for academic challenges. A very subtle point should be made here and that is these characteristics are reflective of older Black men who possess a developed sense of self-efficacy. Questions that then emerge from this perspective include the following: 1) How does self-efficacy develop over time? 2) By what stage (or at what age) do we see the emergence of African American male self-efficacy? 3) How do we disseminate the information gathered from knowing this information in a meaningful and useful manner to parents, researchers, educators, and students?
Other conclusive findings from self-efficacy research are 1) there is a strong relationship between self-efficacy and college students’ choice of career and choice of a major at the undergraduate level (Betz & Hackett, 1983a, 1986; Hackett & Betz, 1989b) and 2) most students are overconfident in their abilities to do mathematics (Hackett & Betz, 1989b; Pajares & Kranzler, 1995). Yet, there are minimal studies that confirm or refute these claims with respect to African American men.

As a theoretical framework, social cognitive theory is appropriate for this study because several social cognitive researchers (Bandura, 1997; Hackett & Betz, 1989a; Pajares, 1996) have gathered some valuable information by examining the self-efficacy of women, an underrepresented group in mathematics-related fields. Using their work as a guide, I will investigate self-efficacy’s influence on the motivation of African American men, another underrepresented group in mathematics-related fields. I am particularly interested in examining more closely one aspect of Bandura’s model of triadic reciprocality due to the concentration on the relationship between self-efficacy, a personal characteristic, and academic achievement, a behavior characteristic. Primarily, I used this model to determine how the participants’ self-efficacy affected their choice of interests, perseverance, and effort as it specifically pertains to collegiate mathematics. Through a qualitative process, I plan to provide evidence that supports or rejects the claims of this theoretical framework.

The principal question in this research was, “What is the influence of self-efficacy on the motivation of African American males and how does this influence affect their academic achievement in mathematics at the collegiate level?” This study examined six African American men’s beliefs in their mathematics abilities in an effort to uncover motivational
characteristics that contributed to their academic success in mathematics at the postsecondary level. The four questions guiding this research are:

1. How do African American males articulate their beliefs about their mathematics self-efficacy?
2. What sources do African American males identify as being conducive to their mathematics self-efficacy?
3. How do African American males explain and/or use self-efficacy’s influence on their motivation to achieve academic success in mathematics?
4. How can self-reflection be effectively incorporated into the evaluation and alteration of African American males’ thinking about and behavior towards mathematics?

Summary

The literature review began by acknowledging that there are a number of educational challenges that African American men face. One challenge is their dismal participation in higher education. However, it has been found that family, peers, role models, and motivation can promote the success of this group in higher education. Similar to the higher education participation, the mathematics participation of African American men is also low. Although we might look to motivation to help explain some of the indifference towards mathematics, findings are inconsistent. An assumption of this study is that motivation is a crucial component to understanding mathematics participation; consequently, more attention should be devoted to research in self-efficacy, which has been shown to influence academic classroom achievement and performance on mathematics exams. Finally, greater attention and more responsible efforts should be allocated to the educational issues confronting African American men.
CHAPTER 3

METHODOLOGY

This chapter addresses the methods and research design used in this study in six sections. The first section describes the research design. The second section describes the research strategies. The third section provides a brief description of the participants’ institutions and the participants. The fourth section includes a description of the instruments used, procedures for data collection, and data interpretation and analysis. The last section provides a summary of this chapter.

Research Design

This research was designed as a qualitative study. Qualitative research is defined as “a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem” (Creswell, 2009, p. 4). Qualitative research usually focuses on the socially constructed meanings of individuals and recognizes the complexity of certain situations (Creswell, 2009; Glesne, 1999).

The objective of qualitative research depends on the researcher’s notion of what constitutes important information and their perspective of reality (Glesne, 1999). Some have called this ontology (Glesne, 1999), paradigms (Lincoln & Guba, 2000), or worldviews (Creswell, 2009), which are defined as “a basic set of beliefs that guide action” (Guba, 1990, p. 17). Creswell (2009) identifies four worldviews—postpositivism, constructivism, advocacy/participatory, and pragmatism. The worldview proposed in this research is
constructivism, which holds several assumptions—1) individuals search for meaning in their lived world, 2) there are numerous meanings, which are also diverse, and 3) the meanings individuals develop about their experiences are subjective. Thus, some of the goals of the researcher, who is the main research instrument (Glesne, 1999), are to depend on the perspectives of the participants and to examine these multifaceted experiences and interpret them based on the researcher’s own background and experiences (Creswell, 2009; Crotty, 1998). To create the interpretations, the researcher must access individuals’ numerous and diverse meanings through in-depth interactions with them (Glesne, 1999).

Qualitative methods were used for several reasons. First, there is an abundance of quantitative studies in self-efficacy research, which seem to be used as a predictive mechanism, but making predictions is not the purpose of this research. Since relatively little is known about the self-efficacy beliefs of African American men, it can not be accurately measured. Before any measurements can occur, some elements of this group’s mathematics self-efficacy must be identified, which comes from asking questions that provide an opportunity for more detailed description (Zeldin & Pajares, 2000) and that produce deeper insights (Pajares, 1996). Second, I wanted to understand the various and complex realities of the educational histories of African American men in early adulthood. This group is not homogeneous and their experiences, therefore, can not be divided into discrete variables (Glesne, 1999). Thus, it was important to focus on each participant’s perceptions of his academic world and his place in it. Finally, it was important to collaborate with African American men to access valuable knowledge concerning their feelings towards academia. This was important to do because recommendations of any kind that affect the condition of a particular group can not be made in earnest without some meaningful contributions of
members of that group. Thus, the study was designed to hear the participants’ perspectives of their mathematics self-efficacy by providing opportunities to define, discuss, and reflect on their beliefs in their mathematics abilities, the sources of their beliefs, and the impact of their beliefs on their motivation and academic achievement in mathematics.

Research Strategy

The strategy for this qualitative study is culturally appropriate research methods, which were chosen for several reasons. First, Tillman (2002) asserts that these methods make use of both the cultural knowledge and experiences of the researcher and those of the subjects in all facets of the research design including data collection and analysis. Second, these important features not only account for the complexity and inter-relatedness of African Americans (Boykin, 1994), but can also be used to propose change (Kershaw, 1990).

One of the principal assumptions of culturally appropriate research methods is that there exists a shared and collective knowledge among African Americans (Tillman, 2002). In order to uncover that knowledge, she employs two conceptual frameworks, Dillard’s (2000) endarkened feminist epistemology and Kershaw’s (1990) Afrocentric emancipatory methodology and suggests that culturally appropriate research methods is characterized by five attributes: 1) culturally congruent research methods—qualitative, but can be quantitative, research that includes interviews and participant observations as a means to gain a holistic representation of the African American experience, 2) resistance to theoretical dominance—goal is to reveal, understand, and respond to unequal power structures, 3) culturally sensitive data interpretations—legitimize the knowledge and experiences of the both the researcher and the researched, 4) informed theory and practice—promote new theories and practices that are specific to the African American experience, and 5) culturally
specific knowledge—use of self-defined experiences of African Americans. Culturally appropriate research methods are applicable to this research in all of the manners outlined by Kershaw.

Each of those key factors is relevant to this research. First, with respect to culturally congruent research methods, culturally appropriate research methods are applicable to this research because most of the literature relevant to this work uses qualitative methods to capture the experiences of their subjects. Those researchers appear to understand the importance of the voices of the researched as a means of capturing the essence of the African American experience in education and in society. This is in alignment with Boykin’s (1994) dimension of oral tradition in African American culture.

Second, with respect to resistance to theoretical dominance, culturally appropriate research methods are applicable to this research because of an evolving social consciousness, which detects the perceptions of African American men that persist in media and research. For example, from the work of Martin (2000), Hrabowski and Maton (1995), and Hrabowski, Maton, and Greif (1998), African American male achievement in mathematics exists; however, what is uncertain is how and why it is happening in its different domains. Popular perceptions suggest that the African American man is to be associated with sports and entertainment (Hrabowski III et al., 1998) and is to be described as dysfunctional, uneducable, and dangerous (Majors & Billson, 1992). However, it is important to display and expand the variety that exists and persists among this group.

Third, with respect to culturally sensitive data interpretations, culturally appropriate research methods are applicable to this research because the knowledge and experiences of
the both the researcher and the researched generated and guided this research. Student input may lead to other considerations for addressing their needs.

Fourth, with respect to informed theory and practice, culturally appropriate research methods are applicable to this research because of its attempt to overlay an alternative theory, self-efficacy, onto the African American academic experience. Specifically, this research is attempting to determine if there is a relationship between African American men and their mathematics self-efficacy. If so, what is the impact of their beliefs on their motivation and academic achievement in mathematics?

Lastly, with respect to culturally specific knowledge, culturally appropriate research methods are applicable to this research because I recognize that I bring a different perspective to the examination of the issue of African American men in collegiate level mathematics courses given my personal experiences as a high achieving mathematics scholar and educator. Initially, I felt I could assess the realities of these individuals based on my own experiences. However, there could have been a significant difference between the experiences of these young men who are currently in school and my experiences as an undergraduate almost two decades ago. As a result, I felt it was important to understand the stories of the participants of this study in order to construct a framework by which other African American men can assess, comprehend, and fulfill their own educational potential. To further facilitate an understanding of the rationale behind this investigation, design, strategies, and analysis, I next describe my role as the researcher and some background into how this study was developed.
The idea for this research evolved during a graduate mathematics education course approximately eight years ago. While studying the literature on African Americans in mathematics, I observed that there appeared to be a general movement within the published literature regarding the relationship between African American students and mathematics. Essentially, it appeared that assigned research articles, which examined African American students, focused primarily on students who came from urban environments, low socioeconomic backgrounds, who exhibited difficulty with mathematics, and who were inevitably assigned to some sort of intervention program. What I quickly noticed after reading these articles was that none of them resonated with me because the educational experiences of the research participants were very different from my own educational experiences.

First, I was not from an urban environment; therefore, I wondered whether anything was being done to address the educational challenges of African Americans from non-urban settings. Second, my socioeconomic status was not of the impoverished nature as the participants presented in the studies. I also do not claim to have come from the wealthiest of backgrounds either, but it seemed problematic to assign so much attention to low socioeconomic status as a contributor of educational attainment when approximately 25% of African Americans live below the poverty level. Third, I did not experience difficulties with mathematics as described in these studies; moreover, neither did some of my peers, particularly my male counterparts. Thus, questions I frequently was left with after reading these studies included: What information is generated by studying the same types of students? How are comparisons being made between African Americans, for example, in a
Midwest setting and African Americans in a Southern setting with no discussion of the limitations of conducting such a comparison? What picture of African Americans was being presented and recycled?

Another big question I had was the following: Are the researchers aware of any African American students’ academic success that did not require their intervention? Based on the assigned readings, none of which positively portrayed African American students, the answer appeared to be an emphatic “no.” Or it could have been that they were aware, but were more comfortable discussing African American students in this capacity. As a result, I grew disappointed with the “equity” materials that were required readings until I read two seminal works by Martin (2000) and Hrabowski, Maton, and Greif (1998). Both of these books specifically addressed the mathematics achievement of African American men and served as models for this research.

The experiences I was afforded as a mathematics teacher also informed my decision to conduct this research. Subsequent to graduate training, opportunities arose that offered service in the following roles: a lecturer and adjunct professor at a Research I university, a liberal arts college, an engineering university and a community college. Through these opportunities, a trend among many, but certainly not all, of the African American male students was observed. Specifically, there appeared to be a general disinterest toward education as a whole, and mathematics in particular, which was fascinating. Recalling earlier days as a student, obtaining a good education was the ultimate objective. Mathematics, more than any other subject, was the discipline that was elevated to a higher standard to obtain because mathematics was ubiquitous. My feelings about mathematics were closely aligned with the statement, “Math is not only the most rigorous mental discipline ever invented, it's
among the richest, most wide-ranging and most useful. Indeed, mathematics is deeply interwoven into all of modern life” (Weber, 2004).

However, the disinterested students that I encountered did not hold mathematics in the same regard; often times performed poorly, yet had very high perceptions of their abilities within mathematics. They routinely expressed sentiments such as, “I used to be good in mathematics;” however, their performances did not support their previous perception of their ability. To add to this already complex situation, more in depth conversations with several revealed that they were absolutely convinced that they did not need to do well in mathematics because they were going to make it within the ranks of professional sports or entertainment.

As I pondered these experiences, I posed two very basic questions. First, “Why do so many African American men aspire to be professional athletes or entertainers?” One possible theory is that of Bandura’s (1969) observational learning through modeling. This theory suggests that as a result of observing certain, modeled behavior, a subject may learn to demonstrate new behavior, which may not have occurred before exposure to modeling of the new behavior. African American men pursue sports and entertainment because they see so many other African American men who do well in those arenas. It gives the illusion that it is easy to obtain, and these young men pursue activities that have demonstrated themselves as being favorable to African American male achievement.

Hence, Bandura’s theory, when applied to African American male mathematics achievement, would imply that African American men could potentially learn mathematics very well and actively pursue it with proper exposure to models that demonstrate the accessibility of mathematics and the avenues it provides. This idea is of great magnitude and
is not without a number of challenges. As has been documented in the literature, the academic environment in the U.S. is not generally favorable to African American men (Okagaki, 2001) because of both systemic discrimination and individual issues like Steele’s (2003; 1999) stereotype threat.

The second question that I posed was, “Why are there not more examples of African American male achievement within academics?” Fortunately, such examples do exist, however the pool of literature is shallow and limited in scope (Jackson & Moore, 2006). Despite the restricted literature base on African American men, some are excelling in mathematics, and the works of numerous scholars (Gordon & Bridglall, 2004; Greif, Hrabowski, & Maton, 2000; Hrabowski et al., 1998; Jackson & Moore, 2006; Martin, 2000; Maton, Hrabowski, & Schmitt, 2000; Moore, 2006; Thompson & Lewis, 2005) demonstrate the importance of these African American men serving as observational learning models for other African American men. In essence, such models of academic success and valuing education set an attainable goal for other African American men, which is an essential supplement to the literature base on successful African American men because this provides more examples of the possibilities that are available to this group. Thus, the conception of this research idea emerged with academically successful African American men as the focus.

Context

The participants included in this study all attended HBCUs. I briefly describe each institution next, and refer to each using a pseudonym.

University 1 is a privately-endowed, non-profit, non-sectarian, and co-educational institution. Located in one of the South Atlantic states, it offers a wide range of technical, liberal arts, pre-professional, professional, and graduate degree programs. The school enrolls
over 5,700 students. Of the undergraduate population, approximately 700 are enrolled as science majors, 56 are enrolled as math majors, and the school has programs in engineering and technology; however, I was unable to obtain enrollment numbers for these fields.

University 2 is a comprehensive institution, which offers bachelor’s degrees in more than 100 fields and awards graduate degrees in an estimated 40 disciplines. Located in a different South Atlantic state, the school enrolls nearly 9,000 students. The school has programs in science, technology, and mathematics; however, I was unable to obtain enrollment numbers for any of these fields.

Participants

Participants were purposefully selected from college and university students who were male, identified as African American, and were between the ages of 18-23. The participants were identified with the direction and help of faculty members and referrals from individuals familiar with this work; however, one of the young men included in this study was recommended by another participant. Each participant was asked to provide a copy of their transcript to ensure that they met the study’s criteria—1) students were not required to be mathematics majors, but must be in a degree granting program that required mathematics beyond Calculus I and 2) students must have received a cumulative average of B or higher in the mathematics courses taken since enrolling in their respective universities.

I initially recruited nine participants who all verbally agreed upon hearing about the research study; however, only six completed all of the data collection instruments. Also, of the nine who were initially recruited, one attended a predominantly White institution while the remaining eight all attended two different HBCUs. However, the primary research question was not intended to address any differences between the schools. Two of the
participants attended University 1, and the other four attended University 2. The participants at University 1 were economics and chemical engineering majors while all of the participants at University 2 were mathematics majors. In addition, the participants included three seniors, two juniors, and one sophomore.

Procedures

*Instruments.* The following instruments were used to collect data: a mathematics autobiography (see Appendix A) and individual interviews (see Appendix B). The instruments were administered in the order in which they were previously stated.

The mathematics autobiography provided some insight into how the individuals view their abilities to perform in mathematics at the collegiate level. Responses to the autobiography also informed some of the questions that were asked during the individual interviews.

The individual interview questions consisted of a standard set of questions for all individuals followed by more individual specific questions, which were determined by the responses from the mathematics autobiography.

*Data Collection.* After receiving the names of potential participants, I contacted each via phone and explained the essence of the research to be conducted. I then mailed a consent form to those students who verbally agreed to participate in the study. Data collection began with the mathematics autobiography. These forms were given to each participant when consent forms were collected. Each participant had approximately one week to complete the autobiography. After I received and read a participant’s autobiography, I contacted them within a week to schedule the second round of data collection, the individual interview.
Participants were given the option of choosing where the interview was conducted for their convenience and comfort. These interviews were performed to unearth and/or clarify factors that explain the individual’s experiences as academically successful African American men in collegiate mathematics. These interviews addressed responses from the math autobiography and were used to discuss the interplay between self-efficacy, motivation, and academic achievement (specifically choice of interest, perseverance, and effort). The interviews were audio taped and then transcribed at the completion of each interview. The participants were assured that their responses are completely confidential.

Data Analysis. In keeping with most qualitative studies, data analysis continued throughout the research process—while collecting data, organizing and reorganizing findings, and writing results. It also continued beyond this initial effort. To ensure reliability, I documented the procedures of the study and attempted to document as many of the steps of the procedures as possible (Yin, 2003). I also used Gibbs’ (2007) reliability procedures of checking transcripts for obvious mistakes and constantly comparing data with the codes and memo writing. Through the use of this process, themes were developed that provide a different view of African American men in collegiate mathematics and that identify facets of these individual’s experiences that were overlooked or underestimated.

Responses to the mathematics autobiographies and the individual interviews were coded. The mathematics autobiographies were used to develop background portfolios of each individual, while the one-on-one interviews were used to develop more current portrayals of each individual. Both were used to blend fragmented data and provide opportunities for other ideas to surface, all the while looking to develop meanings among the participating individuals.
I used transcript based analysis (Krueger & Casey, 2000). I developed a coding frame (with key analytic constructs compiled in a codebook) from the transcripts. The coding frame included broad easily identified themes and more abstract, complex themes. I then used my codebook to review the transcripts a second time to refine the coding categories of the first reading. After the coding was complete, I created graphical models of the data to assist in data transformation using strategies described by Glesne (1999) and Wolcott (1994).

To resolve the issue of quality (Guba & Lincoln, 1994) and ensure the validity of the findings (Creswell, 2009), I incorporated the following strategies suggested by Creswell (2009): triangulation; member checking; rich, thick description; bias; discrepant information; and peer debriefing. In triangulating the data, I examined several sources of information, such as student transcripts, mathematics autobiographies, and interviews, to build a rational justification for established themes, which converged from the data sources. In member checking, I provided each participant, at the end of data collection and transcription of the audio-taped interview, an opportunity to review their interview to edit and provide additional information to their responses that would be more closely matched with their intent.

In rich, thick descriptions, I attempted to provide, where appropriate, multiple and robust perspectives about a theme. Because of the sensitivity of this issue, I am aware of potential bias. I anticipate that my academic experiences may be similar to the subject population, which might lead to over sensitivity to data analysis and interpretation. The sensitivity issue is genuine as I recognize my displeasure with the current state of investigations into African American male academic achievement. Appropriately, I periodically clarify my bias as a means of being self-reflective and honest. With discrepant information, I included
participants’ responses that ran counter to the themes. Finally, in peer debriefing, I had someone review and ask questions about the study so that the study would resonate with people other than me.

Summary

In this chapter, I outlined the research design, qualitative, and strategy, phenomenological research, used in this study. In Chapter 4, I discuss the findings. In chapter 5, I summarize the study, discuss the findings, offer implications, address limitations, and present concluding remarks.
CHAPTER 4

FINDINGS

Introduction

To attempt to answer the main research question, “What is the influence of self-efficacy on the motivation of African American males and how does this influence affect their academic achievement in mathematics at the collegiate level?” this study examined six African American men’s beliefs in their mathematics abilities in an effort to uncover motivational characteristics that contributed to their academic success in mathematics at the postsecondary level. This chapter will present the participants’ responses to each of the four guiding questions and then identify the seven themes, which emerged from the participants’ mathematics autobiographies and individual interviews. Through analysis, several of the themes fit within the framework of social cognitive theory. Although all of the themes were not related to at least one of the four sources of information on self-efficacy, I will still discuss those as well because they do support other findings in research on African American men. The seven themes that emerged were: 1) teacher influence; 2) family influence; 3) peer influence; 4) perception of mathematics; 5) problem solving approach; 6) African American male teachers; and 7) prior experiences.

Creswell (2009) uses the term worldview, defined as “a basic set of beliefs that guide action” (Guba, 1990, p. 17), to describe the objective of qualitative research as a function of the researcher’s notion of what constitutes important information and their perspective of
reality. This study incorporates the following basic set of beliefs—1) African American male achievement in mathematics exists and can be replicated, 2) African American male achievement should be given its proper respect, 3) African American male achievement should be highlighted more, and 4) African American men can be endowed with and will be receptive to appropriate self-assessment skills that will facilitate a more optimistic influence on their condition in academia. The actions that these beliefs guide are 1) more African American men will visualize themselves successfully participating and completing STEM programs, 2) more African American men will consider themselves able to engage the demands of STEM fields, and 3) more African American men will persist when faced with challenges in STEM fields.

This worldview recognizes that the meanings these individuals have towards mathematics can be varied and numerous (Creswell, 2009). Also, this worldview holds a basic assumption that individuals are actively searching for comprehension of the environment in which they participate. The findings from these six participants who have achieved academic success in mathematics are not a global representation of African American men; therefore, the results are not generalizable. The data obtained and the analyses conducted are the results of the design of this study, my interactions with the participants, and my interpretation of the experiences and opinions expressed in the autobiographies and interviews.

I intend to offer, based on the participants’ words and backgrounds, plausible explanations as to how self-efficacy has affected their motivation in mathematics and subsequent achievement in addition to future directions for research on African American men. Because any claims about knowledge that are derived from interpretivist inquiry are contestable (Greene, 1994), it is very possible that someone else could glean completely
different conclusions from the observed patterns in the data than the ones I offer.

Nevertheless, this research provides an arena for issues, which previously received little attention, to be discussed and researched, which is of particular importance for African American men who can not be precisely packaged by the social construction realities of other groups (Stanfield, 1994). Next, I present brief profiles of the participants. A pseudonym is used for each.

Profiles

Alfred is a senior economics major who attends University 1. Since early elementary school, mathematics has been his favorite subject because “I really enjoyed the fun of finding the answer to a problem, especially really complicated and long problems because it allowed me to feel that I had done something that others couldn’t.” In middle school, Alfred began noticing that he was one of only a few black students in most of his classes, including math. As a senior in high school, he took AP Calculus and received college credit. Also, during high school, Alfred took the SAT three times because he was unsatisfied with his mathematics scores. He eventually achieved his goal of 700 (his final score was 710). At the time of this study, Alfred had only taken one college mathematics course, Calculus II, in which he received an A+ and was encouraged by his professor to switch to mathematics as a major. With expectations of going to graduate school, Alfred also took the Graduate Record Exam (GRE) and, on his first attempt, scored 750 out of 800 on the mathematics section.

Barry is a senior chemical engineering major at University 1. Mathematics has not always been one of his favorite subjects; however, it is a subject for which he has developed an appreciation. During his middle school years, Barry was not always willing to exert the required effort in mathematics, was satisfied with B’s on most of his assignments, and
therefore was not a standout student. Barry also expressed that he had an issue with one of his middle school teachers who, by his account, had a domineering personality that stressed him out. In high school, Barry took calculus; however, he felt that he did not learn the concepts to the best of his ability. Consequently, he took the course again at a local college before entering University 1. At the time of this study, Barry had made A’s in all of his college math courses and was preparing to take Probability and Statistics as well as Advanced Ordinary Differential Equations his last semester in college.

Corey is a sophomore mathematics major at University 2. He is also a member of his university’s baseball team. Although mathematics was not a subject that always got him excited, Corey always excelled in the area. In middle school, he joined the math club after being asked by his math teacher. Because of this experience, Corey realized that he loved mathematics and that he enjoyed competing with others. Despite being gifted academically, Corey had his heart set on obtaining an athletic scholarship to attend college. Because he had not received any scholarship offers by his junior year, like his older brother who attended a Division I institution on an athletic scholarship and who was also academically gifted, Corey expressed that this caused a great deal of tension between them. In fact, he shared “I was almost like forget college. If I can’t compete with my brother and do what he did, then I don’t want to do it at all. I’ll just give up.” However, after talking matters over with his brother, they resolved the conflict. Then Corey received his athletic scholarship, and “things turned out fine.”

Dexter is a junior mathematics major at University 2. Dexter was recommended for the study by Corey. Dexter is a former athlete who, at one time, was a member of his university’s basketball team. Both of Dexter’s parents majored in mathematics when they were students at University 2. In elementary school, as a result of completing sheets of multiplications problems very quickly, Dexter discovered he had an affinity for mathematics
and practiced often. He took advanced mathematics courses in middle school and had taken high school courses by 7th and 8th grades. Consequently, upon entering high school, Dexter was placed in mathematics courses where he was one or two years younger than the other students. He completed Calculus by his junior year of high school and received college credit for both Calculus I and II, once again placing him in mathematics classes with students who were older than him. As a result, when the other students discovered how skilled he was, he began receiving a lot of requests for his tutoring services.

Elijah is a senior mathematics major at University 2. Since early in his academic career, he has taken advanced mathematics courses. The predominantly Black elementary school that he attended provided him with the experience of being situated within walking distance of four HBCUs, one of which offered a program that required him to attend another school for gifted students once a week where he was given work that was middle school level. Because of this exposure, he made an easy transition into an integrated middle school where the majority of the students in the advanced mathematics courses were white. These students became his “academic” friends, but he also held on to his relationships with his Black friends who were “non-academic.” By the time Elijah reached high school and was able to take AP courses, he became the only black student in the class, but never felt singled out by any of his peers. Consequently, he never felt the “stigma” of being gifted academically.

Frank is a junior mathematics major at University 2. Corey, mentioned previously, and Frank are roommates. Frank enjoys taking the harder courses because he felt that in taking easier courses, “there’s really nothing to gain from taking those classes.” Frank committed to education at an early age as a result of his mother, who did not graduate from high school, stressing its importance and “making it more important than anything else.” Frank’s father
did graduate high school, but did not attend college. Frank recognized the struggle that his parents endured and made a conscious decision to have a life different from his parents’ and to make his mother proud.

Articulation of Beliefs

The first guiding question was, “How do African American men articulate their beliefs about their mathematics self-efficacy?” To answer this question, I examined the participants’ responses to the Individual Interview Protocol’s first item, which asked participants to describe, in as much detail as possible, the perception of their ability to perform well in college level mathematics courses. In their descriptions, participants were informed that they could include comparisons to their high school perception of their ability, how their feelings may have changed, how their feelings were reinforced, factors that affected their perception and how those factors affected their perception. From the responses given, two observations emerged. First, responses revealed that all of the participants were confident in their mathematics abilities, but responses to this item fell into one of three categories.

The first category of responses was bold and included statements like Elijah’s, Corey’s, and Frank’s. Elijah stated, “I think I’m pretty skilled at math. I guess on a scale of 1 to 10…, I’d say I’m around maybe 8 or 9 when I apply myself fully.” Corey expressed, “Well, see I really believe that I can achieve anything that’s placed before me. …my abilities are never a question when it comes to doing things like taking classes.” The initial part of Frank’s statement sounded very similar to his roommate Corey’s statement. Frank said, “I’ve always felt that I can do whatever in any class, but especially math because math has always been my strong suit.” These comments came from three of the four mathematics majors.

The second category of responses was confident, but more reserved and stated in terms of the difficulty level with mathematics. For example, Alfred stated that he “didn’t really have
too much trouble with it.” And Barry recalled that he had “never really had a problem with math.” These comments both came from the students at University 1.

The last category was a hybrid of the first and second categories. Dexter, the other mathematics major, at first started with a statement that was defined in terms of the difficulty level of mathematics, “I always felt math came pretty easy to me…” then switched to a bolder statement, “A lot of times I felt as though, sometimes, not that I don’t need the teacher, but I can look at the book, see a formula, see what’s going on, and almost do it myself without even going to class, although I still go to class.” As Dexter continued talking, he switched back to discussing the difficulty level of his mathematics courses, which were becoming more difficult and requiring him to go see the teacher more often.

While articulating their beliefs about their mathematics self-efficacy, a variety of factors were mentioned that affected their perceptions. For Frank, his perceptions were based on the advanced courses he was taking and others both recognizing his abilities and asking him for help to prepare for upcoming tests. Dexter’s perceptions were affected by his ability to pick up the textbook and have things just naturally come to him. In his mathematics autobiography, Dexter provided a rationale for his ability to pick material up quickly.

He began taking academically gifted classes in second grade and recalled leaving his normal class to be taught math “in a trailer with other advanced students by a different teacher.” For him, “This made me feel smart, but I did not think it was a big deal like my parents did.” However, it was a bigger deal than Dexter could probably imagine at that time because of the support that the teacher provided. She routinely told the class that they were working problems that were fourth grade level, which for Dexter as a second grader, was a big deal. This significant moment in his academic career carried over to his later thoughts about mathematics as well. Due to the early exposure and encouragement, Dexter stated that
“I still feel as though I catch on to many mathematical problems or issues faster than the other students in my class.”

Corey’s perceptions were affected by several factors. One factor was based on his definition for what he thought it meant to perform well in mathematics, and it included the capacity “…to grasp something and actually apply them and retain the information.” He also stated, “…something that’s very important with your ability to perform well is how well you are able to relate it to other things. … especially in math, there are a lot of things that link up together.” Corey was sure of himself in these areas. Second, his perception was affected by the amount of effort he put into preparing for a mathematics course. In his opinion:

So, I just make sure that I have the proper preparation before I do take on new challenges or what not. So, if I sit down and say that I’m gonna do something, like for instance, my math major, I make sure I stay on top of everything. And I believe I have grasped everything previously, so everything that comes after, it should come natural.

Another factor that affected perceptions was changes in feelings towards mathematics. Barry provides the best example of this because he appears to have had the most evolution based on his responses, which were unique compared to the others. Barry explicitly stated, “Math has not always been one of my most favorite subjects….” However, he went on to say, “…but it has been something that I have developed to enjoy thoroughly.” The development was a result of several key moments in his academic career that provided lifts to his confidence.

In eighth grade Algebra 1, “This is where I noticed that I could handle math and not have anything to worry about.” Then the results from junior year of high school in precalculus “boosted my confidence in math tremendously.” Furthermore, after taking differential equations in college and receiving the results, “I felt at this point that math was something
that I could tackle and not have any issues. By developing confidence in math, I never felt the need to be scared of my major, Chemical Engineering.” Thus, Barry’s confidence in his abilities has grown over time, seemingly peaking in college. However, he also made the remark, “I feel that my confidence has grown smaller because I am not consistently completing the same types of challenging problems anymore.” When pressed to find out why his confidence has declined, Barry replied,

I guess you could say, in most of my classes now, I’m not required to really do any integration or derivations. Pretty much, we’re expected to know those things or know how to do them. So, they’re not really shown to us or required to do them on a test. So, I don’t really exercise those thoughts any more or thinking patterns of going through deriving different math problems or showing how taking formulas and putting them together gives you one big formula. So, that’s why I say my skills in mathematics, I guess, you could say, have digressed. I’m not really required to do those types of problems. It’s just basic algebra and using different formulas to get what you need and putting it into different computer programs to solve for it.

Despite the fact that his confidence has declined, Barry still intends to pursue a graduate degree in engineering and one day wants to teach mathematics to demonstrate to other African Americans, through his presence, that mathematics is accessible. On the subject of teaching, only one other participant, Alfred, wants to be a teacher. Elijah stated that teaching was absolutely out, and the remaining three did not express any feelings on the matter of teaching.

Based on their responses, these African American men articulated optimistic beliefs concerning their mathematics self-efficacy. At this point, though, this study has not captured the true essence of these individuals’ mathematics self-efficacy nor has it established any magnitude for each person’s self-efficacy; however, it has been established that the mathematics self-efficacy of academically successful African American men does exist, and therefore, deserves further exploration.
Sources of Self-efficacy

The second guiding question was, “What sources do African American men identify as being conducive to their mathematics self-efficacy?” A response to this question came from both the mathematics autobiography and several responses to different questions during the individual interview. Three of the four sources of self-efficacy seemed to be prevalent for these participants, and they were enactive attainment, vicarious experience, and verbal persuasion.

*Enactive Attainment.* Enactive attainment, which is deemed to have the most significant affect on self-efficacy, refers to the effects of experiences on efficacy; accordingly, prior success can elevate efficacy while prior failure can lower efficacy (Bandura, 1986). After a strong sense of self-efficacy has been established, then rare failures produce minimal effects on an individual’s perceptions of their capabilities. In addition, efficacious individuals attribute poor performance to things such as inadequate preparation or flawed strategies.

The young men in this study recalled significant moments that sparked them to have positive beliefs about their abilities in mathematics. Four of the participants provided specific examples of in-school experiences that caused them to recognize that they were truly fond of mathematics. Of these four, Alfred and Dexter both came to their realization in elementary school. For Alfred, he chose mathematics as his favorite subject because he “always did well in the subject,” and he “liked the fact that there was usually only one right reason much unlike English.” Mathematics provided fun moments where he could search for and find answers to problems, “especially really complicated and long problems because it allowed me to feel that I had done something that others couldn’t.”
In first grade, Dexter felt attracted to mathematics due to its ease. Accordingly, by second grade, he was doing mathematics beyond what was required by the curriculum. Another significant moment in second grade was the comparison between Dexter’s math performance, which was characterized as “good,” and his reading performance, which he was told “needed work.” Because he was better at mathematics and he didn’t like hearing that he wasn’t good at something, Dexter drew closer to mathematics. In his profile, I mentioned Dexter’s ability to finish sheets of multiplication problems quickly, for which he received prizes. Because he enjoyed finishing these sheets first, Dexter would also go home and practice on his own.

Although Alfred and Dexter noticed early their penchant for mathematics, Barry and Corey both did not arrive at this conclusion until middle school. According to Barry, mathematics was never a subject that stood out to him in elementary school. He remembered doing problems, such as “learning time tables, and working on long division,” that became problematic to his peers but not to him. He, on the other hand, actually enjoyed them and because he enjoyed them, he never viewed mathematics as being the “stereotypically hard subject.” Then in eighth grade, Barry realized that he could grasp mathematics without any worries because of his teacher, whose teaching style he enjoyed, receiving the highest marks on the tests and quizzes, and catching on to the subject rather quickly.

Corey, like Barry, was not always fond of mathematics either; however, he was always able to do extremely well in the subject. Then, after joining the mathematics club in sixth grade and becoming a standout student, Corey “began to form a real love for the subject,” and the fondness kept growing. He was so enamored with the subject that he noted, “It was
the only subject that I didn’t fall asleep through in school…. Math has always challenged me and this is what keeps me drawn to it.”

Once the foundation for their mathematics self-efficacy was established, four out of the six participants used their mathematics beliefs as a guide for course selection and career paths. In high school, Alfred enrolled in more advanced mathematics subjects—geometry, Algebra II, precalculus, and AP Calculus. For all courses, he was determined to perform well and worked very hard. Two consequences of Alfred’s hard work were the scores that he made on the SAT and GRE.

Barry continued to do well in high school and entered an International Baccalaureate program, where he encountered some difficulty with geometry “because of the demanding level of the program.” He “realized that the key to geometry was learning the postulates and theorems,” and after that was accomplished, his “grade improved drastically.” This experience helped his transition into college, where he took Calculus II as a freshman with mostly upperclassmen. Again, he had to work really hard, but developed an immense amount of confidence in his abilities.

Another important factor that led several of the participants to develop an early sense of self-efficacy that was sustained throughout their academic career was the grades they worked for and received in their mathematics classes. Participants’ reactions to the grades they received are an example of what Bandura (1986) calls response outcomes, which serve several functions: 1) provide feedback on the structuring of behavior to achieve a desired outcome, 2) provide encouragement for certain behaviors and 3) automatically strengthen responses. For example, Frank “expected to make A’s and nothing less,” and most of the times, he did. Barry also frequently mentioned grades in the discussion of his perception,
from the A’s in most of his high school mathematics courses to the A+ in differential equations in college.

Alfred mentioned that, while taking the EOGs in second grade, he noticed that his abilities in mathematics were better than average. Specifically, he stated, “I always scored a perfect score in the math section, while my verbal/reading scores usually tended to fluctuate between the perfect and a point less. I took this as a sign that I was a pretty good mathematician in my younger years.” Alfred also discussed how these scores and the many A’s that he received in his math classes encouraged him to be proud of his academic success. As one of only a few students of color, he considered finishing in the top percentile of his class a great accomplishment, which proved that “anyone no matter their race or background could be successful and highly educated at a young age.”

I was also interested in how these students handled setbacks when they occurred. So, I discussed with the participants the effects on their judgments of their mathematics ability when they receive the results from a mathematics assignment. They were asked to discuss based on results meeting expectations and also results not meeting expectations. When the results did meet expectations, the general theme surrounded their idea of being prepared versus not being prepared, which is the explanation that almost every one of them stated when the results did not meet expectations. Moreover, when results did not meet expectations, participants were willing to make the necessary changes—studying harder next time, reviewing old notes, or going to see the teacher for clarification—to ensure that those results did not happen again.

Vicarious Experiences. Vicarious experience occurs when an individual believes in their ability to achieve certain results after observing other people, similar to themselves, who
have engaged in the same activity and have acquired success (Bandura, 1986). In this situation, individuals can convince themselves that if others are capable of being successful, then so can they. The participants in this study identified several vicarious experiences that helped to structure their mathematics self-efficacy. Those experiences included teachers, peers, and family.

The participants unhesitatingly mentioned how receptive they were to the vicarious experiences offered by their favorite teacher(s). Participants spoke of these teachers in the highest regard, and interestingly three of the favorite teachers were male, which had a significant impact on those individuals. Reasons for selecting a favorite teacher varied; nonetheless, from the participants’ descriptions, several key characteristics, such as passion for teaching, caring, motivating, and knowledgeable, were clearly obvious.

Barry expressed that his precalculus teacher during junior year of high school was very motivating, which helped him maintain a very high average for that class. Then Alfred recounted his impressions of Dr. B, his AP Calculus teacher, who “was very charismatic and truly cared about making every student a math success.” Dr. B had a unique ability to make the most complicated problem seem easy and understandable and would not go on to another problem until everyone in the class understood it. According to Alfred, “This teacher helped me to better accept my ability to do math.” Alfred was accustomed to teachers who were effective at teaching, “but not until Dr. B was a teacher so concerned with the success of the class.”

Dexter, on the other hand, identified two teachers as his favorites and both were female. He expressed that they were very similar in their approach to the teaching and learning of mathematics. These ladies tried to make mathematics fun by doing a lot of group work or in-
class competitions, but the thing that Dexter liked the most was their passion for the subject and the way they transferred this passion to the class.

There were hardly any days where either one of them was not smiling throughout the whole class period. You could also tell they wanted every single person in the class to succeed. They also made me specifically feel as though I was great at math and they loved to teach me.

Although Barry, Alfred, and Dexter identified high school teachers as their favorites, Corey identified Dr. K, a college professor, as his. Dr. K was very easygoing, knowledgeable about the information, and, in lectures, “extremely good at articulating it to the class in a manner we can all explain.” But what distinguished Dr. K from the rest, at least for Corey, was his willingness to help students and accommodate questions; in addition, he provided students with experience in a research lab by allowing them to work with him. Thus, according to Corey, “Dr. K has always been a boost to my spirit and ability in math classes.”

Five of the six participants were also receptive to the vicarious experiences offered by their peers. This is not surprising given the abundance of literature (Hrabowski III & Maton, 1995; Hrabowski III et al., 1998; Kunjufu, 1986; R. L. Taylor, 1989) suggesting the influential power peers have on African American men. The influence for these participants was most evident in the types of peers they chose to associate with, their willingness to pattern their behaviors after those types of peers, and also in their willingness to assist others who may not perform as well in mathematics. For example, Alfred mentioned that, “…when I have friends who I know are good at math, then a lot of times we’ll work together. And so they help me learn more and become proficient.” Consequently, Alfred would put more effort into his mathematics courses.
Corey used others doing well around him as a motivational tool. First, he tries to surround himself with people who are performing at or above his level, but knowing that others are better than him bothers Corey because “where I come from I was one of the best or what not. So when I see people perform better than me it hurts me….” However, he used this to his advantage because the hurt “motivates me to do better, and continue to give chase and strive to be the best.”

Dexter also hinted at the notion of his being the best in high school and how seeing others perform better than him was different, but his reaction to that is slightly different from Corey’s reaction. Like Corey, Dexter uses their success as a motivational tool, but still approaches mathematics from a lone stance. Corey took others performing better than him to mean he should study with them and learn from them, but Dexter viewed others performing better than him as an isolated event. In his impression,

I’ve never really felt like somebody that’s in the same class as me, obviously somebody that’s in classes ahead of me they know more, but somebody that’s in the same class as me, I’ve never been the one to think oh he’s smarter than me in this whole entire subject in a math course.

Thus, Dexter took their performance as an illustration that he could learn the topic too. He just needed to set his bar higher, and he felt that could be accomplished on his own. However, the greatest source of peer influence for Dexter came from his roommates who were all “trying real hard to keep their grades up.” As a result, Dexter admitted the following:

I definitely spend most of my time in my room if I’m not playing basketball. I spend most of my time in my room because that core around me allows me to, oh they’re in their room working on their homework, I need to work on mine too.
Elijah almost repeated Dexter’s sentiment exactly when discussing his friends’ performance in relation to his. Many of Elijah’s friends are computer science or mathematics majors who are very proficient at mathematics. Therefore, Elijah felt an extra boost when he approached his studies because “you don’t wanna be the friend who fails the test.”

Finally, Barry described how one particular experience of seeing a friend perform poorly in mathematics has impacted his performance and his perception of his ability. Barry decided to tutor the friend in calculus. After the friend started performing better, Barry concluded:

… I can make an impact on others as far as math because I know a lot of people think math is very difficult or it’s a really challenging subject area. So, if I can help somebody, then that makes me feel like ok, I’m not so bad.

Thus, Barry’s perceptions of his abilities were reinforced by his peers.

To get another perspective on how seeing others perform well in mathematics affected their self-efficacy, I asked participants whether there was a person or persons whose mathematics performance(s) they have tried to pattern. If so, could they explain their selection criteria and identify specific ways they have tried to pattern their performance behavior(s) based on the person they tried to emulate. Most of the participants did pattern their mathematical performance after someone, and the choice was usually a peer while one chose his father, but the selection criteria varied. Elijah stated that he rarely patterns his performances after anyone now, but he once did. The selection choice was based on the other person making a one hundred and one or one hundred and two on an assignment that Elijah made a one hundred on. From this, he gathered that he needed to put in “that extra little bit of effort to maybe do the extra credit problem or to go back and double check, triple check my test before I turned it in.” It is worth remembering that Elijah is a senior, and he
also stated that he takes classes that other people try to avoid. Hence, it is possible that opportunities to see others whom he could pattern his math performances after are limited or have been reduced.

Alfred patterns himself after a good friend who also takes a significant amount of mathematics classes. They help each other, and the friend’s classes are a semester before Alfred’s. “So, I guess I kind of pattern my classes and how I do my work to his. So, I know if he did well, then I should do well.” It wasn’t until later that I determined that Barry was the friend of whom Alfred spoke.

While the others pattern themselves after their peers, Dexter patterns his mathematics performance after his father. Dexter provided the following rationale for pattern his performance after his father’s:

…my dad always talks about how he did so well here. I think he finished with like a 3.9 or something, and I got a 3.8. So, not exactly all his results, but eventually at the end of the, you know, when it’s all said and done, I would like to have a 3.9 just because my dad had a 3.9.

Barry and Frank were the only two who admitted to never patterning their math performance after anyone; however, their reasons differed. Barry expressed that he “never really had a role model in math,” which led him to make good grades to satisfy his own achievement goals. On the other hand, Frank did not like to compare his performance with others because he believed that it was possible for everyone to achieve “on the same level, but sometimes it just might come more naturally to some people than others;” as a result, he competed against himself to “see how far I can go.”

Finally, the participants mentioned how receptive they were to the vicarious experiences offered by their family. Again, this should come as no surprise due to the literature (Hrabowski et al., 1998; Johnson, 1992; Johnson & Prom-Jackson, 1984; Prom-Jackson et
al., 1987; Scott-Jones, 1984) stating how influential family members are for African American students’ academic success. In some cases, the family influence was extremely strong. The relationship between Corey and his brother is a perfect example of this situation. When I asked how much influence did seeing his brother’s academic performance have on his success, Corey responded that his brother had a significant influence because he had to perform at his level and keep the ball rolling; however, as he spoke, it was clear that the reason was not confined to just his brother.

I never wanted to be noticed as that child that didn’t succeed because my father actually came from a great background, performed very well in school, got his degree from (inaudible), but doesn’t really do anything with himself right now. He’s absent in my life right now. He’s pretty much recognized as that child that didn’t succeed. So, I’ve always looked at that, and said my brother’s doing well, there’s no excuse for me not to do well because if he can do it, then I can do it too. That’s how I look at everything. There’s somebody that has done it before, so it is possible.

Corey’s mother also had a great deal of influence on his academic success. She was very active in his life and ensured that he put the necessary work into his academics. Corey remembered how his mother made him sit down every day at the kitchen table and do homework, which she checked. He also remembered how “she would get on me so bad for careless mistakes,” which he recognized as a problem he has. Moreover, he remembered the following about his mother:

…she was pretty strong with math when she was in school…. So, she really pushed me a lot. She pushed me real hard, with school period, but especially with math. It was kind of like you have no excuse to not do this.

While Corey admitted that his mother stayed on him, Alfred recalled his parents taking a more relaxed approach to his academics. According to him, they checked on his academic progress early and often, but eased up as he got older, which put the responsibility on him.
In spite of his parents not pressing him concerning his grades, which was a consequence of his early success, Alfred was absolutely clear that parents must play a strong and supportive role in the academic achievement of African American men because it was imperative to have someone provide the incentives for “the child to go to school, do well in class, finish all your assignments….”

In addition to the parental influence that he received, Elijah also was influenced by an aunt who was an instructor at a university in his hometown. Collectively, those individuals placed tremendous emphasis on school, and Elijah was beginning to see the benefits. For example, although he did not enjoy being on the debate team, which his mother forced him to do when he was younger, he noticed that his communication skills demonstrated in job interviews put him above many.

Although Barry stated that he never really had a math role model, he did have academic models, provided by an aunt and cousin, who both were successful in school and graduated with honors. Thus, Barry wanted to follow in their footsteps and make his family proud by matching their performance or exceeding it. While all of the previous examples looked to an older family member, Dexter’s family influence was not limited to just individuals who were older.

I’ve got an older brother and a younger brother. My older brother didn’t do quite as well in college but in high school he did real well. And so that motivates me. And my little brother is in middle school now making all A’s. So, that definitely motivates me to want to keep doing well.

As their responses indicated, the vicarious experiences that influenced the participants’ self-efficacy most were offered by teachers, peers, and family. From teachers, the participants observed characteristics such as passion for teaching, motivation, and caring. From peers, the participants were motivated to do well academically. Finally from family,
the participants saw models who demonstrated that being academically successful in mathematics was well within their reach.

*Verbal persuasion.* The final source of self-efficacy that seemed a feature of this research was verbal persuasion, which is used to convince people that they possess the characteristics necessary to achieve a certain outcome (Bandura, 1986). This influences whether an individual sustains efforts to achieve a desired goal. Those who provide the verbal persuasion have to be deemed competent enough, by the person who is receiving the persuasion, to evaluate the characteristics. The participants in this study received a variety of verbal cues. Additionally, the effects of the verbal cues appear important in the construction of positive perceptions of mathematics ability.

When asked to identify anyone who gives them verbal cues about their mathematics ability and to explain the effect(s) of those cues on the judgment of their mathematics ability, participants stated that the cues came from a variety of sources, but the effects were the same. It made them feel confident and reinforced the perceptions of their abilities. Frank, who received his complements primarily from teachers and peers, stated:

> Well, when I was growing up, I always received complements on all the things I’ve done in all my classes, from comments written on tests, quizzes, and homework to just like people that I help with math, telling you, ‘Wow, you’re really good at this.’

Dexter indicated that he frequently received complements as well, and added, “Knowing that people think you’re smart helps you, not necessarily become smarter, but helps you believe in your abilities.” In a similar fashion, Corey indicated the impact of verbal cues on his beliefs.

> And it reaffirms that I’ve grasped something so well to the point that I can go back and regurgitate and help somebody else to understand the math concepts
as well. It gives me confirmation that I have truly grasped what it is I am trying to grasp.

Influence of Self-efficacy

The third guiding question was, “How do African American men explain and/or use self-efficacy’s influence on their motivation to achieve academic success in mathematics?” To answer this question, I examined the participants’ responses to Questions 2 through 5, which primarily focused on the effects of their beliefs on course selection and persistence with mathematics. The major finding here was that these young men’s choices of classes were positively influenced by their beliefs in their abilities and that their willingness to persist in mathematics was also positively inspired by their beliefs in their abilities.

In regard to the types of courses he took as a result of his beliefs in his abilities, Alfred asserted that he has always attempted more challenging courses due to a lack of intimidation. Likewise, Elijah held similar views about the types of classes his beliefs encouraged him to engage. He took “some of the more difficult classes as electives, some of the classes that people generally try to stay away from.” More importantly, though, it was his beliefs that affected his willingness to persist because, “Knowing that there’s nothing that I can’t tackle when I try … it kind of helped me stay in there and say, okay, you know you can do this.”

These responses were symbols of persistence; however, the most obvious example of persistence was in the participants’ responses concerning their approach to solving a difficult mathematics problem. The young men, when faced with such a problem, generally followed the process of looking for examples in the book or their notes, conducting research, going to their peers, and going to the professor, although going to the professor always seemed to be the last resort.
Using these different strategies elicited different responses. For example, in discussing a specific problem from Calculus II where he had to go online and conduct research, Barry found, by having to “go above and beyond,” that he was more engaged and that he “realized that in college, you do have to do a lot of independent study along with what is going on in the classroom.” A common thread that ran through all of the responses was the participants seeking to understand the math problem, not just obtain an answer. Dexter, who worked on his own before using his peers as a secondary resource, was clear that he asked them for an approach only because “If you just ask ‘em for the answer, then you won’t know what to do with another problem like that.”

Elijah and Frank had an additional strategy for solving a difficult mathematics problem. They both preferred to rely on something that they had dealt with previously. Elijah called this going back to first principles, where he attempted to derive a way from something he felt comfortable with up to the thing that he was having the problem with. However, their resolve was the same. Using this strategy allowed Elijah to see a problem through to completion “because the more challenging a problem is the more fun it is to me a lot of times,” and Frank stated that, “I just basically keep going at it cause I really hate to give up on things.”

Use of Self-referent Behaviors

The final guiding question “How can self-reflection be effectively incorporated into the evaluation and alteration of African American male thinking about and behavior towards mathematics?” was not posed to the participants, but rather was a question that I hoped I would be able to answer after speaking and listening to the participants. The reason I chose the research question is because I wondered whether there was a way of having African
American men be more cognizant of the idea that they have some authority to modify some of the widely held misperceptions of them. And it was my assumption that using self-reflection was one mechanism that would facilitate a change in the conditions of African American men in mathematics, and thereby a change in misperceptions. In a couple of cases in this study, Corey and Dexter were, at some point in their academic careers, forced to think about their past experiences in mathematics and both used their positive beliefs in their abilities to persist in mathematics. Because of their beliefs, these individuals were able to exert more effort and persevere despite some of the challenges they encountered.

Corey described math as being discouraging at times. Because he felt that his “mathematical skills were superior and developed enough,” he attempted taking five difficult math classes at once. However, when he failed an assignment, he was devastated and it made him “guess whether I was really as knowledgeable of my area of study or whether I deserved to continue with the same major.” As a result, Corey would go back and pay more attention to the concepts that he felt he was not grasping. “And I ask myself a million questions like what did I do wrong, where did I go wrong, what do I do to keep this from happening in the future?” Despite this discouraging moment, Corey has used it to “work very hard to erase all memory of the grade but to also make sure it never happens again.”

Like Corey, Dexter also reconsidered his mathematics major after receiving a bad score on a midterm during freshman year. Because he was used to making really good grades, receiving this grade placed him in unfamiliar territory. He had made a low score on an occasional test before and could handle that, but not doing well on a major test “shook me up a little bit” and made Dexter think that he definitely could not do it. He was so shaken up that Dexter even considered dropping the course; however, he remained in the course and
finished with an A. Because of the beliefs in his abilities, Dexter survived this crucial moment and has continued to perform very well in mathematics.

Other Findings

The primary focus of this research was to identify the influence, if it existed, of self-efficacy on the motivation of African American men and then to determine how such an influence affected their academic achievement in mathematics at the collegiate level. Yet, in addressing those questions, other fruitful conversations emerged from the discussions on self-efficacy that need attention. Because African American men are not positively associated with academic achievement, whether it is not considered to be cool or whether it is an alleged indication of ‘acting white,’ academically successful African American men face certain consequences as a result of their desire to achieve in the classroom. One such consequence involves either living in or feeling as if one is living in dual worlds, which could be difficult terrain to navigate without a proper foundation.

To determine whether this was the case with these young men, I asked the question, “Do you feel that you have had to balance living in dual worlds?” The response was an overwhelming “yes.” Several of the participants mentioned being in advanced courses that were populated by mostly White students, which influenced with whom they spent their time. Thus, according to Frank, “I spent a lot more time with the White kids because they were the only ones in those upper level classes,” but he also had relationships with some of the Black students and stated, in comparing the groups, “You don’t always act the same around each one of them.” Some of the other participants expressed similar feelings, but also indicated that they had different or additional balancing acts to perform.
As an example, Alfred felt as though he had to temper talking about his success. Being the highest performing Black male student made him the target of criticism from other Black male students who thought he was trying to be better than them; however, Alfred was adamant about not downplaying his intelligence. On the other hand, Corey did feel a need to “dumb down a little bit when I do get around some of my friends.” There were actually three worlds in which Corey existed. There was his one circle of Black male friends who Corey could not relate to on an academic level; as a result, this was the group that he would dumb down for, but he was able to fit in socially with this group. There was his second circle of Black male friends who he took classes with and who he could relate to on an academic level. Finally, there was his summer program circle of peers who were not Black. Around this group, Corey felt it was necessary to be more reserved socially, and that he had “to slip into this there’s nothing but working and math type.”

Dexter also managed multiple worlds—one between academics and athletics and the other between academics and friends, which occurred during his high school years and when he played basketball for the university. However, the dormitory in which he currently lives, which also houses other academically gifted students, has relieved, but not eliminated, some of those pressures. It was clear that Dexter recognized the importance of striking a balance. He admitted that if he hung out with his basketball friends too much, then he might begin to adopt some of their attitudes about academics, like, “I’ll take this C on this homework or assignment. It’s okay because we’re gonna go out and play ball today.” To offset this mentality, Dexter knew that he had to find equilibrium to maintain his high academic achievement.
The only participant who did not feel as though they had to balance dual worlds was Barry. In high school, Barry admitted to limiting his relationships to only the people who were in the program in which he was involved. With these peers, Barry developed a competitive, but friendly relationship. For the few friends that he had outside of this program, there were no discussions about academics. Then once Barry made it to college, the people he associated with were either on scholarship with him or were individuals who wanted to do well in school. Consequently, Barry felt that pressures to not work as hard or someone thinking that he was a nerd were removed “because we’re all pretty much there for the same goal, and I try to surround myself with those types of people.”

A second rich conversation that emerged from the discussions of self-efficacy entailed the participants’ views on why so few African American men do not pursue mathematics. Responses included lack of role models, not understanding the importance of math, perceived difficulty of mathematics, being afraid of challenges that mathematics presents, reluctance to expend the required effort, lack of quality teachers, and lack of teachers whom students can relate to. The young men in this study were very candid in their explanations because they have considered the answer(s) to this question. For instance, Barry mentioned that he was discussing this very question with his mother, and he had concluded that most people think mathematics is hard and that most are scared off before they even get started. Then, Barry believed, that mentality becomes innate; as a result, people will not really try it. Another implication of Barry’s response was that people around these African American men are not actively working hard at mathematics or taking the time to show that it could be done. Barry’s last statement was reinforced by Alfred who stated:

If you don’t have a lot of role models who have done well in math, if your father didn’t do well in math or if he’s present. If you didn’t have a brother to
help understand the importance, then a lot of people feel, I guess a good portion due to media, I can play sports or I can just rap or do whatever just to get by or I’m looking for that fast money. Math doesn’t play as big of a deal towards what you’re trying to work for in the future.

Elijah had an upbringing that appeared very conducive to academic success. First, his father taught him mathematics at an early age. As mentioned in his profile, the elementary school that he attended was “within walking distance to four HBCUs,” and a privilege of that close proximity was having access to those university’s education majors who volunteered at his school to fulfill their pre-service requirements. Elijah was able to, as a result of the program he was enrolled in at his elementary school, access middle school materials before some of his other peers. After leaving his all Black elementary school to attend a “mixed” school, Elijah noticed a disparity in resources. As a result, all of these experiences shaped Elijah’s answer to why so few African American men pursue mathematics. For him, the answer was simple, “it has to do, with like the early age development and the programs that are available to you.”

Dexter, Corey, and Frank all agreed, in their discussions, with the importance of developing a firm foundation at an early age in mathematics, not being afraid of putting in the work, which could be a significant amount, and overcoming prior negative experiences. Dexter discussed the consequences, such as getting a particular attitude towards mathematics, if a person is not willing to put in the work. He frequently hears, and was sure I did too, people say “I hate math, I hate math.” But if this is the mindset that is established at a young age, then, as Frank concluded, “The further you go along the worse it gets.” Thus, by the time many of these African American men get to their mathematics courses later, Frank continued that they “get into this mode where it’s like, I just can’t do it and I’d rather not. I’m not good at this. Why keep on doing this when I know I’m not good at it?”
Corey agreed with Dexter’s claim about the amount of work that was necessary and the influence of past experiences, “They see numbers and they see that they don’t do well, or they see that it requires a lot of work and they instantly turn it down.” However, Corey believed that it was possible to understand mathematics if African American men attempted to establish connections and ask for help. “People don’t grasp the concepts and instead of looking for similarities between the concepts and making things easier or going to ask for help, they just completely block it out and forget about it.”

Alfred’s explanation for African American men not doing well in mathematics emphasized that people did not understand the benefits of doing well in math, beginning in elementary through high school, and how that impacts their long term options, such as receiving a scholarship, getting into college, or getting a job. To illustrate his point, he provided an example of a student he was tutoring. The student had aspirations of being a crime scene investigator, but they were not doing well on their math tests. When Alfred asked why he was not doing well, the student responded with, “I just don’t care.” Then Alfred asked why he didn’t care to which the student responded, “Well, it doesn’t matter.” Alfred attempted to explain the significance of his decision, but ended with the following statement:

…most people just don’t realize how their performance, in elementary all the way through high school, will affect if they get a scholarship or if they get into college period or what kind of job they get.

I then asked each participant what they would do to change the lack of African American men pursuing mathematics. Continuing from Alfred’s previous thought, he stated that there should be a greater emphasis on the expectations set for African American men and highlighting more diversity in the achievements of African American scientists,
mathematicians, and doctors instead of celebrities and entertainers. “That way, people see if other people have done this, then I can do it.”

Building on the idea of providing examples of success, Barry expressed a desire to be an example one day.

I want to go to school to be a doctor. And after a certain age, I want to retire and go back and be a math teacher. And I think by being an influence and showing that I can do it or actually being a black face in the classroom, it would change students’ perceptions… change that stigma because it’s important if you want to go into certain science disciplines you have that strong math background.

Corey added that efforts to get more African Americans to pursue mathematics should include more exposure to various programs. “There are a lot of minority programs that are out there; however, there are a couple of problems. People either, one, don’t know about them or people don’t care to tell them about them.” Corey also talked about his own limited knowledge of information concerning funding opportunities to attend college. Appropriately, he seemed to advocate for the accessibility of information that would benefit students in the long term. To finish his point about exposure to various programs, he felt strongly that “you must show them that there is a promising future and that although it may be challenging, it’s people there that will help you.”

A final thought about an effort to change the number of African American men who pursue mathematics was offered by Frank, but the recommendation was slightly different from his own experience. Recall that Frank’s mother stressed the importance of education, made it the number one priority, and started at a young age with him. Thus, Frank stressed the importance of starting early, but also added:

…I think another thing that kind of contributes is that in a lot of the African American households, there’s not always people there to kind of help out their children… with their homework, and in some, certain cases, stressing the importance of education. So I feel like changing the structure of the family as well as providing
further insight at a younger age and further development at a younger age would be the most important thing as far as helping to boost mathematical skills later on in life.

Although Frank had someone stressing the importance of education, it was interesting that he made such a comment. We did not discuss why he made the comment, but it could have been that he recognized his academic achievements, with support, were different from some of his peers, who did not have support. Whatever reason(s) Frank had for making the statement, it is consistent with other Black sons’ responses that indicate active and persistent parental involvement contributed to their academic development because the involvement conveyed a clear message that school and learning were important (Hrabowski et al., 1998).

Going back to a previous statement made by Barry about a Black face in the classroom, participants were asked to offer their perspectives on the significance of having an African American male teacher. Each young man said emphatically that this would be beneficial to African American male students. Alfred and Corey each believed that male African American teachers would be more attentive to the needs of African American male students and thereby more passionate about helping them. The common theme in this discussion was the presence of someone they could relate to. However, when asked to consider the reasons why some African American men would not develop that relationship and go see their African American male teacher, Elijah stated that there are two reasons that African American men would not go see their African American male teacher. One involved the stigma attached to asking for help and the second involved the meager numbers of African American men in the higher level mathematics courses.

…I’ve been in that situation where I’ve been the only one or one out of two or three. It puts extra pressure on you, like maybe if you go to the teacher, kind of in the back of your mind you feel like you’re not representing us well, quote unquote, something like that. You feel like you’re underperforming.
Summary

There were four questions that guided the primary research question. The first question was, “How do African American men articulate their beliefs about their mathematics self-efficacy?” The participants in this study all expressed optimistic beliefs about their mathematics self-efficacy. The articulated beliefs were either very bold, more reserved, or a combination of bold and reserved. The second question was, “What sources do African American men identify as being conducive to their mathematics self-efficacy?” Based on the responses obtained, all four sources of self-efficacy were present; however, three of the four were more prevalent. They were enactive attainment, vicarious experience, and verbal persuasion. From the responses of these participants, it appears that vicarious experience had a more significant impact on self-efficacy than enactive attainment, which Bandura (1986) has stated is the most influential of the four sources. The third question was, “How do African American men explain and/or use self-efficacy’s influence on their motivation to achieve academic success in mathematics?” The major finding here was that these young men’s choices of classes were positively influenced by their beliefs in their abilities and that their willingness to persist in mathematics was also positively inspired by their beliefs in their abilities. The final question was, “How can self-reflection effectively be incorporated into the evaluation and alteration of African American male thinking about and behavior towards mathematics?” Two of the participants in this study provided evidence on the alteration of thinking about and behavior towards mathematics. After facing difficulties in the subject and considering changing their major or dropping a course, both individuals looked at their prior experiences and decided that they were able to overcome these small setbacks, persisted in the subject, and succeeded.
CHAPTER 5
CONCLUSION

In this chapter, I present a summary of the study, discussion, implications, recommendations, limitations, and a conclusion for this study. The summary includes a brief synopsis of the purpose, methodology, findings, and response to the primary research question. The discussion draws attention to several key ideas that emerged from this study. Implications are specified for teachers of African American male students, for parents of African American male students, and for African American male students. I identify the limitations of this study and then conclude with closing remarks.

Summary of Study

Among the many challenges in the educational system of the United States, one that has received inadequate attention is the underrepresentation and underperformance of African American men in education. It is imperative that some attention turn towards disparities in education and opportunity for groups such as this. One approach to addressing disparities is to look more closely at models of success. As a result, the purpose of this study was to uncover reasons why some African American men are not missing out on opportunities to participate in STEM fields.

For this study, I chose to examine motivation, which affects student’s academic success. Motivation has a variety of factors, but I used self-efficacy, defined as students’ “judgments of their capabilities to organize and execute courses of action required to attain designated
types of performances” (Bandura, 1986, p. 391). Accordingly, the theoretical framework that I chose for this study was Bandura’s (1986) social cognitive theory.

In this qualitative, constructivist study, I incorporated culturally appropriate research methods. I employed this research strategy because it allowed me to engage African American men and understand their meanings of self-efficacy and its influence on their academic achievement in mathematics at the postsecondary level. I used the mathematics autobiographies and individual interviews to construct the interpretations in the findings.

The autobiographies and interviews revealed the following seven themes: 1) teacher influence; 2) family influence; 3) peer influence; 4) perception of mathematics; 5) problem solving approach; 6) African American male teachers; and 7) prior experiences. Responses to certain themes were consistent, but there were also variations among participants’ responses, which offered different alternatives for future exploration. The teacher influence theme represents the feedback that teachers gave to these participants through verbal cues or the creation of a supportive and caring environment. The family influence theme represents the role that parents, siblings, or other family members portrayed in developing the participants’ self-efficacy. The peer influence theme represents the role that friends and classmates played in reinforcing the participants’ mathematics self-efficacy. The perception of mathematics theme represents the participants’ identification of how other African American men view mathematics and therefore avoid the subject. The problem solving approach theme represents one aspect of perseverance demonstrated by the participants. The African American male teachers theme represents the participants’ opinions on the benefits of more visibility of these potential role models. The prior experiences theme represents the early achievements in mathematics that encouraged further pursuits in the subject.
This study investigated the responses of six African American men who have been identified as academically successful in mathematics at the postsecondary level. Participants attended two HBCUs, two from University 1 and the remaining four from University 2. The majors of the participants from University 1 were economics and chemical engineering while all of the participants from University 2 were mathematics majors. The intent of this study was to allow opportunities for participants to define, discuss, and reflect on their beliefs in their mathematics abilities, the sources of their beliefs, and the impact of their beliefs on their motivation, academic achievement in mathematics, choice of interests, perseverance, and effort expended.

All of the participants articulated highly optimistic beliefs concerning their mathematics self-efficacy; however, one of the participants, Barry, stated that his confidence in his abilities had declined as a result of not having to exercise certain thought processes. The sources that these African American men identified as being conducive to their mathematics self-efficacy were enactive attainment, vicarious experience, and verbal persuasion. Of these three, it appears that vicarious experience had a more significant influence, which contradicts the premise in the literature that enactive attainment has the most significant influence. From the responses analyzed, it appears that these African American men’s choices of classes were positively influenced by their beliefs in their abilities and that their willingness to persist in mathematics was also positively inspired by their beliefs in their abilities. Finally, through observation of appropriate behaviors and through suitable comparisons, African American male thinking about and behavior towards mathematics can be altered; however, these behaviors and comparisons should be positively reinforced by teachers as well as parents.
Discussion

Results of this study provide evidence that it would be beneficial to further explore the self-efficacy of African American men. As a result of this study, there are several areas of particular importance that I would like to draw one’s attention to. The first area deals with teacher expectations. Teachers are vital to the achievement, attitude, and motivation (Russell, 2005) of their students, particularly in mathematics. Although African American students are underrepresented in higher level mathematics courses, the same can not be said of their representation in the lower track courses (Russell, 2005), particularly the men, where teacher expectations are usually the lowest (Oakes, 1990a, 1990b). Students are very perceptive of the cues provided by a teacher who thinks their class is unmotivated to learn. The poor attitudes and consequent behaviors of teachers send clear messages that the bar of academic success is set exceptionally low with little indication that it will be raised.

In the case of African American men, teachers who hold low expectations for them are potentially disadvantageous to the students (Tucker & Herman, 2002). Low expectations for this group have been demonstrated to occur frequently and regardless of the ethnicity of the teacher. To illustrate this point, Garibaldi (1992) surveyed 500 teachers and asked about their beliefs in their Black male students going to college. Of the 318 respondents, almost 60% responded negatively. Furthermore, 60% of the respondents taught in elementary schools, 70% had at least ten years of teaching experience, and 65% were Black. Compare the attitude of these teachers to the 95% of more than 2,250 African American men who, when interviewed, stated an expectation to graduate high school; 40% held beliefs that their teachers did not set high enough goals for them, and 60% felt that their teachers should push them harder.
What evidence does this study provide that higher expectations could have a positive impact? Consider Corey’s recollection of being asked by his teacher to join the math club and compete. “When I began to think, I realized that math is something I love and that as a direct result I was very gifted in the area.” This moment led Corey to realize, “I felt like I had finally found my purpose and calling in life. I liked the fact that I could be rewarded and compete with others doing something school related.” Also, recall the statements made by Alfred, whose “teacher helped me to better accept my ability to do math” and was concerned with the success of the entire class, as well as Dexter, whose teachers “made me specifically feel as though I was great at math and they loved to teach me.” Unfortunately, not enough African American men feel this way.

African American male images have been given many labels—underserved, hopeless, dysfunctional, uneducable, dangerous, endangered, highly incarcerated, highly unemployed, and incapable of being salvaged (Ellis, 2004; Entman & Rojecki, 2000; Garibaldi, 1992; Majors & Billson, 1992; Murrell, 1994; Pettit & Western, 2004). Because of this, at times they also have lowered expectations in academic arenas. However, the participants in this study lend evidence to the fact that African American men are capable of meeting high expectations, in fact they want them (Garibaldi, 1992), can perform at a high level academically, and are very motivated academically. Moreover, teachers may serve as models from which students can receive information concerning their self-efficacy and also provide verbal cues that enhance and reinforce self-efficacy.

It is incumbent on teachers to do more than say they hold high or higher expectations for their African American male students. What does that truly mean? Do higher expectations include: 1) getting them to successfully memorize a set of rules, 2) getting them to receive a
passing grade for the term, or 3) getting them to pass a standardized test? These are not higher expectations, but minimal objectives that serve as distractions to the fact that real expectations have neither been set nor defined. Real expectations are 1) both the student and the teacher performing to their optimal abilities, both as learners and as teachers, which comprises maximum effort exerted to each task assigned, 2) students seeking help when necessary, 3) teachers offering assistance when necessary, 4) each supporting the other in their respective efforts, and 5) the encouragement of lifelong learning on both sides. If these things are done, then high academic achievement should naturally follow.

The second area deals with the social construction of these young men’s identities. For the African American men in this study, vicarious experience appeared to be more influential than enactive attainment, which Bandura (1986; 1997) has theorized has the most significant impact on self-efficacy. These men appropriately selected and used information from multiple sources, family, peers, and teachers, to construct and maintain their identities as academically successful African American male mathematics learners. Bandura (1986) has made the claim that vicarious efficacy information is partially determined by socially comparing oneself to a similar model. Festinger (1954) and Suls and Miller (1977) concur and add that the models who provide the most informative feedback for determining one’s abilities are usually of equal or to some extent greater ability. This study provides evidence, such as Corey who tries to surround himself with people who are performing at or above his level, that supports this claim.

Both a model’s past performance and a model’s characteristics can impact an observer’s efficacy (Bandura, 1989b). In a study conducted by Brown and Inouye (1978), the researchers found that individuals who modeled failure expressed low self-efficacy and gave
up very easily; moreover, the individuals gave up more quickly the lower their self-efficacy. In the case of African American men, too many, who are fully capable of achieving academic success, are modeling mediocrity and failure, which is why, as some of the participants in this study acknowledge, we do not see a large number of them pursuing areas such as mathematics. There is a mindset, as Frank alludes to, “where it’s like, I just can’t do it and I’d rather not. I’m not good at this. Why keep on doing this when I know I’m not good at it?” Or Dexter recalling how he frequently hears people say, “I hate math. I hate math.” Thus, any efforts aimed at reversing these trends later are useless because the students by then have a “don’t care” and “it doesn’t matter” attitude.

Bandura (1986) and Schunk (1995) have both argued that model similarity provides a valuable source of information to observers because the more alike the observer and models are then the higher the chances are that an observer’s patterned actions will produce results comparable to that of the model. Model similarity has been recognized to have a prominent effect on observer’s self-efficacy (Schunk et al., 2008; Suls & Miller, 1977). In the context of modeling, two types of models are discussed: mastery models who perform flawlessly and coping models who demonstrate deficiencies but improve their performance outcomes and increase their confidence (Bandura, 1986; Thelen, Fry, Fehrenbach, & Frautschi, 1979). Each young man in this study stated their belief that having an African American male teacher, potential mastery model, would be beneficial to African American male students because of the presence of someone they could relate to. Moreover, Alfred recommended that highlighting more diversity in the achievements of African American scientists, mathematicians, and doctors instead of celebrities and entertainers would allow African American boys to “see if other people have done this, then I can do it.”
Schunk and Miller (2002) assert that the observation of mastery models may be less effective in raising self-efficacy than observing coping models because coping models provide more salient examples of the possibilities available when a person is persistent in achieving desired outcomes despite obstacles that may be encountered. In a problematic domain such as mathematics, African American boys need both types of models, but particularly more coping models, than are currently being afforded to encourage their self-efficacy. Bandura (1986) makes the following claim:

Seeing others eventually succeed provides incentives for individuals to undertake difficult tasks. Moreover, showing that success is possible through perseverance helps to sustain effort in the face of setbacks. Without the benefit of observed accomplishments, initial personal failures—which inevitably occur in difficult endeavors—more readily create discouragement and resignation. (p. 302)

There needs to be an aggressive effort to immediately provide these models of success to African American male youth so that they will have accessible mechanisms to help counteract the many perceptions that exist with regard to their academic achievement capabilities. For these youth, they must embrace the idea that being academically gifted and demonstrating it are not denouncements of one’s Blackness and being less educated is certainly not a confirmation of one’s Blackness.

The third area deals with the role of HBCUs. All of the participants in this study attended HBCUs, which have come increasingly under fire. According to the Associated Press (2009), claims made by HBCUs that they provide an environment where African American students are more likely to succeed are not true. Thus, some schools must defend their existence. Historically, HBCUs were founded to provide the collegiate education to African Americans that they were denied (Brown & Davis, 2001). Allen (1992) stated six goals of HBCUs: 1) to maintain Black historical and cultural tradition, 2) to provide leadership to the
Black community, 3) to provide economic purpose within the Black community, 4) to provide Black role models, 5) to provide social competence to college graduates, and 6) to produce Black agents who address the conditions of Black communities.

Although we are seeing diversity unlike any we have ever seen in our previous history and although African Americans now have greater access to higher education than they once did, that does not mean that HBCUs have served their purpose and are no longer necessary. On the contrary, HBCUs are in as much need today as they once were. Although Harper (2006) has shown that supportive environments can be established at PWIs, being at an HBCU provides more readily accessible opportunities to see coping models, potentially mastery models, and alleviates having to deal with some pressures, like stereotype threat or acting white, because as Barry pointed out, “we’re all pretty much there for the same goal.”

As examples, some of the young men in this study commented on the peer influence that they received at their respective institutions. Alfred intentionally studied with friends who he knew were good at math; as a result, he perceived that they helped him “learn more and become proficient.” Dexter mentioned his core, who when he saw them studying made him recognize that he needed to work also. And then there was Elijah who, because he had numerous friends who were computer science and mathematics majors, did not want to be recognized as “the friend who fails the test.” These are not the typical statements that one might expect to hear from African American males when speaking of academic achievement, but these comments were from these young men’s lived experiences.

I did not ask for reasons why these young men decided to attend HBCUs, although I suspect Dexter attended to continue the tradition of his parents. However, responses to such a question could potentially provide information that is invaluable to the future existence of
these particular institutions. It could also be potentially valuable to know whether these institutions have any impact on the identity development of African American men as mathematics learners. In addition, should we expect to see the same types of mathematics self-efficacy beliefs from an African American male student who attends a PWI? The evidence from this study provides a clear indication that some aspect(s) of attending an HBCU are beneficial to African American male achievement. As a product of an HBCU myself, I contend that these campuses must be maintained because without them, access to higher education will be significantly reduced for a considerable amount of African Americans.

Implications for Teachers of African American Male Students

Teachers should encourage African American male students to persevere in mathematics at an early age, provide a stimulating curriculum that encourages more to participate in advanced mathematics courses, and provide greater access to the opportunities that exist within mathematics-related fields. Teachers should also become more aware of any cultural differences that exist between them and their male students (Irvine, 1990; Obidah & Teel, 2001) so that the teachers do not fall prey to the misperceptions that exist about African American men. A final implication for teachers is a call for more African American male teachers by African American male students. Each young man in this study said emphatically that having an African American male teacher would be beneficial to African American male students. Alfred and Corey each believed that male African American teachers would be more attentive to the needs of African American male students and thereby more passionate about helping them. The common theme in this discussion was the presence of someone they could relate to.
Implications for Parents of African American Male Students

Family factors have a powerful influence (Johnson, 1992) on academic achievement, a claim that has been demonstrated by numerous authors (Hrabowski et al., 1998; Johnson & Prom-Jackson, 1984; Prom-Jackson et al., 1987; Scott-Jones, 1984). The cues received from the attitudes and behaviors of parents and other family members could set the tone for the students’ subsequent attitudes and behaviors toward academic pursuits, mathematics in particular. The participants of this study had very positive family influences. Almost every participant stressed the importance of having strong support from family that began at an early age, which confirms the findings of Hrabowski, Maton, and Greif (1998). Consequently, parents should invest in mathematics development in the early stages of their child’s academic career. They should be advocates for their children taking more advanced mathematics classes. Parents should be involved in the development of self-appraisal skills to help “explain to their children who is appropriate for comparison and who is not for gauging their capabilities” (Bandura, 1986, p. 422). Moreover, parents should make the necessary investments in their sons’ education early and trust that it will pay great dividends later.

Implications for African American Male Students

The participants in this study had a variety of experiences, but all shared a commonality, which was to achieve academic success because they knew they were capable. A fundamental feature that these participants used to judge their beliefs in their mathematics abilities were vicarious experiences received from teachers, peers, and family. These participants appeared to have developed relatively reasonable mechanisms by which to assess their efficacy judgments, which were assisted early on by strong parental involvement to
establish the beliefs. Then they were able to rely on their own attributes in later stages of their academic career. The implication, then, for other African American male students is to be more receptive of the experiences provided by teachers, peers, and family that promote and nourish one’s beliefs in their mathematics abilities. Another implication for other African American male students is to establish a set of peers whose mathematics performance is equal to or better. It is essential that African American male youth have a core, which one participant referenced, that motivates and encourages academic success. For African American boys, a significant portion of their social learning happens in the context of their peers. Thus, more care should be exercised in peer selection because, according to Bandura and Walters (1963) as well as Bullock and Merrill (1980), selective peer relationships will enhance self-efficacy.

Bandura (1989a) states that self-generated actions are central components of causal processes. In view of that, if African American male youth are taught and encouraged to use accurate self-assessment skills, then the knowledge gained should allow them to formulate their own efficacy judgments across various situations (Bandura, 1986). Bandura (1986) further asserts that accuracy of assessment depends on a number of skills and that individuals must concentrate on multiple sources of information, such as type of task engaged and results produced. Thus, attention should be given to efficacy information gathered over time instead of focusing on particular examples.

A benefit of developing durable self-efficacy is individuals then have experience in mastering difficulties during trying times (Bandura, 1989a). In a couple of cases in this study, Corey and Dexter were, at some point in their academic careers, forced to think about their past experiences in mathematics and both used their positive beliefs in their abilities to
persist in mathematics. Because of their beliefs, these individuals were able to exert more effort and persevere despite some of the challenges they encountered. But how can we enable more African American male youth to incorporate processes needed to expend more effort and persevere, especially when their perceptions are largely influenced by social comparisons? Bandura (1986) claims that at approximately six years of age, young children are able to recognize that the most useful comparisons are with individuals who are similar but a little better; however, he also claims that a dilemma of future research is identifying how children distinguish which social comparisons are most beneficial. If this is the case in general, then further exploration must be done to determine the characteristics of social comparisons most effective for African American male efficacy evaluation.

Recommendations for Future Research

Earlier, I posed the question, “By what stage (or at what age) do we see the emergence of African American male self-efficacy?” This question was in response to Whiting’s (2006) conceptual model of Scholar Identity in Black Males. Based on the responses of participants in this study, we see self-efficacy emerging as early as second grade, in the cases of Alfred and Dexter, but as late as eighth grade, in the case of Barry. Does that span of years provide the most opportune moment to answer questions concerning the mathematics achievement and self-efficacy of African American male students? Once past eighth grade, is it too late to develop the mathematics self-efficacy of African American male students?

Future research should consider examining this timeframe because we know for certain that African American students leave the pipeline to higher education as early as elementary school (Oakes, 1990c) and are completely off the track by high school. In addition, future research is needed to address the early development of self-efficacy among African
American male students, as well as, how their self-efficacy develops over time. The results of this research reveal that vicarious experiences had a significant effect on the mathematics self-efficacy of these young African American men. Future research is needed to identify the generalizability of the previous result. In general, future research is needed to produce a more comprehensive review of the self-efficacy of African American men.

Limitations of the Study

The research questions in this study were designed to encompass a broad view of African American male mathematics self-efficacy. Because qualitative methods were used, I conducted unstructured, open-ended interviews, which I audio taped and transcribed. I attempted to maximize the strengths of this interview process while also attempting to minimize its weaknesses.

In the data collection phase of this study, there were three limitations, which are characteristic of interviews (Creswell, 2009). First, the interpretation of the questions by each participant may have been different; consequently, their responses may have been filtered. Second, I was unable to conduct each interview face-to-face, which was the original design of the study. Consequently, some information may have been lost due to not observing the participants in the field. Third, for the participants whom I did interview face-to-face, my presence may have contributed to some bias in the responses.

In the data analysis phase of this study, there were two primary limitations. First, there was some loss of information from the audio taped interviews conducted via telephone. Some portions were inaudible; therefore, these transcriptions were incomplete. Finally, Creswell (Creswell, 2009) includes in his description of the data analysis process “making
sense out of text” (p. 183). My novice analyses will potentially alter the data through multiple re-interpretations.

A final limitation of this study is the scope of the data collected. The proposed number of participants was eight; however, I was only able to acquire six. Although generalizations are not the intent of qualitative research, that is absolutely the case here. Also, I may have been unable to capture the true essence of these individuals’ lived experiences. At a minimum, the results here will serve as a basis for future inquiry.

Closing Remarks

This work was very refreshing for me and also caused me to do my own self-reflection. First, I had to address what some of the participants’ said about the benefits of having an African American male teacher. It would be someone who they could relate to, someone who would be more passionate toward educating them, someone who could motivate them, and someone who could make them feel more comfortable. As I reflect on the number of African American men who I have had and currently have as students, I have to ask myself questions such as the following: Have I been able to relate to the African American men in my classroom? Have I been passionate toward educating them? Have I been able to motivate them? Have I been able to make them feel more comfortable in the classroom? If my response is yes to any of these, then how may I improve in those areas? If my response is no to any of these, what do I need to do differently to ensure that these students receive the attention, motivation, relationships, and comfort that they seek?

I also must do some self-reflection as a researcher. As a researcher, have I been as sensitive to the features of this study as I claim others should be when examining conditions that impact African American men? Am I devoted to searching for meaning in a complex
system that is constantly evolving? I would like to think my answers to the previous two questions are yes, but I need to periodically check to ensure that I am staying true to the task at hand, which is to identify specific reasons why some African American men are able to achieve academic success in mathematics at the postsecondary level, to disseminate this information as a researcher, and to provide the experiences that will motivate and encourage academic success as a teacher.
APPENDIX A: MATHEMATICS AUTOBIOGRAPHY

Mathematics Autobiography

Instructions
You have one week from the date received to complete the questions below. Your response to each question should be typed, single-spaced, and should not exceed 1.5 pages per question. Please number each response according to the question that you are answering (i.e. Response #1 would correspond to “Identify and write about significant…”).

1. Identify and write about significant moments you have had with mathematics from kindergarten to your current grade. Please include both positive and negative experiences. The experiences can be either in-school or out-of school.
   a. When were you first drawn to mathematics?
   b. What is it that drew you toward mathematics?
2. When did you first realize you were “good at math?”
   a. Describe and elaborate on this memory.
   b. How did you feel when you made this realization?
   c. Who helped you realize you were “good at math?”
   d. Do you feel the same way about your abilities now?
3. Describe the best mathematics teacher you had?
   a. What was it like to be in this teacher’s class?
   b. What qualities or characteristics influenced your thoughts about this teacher?
   c. How was this teacher different from other teachers?
APPENDIX B: INDIVIDUAL INTERVIEW PROTOCOL

Individual Interview Protocol

The first question is designed to be very general. Afterwards, I will move into more specific questions to clarify ideas and/or get you to think about some other things.

1. Describe, in as much detail as possible, your perception of your ability to perform well in college level mathematics courses.
   a. Feel free to include in this description comparisons to your high school perception of your ability, how your feelings may have changed, how your feelings were reinforced, etc.
   b. What things do you think affected your perception? How?
2. Describe how your beliefs in your ability impact your choice of mathematics courses?
3. Describe how your beliefs in your ability have affected your willingness to persist with mathematics?
4. Describe how your beliefs in your ability affect the effort that you put into a course?
5. Describe your approach to a difficult mathematics problem (amount of effort expended, perseverance).
6. After you receive the results from a mathematics assignment, describe how it affects your judgments about your ability when the results meet your expectations and when the results do not meet your expectations.
7. When the results meet expectations, what things do you attribute that to? Why?
8. When the results do not meet expectations, what things do you attribute that to? Why?
9. Describe how seeing other people (friends, peers) perform, successfully or poorly, in mathematics impacts your performance and your perception of your ability.
10. Is there a person or persons whose mathematical performances you have tried to pattern?
    a. If so, explain the criteria you used to choose that person or those persons?
    b. Specifically, identify ways in which you have tried to pattern their performance behavior(s).
    c. Explain any modifications you have made to your attempts at patterning their behavior.
11. Identify anyone who gives you verbal cues about your mathematics ability.
12. Explain the effect(s) of verbal persuasion on your judgment of your mathematics ability.
13. Just before you take a test, describe your physical state (relaxed, nervous, sweaty palms).
14. Describe the effects of these arousal cues—fear, nerves, sweating—on your performance and your perception of your mathematics ability.
15. Do you feel that you have had to balance living in dual worlds? If so, how?
16. Why do you think that so few African American males pursue mathematics? What could or should be done to change that?
17. Are there any other factors, which you may not have mentioned, that you feel contribute to your motivation and subsequent academic success?
APPENDIX C: SPORTS PROBABILITY CHART

Estimated Probability of Competing in Athletics
Beyond the High School Interscholastic Level

<table>
<thead>
<tr>
<th>Student-Athletes</th>
<th>Men's Basketball</th>
<th>Women's Basketball</th>
<th>Football</th>
<th>Baseball</th>
<th>Men's Hockey</th>
<th>Men's Soccer</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School Student-Athletes</td>
<td>549,500</td>
<td>456,900</td>
<td>983,600</td>
<td>455,300</td>
<td>29,900</td>
<td>321,400</td>
</tr>
<tr>
<td>High School Senior Student-Athletes</td>
<td>157,000</td>
<td>130,500</td>
<td>281,000</td>
<td>130,100</td>
<td>8,500</td>
<td>91,800</td>
</tr>
<tr>
<td>NCAA Student-Athletes</td>
<td>15,700</td>
<td>14,400</td>
<td>56,500</td>
<td>25,700</td>
<td>3,700</td>
<td>18,200</td>
</tr>
<tr>
<td>NCAA Freshman Roster Positions</td>
<td>4,500</td>
<td>4,100</td>
<td>16,200</td>
<td>7,300</td>
<td>1,100</td>
<td>5,200</td>
</tr>
<tr>
<td>NCAA Senior Student-Athletes</td>
<td>3,500</td>
<td>3,200</td>
<td>12,600</td>
<td>5,700</td>
<td>800</td>
<td>4,100</td>
</tr>
<tr>
<td>NCAA Student-Athletes Drafted</td>
<td>44</td>
<td>32</td>
<td>250</td>
<td>600</td>
<td>33</td>
<td>76</td>
</tr>
<tr>
<td>Percent High School to NCAA</td>
<td>2.9</td>
<td>3.1</td>
<td>5.8</td>
<td>5.6</td>
<td>12.9</td>
<td>5.7</td>
</tr>
<tr>
<td>Percent NCAA to Professional</td>
<td>1.3</td>
<td>1.0</td>
<td>2.0</td>
<td>10.5</td>
<td>4.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Percent High School to Professional</td>
<td>0.03</td>
<td>0.02</td>
<td>0.09</td>
<td>0.5</td>
<td>0.4</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Note: These percentages are based on estimated data and should be considered approximations of the actual percentages.
Appendix D: Consent Form

Consent Form

University of North Carolina-Chapel Hill
Consent to Participate in a Research Study
Adult Participants
Social Behavioral Form

IRB Study # 08-0939
Consent Form Version Date: June 16, 2008

Title of Study: The Impact of Self-efficacy on the Mathematics Achievement of African American Males in Postsecondary Education

Principal Investigator: Richard Noble III
UNC-Chapel Hill Department: School of Education
Email Address: rnoble@email.unc.edu, noble@ncssm.edu

Faculty Advisor: Carol E. Malloy
Department: School of Education
Mailing Address/CB #: 3500
Phone number: 919-962-6607
Fax number: 919-962-1533
Email Address: cmalloy@email.unc.edu

Study Contact telephone number: 919-451-8219
Study Contact email: rnoble@email.unc.edu

What are some general things you should know about research studies?
You are being asked to take part in a research study. To join the study is voluntary. You may refuse to join, or you may withdraw your consent to be in the study, for any reason, without penalty.

Research studies are designed to obtain new knowledge. This new information may help people in the future. You may not receive any direct benefit from being in the research study. There also may be risks to being in research studies.

Details about this study are discussed below. It is important that you understand this information so that you can make an informed choice about being in this research study. You will be given a copy of this consent form. You should ask the researchers named above, or staff members who may assist them, any questions you have about this study at any time.
What is the purpose of this study?
The purpose of this research study is to learn about the self-perceived abilities of African American males who have exhibited academic success in mathematics at the university level. The articulated beliefs and their sources will be used to examine and better understand the impact of these beliefs on academic motivation and mathematical achievement.

You are being asked to be in the study because you are an African American male who is enrolled in a degree granting program that requires mathematics beyond Calculus I and who has been identified as mathematically successful. For the purposes of this study, success is defined as having a cumulative mathematics average of B while attending your current institution.

How many people will take part in this study?
If you decide to be in this study, you will be one of approximately eight people in this research study.

How long will your part in this study last?
Your participation in the study will take approximately 4 weeks. Your participation in the study should be complete by September 2008.

What will happen if you take part in the study?
Once your permission is received to participate in the study, you will be asked to write a mathematics autobiography and participate in an individual interview. You will be given one week to complete the mathematics autobiography. The interview will last approximately one hour. The interview will take place at a location of your choosing for your convenience and comfort. With your permission, the interview will be audio-taped and transcribed. You will have the right to not answer any question for any reason. A copy of the mathematics autobiography protocol and interview is included. If at any time you request to withdraw from the study, the request will be granted.

What are the possible benefits from being in this study?
Research is designed to benefit society by gaining new knowledge. You may not benefit personally from being in this research study. However, your perspectives as mathematically successful African American males will inform researchers and educators about the academic involvement of African American males and will inform other African American males about the possibilities that are open within academic fields.

What are the possible risks or discomforts involved from being in this study?
Although there are no known risks to participating in this qualitative study, you may feel some uneasiness in describing any challenges you have faced in academic or social circles. Recounting experiences that have brought you to your current academic status may be difficult.

Efforts will be made by the researcher to make you as comfortable as possible. Interviews will be conducted in an environment that is open, comfortable, and private, where you can feel secure about any emotions and experiences that are divulged to the researcher.
There may be uncommon or previously unknown risks. You should report any problems to the researcher.

**How will your privacy be protected?**
In an effort to maintain privacy, your name will not be used on any audio-taped interviews. If at any time you request that the tape be turned off during the interview, your request will be honored. I will transcribe the tapes and they will be kept in a locked drawer in my office. I will also replace the names of any school, organization and/or community you may mention with different names to protect your identity. During the interview, you will be asked to choose your own pseudonym.

You will be asked to provide an official academic transcript that will be obtained from the registrar’s office of your home institution. Any personal information, such as social security number, that is on the official transcript will be deleted.

At the conclusion of the study, all notes and records that contain your name or the names of any school, organization or community mentioned will be destroyed.

In addition, you will be offered a copy of the transcript of your interview. I will be the only person in possession of interview audiotapes. Audiotapes and all documents related to the study will be kept in a secured location.

Participants will not be identified in any report or publication about this study. Although every effort will be made to keep research records private, there may be times when federal or state law requires the disclosure of such records, including personal information. This is very unlikely, but if disclosure is ever required, UNC-Chapel Hill will take steps allowable by law to protect the privacy of personal information. In some cases, your information in this research study could be reviewed by representatives of the University, research sponsors, or government agencies for purposes such as quality control or safety.

Check the line that best matches your choice:

---

_____ OK to record me during the study
_____ Not OK to record me during the study

**Will you receive anything for being in this study?**
The inducements for participation will be $50. Each participant will receive $20 for completing the mathematics autobiography, $20 for completing the individual interview, and $10 to cover the costs of ordering an official transcript to verify their academic standing.

**Will it cost you anything to be in this study?**
The participant must provide me with an official transcript (the cost of which is to be reimbursed up to $10—including in the incentive).

**What if you are a UNC student?**
You may choose not to be in the study or to stop being in the study before it is over at any
What if you have questions about this study?
You have the right to ask, and have answered, any questions you may have about this research. If you have questions, or concerns, you should contact the researchers listed on the first page of this form. Richard Noble III, Principal Investigator, can be reached via phone, at (919) 451-8219, or email (rnoble@email.unc.edu). Carol E. Malloy, Ph.D., faculty advisor, can be reached via phone, at (919) 962-6607, or email (cmalloy@email.unc.edu).

What if you have questions about your rights as a research participant?
All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject you may contact, anonymously if you wish, the Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu.

Title of Study: The Impact of Self-efficacy on the Mathematics Achievement of African American Males in Postsecondary Education

Principal Investigator: Richard Noble III

Participant’s Agreement:
I have read the information provided above. I have asked all the questions I have at this time. I voluntarily agree to participate in this research study.

_________________________________________ _________________
Signature of Research Participant Date

_________________________________________
Printed Name of Research Participant

_________________________________________ _________________
Signature of Person Obtaining Consent Date

_________________________________________
Printed Name of Person Obtaining Consent
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