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Self-Efficacy: Understanding African American Male Students Pathways To Confidence In Mathematics

Lisa Ann Williams
Wayne State University,

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**SELF-EFFICACY: UNDERSTANDING AFRICAN AMERICAN MALE STUDENTS
PATHWAYS TO CONFIDENCE IN MATHEMATICS**

by

LISA WILLIAMS

DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

2017

**MAJOR: LEARNING DESIGN AND
TECHNOLOGY**

Approved By:

Advisor

Date

DEDICATION

To my husband, Rodney—You are my friend, my rock, my love. I could not have accomplished this without your support, patience, and wisdom. To my daughter, Lauryn—you rock! You have been a source of encouragement, and you are indeed my gift from God. Life is great because of the two of you. Together, may we always soar!

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CHAPTER 1: INTRODUCTION

The Council of The Great City School, the nation's primary coalition of large urban public school systems, characterized African American male students achievement as a "national catastrophe" (Lewis, Simon, Uzzell, Horwitz, & Casserly, 2010). Their social identity is tagged as uneducable, dysfunctional, endangered, and dangerous (Gibbs, 1988; Majors & Billson, 1992; Parham & McDavis, 1987; as cited by Jackson & Moore, 2006). Along with these negative stereotypes, according to Jackson and Moore (2006) African American males experience far greater challenges at the elementary, secondary, and postsecondary levels of education than their counterparts. For instance, they are more likely to be placed in remedial programs, low-track courses, and special education (Berry, Ellis, Hughes, 2014). They are also more likely to be suspended and expelled from school, underrepresented in gifted education programs and advanced placement courses (Berry, 2008).

In addition to the issues above, in 2015, the National Assessment of Educational Progress (NAEP) scores revealed that African American male students' mathematics achievement was statistically significantly low in comparison to their counterparts. For instance, the African American high school male students' average mathematics score on a nationally representative test was 30 points below White male high school students. Similarly, African American high school male students average mathematics score was 41 points below Asian/Pacific Islander male high school students. A critical review of the literature about the mathematics education of African Americans provides evidence that their poor performance is due to conditions that constrain their achievement (Berry et al., 2014). They are negatively impacted by factors such as the lack of advanced mathematics

courses and high-quality, experienced teachers. Thus, researchers argue that it is counterintuitive to focus on deficit models when discussing their achievement (Flores, 2007; Gutie'rrez, 2008).

As it relates to higher education specifically, African American males lag behind in science, technology, engineering and math (STEM) degree attainment when compared to other minority students (Ferguson, 2003; Hrabowski, Maton & Grief, 1998; Polite & Davis, 1999). For instance, their rate of post-baccalaureate degree attainment of 109% is alarmingly lower relative to the comparative rate of increase for Latino men of 242% and Asian American men of 425% (Harper & Davis III, 2012). Moreover, in 2009, African American men who attained an associates, bachelor's, and master's degree were 31.5 %, 34.1%, and 28.2% respectively; whereas, African American women who attained the same degrees were 68.5%, 65.9, and 71.8%, respectively (Harper, 2012).

Problem Statement

There is a plethora of research that suggests that motivation is fundamental to learning. Motivation is a major concern for all groups. However, it is of particular importance to African American males who suffer the most in the academic arena. Research has shown a decline in their motivation in relation to academics (Fashola, 2005; Pintrich, 2003; Turner & Patrick, 2004). However, there are those who have continued towards success in mathematics, despite being bombarded by challenges and the dominant discourse that suggest that they are incapable of educational achievement. Their success can be explained by their motivation and belief that education is the great equalizer (Harper & Davis III, 2012).

According to Woolfolk (see Shaughnessy, 2004) those interested in improving the academic achievement of students must first begin by examining the sources that build their self-efficacy. Bandura (1997) hypothesized that self-efficacy, individuals' judgment of their abilities in a specific academic domain, is informed by four sources of efficacy-relevant information: enactive mastery experiences, vicarious experiences of others, social persuasions, and physiological and affect state. According to Bandura (1997), "enactive mastery experiences are the most influential sources of efficacy information because they provide the most authentic evidence of whether one can muster what it takes to succeed" (p.80). Some researchers have suggested that the sources of self-efficacy are a function of ethnic background (see, Usher & Pajares, 2006, 2008). Furthermore, they have asserted that African American students [males] may rely on sources other than enactive mastery experiences to build their self-efficacy because their achievements are fewer (see Usher & Pajares, 2006). These researchers have asserted that race-comparative studies are needed to determine if the pathways to self-efficacy for African American and students of other ethnic groups are similar to the pathways taken by White students. On the contrary, other researches have asserted that such studies sends an unintended message that within-group studies of marginalized students are not worth researching and positions their culture as deviant (Graham, 1994; Gutie'rrez, 2008). Thus, Gutie'rrez argued for within-group studies of the advancements, gains, and excellence of marginalized students.

Purpose

The purpose of this study was three-fold. First, this study documented the school experiences of high-achieving African American undergraduate students to assess Bandura's (1997) theorized sources of self-efficacy, self-efficacy, and relevant motivation

constructs. Second, this study examined whether or not African American male students' selection and integration of the sources hypothesized by Bandura was a function of race/ethnicity. Third, this study gained insight from parents and African American male math teachers of higher education on how they and societal factors exerted their effect on the creation and development of African American males' efficacy beliefs.

Rationale for the Study

Mathematics was the focus of this study because it has been established that successful performance in mathematics creates differential opportunities for choice of colleges, majors, and career options. Individuals who graduate from STEM related fields attain greater opportunities for upward mobility, higher salaries, and social status positions. In this sense, understanding the sources that build African American men math self-efficacy is important.

Research Questions

1. How do high-achieving African American men discuss their beliefs about their mathematics self-efficacy?
2. What sources of information do high-achieving African American men use to inform their self-efficacy beliefs?
3. Are the sources of information that inform the self-efficacy beliefs of high-achieving African American men a function of race/ethnicity?
4. How do high-achieving African American men explain how their self-efficacy mediates their performance behavior?
5. What insights can parents provide about how parental support and societal factors shape self-efficacy beliefs?

6. What insights can African American male higher education mathematics teachers provide about the situational factors that enhance or hinder the mathematics self-efficacy of African American men?

Theoretical Framework: Social Cognitive Theory

Overview

Social cognitive theory is grounded in the agentic perspective in which individuals behaviors has a direct influence on the course of events that occur in their life (Lent, Brown, & Hackett, 1994). According to Bandura (1997), human agency, one's power to make things happen, operates within a triadic reciprocal causation structure. This structure consists of three determinants: behavior, internal personal factors, and environmental factors. These factors are interdependent and influence one another bi-directionally. They do not necessarily have equal strength nor do they exert their influence simultaneously.

People are viewed as both producers and products of social systems (Bandura, 1997). Social structures, such as policies, practices, and procedures, impose restrictions and provide resources for personal growth and routine functioning. However, social cognitive theory asserts that the interplay of internal personal factors and environmental factors produces actions. In summary, social cognitive theory asserts that individuals are not simply a conduit of environmental influences; rather, they are partial contributors to who they become in life.

Hypothesized Sources of Self-efficacy

Self-efficacy is defined as “the belief in one's capabilities to organize and to execute the courses of action required to produce given attainments” (Bandura, 1997, p. 2).

It holds that self-efficacy is formed from four sources: enactive mastery experiences, vicarious experiences, social persuasion, and emotional and physiological indexes.

Enactive Mastery Experiences

According to Bandura (1997), enactive mastery experiences are past successes and failures that individuals draw on when appraising their abilities. He believes that they are the influential sources of self-efficacy because they are authentic evidence of a student's ability to master subsequent tasks related to a specific academic domain. Parents bolster children's efficacious beliefs by exposing them to activities that are moderately challenging and enable autonomy; whereas parents who provide few home enriched activities develop less-efficacious children. For instance, empirical evidence revealed that stimulating early childhood experiences builds self-efficacy (Maloney & Beilock, 2012; Vukovic, Roberts, & Green, Wright, 2013).

The relative weight given to performance experiences are effected by seven factors: preconceptions of ability; the perceived difficulty of tasks; the degree of effort exerted, the amount of external assistance received; temporal patterns of successes and failures; the contextual conditions; and the way these events are cognitively processed. First, under preconceptions of ability receiving good grades bolsters individuals self-efficacy beliefs; whereas, repeated failures lowers self-efficacy beliefs especially if the failure is not linked to a lack of effort or adverse external conditions. Second, success at tasks perceived as difficult will bolster self-efficacy; whereas repeated successes at easy tasks do not build self-efficacy beliefs. Third, self-efficacy is less likely to be bolstered when laborious efforts are exerted to achieve at a tasks because the success is attributed to effort rather than ability. Fourth, successes achieved after performing tasks perceived as difficult without external

aids builds personal efficacy beliefs; whereas, successes achieved after performing tasks perceived as difficult with external aids have little effect on personal self-efficacy because the accomplishments are not attributed to personal capabilities. Fifth, those who periodically fail but continue to improve their performance over time are more likely to boost their self-efficacy beliefs. On the contrary, those who succeed but feel as though they are approaching the limits of their ability do not invest the additional time and effort, and they are less apt to raise their self-efficacy. Sixth, the conditions under which they are expected to perform determine the impact of their successes and failures. For example, if a student performs under adverse conditions then the impact of self-efficacy will be weaker than had the student performed under optimal conditions. Seventh, the cognitive organization and reconstruction of memory impacts self-efficacy beliefs. Personal self-efficacy is influenced by selective focus of personal attainment. For example, self-efficacy is enhanced or hindered by the recall of perceived recent successes or failures. Judgments of competence are bolstered by focusing on past accomplishments and is diminished by recalling failures.

Vicarious Experiences of Others

Vicarious experiences of others serves as another source of information that individuals rely on for efficacy appraisals. There are different forms of comparative information that are weighted and integrated to build self-efficacy: normative comparative, specific social comparative, and comparative personal information. Individuals conduct normative comparisons when they compare formative and summative performance outcomes (i.e. grades) to their peers to judge their abilities in a specific academic domain. Individuals who progress slower than others may signify low self-efficacy. Whereas, swift

progress may signify high self-efficacy. Specific social comparisons are the use of models to acquire knowledge and skills. Thus, observers do not regard the gap in their performance compared to the model as an indicant of basic capability but rather attribute it to their transitory level. Self-comparisons are the evaluation of skill improvement concerning moving upwards towards the skill set of an individual who has mastered a task.

The selection of models will determine the type of competencies that will be observed. In turn, observers' dispositions, perceived competence and motivational orientations will be influenced by these observations. Models that possess the same or slightly higher abilities provides the most comparative information for observers to assess their capabilities. Competitive comparisons can give lead to despondency and self-deprecation. Conversely, advantageous comparisons with individuals who have similar talents can produce positive self-appraisals. The similarity of others and the belief that the model's achievement is attainable influence the observers' judgment of their competency. Typically individuals tend to compare themselves to daily associates such as teachers, family members, peers, work associates, or individuals who are performing tasks in similar settings. Seeing or visualizing someone who is perceived as similar perform successfully raises efficacy beliefs in observers (Bandura, 1997). However, observing similar others fail convinces the observer that subsequent failures are due to personal limitations. The greater the perceived similarities, the more persuasive are the model's successes and failures. For example, children develop stronger self-efficacy from peers rather than from adults who exhibit the same cognitive skills (Schunk & Hanson, 1985; as cited by Bandura, 1997). As it relates to gender, women derive a stronger sense of personal capabilities from female models opposed to male models (Gould & Weis, 1981; as cited by Bandura, 1997).

Furthermore, individuals view models of similar race and gender as more credible. Thus, they have greater influence on efficacy. However, dissimilar models that provide valuable skills should not be discounted especially if the activity is not linked to stereotypes (Bandura, 1997).

Another form of vicarious experiences are symbolic modeling that is provided by mediums such as YouTube, television, social media, videos and other forms of technology which can have a direct influence in bolstering individuals self-efficacy. Symbolic modeling can have an immediate influence on observers' attitudes and behaviors. They can also teach knowledge, skills, and strategies which in turn bolsters self-efficacy beliefs.

There are two types of modeling formats: mastery modeling and coping modeling. Mastery modeling is an individual who perform faultlessly and calmly. They can bolster self-efficacy beliefs by teaching ways to control environmental demands. Coping modeling is an individual who convey nervousness and doubt but overcome their difficulty through unyielding effort. They can improve an observer's self-efficacy by showing the rewards of perseverance and by teaching skills for managing stress. For example, when parents model coping skills when they exert effort, persist and persevere when faced with challenges. Also, parents provide a vicarious boost in self-efficacy by directing their children to peers who are efficacious. Likewise, teachers, who remain calm when facing teaching a difficult math concept bolsters their students' self-efficacy. Conversely, when parents and teachers give up, the observers perceive that similar problems will be difficult for them as well.

Social Persuasions

Social persuasion is a third source that can either strengthen or weaken in the beliefs individuals have in their competencies. The expression of faith from individuals that are

respected has a powerful influence on someone who is experiencing difficulties. For example, encouraging messages that parents convey to their children concerning their math abilities can bolster children's self-efficacy. Whereas, discouraging messages may result in children avoiding challenging math tasks for fear they may fail, thus, reducing opportunities to build skills. Persuasive messages are believable when the successful performance of the task is reasonable. On the other hand, the credibility of the persuader is lowered when the performer experiences repeated failures. Thus, persuasory mentors who are interested in building self-efficacy beliefs structure activities so performers can experience success opposed to repeated failures.

Evaluative feedback that focuses on personal capabilities can also have a positive effect. Such feedback is particularly influential during the early stages of skill development. However, evaluative feedback that focuses only on effort has the potential of undermining self-efficacy. Self-efficacy is undermined because it only conveys laborious effort that resulted in successful performance attainment rather than talent (Bandura, 1997).

Physiological and Affect State

The final source of information that develops self-efficacy is the individual's interpretation of his or her physical and emotional state. Students who interpret their anxiety as a personal deficiency are more likely to reduce their self confidence in their abilities than someone who interprets their anxiety as a natural reaction that competent people occasionally experience. Thus, for low achievers the presence of aversive arousal may have a negative impact and debilitate performance. However, for high achievers aversive arousal may energize them. Obsession about one's emotional state can lead to

dysfunction and can negatively highlight the area that concerns the student the most. On the other hand, experiencing success along with minimizing the presence of anxiety increases individuals beliefs in their abilities. The students' mood also impacts cognitive processes (e.g., reflection, interpretation of arousal and memory recall). For example, a negative mood may cause individuals to focus on past failures resulting in diminished efficacy whereas a positive mood may cause individuals to focus on prior accomplishments resulting in enhanced efficacy (Bandura, 1997).

Self-efficacy as a Mediator

Cognitive Processes

Understanding how students form their self-efficacy is critical because self-efficacy mediates cognitive, motivational, affective, and selection processes (Bandura, 1997). Self-efficacy impacts thought patterns which takes various forms. For instance, people are motivated, and their behaviors are regulated through the exercise of forethought. For instance, students engage in retrospective thinking in which after the completion of an event they self-analyze the results. Thus, the student will act based on their belief of the possibility of a future outcome.

The goals that they set are a function of their self-appraisals of their capabilities.

Goals are powerful in the sense that they enhance and sustain motivation (Locke & Latham, 1990); as cited by Bandura, 1997). It is theorized that goals influences motivation and behavior through self-evaluation mechanisms (Bandura, 2012). Thus, individuals must establish specific personal standards and have knowledge of their competence for goals to be effective.

Motivational Processes

Bandura (1997) conceptualized that self-efficacy impacts three motivational processes: causal attributions, outcome expectancies, and cognized goals. They form beliefs about their abilities, they reflect on likely positive and negative outcomes of different endeavors, and they establish goals for themselves and plan courses of action intended to achieve valued futures and avoid aversive ones.

Affective Processes

Bandura (1989, and 1986) argued that self-efficacy also mediates human functioning through affective processes. He perceived that coping efficacy mediates anxiety and stress meaning that people do not avoid situations because of the anxiety that they will experience rather they avoid the situation because they believe they will be unable to cope.

Selection Processes

Self-regulation is influenced by internal standards and evaluative feedback. In summary, Bandura's (1997) principles of triadic reciprocity asserts that people judgment of their abilities influence their selection of their environment and behaviors, which then influence their performance, and, ultimately, the results of their performance influence their beliefs. Additionally, he holds that students beliefs in their abilities has a profound effect on their choices of tasks and activities (Bandura, 1997), as well as, college majors and career choices (Betz & Hackett, 1983a; as cited by Bandura, 1997). Thus, self-efficacy is a greater predictor of task and activity selection as well as major and career choices than actual ability (Betz & Hackett, 1983a; as cited by Bandura, 1997).

Limitations and Delimitations

The limitations of this study are the following: limited causality and generalizability; self-report instrument.

The qualitative research design of this study limits causality. Also, because this research will use purposive sampling to obtain a sample of students, the lack of true random sampling limits the generalizability of the findings of this study. Also, the lack of diversity in the population may not allow the generalization of the study results across more urban, diversified schools and school districts.

Delimitation is the selection of the participants of this study. This is a practical rather than an impractical decision. The constraints are resources (e.g., financial and time burden).

Significance of the Study

Some researchers have documented the college experiences of African men (see, e.g. Davis, 1994; Stage & Kloosterman, 1995; Treisman, 1992). The themes that they have identified have centered on racism and difficulties that African American men have experienced in mathematics. Although it is helpful to understand the negative experiences that African American male students encounter (Jett, 2011), it is equally important to research high achieving African American male students (Harper, 2005) to counter the negative discourse, particularly in mathematics (Berry, 2008; Jett, 2011)

Researchers see the value in documenting the success stories of African American students (see, e.g., Berry, 2003; Harper, 2005; Jet, 2011). For example, Harper poses the question “But what about those among this population who beat the odds, make the most of college, and achieve in multiple ways inside and outside of the classroom? Who are

they, and what can they teach us?” (Harper, 2005, p.8). Aligned with the questions posed by Harper (2005) this study chronicles the schooling experiences in mathematics of high-achieving African American men. Furthermore, the vast majority of motivation studies have specifically focused on the motivation of Caucasian students (Usher & Pajares, 2008). The critical review of the literature of the few motivation studies of African Americans revealed that researchers used quantitative measures, a race-comparative approach, and attribution and expectancy-value theoretical frameworks to explore their motivation (Graham, 1994). Major weaknesses of these studies were they emphasized African Americans so-called motivational deficits without attending to the cause of perseverance, selection, or intensity of behavior which are the foundations of these frameworks (Graham, 1994). Thus, Graham (1994) recommended that future motivation research of African Americans should be within-group studies that focus on the cognitive and emotional factors that influence their human behavior and academic achievement. She also suggested that the studies be guided by Bandura’s (1997) social cognitive theory; it offers a broader theoretical perspective for understanding how African American students’ motivation influence human behavior and achievement opposed to attribution and expectancy-value theory (Bandura, 1997).

Over 20 years has passed since Graham (1994) admonished researchers for neglecting to explore the social cognitive aspect of African Americans motivation and for perpetuating a deficit model. Parallel to Graham’s contention, other researchers have also asserted that it is counterintuitive to focus on deficit models (Flores, 2007; Gutierrez, 2008). Yet, few within-group studies have been conducted that have explored the sources that shape their motivation (Usher & Pajares, 2008). Even fewer studies have explored the

sources that build the self-efficacy of high-achieving African American male undergraduate students (Noble, 2011). Hence, this study will add to the body of literature by identifying and describing the sources of math-related academic and self-regulatory self-efficacy of high-achieving African American men.

This study will also investigate the contextual factors that may influence African American male students' selection and interpretation of sources that built their self-efficacy. Finally, this study will explore how parents and African American male mathematic teachers exert their effect on the creation and development of African American male efficacy beliefs. Performance consultants, instructional designers, administrators of teacher education programs, coaches, and school personnel may use this information to influence education policy and design interventions that meet the needs and interests of African American male students, a population that has been historically underserved in school mathematics in the United States.

Operational Definitions

1. Academic self-efficacy: "measures students' judgments of their capability to learn academic subjects and skills" (Usher & Pajares, 2006, p.132).
2. African American: For this study, African American will be used interchangeably with Black.
3. Agency: "in this context was defined as the participants' ability to accommodate, resist, or reconfigure the available sociocultural discourses that surround African American males in order for them to effectively negotiate these discourses in their pursuit of success." (Stinson, 2004).

4. Deficit model: “a perspective which attributes failures such as lack of achievement and learning to a personal lack of effort or deficiency in the individual, rather than to failures or limitations of the education or to prevalent socio-economic trends” (Wallace, 2012, “Oxford Reference Deficit Model,” Para. 1).
5. Enactive mastery experiences: authentic evidence of capabilities (Bandura, 1997)
6. Ethnicity: distinct American groups that have a common culture, heritage, and place of origin outside of Europe (Phinney & Landin, 1998)
7. Emotional and physiological index: judgments of one’s capabilities are determined by anxiety, stress, and mood (Bandura, 1997).
8. Entity view of ability: the conception that ability is fixed (Dweck & Leggett, 1988)
9. Incremental view of ability: the conception that ability can be altered through effort and the proper learning strategies (Dweck & Leggett, 1988)
10. People of color: African American, Latino, Native American, Black
11. Physiological and affective arousal: Feelings about anxiety, mood, arousal
12. Self-efficacy: “beliefs in one’s capabilities to organize and execute courses of actions required to manage prospective situations: (Bandura, 1997, p. 2).
13. Self –reflection- referred to forethought as a “distinctly human” characteristic.
14. Self-regulatory skills-“generic skills for diagnosing task demands, constructing and evaluating alternative courses of actions, setting proximal goals to guide one’s efforts, and creating self-incentives to sustain engagement in taxing activities and to manage stress and debilitating intrusive thoughts” (Bandura, 1997, p.51).
15. Social persuasion: “verbal persuasion and allied types of social influences that one possess certain capabilities” (Bandura, 1997, p.79).

16. Vicarious experiences: “alter efficacy beliefs through the transmission of competencies and comparison with the attainments of others” (Bandura, 1997, p.79).

Summary

This chapter discussed the deficit theory that seems to be applied to African American male students. It presented key background information for the current study to explore the sources that African American male undergraduate students select and integrate into their self-efficacy.

CHAPTER 2: LITERATURE REVIEW

Introduction

Chapter one explored the general concepts that impact the motivation of African American males and defined the framework of this study. This literature review will discuss how disproportional mathematics learning opportunities have resulted in African American male students' underachievement. Second, it will discuss how African American parents support has been framed by mainstream researchers and how institutionalized racism has impacted parents' perceptions of their child's school experiences. Third, this study will bring to the forefront the limitations of quantitative studies that have investigated African American undergraduate college students underlying sources of mathematics-related self-efficacy beliefs. Fourth, studies that have been used to suggest that the sources of self-efficacy is a function of race/ethnicity will be discussed. Fifth, this study will present a justification for qualitative studies when exploring the mathematics education of African American male students. Lastly, the literature review will end with a summary of the relevance of the literature review findings as they relate to the school experiences in mathematics of African American students, specifically African American males and the aim of the proposed study.

The strategies employed in conducting this literature review included selected research articles from peer-reviewed journals and scholarly publications, such as doctoral dissertations, books, periodicals, professional conferences, and reports in the field of education, sociology, and psychology. To ensure a comprehensive literature review was achieved several databases were utilized such as Google Scholar, Scopus, Eric Resources Information Center, PsycArticles, and Academic Search Premier. Some of the key words

and phrases used as the Boolean search words were: African Americans, self-efficacy, critical race theory, parent support, familial factors, sources of self-efficacy, mathematics, and college students. Finally, I have explored organizational and educational websites, such as National Council of Teachers of Mathematics (NCTM) and the United States Department of Education, United States Census Bureau and newspapers.

Historical Perspective of African American Learners of Mathematics

Some researchers have asserted that African American students underachievement in mathematics is due to genetic predispositions (Hernstein & Murray, 1994), family history (Jencks & Philips, 1998) and cultural factors (Weiner, 1994). As a result, inequality in achievement between African Americans and other racial/ethnic groups have been described as a hierarchy of competence (Flores, 2007). However, Flores (2007) asserted that rather than frame the disparity in mathematics achievement as hierarchical competence it should be framed as unequal opportunities experienced by African Americans, other people of color, and low-income students.

Berry et al. (2014) critical review of the literature of school mathematics revealed that the opportunities to learn were not equally distributed among all students. Specifically, between the 1900's and 1970's, African American students experienced rote procedural learning and were not considered for mathematic courses beyond basic arithmetic. Ellis (2008) found that standardized assessments and teachers' perceptions of students were the primary methods used to assess mathematical ability and served as a justification for placing students in remedial, general, or advanced classrooms, and for tracking purposes based on race/ethnicity. These assessment methods resulted in African American male

students experiencing unequal access to learning mathematics, thus, increasing the likelihood that they would be underprepared for higher education.

Between the 1980's and 1990's, the National Council of Teachers of Mathematics spoke boldly of the need to address the social injustices of school practices in their publications, Curriculum and Evaluation Standards for School Mathematics (CESSM, 1989) and Principles and Standards for School Mathematics (PSSM, 2000). These documents positioned social justice under the context of ensuring economic competition and national interest and situated equity in a broad context that left African American learners and members of other groups' social needs and social realities vulnerable (Berry et al., 2014). Martin (2003) asserted that these documents failed short in addressing or referencing the challenges that marginalized students face, such as inequitable arrangements of mathematical opportunities, differential treatment, and underachievement. Policymakers and leaders framing the inequalities in academic achievement as a threat to the nation's economic health assisted in maintaining the status quo of racial minorities in the American school system (Berry et al., 2014).

On January 8, 2002, President George Bush signed into law No Child Left Behind (NCLB) in an attempted to create a high standards-based education reform and establish measurable goals that would ensure that every child, regardless of race, income, background, and zip code would receive a quality education. Advocates of NCLB hoped to change high poverty schools which were typically schools where African American students and students of low socio-economic (SES) status attended. These schools were plagued with limited resources, poorly trained teachers, and instability of students and teachers. The NCLB was to assist with improving high poverty schools by (1) increasing

the positions and pay of math and science teachers; (2) creating math and science partnerships; (3) funding research to determine best practices for teaching and assessing mathematics and science (United States Department of Education, 2004). To evaluate these schools progress, they were required by the state to collect and disseminate student data, ensure that teachers were highly qualified, and guarantee that all students achieve academic proficiency by 2014. The first year, NCLB promises went unaddressed, but the punitive consequences for schools failing to meet adequately yearly progress (AYP) goals for overall performance and performance in each subgroup was enforced.

Due to results on international tests and the decline of U.S. students pursuing careers in math and science related fields, the NCLB law required Highly Qualified Teachers (HQT) in all K-12 public schools. A HQT was characterized as one who held at least a bachelor's degree and who had passed state certification or licensure requirements. Critics argued that the quantitative criteria used to define a HQT failed to take into account the importance of teachers understanding the social context, cultural background, and identities of their students (Martin, 2007). Opponents of NCLB also argued that the use of quantitative metrics perpetuated the notion of a static identity of students by discussing the achievement gap based on race, gender, language (Gutie'rrez, 2008) and that the use of quantitative metrics to create solutions for student learning further alienated Black learners from advanced mathematics (Berry et al., 2014). Thus, they asserted that that once more the reform efforts in mathematics education failed to address the realities of Black lives rather its efforts had focused primarily on meeting the needs of U.S. national interest.

In 2010, the Council of Chief State Standards for Mathematics and the National Governors Association released the Common Core State Standards for Mathematics

(CCSSM). CCSSM was a standards-based educational reform policy based on the premise that establishing consistency in the content between and within states would improve student achievement. It also posited that students would be able to compete domestically and abroad and there would be positive changes in U.S. school culture (CCSSO & NGA, 2010). Critics of CCSSM argued that its blanket statement “The standards promote equity by ensuring all students, no matter where they live, are well prepared with the skills and knowledge necessary to collaborate and compete with their peers in the United States and abroad” (National Governors Association Center for Best Practices and Council of Chief State School Officers 2010b; as cited by Berry et al. 2014, p. 550) ignored the gross inequities that Black learners have experienced and continue to experience in this society (Berry et al., 2014). They also argued that rhetoric that reflects “mathematics for all” will not improve Blacks learners’ achievement in mathematics until serious attention is given to the nontechnical issues such as race, racism, contexts, identities, and other conditions that hinders their success in mathematics.

In December 2015, President Barack Obama signed the Every Student Succeeds Act (ESSA). ESSA is viewed as a rewrite of NCLB. Similar to its predecessor, this law maintained federal standardized testing in reading and mathematics and required the disaggregation of data by race, income, English language proficiency and other categories. This law also perpetuated the notion of greater between-group than within-group variations and the notion of static identity. Its language focused on improving curricula, school culture, and classrooms; thus, like NCLB it assumed that there was only one type of mathematical experience that would benefit all children.

Unlike NCLB, ESSA did not impose punitive consequences for the poor performance of schools. Instead, state and local officials determined performance goals, rating of schools, and consequences for schools failing to meet objectives. This new legislation gave some of the control of public schools back to state and local districts. States had the flexibility of continuing to use CCSSM or adopting new standards, establishing goals for raising achievement, developing strategies for improving struggling schools, and designing methods for assessing student progress.

The ESSA made significant changes to the HQT provision of the NCLB law. Under ESSA, the state was no longer bound to ensure that teachers were certified in core areas in which they taught. The new law allowed public funds to be used to support the growth of entrepreneurial teacher programs such as Elevate Preparation Impact, Children (EPIC), National Center for Teacher Residences, (NCTR), TeacherSquared, TeachingWorks at the University of Michigan, University-School Partnership for the Renewel for Educator Preparation (Fra'nquiz & Ortiz, 2016). These teacher preparation programs were a response to teacher shortages (Glass , 2008; Heineke, Mezza, Tichnor-Wagner, 2014; Humphrey, Wechsler, & Hough, 2008).

According to extant literature, math teachers must have specialized expertise and a thorough understanding of math and pedagogical content knowledge in order to skillfully carry out tasks to make a specific mathematical point, link mathematical representations to real world ideas and other representations (Ball & Forzani, 2011; Ball, Fra'nquiz & Ortiz, 2016; Thames & Phelps, 2008). Despite the significance of such knowledge provision of the ESSA law allows recruits of entrepreneurial teaching programs to receive five weeks of formal training before teaching at schools, specifically high need schools, wherein the

student population is predominately minority students (Fra'nquiz & Ortiz, 2016). Thus, unlike traditional university programs which are 2 to 4 years of teaching preparation and a culminating student teaching experience, recent college graduates who typically did not major in education, were provided streamlined preparation. Hence they were provided less classroom experiences and training before becoming the teachers of record (Heineke et al., 2014). Furthermore, unlike most university urban education programs, the teacher education academies did not require analysis of methods for teaching content in high poverty schools in order to assure that they include culturally relevant interventions (Fra'nquiz & Ortiz, 2016).

Past evaluations of entrepreneurial teacher programs suggest that they failed to offer a systemic curriculum; its assessment were not grounded in professional standards of practice; and there was no quality control over mentoring or placement, thereby resulting in an extremely high turnover of teachers (Darling -Hammond, 1994). Recently, the findings of a large-scale mix-methods study of alternative certification revealed that TFA corps members were less likely to stay at low-income schools than recruits who had taken the traditional pathway to certification (Humphrey et al., 2008). Likewise, a study conducted by Donaldson and Johnson (2011) revealed that 56% leave their initial placement school and 39% of the TFA corps members leave the teaching profession. Thus, critiques suggested that recruits were individuals who most likely were not pursuing long-term teaching careers (Darling-Hammond, 2006; Labaree, 2010); rather, they were lured into the programs with financial benefits and opportunities with top graduate schools and companies (Labaree, 2010).

Although the National Association for the Advancement of Colored People (NAACP) and other civil rights organizations supported ESSA, they raised concerns about several provisions. First, they were concerned that the absence of consistent standards and federal oversight may have been a step backwards for meeting the needs and interest of Black learners, other children of color, and children who are members of low-SES (Klein, 2016). Further, under the new law, they argued that the parents would have no way of validating a teacher's certification. Third, alternative teacher education preparation programs were exempt from the rigorous requirements of content and methods that are used to approve teacher education programs. Thus, civil rights organizations believed that certain provisions of the ESSA law, like its predecessors, overlooked the needs and interest of those who have been historically underserved in the U.S. education system, particularly in mathematics.

Parent Support

When attempting to explain the reasons for the disparity in the mathematics achievement of African American male students compared to other ethnic groups some researchers have suggested that a lack of parental support is the culprit (e.g., Ogbu, 1987, 1992, 1998). However, African American parents' awareness of the importance of education and their parental support is revealed in Fields-Smith (2005) chronicle of African American education before and beyond the Brown vs. Board of Education decision. Before Brown vs. Board of Education. Fields-Smith (2005) cites the vested interests that the home, church, school, and the African American community had in the success of African American children and their trust in schools to educate their children (Camm, 2009). During the segregation of schools era, African American parents were involved in the

Parent Teacher Association (PTA), provided financial assistance, materials, and transportation. In contrast, the integration of schools, replaced parents trust in schools with distrust (Camm, 2009; Fields-Smith, 2005). Martin (2009) excerpt from a 40 year old mother of three children who was a substitute teacher in the San Francisco Bay area revealed this sentiment:

This system is not designed for African American children to learn. This system is designed for European children and if you were to design an Afrocentric method of teaching these children, they would excel in math, you know, they would do better. And I believe that until the day I die. That is the reason why these kids are not doing well. . . . African Americans have got to stop giving so much power to this system, that's why we are in the condition that we are in. We gave up the power so now we're in this dilemma. We thought [de]segregation was it and that's the worse thing that has ever happened to us. People didn't care about our kids. We were shoving our kids into places where people hated them. How are you going to teach somebody you hate? I don't think Europeans should teach our children. Because our skins are a different color, they have a tendency to hurry up and get our kids out of their face. It's not about that. It's about making sure our children are really prepared. We think [de]segregation was the best thing, but it hindered us. It really hurt us because when our children came into those classes. Europeans looked at them, you know, they didn't want to get close to them (p.327).

According to Ogbu (1998), a mismatch in cultures caused African American parents to become inactive or behave passively towards the system represented institutionally by schools. In contrast, Fields-Smith (2005) cited that the barriers in learning styles, communication, and language resulted in African American parents advocating on behalf of their children and supplementing their learning with extracurricular activities within the home to ensure that their children were learning what was being taught. Thus, the way in which they supported their children's learning had changed but nonetheless they provided educational support.

It is well documented that schools that are largely populated with African American students are more likely to have teachers who lack state certification/licensure,

inexperienced teachers, and receive less resources (Haycock, 2001). Thus African American students are more likely to experience ineffective instructional practices, encounter low teacher expectations, and have limited or no access to advanced math courses (Denbo, 2002; Johnston & Viadero, 2000; Thompson & Lewis, 2005).

The support of family is critical to African American males' academic success, performance and persistence (Hrabowski & Maton, 1995) in mathematics. Familial persuasion and parents' expectation affect African American males' knowledge and skill development (Hrabowski & Maton, 1995). For example, studies have revealed that parental academic variables such as high nurturance, such as frequent hugs and praise (Taylor, Hinton, & Wilson, 1995), maternal involvement in kindergarten, authoritative parenting style, and parental expectations for high levels of educational attainment (Luster & McAdoo, 1996) have predicted African American males educational achievement and attainment.

The findings of studies have revealed with parental support African American male students were able maintain high math-related self-efficacy (see Noble, 2011) and mathematics achievement (see Berry, 2003; Noble, 2011) as they navigated through a system entangled with institutionalized racism. According to Ladson-Billings (1995), the explicit messages African American students receive about racism is countered by the positive messages they receive from their parents. Thus, these findings suggest that the vicarious experiences and social persuasions of African American parents impacts their children's beliefs in their math abilities which in turn effects their mathematics achievement.

Problematic Methodological practices used in Quantitative Studies

A set of legitimizing myths thus began to emerge.... (Howard, 1999, p.52).

Guided by the preconceived assumptions that African Americans possess negative self-views of their competence narrowed the empirical focus of mainstream researchers (Graham, 1994). Thus, issues related to the motivation of African Americans were left unresolved or uninterpreted and questions were left unanswered.

Likewise, 14 years later, Usher and Pajares (2008) critical review of the literature still confirmed that researchers do not adhere to theoretical principals when investigating the motivation of African Americans. According to Bandura (1997), individuals' cognitive appraisals should be used to assess enactive mastery experiences. Yet, some researchers have used objective measures (i.e. prior grades). For example, Gainor and Lent (1998) conducted a study that explored the mathematics interest and career choices of first year African American college students. The researchers used past objective performance measures to assess enactive mastery experiences. This assessment is inconsistent with Bandura's (1997) conceptualization of enactive mastery experiences as the interpretations individuals make of experienced events rather than past objective measures themselves. Therefore, the findings that suggest that the predicative utility of enactive mastery experiences concerning self-efficacy should be interpreted with caution.

Smith (2001) conducted a race-comparative study that investigated the influence and interrelationship of the four sources hypothesized by Bandura (1997) on math-related self-efficacy. However, Smith (2001) was not attentive to the theoretical guidelines put forth by Bandura (1997). For example, rather than measure the individual's interpretation of their prior performance the participants of the study were asked to self-report on their

prior grades. This is problematic because this objective assessment does not consider scenarios whereby one student view a grade as disappointing and questions his/her capabilities; whereas another student who receives the same grade is pleased because he/she has struggled in mathematics and has received lower grades in the past. Thus, Smith's finding that assert that enactive mastery experiences predicative utility of self-efficacy was lower for African American male students compared to non-African American students should be interpreted with caution.

When assessing the influential power of vicarious experiences of others on self-efficacy, some researchers have also neglected to consider the tenets hypothesized by Bandura. For instance, when investigating the relationship between racial identities and the sources of self-efficacy, Smith (2001) determined that vicarious experiences was the most powerful influence on math-related self-efficacy for African American male students. However, due to the researcher's aggregation of data as Whites and Non-Whites and by not aggregating data relative to gender it was unclear as to the predicative utility of vicarious experiences on the self-efficacy of African American males.

Social persuasion should be measured based on students' interpretation of the messages received from individuals such as parents, peers, and teachers (Bandura, 1997). Yet, Gainor and Lent (1998) used items such as "my friends discouraged me from taking math courses" (p. 406), which are directives participants received from their peers rather than their interpretation of evaluative feedback. Thus, findings that suggest that social persuasion and enactive mastery experiences yield comparable paths to self-efficacy should be construed with apprehension.

Lastly, Gainor and Lent (1998) examined psychological and affective arousal by measuring students' anxiety towards taking math tests. Physiological and affective states can be influenced by some factors such as mood, levels of distress and elation, physical strength, and positive dimensions of physiological state (Bandura, 1997). However, Gainor and Lent (1998) possible exclusion of these factors may have resulted in an incomplete picture of the nature of this source. Likewise, in the study conducted by Smith (2001) physiological arousal was assessed as students' anxiety towards computers with no mention of other factors that exercise influence on physiological and affect states. Thus, findings that suggest that the physiological state index was higher in African Americans than their counterparts should be interpreted with caution.

The Sources of Self-efficacy as a Function of Race/Ethnicity

Martin (2007) argued that mainstream research and policy context have created frames that depict African American male students as having fewer abilities than those students who are identified as White and Asian. "Framing is about getting language to fit your worldview. It is not just language. The ideas are primary—and the language carries these ideas, evokes these ideas" (Lakoff, 2004, p. 4). Desiring to make the meaning of framing much more clear, Martin (2007) stated Entman's (1993) definition:

Framing essentially involves selection and salience. To frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation....Most frames are defined by what they omit as well as include, and the omissions of potential problem definitions, explanations, evaluations, and recommendations may be as critical as the inclusions (p. 52-54).

Usher & Pajares (2008) have suggested that the relationship between the four sources of self-efficacy and their predictive utility may vary as a function of group

membership. They cite several studies to support this theory (i.e., Klassen, 2004; Stevens, Olivarez, and Hamman, 2006; and Usher & Pajares, 2006). The findings of Klassen (2004) study showed that vicarious experiences of others and social persuasions were the most influential sources that informed Indo-Canadian students self-efficacy beliefs. Whereas Anglo-Canadian students past performance and physiological arousal significantly predicted their math self-efficacy. Based on these findings, Klassen (2004) suggested that cultural differences between the two groups may have contributed to this variation. However, Klassen (2004) asserted that the findings must be interpreted with caution because of the many cultures that exist within the Indo-Canadian label. It bears noting that Usher and Pajares (2008) overlooked Klassen's explicit message that multiple identities and agencies are within the Indo-Canadian group. Also, they overlooked Klassen's assertion that other contextual factors such as the educational system may have impacted how members of this group selected, weighed and interpreted efficacy-relevant information. A myopic focus may play a role in the disregard of theoretical guidelines or counterintuitive set of findings (Graham, 1994).

Stevens et. al. (2006) conducted a study that explored the relationships between cognitive, motivational, and emotional variables across 666 4th to 10th grade Mexican American and White students to predict mathematics performance. The findings revealed that Mexican American students experienced higher levels of anxiety and less successful enactive mastery experiences and messages of encouragements than White students. Additionally, self-reports revealed that Mexican American students had more positive mathematics models than White Students. These findings provide little evidence regarding self-efficacy as a function of ethnic background. It also bears noting that due to the absence

of sample items from the Mathematics Experience Scale (MES) which was written by Stevens et. al. (2006) it is unclear as to whether this scale adhered to the tenets hypothesized by Bandura (1997). Thus, the findings of this study must be interpreted with caution.

A study conducted by Usher and Pajares (2006) examined the influence of Bandura's (1997) hypothesized sources of self-efficacy on the academic and self-regulatory self-efficacy of 263 middle school students. The study was also conducted to determine if the sources were a function of race/ethnicity, gender, and read ability. The findings of the study revealed that African American students' academic and self-regulatory self-efficacy was influenced by enactive mastery experiences, physiological states, and social persuasions. Of the three sources, Usher and Pajares (2006) asserted that social persuasions was the most predicative source of academic and self-regulatory self-efficacy. Thus, they asserted that the variation between groups may have been caused by African Americans students having experienced lower grades than did White students. The criticism of this study is that Usher and Pajares (2006) did not categorize students by readability and then compare ethnic groups within the readability levels (e.g. above-level, on level, and below level). Thus, this interpretation should be considered with caution.

In summary, Gutie'rrez (2008) argued that suggesting that multiple identities and agencies do not exist within a race/ethnic group is erroneous and that using a myopic view to investigate the mathematics education of African Americans is counterintuitive. In support of Gutie'rrez (2008) contention, other researchers have argued that having focused on uncovering African American students' personal limitations in intelligence and diligence, mainstream researchers have overlooked contextual factors that impact motivation (Graham, 1994) and mathematics achievement (Martin, 2007).

Justification for a Qualitative Approach

Lubienski and Bowens (2000) wrote an essay entitled “Who’s Counting? A Survey of Mathematics Education Research 1982–1998” which discusses their analysis of equity research in mathematics. The authors concluded, “One gets the impression that researchers look primarily at outcomes of these equity groups [ethnicity or class] and rarely examine how schooling experiences contribute to these outcomes” (p.631). Aligned with this assertion is the argument made by Reyes and Stanic (1988) which suggest the need for studies that examine the lived experiences of African American students. They wrote:

Clearly, we live in a society where racist, sexist, and classist orientations exist in institutions and individuals. What is not clear is how such ideas are transmitted to and through school, how the ideas are mediated by the democratic ideals of equality and equality of opportunity, and the extent to which teachers and students accept and resist the ideas. More specifically, we do not yet fully understand how these ideas affect the teaching and learning of mathematics. (p. 27)

Reyes and Stantic (1998) offered a theoretical framework to guide equity research in mathematics education. They suggested that researchers should focus on six factors: societal influences, teacher attitudes, school mathematics curricula, student attitudes and achievement-related behavior, classroom processes, and student achievement. Hence, Strutchens (1993) applied Reyes and Stanic (1988) framework to examine the societal and ethnic factors that impacted five African American middle school students performance in mathematics. Strutchens (1993) asserted that African American students’ current performance is shaped by past events. Strutchens (1993) concluded that societal and ethical factors such as family’s socioeconomic status, parental support, and how the broader community view African Americans impact their performance outcomes. Likewise, Martin (2000) used the Reyes and Stanic (1988) framework. However, he expanded the sphere of his research to include social and historical policies and practices of racism and

discrimination. His study revealed that the academic success and failure of African American students was hinged to the social and historical policies of racism and discrimination that prevented “African Americans from becoming equal participants in mathematics and other areas of society” (p. 29).

Bandura (1986) noted that there are several conditions in which self-efficacy predicative, influential, and mediating role on human agency is hindered. First, in prejudicially structured system students may discover that no amount of effort will produce desired outcomes. Thus, they may have in-depth knowledge, effective skills, and high self-efficacy but may not put forth an effort because they lack the necessary incentives. Secondly, self-efficacy may have no bearing on students’ performance if schools lack the appropriate resources such as effective teachers, the necessary equipment to perform tasks, and support systems. In such cases, students’ self-efficacy may exceed their actual performance because it is not that they cannot perform rather it is the societal constraints and the lack of resources that are hindering their performance. In summary, school polices, instructional practices, and its role as a societal system develops and cultivates students’ self-efficacy beliefs. Since self-efficacy is built on the four sources hypothesized by Bandura’s (1997), they are theoretically tangential to self-efficacy. So, the factors that impact the influence of self-efficacy are the factors that impact the influence of its underlying sources.

Studies that have used critical race theory have stopped short of an examination of how discrimination, race, racism, cultural dissonance impact how African American male students construct their self-efficacy beliefs. For instance, Berry (2003) discovered that race, perceived racism, low expectations, and cultural dissonance were all issues that

plagued the mathematics experiences of eight African American male middle school students. According to Berry (2003), the participants experienced aggregated individual discrimination which he described as “when individuals intentionally or unintentionally discriminate against students of color for the incorporation of policies and practices that work to the disadvantage of students of color” (p. 120-121).

Darren, a participant, reflected on the grades that he received in third, fourth and fifth grade, a C, D, and an A, respectively. This is what he said: “My performance in fifth grade was excellent because I had an excellent teacher; I enjoyed being in her class. She was different from the other teachers.... I would love to see more teachers like her (Berry, 2003, p. 91).” When individuals perceive they are performing under faulty conditions, they tend to believe that no amount of effort will improve their performance outcome (Bandura, 1986). Thus, Darren may have attributed his faulty performance in the 3rd and 4th grade to adverse conditions rather than personal capabilities. Therefore, he may have ignored prior enactive experiences which resulted in a cycle of failure.

Thompson & Lewis (2005) conducted a case study of Malik, a high achieving African American male high school student. Malik had a 3.5 grade point average on a 4.0 scale and ranked number 7 in his class. Realizing that he needed advanced mathematics courses to achieve his deep rooted goal of one day becoming a pilot, he petitioned the school principal to extend its curriculum to include Pre-Calculus. Algebra II was the school’s terminal mathematics course. Malik’s was aware of his school being plagued with gross inequalities such as a lack of advanced math courses, low expectations of students, poorly skilled mathematic teachers, and poor scheduling (Thompson & Lewis, 2005). Thus, contrary to the tenets hypothesized by Bandura (1997) that enactive mastery

experiences are the most powerful influential sources on self-efficacy beliefs, Malik did not rely on his enactive mastery experiences to inform his math self-efficacy. This is what he said:

When you are at Garvey High School, the competition may not be as great as maybe some of the other schools in Baltimore. So you kind of feel like you are on this false sense of confidence. But once you start to compare yourself nationwide, you're like oh, "I'm kinda weak compared to those guys" (Thompson & Lewis, 2005, p. 7).

Thus, central to the construction of Malik's judgment of his math abilities were the vicarious experiences of his peers nationwide. Therefore, contrary to the contentions made by Usher and Pajares (2008) that African American students may not rely on enactive mastery experiences to build their self-efficacy beliefs because of few achievements, the sources this high-achieving African American student used to build his self-efficacy beliefs was impacted by the gross inequities entangled in his school experiences.

Researchers have suggested that students have either a mastery or performance goal orientation (Dweck & Leggett, 1988). Goal orientation is characterized as the reasons students pursue learning (Dweck & Leggett, 1988). Students who have a mastery orientation are interested in learning to acquire knowledge and improve their skills; whereas individuals who have a performance orientation are concerned with the judgments of others (Dweck & Leggett, 1988). The messages that students select and integrate to construct their beliefs in their abilities impact their goal orientation. Parallel to this theory, the findings of Berry (2008) study revealed that due to the negative stereotypes tagged to the social identities of African American males, Clayton may have adopted a performance goal orientation. This is what Clayton said.

Since the third grade, I have made only two B's as a final grade; the rest of my grades have been A's....As an African American male, I must strive two times as hard to please others. My parents have stressed the importance of working hard.

Unfortunately, many of the African American males at my school set bad examples and make bad reputations for African American males. They act terribly; I work hard to counter that by governing myself in a mature manner all day, every day. My dad has talked to me and other African American males at my church about the importance of being a positive role model for younger boys (Berry, 2003, p.80-82).

Thus, having been impacted by the negative messages of the broader culture Clayton's reasons for learning was to please his teachers and parents. Therefore, contrary to the tenets hypothesized by Bandura (1997), due to societal factors, social persuasions from teachers, parents and peers may have had equal or greater influence on his math self-efficacy compared to his enactive mastery experiences. Additionally, the pressure of not wanting to disappoint his family and his church community may have impacted his physiological and affective state.

According to Bandura (1997), individuals such as teachers and administrators tend to believe the negative stereotypes tagged to the social identities of members of a race/ethnic group and behave in ways that substantiate these beliefs. The discourse that suggest that African American male students have personal limitations in intelligence and diligence and labels such as "at risk learners" and "special needs learners" have affected school personnel achievement and behavioral expectations of African American males (Cousins -Cooper, 2000; Strutchens, 2000). For example, after conducting a synthesis of several empirical studies that explored the relationship between teachers expectations and race, Irvin (1988) concluded: "that teachers, particularly white teachers, have more negative expectations for black students than for white students" (p. 508). Pertaining to "such variables as personality traits and characteristics, ability, language, behavior, and potential" (Irvine, 1988, p. 508).

In alignment with Irvin's (1988) assertion, the results of a study conducted by Reed and Oppong (2005) corroborated that a teacher's expectation was impacted by negative stereotypes associated with African American male students. For example, in an attempt to motivate African American male students a National Board Certified middle school mathematics teacher appealed to what she believed to be her students' future aspirations.

This is what she said:

Because I always tell them, I say I can't choose what you're going to be when you grow up. And if you're telling me right now that you're going to drop out of school the minute you turn 16 in ninth grade, that's fine. I'm not going to argue with you. I'm not going to disagree with you.... I want to make sure you know how to balance a checkbook. I want to make sure that when you sign your NBA contract and the guy says ten percent or ten thousand dollars and you say oh, ten thousand dollars sounds really good and you have a million dollar contract, you know, you've just thrown away \$100,000.

The researchers argued that having suggested that African American males may one day drop out of school or become basketball players revealed the teacher's low expectations and the belief that African American male students do not have a viable future in mathematics. This finding supports the extant literature that asserts that African American male students have had to navigate through prejudices, bias, and negative stereotypes imposed on them by their schools and the local community (Berry, 2003; 2008). Likewise, Walker (2000) asserted that due to the negative messages that African American males have received from the broader culture they have had to use other sources to inform their self-efficacy beliefs. Thus, African American male students' use of vicarious experiences of models such as teachers is hindered by the negative discourse that entangles their social identity. Likewise, social persuasion may also be at risk to bias of African American male students. For instance, receiving messages of encouragement from their teachers may be disproportional for them compared to the positive messages that

African American female students, as well as student of other ethnic groups, receive from school personnel.

Some researchers have suggested that African American male students would benefit from African American teachers (e.g., Anderson , 1988; Foster , 1998; Franklin , 1979; Irvine , 2003; King , 1993; Ladson -Billings, 1994, 2000; Walker , 1996; Silver, 1973; Wright, 1970; as cited by Martin, 2007). Similarly, in a study conducted by Scott, Taylor, and Palmer (2013) they used 68 essays written by African American college-bound high school graduates to understand the challenges Black males face while in high school. A theme that emerged from this study was a lack of skilled and culturally competent teachers. One student stated, “I believe African American young men are not graduating from high school because there is a low presence of African American male teachers as models to coach, train and mentor us while preparing us for the future” (Scott et al., 2013, p. 292). Another student stated,

Often times, students gravitate towards people who look like them for mentorship. This opportunity is often [not available for] . . . African American male students due to the lack of African American male representation employed in the school system (Scott et al., 2013, p.292).

Likewise, Bandura (1997) asserted that models who possess similar attributes such as race/ethnicity and gender is a powerful, influential source on individuals’ self-efficacy. However, there is a scarcity in African American male models. Of the African American males who earn degrees in teacher education programs, only 23 percent pursue teaching careers (Toldson, 2011). This is in stark difference from the percentage of African American females and White females who become teachers, 41 percent, and 42 percent, respectively (Toldson, 2011). Likewise, higher education has struggled with the recruitment and retention of African American male faculty (Aud, Wilkinson-Flicker,

Nachazel, & Dziuba, 2013) Thus, as minority students become the majority in public schools, the pool of African American male teachers is sparse at all levels of education.

Leaders of education reform efforts have asserted that race does matter (Hawkins, 2015). They have stated that it is not only important for African American children and other children of color to see teachers who look like them but that it is also important for White children to be exposed to African American male teachers (Hawkins, 2015). It is their belief that such exposure will debunk negative stereotypes tagged to the social identities of African American men (Hawkins, 2015). Aligned with Hawkin's contention, a study conducted by Jett (2011) revealed that an African American doctoral student believed that he benefited by having been exposed to an African American male mathematics professor. Roger explained:

I had a teacher, he was a math teacher, he really took me under his wings and stuff. I mean I was trying to do good and stuff. Stuff wasn't clicking, but after he got with me how to do things, the ins and outs and stuff like that. Actually, it was gray to me. And then basically, he just worked with me, and it was easy.

The race of the model played a central role in piquing Roger's interest in math because Roger was able to visualize himself as a doer of mathematics (Jett, 2011). Other themes that emerged from this study were the one-on-one support that Roger received as well as words of encouragement from someone he related to and respected.

In alignment with the findings of Jett 's (2011) study, graduates who pursued a mathematics Ph.D. response to a questionnaire revealed that African American faculty words of encouragement were the most influential source of their judgment of their math abilities (Cousin-Cooper, 2000). Likewise, a study conducted by Noble (2011) revealed that six high achieving African American male undergraduate students believed their math self-efficacy would be bolstered by exposure to African American male professors.

Contrary to the assertions that suggest that African American teachers are a source that builds the self-efficacy of African American male college students, Brock (2015) conducted a study that examined the impact that African American teachers have on the career and academic self-efficacy of African American undergraduate students. Brock (2015) hypothesized a positive relationship between students' exposure to an African American teacher and career choice and their academic self-efficacy. However, the findings revealed no statistically significant relationship between the variables. It bears noting that the limitation of Brock's (2015) quantitative study is that it suggested that the quantity of African American teachers augments the strength of vicarious influence rather than the time and strength of the relationship between African American teachers and African American students.

The limitations of quantitative research are that it relies on one-time responses of teachers and students to a single-item measure to investigate motivation and achievement. Additionally, the cross-sectional nature of race-comparative quantitative studies makes it extremely difficult to identify the "true" causes of the disparity between African American males and other groups (Gutie'rrez, 2008). Gutie'rrez (2008) argued that the most dangerous research are quantitative race-comparative studies that only document the gap in achievement, ignoring the numerous societal factors associated with the phenomenon. Such studies have perpetuated the dominant discourse that describes the disparity in the mathematics achievement of African Americans compared to middle-class White students as a deficit model. It is the theoretical lens rather than the quantitative data that perpetuates this model. Additionally, researchers who have used this theoretical lens have quantified attributes (i.e., race, gender, class), suggesting that African Americans have a static

identity. As a result, they have ignored the multiple identities and agencies of these students. Whereas other quantitative studies have focused on contextual effects and thus have provided evidence that racial hierarchy is socially constructed (e.g., Aronson, Lustina, Good, Keough, 1999; Gierl, Bisanz, Bisanz, Boughton, & Keough, 1999; as cited by Gutierrez, 2008).

Bandura's (1986) social cognitive theory which guides this study is concerned with understanding the complexity of human thought and action. This theory is grounded in the agentic perspective in which people's behaviors have a direct influence on the course of events that occur in their life, which, in turn, effects their thoughts and environment (Lent, Brown, & Hackett, 1994; as cited by Bandura, 1997). Bandura (1997) posited that individuals' behaviors are goal directed and is guided by self-reflection. Self-reflection involves the self-appraisal of one's thoughts against his/her personal standards and against the behaviors and outcomes of others which then results in self-regulation, meaning controlling one's behavior and selecting or altering environmental demands to achieve successful attainment. The level of influence of these factors is not always mutual or occur simultaneously. Rather an individual's view of self and society will determine the strength of each determinant.

Bandura (1997) asserted that "the inferential processes that govern the self-appraisal of efficacy are better elucidated by analyzing how people select and integrate multidimensional efficacy information than by having them rate the relative weight they give to a few preselected factors" (p. 84). Therefore, a qualitative study utilizing a culturally sensitive research approach to explore the heuristics that African American men use to select, attend to, and integrates the sources that build their self-efficacy beliefs is needed.

Such studies capture the situational, social, personal, and temporal conditions under which African American men have cognitively processed and appraised their beliefs and experiences. Qualitative inquiry allows the voices of African American men who have been historically marginalized to be heard.

According to Bandura (1998), moments in one's life can serve to influence self-belief and action powerfully. Likewise, researchers have observed that certain moments in one's life can change one's "theory of who he is and what he is worth" (Seligman, 1995, p. 109). The challenges facing African American male students in their schooling are many. Therefore, there is a need to explore the sources of efficacy-relevant information that informs their beliefs in mathematics.

Summary

This chapter discussed how the needs and interests of African American students of mathematics, specifically African American male students, have been dismissed and how societal barriers have had a negative impact on African American students' motivation and academic achievement. Also, this chapter discussed African American parents' involvement in schools before and after the Brown vs. Board of Education decision. It discussed the problematic methodological practices of studies that explore the motivation of African American students. The literature review revealed that the assumption that the sources students select and integrate into their self-efficacy is a function of race/ethnicity (see Usher & Pajares, 2006, 2008) is not adequately supported. Lastly, the chapter revealed that qualitative studies are needed to counter the negative discourse that surrounds the mathematics achievement of African American male students.

CHAPTER 3: METHODOLOGY

Overview

This chapter addresses the methods and research design used in this study. In the first section, I discuss researchers' theories of what constitutes reality and knowledge (ontology and epistemology) to explain my rationale for conducting a qualitative study. Having adopted an interpretivist perspective the second section describes Tillman's culturally sensitive research approach framework. The third section provides a brief description of my role as a researcher. The fourth section provides ethical considerations. The fifth section provides an overview of the universities that the African American male college students attended. The sixth section provides the criteria used to select the students, parents, and professors. The final section includes a description of the instruments used, procedures for data collection, and data interpretation and analysis.

Ontology/Epistemology

Ontology and epistemology are theories of what constitutes reality and knowledge. Although implicit than explicit, they reveal themselves in the form of methodology and approach. Marsh and Furlong (2002) asserted that one's ontological and epistemological stance "shape the approach to the theory and the methods" utilized, and they are the underlying source of researchers' beliefs about the world.

Blaikie (1993) defines ontology as "the sciences or study of being" which raises the question of how the world is created. The central question raised by ontology is whether there is a 'real' world out there. Objectivists believe that there is a 'real' world that is independent from our knowledge and unaffected by societal factors (i.e. social, economic,

and political issues). On the contrary, interpretivists believe that the world is socially and broadly constructed and, thus, dependent on societal forces.

Epistemology is the theory of knowledge. One's epistemological stance reflects the "view of what we can know about the world and how we can know it" (Marsh & Furlong, 2002, p. 18-19). Two basic distinctions can be made: first, the belief that the acquisition of knowledge is unmediated by societal factors (i.e. social, political, and economic issues); or, secondly, acquisition of knowledge is affected by cultural, historical, and contemporary contexts.

There are two opposing positions with regards to epistemology. Positivists adopt objectivist ontology and an aligned epistemology. Their stance is that everyone sees everything the same way; therefore, their goal is to find general laws and causal statements about social phenomena, implying that objectivity is possible. Positivism was derived from an empiricist tradition of natural science and believes that the same possibilities are true of social science. Specifically, what we can know and how we can know a social phenomenon can be observed and understood without mediation. Therefore, positivists usually employ quantitative research methods, using theory to generate hypotheses that can be tested by direct observation. Positivists seek explanations for behavior rather than the meaning.

Conversely, interpretivists adopt subjectivist ontology and aligned epistemology. They do not believe that they can observe and then make objective statements about the real world. For them a real world does not exist, rather meanings of things or actions are determined by the social actors, not their sheer existence. Specifically, interpretivists assert that observations are not independent of interpretation and every observation concurrently affects what we observe. According to Marsh and Furlong (2002) interpretivists "operate

within discourses or traditions. Consequently, knowledge is theoretically or discursively laden” (p.26). Believing that objectivity is not possible, they employ qualitative research methods. Thus, unlike positivists, interpretivists seek to understand social behavior and focus on its meaning.

The ontology and epistemology that is the foundation of this study is that of an interpretivist. Thus, it is my belief that individuals’ judgment of their abilities in mathematics is not constructed in isolation from the world. Rather the interplay between the external environment, internal personal factors, and human behavior influences how individuals construe their judgments of their competence. This perspective aligns with Bandura’s (1997) triadic causation model that suggest that human agency is caused by the interplay of three major events; affective, cognitive, and biological events; environmental events; and behavior. Thus, a qualitative research method was used to explore how African American male undergraduate students constructed their beliefs in their mathematics abilities.

Research Design

Tillman’s (2000) culturally sensitive research approach framework is the foundation of this qualitative study. Tillman argued that “Culturally sensitive research approaches both recognize ethnicity and position culture as central to the research process” (p.4). Its foundation is built on the work of Dillard’s (2000) expanded notion of Collins (1999, 2000, 2002) “endarkened” feminist epistemology and Kershaw’s (1989, 1992) Afrocentric emancipatory methodology. What these researchers’ framework have in common is that rather than situate African Americans on the margin of the inquiry they are the locus of the study. For example, when discussing research concerning Black women

Dillard articulated that it is only by situating research in the historical and contemporary context of Black feminist and by addressing issues of race, gender, and other identities can researchers reveal and understand Black women realities. This philosophical reference is equally applicable to African American males in this study. Kershaw perspective concerning what we can know about the world and how we can know suggest that the methodology of the research should be based on centrism, meaning knowledge should be generated by those "who are products of a particular historical and cultural context" (Kershaw, 1992, p. 160). Relative to this study, African American males who are members of a group that have been historically underserved by the U.S. school system were interviewed and their stories were well documented.

Tillman's (2000) culturally sensitive research approach for African Americans is based upon the perspectives of these frameworks: (1) culturally congruent research methods– in which the researcher uses qualitative methods (i.e. interviews, observation, and participation observation) to gain insight concerning factors (i.e. social, political, economic, educational) that affect the experiences of African Americans, particularly in academic settings (2) culturally specific knowledge–the multiple realities and knowledge bases of African Americans is viewed as relevant. Thus, the participants and other members of the community cultural integrity is maintained (3) cultural resistance to theoretical dominance – Culturally sensitive research approach is responsive to social inequities that perpetuates minimizing, marginalizing, and excluding the lived experiences and knowledge bases of African Americans (4) culturally sensitive data interpretations–the analysis and the reporting of the data is co-constructed. The interpretations may be in the form of storytelling, narratives, family histories, and other forms of data presentations (5)

culturally informed theory and practice—Findings from the study is used as a conduit for educational change.

The Researcher

When addressing the mathematics education of African American students, mainstream researchers have used an achievement lens. Its theoretical perspective promotes deficit thinking and negative stereotypes about African Americans (Martin, 2007). These mainstream researchers tend to use methods that rely on one-time responses from its participants; data is correlated, and inferences are made concerning differences between students whose social identity is quantified by race, class, gender, language, and other identities (Gutiérrez, 2008). The fundamental false assumption of these studies is that it is assumed that the problem lies within the individual.

In consideration of the drawbacks of the achievement lens, I used an experience lens to explore the mathematics education of African American men. Unlike the achievement lens, the experience lens theoretical perspective posits the hierarchy of competence is socially constructed. It focuses on African American students and their parents' actual experiences in mathematics (e.g., Berry, 2003; Martin, 2000, 2006a, 2007; Moody, 2001). The experience lens broadens the scope of the achievement lens inquiries by asking who and what may be responsible for African American males' differential outcomes (Martin, 2007).

I have intentionally chosen high-achieving African male undergraduate students; they offer a lengthy history of their mathematics experience in a school context. I use their narratives to challenge the dominant discourse that tags African American men intelligence and capabilities with negative stereotypes. Their narratives are used to bring to the forefront

the processes within academic institutions that impede the achievement of group members of one race relative to group members of another race. It is my belief that when seeking to understand African Americans convergence or divergence from the tenets of the sources of self-efficacy as theorized by Bandura (1997), the perspectives of those who have been marginalized by the U.S. education system should be privileged over the assumed knowledge of those whose lived experiences are outside of this realm. African American parents have been described as incapable of providing the academic assistance and home environment needed to support their children's mathematics achievement (Martin, 2007). Thus, I have chosen to chronicle the voices of parents who have played an active role in navigating African American males through an educational system plagued with gross inequities. Finally, I use the voices of African American male professors who are diminishing quickly in a society in which minority students are becoming the majority (Hawkin, 2015). I enlist their insight on how the U.S. education system can better serve Black learners.

Ethical Considerations

This study was in compliance with the regulatory requirements of Wayne State University Internal Review Board (IRB). First, participants of this study were not contacted, and research was not conducted until my application was submitted to the IRB, reviewed, and approved. Secondly, potential participants of this study were required to sign a letter of consent stating that participation was voluntary, that no compensation would be provided, that there would be no penalties for withdrawal and that they could stop at any time without any repercussion (see Appendix B-1; Appendix B-2 and; Appendix B-3). Lastly, upon receiving an unofficial transcript, a completed questionnaire, mathematics

autobiography, and interviews, student participants received a gift card for their time and inconvenience.

Confidentiality of the interviews was strictly maintained. The audiotapes, questionnaires, mathematics autobiography and receipts were securely stored, and password protected on my personal computer without disclosure to anyone. The participants of this study was made to feel comfortable to speak or decline from answering question(s). The findings of this study did not include the names of the participants; rather pseudonyms were used. All protocols in this study were strictly adhered to when collecting and analyzing the data, as well as sharing or transferring the findings from the research.

Participants

Purposive sampling was used for this study. This sampling technique utilizes a non-probabilistic strategy that selects participants based on an inclusion strategy for a study. The participants are as follows:

Pilot Study Participant

I conducted a pilot study in preparation for the actual research to uncover potential barriers and conflicts. Unable to generate a large pool of African American male participants, I used a student who had completed Calculus I although his program did not require advanced math courses. Also, the selection of this student for the pilot study was based on the following: (a) identify as African American; (b) ages 18-23; (c) an overall cumulative G.P.A. of a B or better in mathematics; (d) high mathematics self-efficacy; (e) and a willingness to participate.

Student Participants

Student participants in the study were purposefully selected by a combination of leaders associated with STEM related fields, faculty at colleges and universities, and referrals from people who were aware of African American males who met the following criteria: (a) identify as African American (b) ages 18-23; (c) cumulative G.P.A. of a B or better in mathematics and; (d) matriculate in a degree granted program that requires a minimum of Calculus I, and (e) high self-efficacy in mathematics.

Of the seven students who responded with an interest of participating in this study, only four met the requirement. Students (all names are pseudonyms) in this study are:

Table 1: Student Participants

Student Participant	Age	SES	College	Classification	Major
John Smith (Pilot)		Low SES	Uptown	Senior	Biopsychology, Cognition, and Neuroscience
Reggie Gold	19	High SES	Uptown	Junior	Electrical Engineering
Xavier Jeeter	19	Low SES	Midtown	Sophomore	Electrical Engineering
Tom Hanks	19	High SES	Midtown	Junior	General Mathematics
Ezekiel Smith	20	Low SES	Uptown	Junior	Mechanical Engineering

Parent Participants

Parent participants were purposefully identified, and selection was based on (a) parent of an African American undergraduate student and; (b) their willingness to participate. Two of the parents agreed to participate in the study. Upon receiving a signed consent form, an interview was scheduled and conducted.

Parent participants (all names pseudonyms) are as follows:

Table 2: Parent Participants

Parent Participant	Education	Occupation
Ms. Gold	Bachelor's Degree	Director of Human Resources
Mr. Hanks	PhD	Retired

Teacher Participants

Teacher participants were purposefully identified and recruited through a combination of referrals and use of social media. I selected teacher participants based on the following: (a) African American male mathematics teacher of higher education; (b) experience working with African American male students; (c) 5 or more years of overall experience. I discussed my impending research study with eight teachers to assess their interest. However, only three of the teachers met the requirements of this study. Upon receiving a signed consent form, an interview was scheduled and conducted.

The teacher participants (all names are pseudonyms) in this study are as follows:

Table 3: Teacher Participants

Teacher Participant	Degree(s)	Years of Teaching Experience
Mr. Johnson	Masters of Arts in Teaching-Secondary (Mathematics)	16 years (k-12 & community college)
Mr. Coleman	Bachelor: Mathematics Masters: Operational Research	14 years (community college)
Mr. Hanks	Bachelor: Finance & Computer Science Masters: Management Information Systems Ph.D.: Information Systems	5 years (University)

Settings

The following are descriptions of the universities that the student participants attended.

Uptown University

Uptown University and its satellite schools is located in the Midwest of the United States, and it enrolls over 30,000 students. Also, the students who attend this school come from all parts of the world, meaning different locations within the United States and abroad. In 2015, Uptown University's total student population was comprised of approximately 4 percent of African Americans of which 1.5 percent were African American males; whereas, Whites comprised over 60 percent of the student population.

Despite the fact that the university offers a wide range of degree programs (i.e., architecture, liberal arts, education, engineering, medicine) there was a dramatic distinction between the number of African American males enrolled in liberal arts programs compared to African American males enrolled in STEM related fields, such as engineering. When comparing African American and White male undergraduate students, African American male students' enrollment in undergraduate degree granting engineering programs, was a sobering 1 percent compared to 40 percent of White male students.

A review of Uptown University faculty headcount (not including adjunct, clinical and visiting titles) over the past five years revealed a decline in African American males who held a position as a professor and tenure and tenure-track faculty. Uptown University data revealed that the faculty headcount of African Americans who were professors, associate professors, assistant professors and tenure and tenure-track faculty ranged from approximately 4 to 5 percent of which 2 percent were African American males.

Midtown University

Midtown University is situated within an impoverished city and enrolls approximately 25,000 students. Students who attended Midtown were primarily those who lived within the state. Disproportional to its community, less than 18% of the student population at Midtown University was African American compared to the 55% who were White. Similar to Uptown University, Midtown University offers a myriad of degree programs (i.e., business, education, engineering, performing arts, law, and medicine). The full-time four year graduation rate of African American students in 2015 was 12% which was significantly less than other ethnic groups. When reviewing the extant literature concerning the faculty headcount, the information was aggregated. Thus, it was unclear as to the percentage of faculty that was African American males.

Data Collection

In compliance with Wayne State IRB, before collecting data, I received a sign consent form from potential participants (See Appendix B-1; Appendix B-2 and; B-3).

Transcript and College Bulletin

I requested that student participants provide an unofficial transcript in order to validate that they met the following criteria: (a) identify as African American/Black (b) ages 18-23; (b) cumulative G.P.A. of a B or better in mathematics and; matriculate in a degree granted program that requires a minimum of Calculus I indicated in the college bulletin. After I validated that they had met the abovementioned criteria I then requested that they complete the questionnaire (See Appendix A-1) and the mathematics autobiography (See Appendix A-2).

Questionnaire

Thus, a questionnaire was used to collect data such as parent level of education and estimated annual family income (before entering college).

Autobiography

An autobiography provided an opportunity for “critical examination and experience of difference” (Jackson, 1992, p. 4). Participants were able to use their voices to represent “themselves and their stories from their perspectives” (p. 3). Thus, using an autobiography protocol adapted from Berry (2003) participants were asked to document their lived experiences concerning significant moments with mathematics from kindergarten to college; they were asked to identify their perception and realization of their math ability; Lastly, they were asked to describe the characteristics of a mathematics teacher who they believed was exceptional.

Interview

Face-to-face interviews were the primary source of data collection. I used the semi-structured interview protocol adapted from Noble (2011) (see Appendix A-3). It explored how participants selected, weighed and integrated the four sources of efficacy-relevant information hypothesized by Bandura (1997). The semi-structured interview allowed participants to elaborate on past and current experiences and to bring to the forefront other factors that influenced their judgments of their abilities and their mathematics achievement. A semi-interview parent protocol adapted from Berry (2003) was used to capture the parents’ perspective of their children’s school experiences in mathematics (See Appendix A-4). Ladson-Billings (1994) semi-structured teacher interview protocol was used to capture African American higher education teachers’ perspectives on the mathematics

education of African American males (See Appendix A-5). As recommended by Merriam (1998) the questions were designed to probe the student, parent, and teacher participants.

Trustworthiness

Trustworthiness was established through transferability, credibility, dependability, and confirmability (Lincoln & Guba, 1985). Transferability was established by creating a thick, rich descriptive narrative of the following: students' lived experiences in mathematics education from grade school to higher education; parents' perception of their child's experiences in mathematics education; and higher education teachers' perspective on mathematics education relative to African American males.

The premise of credibility in qualitative research is to establish a match between the constructed realities of the respondents and those realities presented by the researcher (Guba & Lincoln, 1989). Thus, member checks in which participants were asked their opinions concerning matters such as themes, incidents, interpretations, and the final narrative were employed.

The basis of dependability is to take into account the change of data over time (Lincoln & Guba, 1985). The consistency of data will be achieved through the examination of field notes, matching data collected from the transcript against the college bulletin. Dependability will be taken into account by examining consistencies and discrepancies between the data collected from the semi-structured interviews of student and parent participants.

Confirmability demonstrates that data interpretations and outcomes of qualitative research are established in contexts and apart from the researcher. I provided an audit trail meaning clear documentation of my research decisions and activities. For instance, a start

list of codes (See Appendix: A-6) was created before the fieldwork. Codes are tags or labels that are assigned to varying chunks of words, phrases, sentences, or whole paragraphs (Miles & Huberman, 1994). This start list was constructed based on information derived from the social cognitive framework, list of research questions, and key variables of the study. Codes may be redefined or discarded when the codes are inapplicable or empirically ill-fitting (Huberman & Mile, 1994). Miles and Huberman (1994) recommend early data analysis to allow for reflection of existing data and for the generation of strategies for collecting new data.

Qualitative inquiry is validated and verified through four types of triangulations: theory, investigator, data, and methodological (Patton, 1999). Theory triangulation means looking at several theories or perspectives of several stakeholders to analyze one set of data; investigator triangulation is established by having several analyses review the findings; data triangulation involves comparing interview data with observational data, checking for consistency of information derived from the interview from the interviewees; methodological triangulation involves using multiple data collections. In this study data triangulation and methodological triangulation were used. Data from the college bulletin and the unofficial transcript were matched to verify that Calculus 1 was a required course of the degree program. Student and parent data was compared for consistency. Methodological triangulation was established through collecting data from observations, unofficial transcript, student interviews, parent interviews, teacher interviews, autobiographies, field notes, and questionnaires.

Data Analysis

Pilot Study

When conducting the pilot study, the following research instruments were analyzed: academic transcript, college bulletin, autobiography, questionnaire, and the interview protocol. The transcript and the college bulletin were cross checked to validate that the participant was enrolled in a degree program that required Calculus 1. The mathematics grades on the transcript were analyzed to determine if the student had a 3.0 Grade Point Average or better. An assessment of the transcript was conducted to determine whether or not the document provided information such as a degree program, classification, name of courses, and grade identification. The questionnaire was evaluated to assess whether or not information should be included or removed from the document. The race/ethnicity of the participant was determined by the answer chosen on the questionnaire and through observation. The autobiography was evaluated for clarity and fluency and to estimate the length of completion and return time. A qualitative approach is better suited to explore the sources that build the self-efficacy of students (Woolfolk: see Shaughnessy, 2004). In support of this contention, the pilot study was used to determine clarity, fluency of the interview protocol and to self-appraise my interviewing skills.

Thematic Analysis

Themes are defined as pieces of information or phrases derived from patterns such as "conversation topics, vocabulary, recurring activities, meanings, feelings, or folk sayings and proverbs" (Taylor & Bogdan, 1989, p.131). Themes are recognized by "bringing together components or fragments of ideas or experiences, which often are meaningless when viewed alone" (Leininger, 1985, p. 60). Themes emerge from the

participants stories and are gathered together to form a comprehensive picture of their collective experiences. The "coherence of ideas rests with the analyst who has rigorously studied how different ideas or components fit together in a meaningful way when linked together" (Leininger, 1985, p. 60).

First, from the transcribed interviews, patterns relative to Bandura's (1997) social cognitive theory were used to identify themes (see Appendix A-6). The next step was to identify all the data that relate to the classified patterns and to create new classifications if necessary. Related patterns were combined and catalogued into sub-themes. When possible participants provided feedback that was incorporated into the theme analysis. The literature was interwoven with the findings, thus, giving the stories merit.

The six questions were addressed in the following manner: RQ1: How do African American men discuss their beliefs about their mathematics self-efficacy? In addressing this question, I analyzed the autobiographies and the interview transcripts for themes that depicted Bandura's (1997) tenets of self-efficacy and other motivation constructs. Each autobiography was also used to develop follow-up questions. RQ2: What sources of information do African American men use to inform their self-efficacy beliefs? Using the data collected from the autobiographies and the semi-structured interviews I looked for themes relative to the four sources hypothesized by Bandura (1997). Yin (2004) warned that the adoption of a theory may limit one's discovery. Likewise, Tillman (2000) suggested that the perspectives of those who have been marginalized by the U.S. education system should be privileged over the assumed knowledge of those whose lived experiences are outside of this realm. Therefore, I was mindful to look for other sources that African American males used to construct their self- efficacy beliefs. RQ3: Are the sources of

information that inform the self-efficacy beliefs of African American men a function of race/ethnicity? Usher and Pajares (2008) asserted that enactive mastery experiences has consistently emerged as the most influential sources of self-efficacy across domains; however, they asserted that there has been some variation in its predicative utility in relationship to group membership. Therefore, they hypothesized that because African Americans have experienced few achievements, they may attend to sources other than enactive mastery experiences to inform their beliefs in their capabilities (Usher & Pajares, 2006). However, using an experience lens which is characterized as highlighting “the ways in which African American students experience mathematics as African Americans and how these social realities impact mathematics learning and participation among these students” (Martin, 2007, p 24) I looked for societal factors (see Berry, Ellis, & Hughes, 2014) that may have influenced how each participant selected, attended to, and integrated efficacy-relevant information. I then analyzed whether this theme was consistent across the group and, if so, why the occurrence. RQ4: How do African American men explain how their self-efficacy mediates their performance behavior? According to Bandura (1997), students who have high self-efficacy tend to have a strong self-regulatory repertoire such as clear and concise note taking, organizing, and planning work space and time. Thus, when exploring how African American men explain how their self-efficacy mediates their performance I used Bandura’s (1997) social cognitive theory to explore for themes in relationship to self-regulatory behavior (see Appendix: A-6). RQ5: What insights can parents provide about how parental support and societal factors shape self-efficacy beliefs? Using the data derived from each of the parent participants’ semi-structured interview, I explored for common themes between the data collected and the literature review (see

Berry, 2003; Hrabowski et. al., 1998; Schunk & Pajares, 2002) concerning the parental involvement in the development of their children's self-efficacy. RQ6: What insights can African American male higher education mathematics teachers provide about the situational factors that enhance or hinder the mathematics self-efficacy of African American men? In addressing this question, I explored the data for common themes between the semi-structured interviews of the three mathematics professors and the literature (see Aronson et al., 1999; Berry, 2003; Gay, 2000, 2002) concerning African American males' school experiences and culturally relevant teaching practices.

Summary

This chapter provided the methods to be used in the study, which explored the sources of information that informed the self-efficacy beliefs of African American male undergraduate students. The rationale for utilizing a qualitative analysis was discussed. A description of the study design, the instruments, and the procedures were also discussed. The ethical considerations were noted, and the methods to overcome any concerns were proposed.

CHAPTER 4: DESCRIPTIVE PORTRAITS AND FINDINGS

Overview

Self-efficacy, a component of social cognitive theory was the framework used for this study. Consequently, I used the framework to analyze the sources that informed the self-efficacy of the student participants. This chapter has three major sections. I first provide a brief description of the data analysis from the pilot study. The second section provides a descriptive portrait of each student participant. It consists of a compilation of data collected from the questionnaire, the student autobiography, and the student interview. The second section uses the voices of each student participant; consequently, they speak in first person. The third section is an analysis of the data. Five broad themes emerged from the analysis of the data: (1) college experiences, (2) K-12 experiences, (3) access and equity, (4) the deficit model, and (5) familial factors. These themes are not mutually exclusive rather they are interdependent and, thus, they influence one another. Yet, they are distinguishable. The college experience theme represents four major elements to include self-efficacy, the sources of self-efficacy during college, self-regulation, and implicit theory of intelligence. The K-12 theme represents the sources of self-efficacy in mathematics before college. The access and equity theme represents three major elements to include effective mathematics program, African American male teachers, and culturally responsive teaching. The deficit model represents the impact of negative stereotypes tagged to African American males' social identity. The familial factor theme represents the vital role of parents in the creation and development of their children's self-efficacy and academic achievement, and how societal factors impacted parents ability to be a source of self-efficacy.

Pilot Study

A pilot study was conducted in preparation for the actual research to uncover potential barriers and conflicts. When conducting the pilot study, the following research instruments were analyzed: academic transcript, college bulletin, autobiography, questionnaire, and the interview protocol. The findings revealed that the college bulletin and the transcript could be used to crosscheck information such as required courses relative to the student participants major and the classes indicated on the transcript. The questionnaire was evaluated to assess whether or not information should be included or removed from the document. I determined that the age of the participant should be added to this document. The autobiography was evaluated for clarity and fluency and to estimate the length of completion and return time. I determined that the length of the autobiography was irrelevant rather the quality of the writing (i.e. vivid descriptions of their experiences) was most important. I had to forgo receiving the autobiography in one week. Rather I had to work around the participants hectic schedules (i.e. work and other commitments. Finally, the pilot study was used to determine clarity, fluency of the interview protocol and to self-appraise my interviewing skills. The interview revealed that the questions needed to be modified to ensure clarity and fluency.

Reggie Gold's Descriptive Portrait

Reggie Gold was a 19 year old junior who attended Uptown University. He majored in electrical engineering. He was tall, medium built, wore glasses and appeared self-assured. His father and mother were college graduates. His mother earned a Bachelor of Science in Engineering Management and was a director of corporate compensation at a company within the health industry. His father earned a degree in electrical engineering

and worked as an analyst at an organization affiliated with the military. His family's socioeconomic status was mid to upper middle class. He lived in a suburban area where he attended elementary, middle, and high school.

His parents had been divorced for many years, and he was the younger of their two children. His mother worked diligently to ensure that Reggie continued to grow up in a community that she felt was safe and would provide him with a great education. At one time the community had been diverse; however, over the years that changed. The student population became predominately African American, and there was an increase in the number of African American teachers. Yet, from grade school through high school Reggie's exposure to African American male teachers had been limited, and he had never had an African American male mathematics teacher.

Reggie Gold's Voice

I was first drawn to mathematics before I started kindergarten. My mom enrolled my sister and me in a math/reading learning program called Kumon when I was at most 4 or 5 years old, perhaps even earlier. In my opinion, the aim for Kumon was to allow students to get a "leg-up" in their studies outside of school. I started off doing 3 to 5 math and reading Kumon packets a week, which consisted of 3 to 4 pages (front and back) and questions/problem sets that would test specific content. The levels of difficulty increased as you completed more and more packets, but I decided around 1st grade that I only wanted to do Kumon math, not both math and reading. I consider that a significant moment because I realized from a young age that math was both challenging and interesting; it was worth the extra instruction. Most kids my age were in sports or music outside of school around elementary school time, but I mostly did math and some baseball here and there. I enjoy all types of extracurricular activities (both academic and non-academic), but it seemed even then that math was, and would be, a constant in my life.

The next major significant moment came for me in 5th grade. My class would receive these timed multiplication sheets that should be completed in under a minute. While most of my classmates would dread these, I would look forward to them. It would give me a chance to show what I knew since I'd been studying the content outside of school for at least a year. Usually, I would finish the set of about 20-30 simple multiplication problems in about 45 seconds. On a good day, 30 seconds. I considered it a lovely challenge, and it would always be accompanied by

my classmates saying I'm trying too hard that I was a nerd but it never stopped me from enjoying it regardless.

My first negative experience with mathematics occurred probably around 8th grade. I believe I was performing at a 10th grade level in Kumon and my school mathematics weren't giving me much trouble. I had started to get into music around this time, and I had a lot of obligations (school band, private lessons, outside of school bands) besides Kumon that I had to fill. I stopped really giving it my full attention and I started to decline in speed and accuracy on my assignments in Kumon. I had to spend more time at the center asking the tutors for assistance, or I just would put off the packets for weeks at a time. Eventually, by 10th grade, I decided to give up Kumon and just focus on school mathematics. By that time I was performing around a 11th grade level, so I thought it would be fine just to do school math, which proved to be extremely easy.

The next few experiences happened during my first year at Uptown University. I took the AP Calculus 1 test during my senior year of high school and didn't receive my score until the following summer. During that summer, I participated in a pre-college entrance engineering camp that would prepare me for my introductory level math, science, and coding courses. In the midst of the camp, I learned that I had received a five on the AP test, which is the highest score. With this in mind, I could start college with Calculus 2, and cut a semester of mathematics off of my engineering track. After taking the practice Calculus 1 course over the summer, though, I realized that my math skills may not be up to par with Uptown University's standards and I decided to take Calculus 1 even with my transfer credit. This decision I believe was a good one, though it hurt my ego slightly since most of my friends were not really ready for Calculus 2 at Uptown University and did not do as well. Having taken Calculus 1 there, I knew the way that the school structured their questions and the type of answers they were looking for. Thus, my mathematics career at Uptown University took an upturn at the start and proliferated through my years here so far. In all 4 Calculus's that are required by engineering students, I hadn't gotten below a B+. Though the classes were really difficult, I still found the content useful and the classes fun to undertake.

Xavier Jeeter's Descriptive Portrait

Xavier Jeeter was a 19 year old sophomore who attended Midtown University. He majored in electrical engineering. Xavier who was tall, medium built and wore glasses arrived promptly and professionally dressed for the interview. He was the oldest of three children. His mother who had taken some college courses had raised her children single handedly. She had worked in her home and her primary source of income had been social security. His father was a construction worker and his formal education did not extend past

high school. The estimated average annual family income was between \$15,000 and \$19,999. His low-income inner-city elementary, middle, and high school was situated in an impoverished community.

Xavier Jeeter's Voice

My Kindergarten teacher, Ms. Ramez (pseudonym), was the first teacher to inspire me in mathematics. I remember her efforts in trying to teach us math that was not supposed to be learned until first grade. One concept, in particular, was carrying. I remember performing the math but not really understanding how the concept worked. It was more mechanical at that time; however, while I was in first grade, I had an epiphany when we delved deeper into addition because I had a greater understanding from Kindergarten. This is when I was first drawn to mathematics, and I became really good at math. One of my favorite memories about math is when my elementary classes would play competitive math games. It was so fun to try to do the math as fast as possible.

I knew that I was good at math because I would win the games sometimes, but it wasn't until I got to college when I found out how good at math I was. This happened in my first math class with Mr. Wilson (pseudonym). When the class first started, I was fairly behind. The material that he said was review was not review to me, and I struggled at first. After the first few quizzes, I started to get perfect scores on them and I also got perfect scores on three out of four tests. Mr. Wilson gave me the mind set to push myself farther in mathematics. After I realized that I was very good at math, I felt so powerful. Not powerful in a status but powerful in that I had a higher level of understanding.

Mr. Wilson was the best math teacher that I have ever had. He taught math in a way where I could understand and remember it. Although he taught math well, teaching it was only half the battle. He implanted a mindset into the class. That mindset was to challenge yourself to go higher. It was like a training mindset where we prepared and trained for the final exam. That class changed my outlook on the way I learn math. Mr. Wilson was different from other math teachers because he taught us life lessons while teaching math.

Tom Hanks' Descriptive Portrait

Tom Hanks was a 19 year old junior who attended Midtown University. He majored in general mathematics. He was the younger of two children. He was tall, medium built, had high cheekbones, soft long twisted hair and spoke softly. His father's formal education was a doctorate in a math-related field, and his mother was also a college graduate. The annual family income was \$100,000 or above. Despite their income, Tom, and his family

lived in a thriving neighborhood in an impoverished city. However, around high school that had changed and like other neighborhoods it too showed signs of neglect.

He spoke of how his father and mother had come to America to create a better life for themselves. His father was an immigrant from Ghana, and his mother was an immigrant from the Philippines. When asked on the questionnaire what his nationality was he indicated African American. Tom reflected on the time he traveled to his father's country and had witnessed the social and economic disadvantages of the people within the community in which his father once lived. When discussing his relationship with his sister he stated that there had always been some friction. He believed the friction between them derived from the social comparisons made by others concerning their academic abilities. Academically, particularly in mathematics, he stated that he had always exceeded her in performance. He described himself as an introvert and musically inclined.

Tom Hanks' Voice

Mathematical moments I had during my upbringing include some out of class experiences and in class experiences. A few notable ones in my out of class experience include quirky ways my father would try to get us to learn and get us ahead in academic terms in relation to my peers at a very young age. Throughout my schooling for Kindergarten to about 11th grade he would daily emphasize the importance of preparing ourselves for certain placement tests that grant high school and college admittance. He would do everything from quizzing my sister and me on our times tables to buying television advertised products that taught a way to multiply large integers in a matter of seconds. The majority of my in class math experiences were from grade school through high school because math was a requirement. I had fun playing counting related games, multiplication races, other than that I just saw it as something I needed to learn. I believe the deep interest in mathematics came alive when I entered college. Before settling "hopefully" on being a Math major, I was an Anthropology then Electrical Engineer major beforehand. What really drew me to this major was a mental realization of sorts when I began to really understand the role Math played on earth as a whole. Earth became more evident to me as a universal concept and the basis for a lot of understandings once I moved on from simple algebra and arithmetic to Calculus and sorts. Also, I began to take interest into the idea of sacred geometry and old world mathematical techniques. I figured understanding one would most likely help

in understanding the other. Plus I see math as a backup or comfort like major, just in case I don't know what career path I want to pursue I'll have Mathematics down pact, which can be used in several areas of study.

I never really realized I was skilled at math, but I believe I am a fast and quick learner when a new concept is fully presented and understood by me through practice. So I believe patience and persistence will get me through this pursuit of a Bachelor of Arts in General Mathematics. In terms of who inspired me to pursue math as a major would most likely be the movie A Beautiful Mind, and the use of algorithms within today's society also pushes my ambition.

The best math teachers I ever had would probably be Mr. Pearson (pseudonym), my 4th-6th grade teacher and Mr. Donaldson (pseudonym) of my Calculus 1 college class. I mention Mr. Pearson because his teaching style impacted my life severely and helped mold me into the learner I am today. His method usually consisted of positive reinforcement when good work is shown, calling you out on bad stuff when he knew you could do better, and pushing you to do better on an assignment or test when he noticed a lack of effort. He could be crude at times but was a very poetic and tough-loving teacher; I remember every moment throughout those years he would quiz the class on multiplication and division cards he'd call out, and make us keep track of our marks. Looking back on the experience the growth was quick, and it really engrained it into our minds to second nature status.

The second is Mr. Donaldson whose enthusiasm, wittiness, and knowledge of mathematics I found remarkable. His teaching style was enjoyable but fast paced, however like Mr. Pearson when he taught hard the lesson was meant to be mentally engrained longer. There we're times however when I would miss a class or two and not know any of the material the next day, but being in...catching up was fairly easy when you knew who to go to.

Ezekiel Smith's Descriptive Portrait

Ezekiel was a 20 year old junior who attended Uptown University. His majored in mechanical engineering. He is the youngest of several children. He was medium built, short, and soft spoken. His father was a recent college graduate and a veteran of the Vietnam War. His mother's formal education did not extend beyond high school. The annual family income was \$10, 000-\$14,999 a year.

He arrived promptly to the interview dressed in business casual clothes. As we waited for someone to open the door of the conference room, we talked briefly about himself and his family. From the onset, he informed me that he was an introvert. There was something about his mannerism that indicated that he had been reared by older parents. He spoke of

his mother with adoration. He talked about how she had supported him academically as much she could and how she had always encouraged him. His older nephew, who he described as a friend, and a host of other family members and friends were sources of encouragement. He stated that he didn't want to let them down.

Ezekiel Smith's Voice

When I was in the 7th grade, I was placed in the class that learned advanced math. They told me that I would learn algebra 1, and I wouldn't have to take it in high school. So I was very excited to be in an accelerated class. Looking back, I noticed I never studied for a class, and I did average on my test and homework assignments. I also participated in a math based extracurricular activity called Academic Games. I really loved it and noticed I was good at it. It introduced me to proofs, helped me to better understand equations, and how to work on equations faster. When I went to high school, I skipped right over algebra 1 and went to algebra 2. In high school, I became really close to my math teacher because I was so good at. I understood most stuff quicker than the people in my class, which resulted in me not trying as much. Granted there were lessons that had me stumped, but I still found myself overcoming the material without stressing over it. So this was around the time math became my favorite subject because it came so easy to me. It made me popular among my classmates because if the teacher were occupied then they would ask me for help. I enjoyed the feeling of being needed, but it also took away time from me doing my work.

When I first started to like math, I was maybe in the third grade. I remember learning the multiplication tables, and it didn't take me long to learn them. There was also a girl in my classroom who was good at math too, and during tests, we would race to see who would finish first. I started to know I was exceptionally good at math during middle school. Even when I didn't pay attention in class and would talk to my friends, I still did good. I was always just good with numbers. There was a teacher named Mr. Stevenson (pseudonym) who everyone thought was mean. He reprimanded me for talking too much, but he also noticed I wasn't struggling in his class at all. So he had good talk with me and told me that there are others times my friends and I can converse, but we need to learn now. He set me on track to be a better student, to do the best I can in school.

I still feel like I am currently good at math, but college is on a whole different level from grade school. Sadly, I believe my high school didn't help transition me well enough to start off college. This is when I found out I really had to try in all my classes. I heard a lot of people say that Calculus 1 is hard and the fact that I am doing Calculus 3 is amazing. I can't say that any of the math classes I took I was easy. Every single one took tedious studying and determination. And that's why I believe people think math is hard. They don't want to take the time to work out the problems or try to connect different concepts to learn a new concept.

My favorite teacher would have to be my high school teacher Ms. Phillips (pseudonym). I had her for all four years of high school. She was a very strict but caring teacher. She really reminded me of a younger version of my mother. She was a mother figure to a lot of people including me. She tried her best to accommodate everyone in the class. In her class, you never felt like she wasn't 100% honest. She was real and straight to the point, and she wasn't scared to play the villain either. She was instrumental in a lot of the activities that were going on in the school. She understood I was able to learn the material faster than most people, so would have me explain it to some people in the class. I didn't know then, but she was still testing me on how well I knew the material. A recent professor told me that a study tactic is to try to explain the material in your own words so you can make sense of it on your own, instead of following someone else's instructions. She really believed in me and left a big impact on my life.

College Experiences

Self-efficacy

Perceived self-efficacy is one's judgment of their capabilities in a specific academic domain. It is powerful in the sense that people tend to engage in activities in which they feel efficacious. Their belief in their abilities is a strong predictor of the goals that they will pursue and performance attainment. All of the student participants of this study had high math-related self-efficacy. This is what they said:

I believe in my skills. I believe strongly in my mathematical ability. I don't think anything will stop me unless it's myself. In growing as a person, I'm learning to not to let my mental or emotional frets or constraints that come and go to stop me from doing what I need to get done. (Tom)

Well, for the most part, I know that on homework assignments for any math class that I do, I can do them, I can finish them, I can do pretty well on them. (Reggie)

I feel like I'm good at math so I put forth the most effort in math. (Xavier)

I noticed I was pretty good with numbers. I understand the concept better than most students in the class. (Ezekiel)

Sources of Self-efficacy

Symbolic models that display useful skills and strategies bolsters individuals' belief in their capabilities (Bandura, 1982a; Schunk, 1987; as cited by Bandura, 1997).

Individuals acquired knowledge, skills and strategies from listening to symbolic models verbalize their thoughts and by observing their effective problem-solving strategies. Furthermore, symbolic modeling enhances cognitive rehearsal. By visualizing oneself using modeled strategies strengthens the belief that it can be performed in actuality. Thus, modeling in conjunction with rehearsal strengthens efficacy beliefs opposed to modeling alone. However, modeling, alone, is much more effective than verbal instructions concerning the same strategies (Maibach & Flores, 1993; as cited by Bandura, 1997). This is what Ezekiel stated concerning his exposure to symbolic models:

A big strategy is the internet. Internet helps a lot. It helps a lot. I go into Khan Academy, and it gives you step-by-step for a lot of problems in math or other stuff like that. I will also go online and look for practice problems that they give and just going through it all, so I wouldn't be surprised on tests or anything like that.

When describing sources that influenced his perceived competence in mathematics Tom stated:

In terms of whom inspired me to pursue math as a major would most likely be the movie A Beautiful Mind, and the use of algorithms within today's society also pushes my ambition....Sometimes I watch instructional videos on YouTube or look at Kahn Academy, they give me more simplified, or easier to understand ways ... easier explanations, so I can ingrain more easily than what a professor would have taught me.

Reggie asserted "I just go online and look up how to do this problem in a different way, or I just read the book." Similarly, Xavier asserted;

I used to go and do the online homework a lot because with the online homework, I used to practice whatever we were learning. If you get it wrong then it tells you how to do it and stuff and so I would just keep doing it until I finished the whole thing.

Thus, all of the participants acquired knowledge and skills from symbolic models. In turn, their self-efficacy was strengthened.

In alignment with the tenet hypothesized by Bandura (1997), the most influential sources that informed Reggie's self-efficacy were his enactive mastery experiences. He stated, "I enjoy verbal praise but the only praise if any if it is even praise that I actually care about is the grade on an assignment." Although Reggie espoused that social comparison (vicarious experiences of peers) was not a source that informed his judgment of his abilities, his remarks suggested otherwise. He stated the following:

At first, it was comparison and then I realized that that was detrimental for like, emotionally how I felt about my performance. I know a lot of people in college would compare themselves to the smartest person in the room and then get extremely sad, and then it leads to depression and things along that line. I saw myself on that spiral, so I turned it from comparison to, I don't know a word to describe it ... I would just say being on the same tier, not being left behind per say.

I would see them get higher grades on exams, or I would see them do better on homework and I would ask them how they did that. I would ask them what they're doing differently than what I'm doing to get to that point. They would tell me. If it were something that would benefit me, which it usually was, I would implement it. I would integrate it into whatever I was doing to study at that point, at that time. Then it just became common place for me to do that with my studies further on until I got to the point where people were asking me what I was doing differently from what they were doing. Then the people who I used to ask for assistance they were coming to me for assistance or we were on the same tier, and I saw the progress I was making.

Performance is hard to gauge in an academic setting; thus, individuals conduct social comparisons to assess their abilities. Peers are powerful, influential sources of self-efficacy beliefs. They also impart knowledge and skills which may improve performance; in turn, this will bolster individuals' academic self-efficacy (Bandura, 1997). By listening to what his peers had to say about their experiences in mathematics, Reggie determined what methods and procedures would result in successful performance attainment opposed to methods and procedures that would result in failure. Emulating the behaviors and attitudes of models can minimize risks and effort, and save valuable time (Usher, 2008).

It is also important to note that the above mentioned statement suggest that Reggie's beliefs were also informed by the vicarious experiences of self. By observing his progression in his math abilities, his confidence in his abilities was bolstered.

Individuals' interpretations of their physiological and affective states can impact their beliefs in their competencies. Anxiety may cause some students to believe that they lack math capabilities whereas other students may believe that anxiety is a natural emotional experience. When Reggie interpreted his emotions concerning his confidence in his math capabilities, this is what Reggie said: "Nervous, not nervous anxious. Usually just making sure I got all the pencils.... I'm never like nervous like sweaty palms, or freaking out." Thus, he did not believe he experienced negative dimensions of physiological arousal or affect state. Rather his positive mood reconfirmed his confidence in his abilities.

Reggie's beliefs in math abilities were linked to his internal standards. For instance, he recalled how he could have taken several of his math courses that were required for his major at a community college which he stated would have been easier. However, he opted to take them at the University because he believed they would be much more rigorous. In summary, enactive mastery experiences, vicarious experiences of peers, vicarious experiences of self, physiological and affect state, and symbolic models, informed Reggie's self-efficacy beliefs during his collegiate career.

As a college student, the most influential sources that built Xavier's judgment of his math abilities were his enactive mastery experiences (i.e. test scores). Xavier stated the following:

Right now I am very confident in my math ability. That comes from my test scores that I have taken here and seeing that I am at par with the rest of my class and seeing that I am near the top of the class. That has really reassured me that I am good in math.

Xavier also indicated that “there was this culture to bring up the next person or to help train the other person, we had this mindset of training.” According to Bandura (1997), “modeling influences do much more than simply provide a social standard against which to appraise personal capabilities” (p.88). Models also transmit knowledge, effective strategies, and skills for managing environmental factors (Bandura, 1997). Thus, Xavier’s self-efficacy belief was also influenced by the vicarious of his peers. Likewise, his math abilities was influenced by his African American male mathematics teacher. According to Xavier, he acquired knowledge and skills and he also received words of encouragement from his professor. Xavier indicated that he used forethought to bolster his self-efficacy beliefs. For instance, he talked about how he thought about prior successful performances to strengthen his belief in his math abilities. In summary, enactive mastery experiences, vicarious experiences of peers, vicarious experiences of teachers, social persuasions of teachers, and symbolic models informed Xavier’s self-efficacy.

Ezekiel’s self-efficacy was informed by his enactive mastery experiences. He stated:

When I take a test, I see I did good on it. I probably got exactly what I expected to get on it. It makes me feel good. It makes me feel like I accomplished something, that I'm doing something right. It definitely inspires me to keep going, to keep doing what I'm doing, so I can keep the grade through the end. I don't want to go downhill with my grades.

Enactive mastery experiences and social persuasions of family members may have been equally influential sources that informed Ezekiel’s self-efficacy beliefs. He routinely received words of encouragement (social persuasion) from family members. Ezekiel stated:

Definitely my family! They all encourage me with my mathematics ability. A lot of my family didn't go to college. Some of them barely even graduated high school, so when they see my grades and hear the classes that I'm taking, they're like, “Wow,

keep doing what you're doing." Definitely, for discouragement, by the grace of God, I haven't really found anyone who discouraged me in my mathematics ability. Everyone that I came through from elementary to middle to high school, they were all encouraging. They didn't tell me that I was stupid or dumb. They didn't tell me that, "Oh, you're not going to make it in college if you keep" ... It was all encouragement. They all wanted me to do my best.

Reflecting on all the people who were counting on him to be successful was the strategy he used to bolster his belief in his math abilities. He stated:

I have an older nephew than me actually, and he definitely inspire me to just do real good in it. He just always told me like, you have to do good man, I could tell that he was real serious, and then from then on, I was like, "I have to be the best at it. I have to try." He also reported a competitive drive to outperform others. He stated "Sometimes. It may not be a spoken thing, but deep down, you find yourself competing against each other trying to get the best grade that you can."

Similar to the other student participants the vicarious experiences of peers were also influential sources that built Ezekiel's beliefs in his competence. Observing his peers successful performance attainment made him feel as though he could accomplish similar tasks. This is what he said:

I also talk to some of my friends, do group study sessions, things like that, or even with friends that aren't taking the same math classes as me. I will talk to them and try to explain some of the concepts with it, and if they understand the basic idea of it, then I know that I'm able explain it right to them. Therefore, I should understand it in my own way too.

This finding also showed that Ezekiel engaged in the vicarious experiences of self. As a tutor, he was able to observe himself successfully improve proficiency in skills and utilize strategies (Bandura, 1997). In turn, these observations strengthened his beliefs in his capabilities (Bandura, 1997). Ezekiel did tend to get nervous concerning tests. However, he did not perceive his nervousness as a lack of ability rather he associated it with a lack of effort. Thus, his beliefs in his mathematical abilities were not impacted by physiological and affective state: This is what he said:

When I'm nervous, it's not I expect to do bad, and I do bad. When I'm nervous I feel like, Oh, if I did do bad, I could have done better. That's why I was nervous because I know I could have understood more of the material that I was learning....Sometimes I actually do perform better than what I expected to do (enactive mastery experiences), and it definitely boost my confidence for the next test that I will take because like, "Oh, I felt this bad, so I shouldn't keep feeling this way about it.

His assertion also suggested that he used his thoughts to regulate subsequent affective states. He reminded himself of how he felt in the past and, yet, the outcome was positive. According to the tenets hypothesized by Bandura (1997) forethought is a powerful component of the construction of self-efficacy beliefs. In summary, the sources that informed Ezekiel's self-efficacy were enactive mastery experiences, the vicarious experiences of peers, vicarious experiences of self, social persuasions of family, and symbolic models.

In contrast to the tenets hypothesized by Bandura (1997), the most influential sources that informed Tom's self-efficacy were the vicarious experiences and social persuasions of his parents. When discussing his parents this is what he said:

Ever since then, he [his father] worked himself up through scholarships and his own academic achievements to get to where he is now. He really enforced the importance of education in America and how it was a solid foundation and put us in a position to succeed more easily than others....She [his mother] always pushed us too... year when I visited in Ghana and went back to my Dad's home town where it's really shanty like. It put it into perspective where you can take your life if you really put your mind to something.

Thus, unlike the findings of a thought-listing analysis which revealed that social persuasion of parents did not impact college students confidence in their academic capabilities (see, Hutchison, Follman, Sumpter, & Bodner 2006), Tom's beliefs in his abilities was impacted by the social persuasions of family members. Tom's self-efficacy

was also informed by the vicarious experiences of his advisor/student teacher. Tom asserted:

It's a good part of the program they would have people we could go to. We could go to like an advisor or a student teacher, and they'll help you out. They won't give you the answer, but they'll help guide your steps into getting the right answer. After you get it, they will go back over it and teach you. Show where you're thinking went wrong when you first tackled it and why you didn't get it the first time. I feel that's helped me a lot with my mathematical journey or whatever.

However, because Tom was an introvert, he did not utilize this support network quite often. Thus, the impact of the vicarious experiences of his advisor/student teacher on his self-efficacy was minimal. Therefore, the primary sources that informed Tom's self-efficacy beliefs were the vicarious experiences and social persuasions of his parents. He recounted his father's and mother's experiences as immigrants and the meaning of his name to bolster his beliefs in his math abilities. He stated, "My name means no fear, so I don't really have an excuse to not do anything unless I'm procrastinating or psyching myself out."

Self-regulation

Self-efficacy beliefs mediate self-regulatory skills (Schunk & Pajares, 2002). Self-regulatory is a metacognitive process that encompasses skills for planning, organizing and managing instructional activities; enlisting resources; regulating one's own motivation; taking clear notes, waking up early and getting rest, and applying metacognitive skills to evaluate the adequacy of one's knowledge and strategies" (Bandura, 1997, p. 174-175).

When discussing his self-regulatory skills this is what Reggie stated:

When I get a hard problem, first thing I like to do is just write down whatever comes to mind that might relate to the problem. Kind of like thought bubbles but with math, just write down all of the equations that I might need for the problem, everything that might relate to the problem that I, we haven't necessarily been told relates to the problem, just write it down on the side. Then, going from there if it's

just a straight math calculation problem I follow the steps until I can't get to until I can't get past the step that I'm at. Then once I get to that point I would look in a book or look online for something that's similar to the problem and kind of reverse engineer a solution to it. If that doesn't work, then I would just let it sit for a good twenty or thirty minutes if I have the time, and then come back to it after doing some other problems, get my brain jogged up and then try it again.

Then usually at that point, I'm able to get something that looks like a final answer, it might not be right, but it's on the way. Then if that can't happen, I just let the problem go if it's on an exam or I go to office hours or ask somebody else whose already done it, how they did it, but not for the answer because if I just ask for the answer I'm not going to learn. I want to know the process to get to the right answer, and then from that point, you can apply it to any other problem that's like it.

Xavier asserted the following when discussing his self-regulatory behaviors:

Usually, I'm very rested the day before and the morning of I get up early because to me your physical body is very in tune with your mental state, and that's just something that I live by. I make sure I eat breakfast, I make sure I get up early, and I go to sleep early and rested, and I don't do homework the previous day, or I try not to at least.

Ezekiel and Tom stated that they used the internet when enlisting resources. Ezekiel stated:

A big strategy is the internet. Internet helps a lot. It helps a lot. I go into Khan Academy, and it gives you step-by-step for a lot of problems in math or other stuff like that. For math, the book provides different examples of practice problems, even the problems that they give you or you working out for homework and stuff like that. I study that extensively.

Likewise, Tom stated "I watch instructional videos on YouTube or look at Kahn Academy, and they give me more simplified, or easier to understand ways ... easier explanations, so I can ingrain more easily than what a professor would have taught me".

Individuals who have high self-efficacy have similar self-regulatory beliefs (Zimmerman, Bandura, & Martinez-Pons, 1992; as cited by Bandura, 1997). Thus, the sources that inform their academic self-efficacy are theoretically tangential to the sources that inform their self-regulatory self-efficacy (Pajares, 2002).

Implicit Theory of Intelligence

Carol Dweck's work with feedback, self-motivation, and self-efficacy led to her development of implicit theory of intelligence. Implicit theory of intelligence posits that individuals hold beliefs in their intelligence as either malleable or fixed (Dweck & Leggett, 1988). Incremental theorists believe their intelligence is malleable and unlimited (Dweck & Leggett, 1988). They do not gauge their ability in the normative sense (Quihuis, Bemphat, Jiminez, Boulay, 2002). Thus, errors are viewed as a normal part of learning (Ames & Archer, 1988). Failure and mistakes are perceived as feedback on how to improve. They are inspired by challenges. They are interested in "stretching themselves. It's about becoming smarter" (Dweck, 2006, p. 17).

By comparison, entity theorists adopt a performance goal orientation associate their performance with their capabilities (Ames & Archer, 1988). Thus, exerting a great deal of effort causes them to question their abilities. Hence, errors are viewed as a lack of competence. Individuals who have low self-efficacy and hold entity theorist perspectives tend to give up and do not take risks in learning situations. Whereas, entity theorists believe their abilities are fixed inborn traits and tend to gauge their ability on grades and recognition from others (Dweck & Leggett, 1988). They pursue tasks that guarantee success because they are afraid of failure. They perceive feedback as indicators of their abilities. However, individuals who have high self-efficacy and hold entity perspectives articulate strategies for achieving success in the face of difficult tasks.

Dweck and Leggett (1988) asserted that one's theory of intelligence influences the type of goal orientation that is adopted. Incremental theorists adopt a mastery goal orientation and are preoccupied with the development or mastery of new knowledge and

skills. Adoption of mastery goal orientation has been associated with pursuing challenging tasks opposed to easy tasks (Ames & Archer, 1988; Elliot & Dweck, 1988), focusing on effort rather than attributing success and failure to ability (Ames & Archer, 1988; Nicholls, Patashnick, & Nolen, 1985) and using effective learning strategies (Ames & Archer, 1988; Meece, Blumenfeld, & Hoyle, 1988; Nolen, 1987). Whereas entity theorists adopt a performance goal orientation whereas individuals are concerned with the judgments of others (Dweck & Leggett, 1988). They tend not to pursue challenging tasks because of fear of failure. When describing his perception of his intelligence this is what Reggie said:

I would say, for most people including me it's innate to be proficient at math. Like you can get the concepts down easily but applying it and showing that you are prominent at exams and rigorous testing requires effort. I would say that required a lot of effort from me.

Based on Reggie's statement he had high self-efficacy and held the knowledge structures inherent in both incremental and entity theories. This finding aligns with the contentions of some researchers who have argued that the nature of the theories allows individuals to hold both incremental and entity knowledge structures (see, Lewis, 1995; Nicholls, 1983; Schunk, 1995) and use either of them when it is suitable for them (Anderson, 1995).

The findings of this study revealed that Xavier adopted an incremental theorist perspective. He believed his intelligence was malleable and unlimited and through practice, he could improve his competence in mathematics. He also adopted a mastery goal orientation in which his reasons for learning were to acquire knowledge and master skills. Studies have shown a correlation between individuals' goal orientations and cognitive functioning (Dweck & Leggett, 1988). Those who adopt a mastery goal orientation reflect on prior experiences that bolster their beliefs in their competence and they engage

themselves in self-regulated activities such as planning, goal setting, seeking assistance, and monitoring and evaluating their actions. When Xavier discussed his behaviors regarding difficult tasks relative to mathematics this is what he stated:

When I'm faced with difficulty in mathematics I just try to remember like I can remember a lot of times when it was hard, but I understand that the brain adapts well to change, and so I can learn how to do the math even though it's hard. It's not something that can't be taught. I understand that it will get hard and it's kind of like a mindset that you have to have, not a mindset of my ability of math, but that it's not something that can be done.

In alignment with Ames & Archer (1988) assertion that those who adopt a mastery orientation reason for learning is to acquire knowledge and mastery, Xavier viewed his mistakes as opportunities to build skills rather than evidence of his capabilities.

The first is a mistake that I made. I check to see did I know the material and I just made a mistake or did I really not know the material, and I just didn't know it. That's what I check first, and if it was a mistake, then I need to practice to weed out those mistakes. If there's something that I didn't know, then I need to go back and learn it the way that I'm supposed to learn it.

Tom had strong positive beliefs in his math abilities. When describing his math self-efficacy Tom stated the following “Now, in college, I feel like my mathematical ability is probably about an eight or nine.” He also believed that his intelligence was malleable and unlimited. This is evident by the following statement “Because even though sometimes I struggle with learning new subjects, or learning new topics, I know I will eventually get it after a lot of repetition and going back to it and over it.” Thus, Tom held the knowledge structure that is inherent in the incremental theory of intelligence (see, Dweck & Leggett, 1988). In alignment with Tom, his father stated the following:

I don't think people are; everybody has the possibility of doing, of creating innateness putting effort I think that is basically it. I never believe that people are because if you put effort on things, you will succeed regardless of how. If it's not hard then what does the word effort means, it has to be hard and your willingness to put a lot of effort on it.

Supported by the findings of Lewis (1995) and Quihuis et al. (2002) which showed that individuals can simultaneously hold both entity and incremental theories in the same domain, similar to Reggie, Ezekiel asserted that he believed that he possessed knowledge structures that are inherent in both theories. Ezekiel stated:

Definitely, I feel like it's a mixture of both, especially now. College changed everything, but before college, it was more innate, how you said. It just came to me easily, but at college, they test you way harder. You might just be naturally good at math, but you have to put that work in. You have to put the effort. I believe that now I know how to put in the effort, and I know how to study for it. I feel like I have a little bit of both.

According to researchers, students beliefs about learning is influenced by the achievement beliefs of their parents, teachers, peers, as well as the cultural, social and academic environment in which they have developed and are developing (Ames and Archer, 1987; Bempechat, Graham, and Jimenez, 1999; Ogbu, 1987). Thus, it is important to mention that both Reggie and Ezekiel attended Uptown University which fosters a highly competitive environment. In contrast, Xavier and Tom participated in a program at Midtown University which emphasized cooperative learning. Thus, this may explain why both Xavier and Tom held knowledge structures inherent in only incremental theory in which the reasons for learning is to acquire knowledge and mastery of skills. Whereas, both Ezekiel and Reggie possessed knowledge structures inherent in incremental theory, as well as in entity theory in which the reason for learning is to gain favorable judgment from others and to perform better than one's peers.

However, despite the variation in the students understanding of their intelligence, all of the participants approached math-related situations as tasks to be mastered. For example, each participant had either enrolled in a summer bridge program or in math

courses that were not relative to their major to build or improve their conceptual understanding. Also, when faced with difficult tasks they sought the assistance of their professors, and peers to acquire knowledge and skills opposed to seeking the solutions to the math problems.

K-12 Experiences

Sources of Self-efficacy

Empirical evidence has shown that from kindergarten to 4th grade children use social comparisons of peers to gauge their performance (Nicholls, 1978, 1979). As evident by Xavier's autobiography, vicarious experiences and social persuasions of his teacher, Ms. Ramez, was central to the construction of his self-efficacy beliefs in mathematics. When describing his kindergarten teacher he used the word "amazing." Xavier stated that she had high expectations of him and that she taught him math concepts that were considered beyond his grade level. She inspired him to learn by offering words of encouragement, through scaffolding and by facilitating his learning as he experienced a "productive struggle." This finding aligns with Bandura's (1997) assertion "people are not about to discard information that makes them more efficacious just because it comes from a dissimilar source" (p.101). Thus, Xavier beliefs in his competence in mathematics were informed by the vicarious and social persuasion of his teacher.

Young children who are still developing their skills rely on the vicarious experiences and social persuasions of someone they trust and respect (i.e. teacher) to inform their self-efficacy beliefs (Bandura, 1997). Thus, the vicarious experiences (modeling) and social persuasions (feedback) from Reggie's mom and Kumon tutor were used to inform his self-efficacy. According to Bandura (1997), vicarious experiences of

self also bolster personal self-efficacy. In alignment with this assertion, how quickly Reggie accomplished the Kumon packet informed his beliefs. Also, Reggie's mother asserted that tutoring his peers was a factor that informed his self-efficacy beliefs. She stated: "He also would tutor or help his friends with math too. I think that also helped reinforce his knowledge and his skillset by helping others".

It is around the age of 10 that students' associate success and failures with their ability opposed to their effort (Nicholls, 1978, 1979). Thus young adolescents are comparing their performance outcomes to their peers, and they believe that the causes of similarities or differences in achievement are due to ability rather than effort. Thus school practices such as timed multiplication drills results in building or diminishing the self-efficacy of young adolescents. Reggie's self-efficacy was bolstered by enactive mastery experiences. For example, his self-efficacy was bolstered by the grade he received on the assignment and his observation of his improvement in the amount of time it took for completion and fluency. He also gauged his performance based on the performance of his peers. However, as theorized by Bandura (1997) because Reggie had experienced repeated successes as evidenced by the timed drills, he was not attentive to the words of discouragement from his peers (i.e. trying too hard, nerd). Thus, Reggie's interpretation of his physiological and affective arousal state had a positive effect [or no] effect on his self-efficacy. Reggie also conveyed that as a young adolescent the vicarious experiences of symbolic models also informed his self-efficacy. Reggie asserted:

Yes, for me, the people I've grew up around, by people I mean role models per say, movies, TV, it was like smart people and then people who are good at math. For other people, that's not the case it's just people are good at basketball, people are good at music and things like that. I would just say, those, if I haven't mentioned them already, those are the factors I would say that made me want to be good at math and want to keep going with it.

Tom indicated that his beliefs in his mathematics abilities were bolstered by the vicarious experiences and social persuasions of his 4th-6th grade mathematics teacher. He stated:

I mention Mr. Pearson because his teaching style impacted my life severely and helped mold me into the learner I am today. His method usually consisted of positive reinforcement when good work is shown, calling you out on bad stuff when he knew you could do better, and pushing you to do better on an assignment or test when he noticed a lack of effort. He could be crude at times but was a very poetic and tough-loving teacher; I remember every throughout those years he would quiz the class on multiplication and division cards he'd call out, and make us keep track of our marks.... Looking back on it, I think he was very understanding of my situation and ethnicity. Being that he also lives inside..., not outside ..., so he was probably used to being in that type of environment and used to the cultural and social weight of them, per se.

Enactive mastery experiences and the vicarious experiences of peers (social comparisons) was an influential source that built Ezekiel's math-related self-efficacy. When discussing his elementary experience in mathematics, he reflected on his ability to outperform his classmates, and he also thought about an African American female, who he perceived to be just as smart as him. This is what he said:

In elementary school, I noticed I was pretty good with numbers. When we were learning multiplication and addition, I understood the concepts better than most students in the class. It was this girl named Patricia (pseudonym), and during the test, we used to try to race to see who could get done with the test first.

Also, Ezekiel's beliefs in his math abilities were informed by vicarious experiences of self. He asserted the following:

She understood I was able to learn the material faster than most people, so would have me explain it to some people in the class. I didn't know then, but she was still testing me on how well I knew the material. A recent professor told me that a study tactic is to try to explain the material in your own words so you can make sense of it on your own, instead of following someone else's instructions. She really believed in me and left a big impact on my life.

By the time adolescents' transition from elementary to middle school they have adopted the standards and values of their home environment (Bandura, 1997). Thus, they typically acquire friends who share the same behaviors and value system (Bandura, 1997). Peers promote the development and validation of self-efficacy (Bandura, 1997). Peers model efficacious thinking and behaviors. They are the most informative source for comparative self-appraisals.

In middle school, Xavier and Ezekiel joined Academic Games, a peer network. They did not indiscriminately choose who they interacted with rather they chose to affiliate with peers who had similar interests and values and who had equal or higher ability in mathematics. Their affiliation with peers who had similar interest and the same or higher abilities in mathematics had a positive impact on their personal self-efficacy which mediated their interest in mathematics. This is what Ezekiel said:

I have to say academic games may be the only math-related extracurricular activity I had. My parents didn't even put me into that. They didn't know nothing about it. That was a friend thing. I saw that my friends had joined it. I was like, "Let me join it with them." I enjoyed it a lot. It was fun. I went on a little tournament, and it was kids from all over the state who came there to play academic games. It was just good to see everybody. You had a lot of smart kids there, a lot of people who really enjoyed the game and played the game well. I think that was the only math based extracurricular activity I was in. It was a good experience.

This finding showed that the as middle school students, Xavier's and Ezekiel's beliefs in their math abilities were bolstered by the vicarious experiences of peers.

In summary, the findings showed that enactive mastery experiences, vicarious experiences of peers, vicarious experiences of parents, vicarious experiences of teachers, vicarious experiences of self, social persuasions of family, social persuasion of teachers, physiological and affect state, and symbolic models were the sources that informed the self-efficacy beliefs of these four high-achieving African American undergraduate

students. However, it is mindful to note that although there is some overlap in the sources that informed their beliefs, there were distinguishable sources among each participant.

Access and Equity

Effective Mathematics Program

It is well known that students who attend schools situated in impoverished communities which are highly populated with African American students experience unique challenges. An examination of the history of mathematics education reform reveals that African Americans have been historically underserved (Berry et. al., 2014). Research has found that African American students are more likely to have teachers who are certified outside of mathematics, who have less professional experience, and have a weak mathematics background (Battey, 2013; Darling-Hammond, 2007; Flores, 2007; Stiff, Johnson, & Akos, 2011). Furthermore, effective instructions that support meaningful learning is rarely implemented (Leinwand et al., 2014). For instance, they have been taught to memorize facts (R. S. Ellis, 1993) and mimic teacher behaviors (Berry et. al. 2014).

According to NCTM (2014) effective teaching engages students in meaningful learning that fosters their ability to reason and understand mathematical ideas. Mr. Coleman and Mr. Johnson, African American male mathematics professor of higher education, believed that the disparity in the mathematics achievement of African American males was due to their lack of exposure to effective teaching. Mr. Coleman asserted that “When I work with students outside of my own class, it really is the poor prerequisite skills. They're missing the fundamental concepts of mathematics.” Likewise, Mr. Johnson indicated that his remedial math courses were highly populated with African American male students. He stated, “If you took our African American students as a whole they do

tend to be in the lower math classes.” Similarly, Tom’s father, Mr. Hanks who had been a professor at a university stated “I don’t remember seeing any more than two Black people over the five, six years we taught that class. Personally, I think it has something to do with preparation....” Thus, this finding suggests that researchers reconsider current explanations that suggest hierarchical competence without addressing the opportunity gaps that may have caused them (Flores, 2007).

Self-regulatory capabilities contribute to success in formal education, promote lifelong learning, and are highly predictive of achievement scores on norm tests (Zimmerman and Schunk, 2001). Students who are equipped with skills such as planning, organizing, and managing instructional activities, seeking resources, regulating one’s motivation, and evaluating and monitoring one’s knowledge and skills are capable of successful performance attainment. However, some social critiques believe that schools have fallen short of teaching children self-directedness. In alignment with this contention, this is what Ezekiel stated:

Sadly, I believe my high school didn’t help transition me well enough to start off college....I couldn’t just sit myself down and read out the textbook, learn the material out of it, writing notes. I wasn’t that good at it. I see students, and I see them highlighting everything in their books and throughout their notes, and I never got that skill to study like that. It was hard. It was really hard, definitely, in the beginning. I learned to do it myself now.

Similarly, when reflecting on his first year of math at Midtown University Xavier stated:

He was saying that when he was up there teaching stuff he would tell us about what we were learning. He was saying that this is supposed to be review and everything. I am like well this is not review for me. If I learned it, I learned it one time, and I didn’t practice it after that. I don’t know. That’s why I felt like I was behind. Some of the stuff that other people in the class, they were getting more quickly than I was because I had never learned that stuff before and they were like “oh yeah I did this in high school and I remember it” but I didn’t remember any of it, so I had to catch up.

Furthermore, during Xavier's high school year's valuable learning time was lost due to classroom management (i.e. attendance and passing out papers). When describing the instructional methods of his geometry teacher, Xavier said "We used to go to the board and we had the overhead projector. We used to go up there and write and answer the stuff." The implications of this statement is that he had experienced routine exposure to activities that focused on rote, decontextualized learning through practice and drill, memorization of facts, and mimicking teacher-modeled procedures opposed to exposure that emphasized conceptual understanding, connections, mathematical communication, multiple representations, and analyzing data. Due to Xavier's perception of his high school learning environment divergent from the tenets hypothesized by Bandura (1997) enactive mastery experiences were not the most influential sources that informed his beliefs in his math abilities. Rather, similar to Malik (see Thompson & Lewis, 2005), Xavier had to rely on the persuasions of his peers nationwide to inform his beliefs in mathematics. This is what he said: "In high school, I knew that I was good in math, but I was good in math within my own community, not compared to the rest of the world." Xavier's high school experiences in mathematics may have played a central role in him having to take an algebra/trigonometry course in college which was not applicable to his major.

According to Tom's father, Mr. Hanks, the school personnel at Tom's parochial school emphasized the importance of academics and taught students self-regulatory learning skills such as note taking, creating a place and time for studying, seeking assistance, and evaluating and monitoring their work. However, having been placed in basic algebra his first year of high school raises questions about the quality of instruction that Tom received in elementary and middle school. Unlike many inner-city public high

schools in which advanced math courses are not offered (Thompson & Lewis, 2005), Tom's high school offered Calculus I. However, Tom's terminating course was Algebra II. When asked why he did not take Calculus he said: "In high school. I didn't understand what I wanted to be. I didn't have a set plan on where I wanted to go career-wise." Thus, this finding diverges from extant literature on African Americans mathematics education that asserts that career attainment is a function of African American students' exposure to advanced math courses (Ellis, 1993; Thomas, 1986). Rather, this finding aligns with research that has concluded that African American students' pattern of enrollment is a function of career decisions (Connell & Lewis, 2003; Lewis, 2003).

When discussing his experience at a pre-engineering camp, Reggie stated:

We got to take a mock Calculus one class that has the same rigor as the class you can take at Uptown University, and I took that class, and I realized that I didn't know as much as I thought I did.

Thus, this finding raises questions concerning the quality of his high school math instruction. Parallel to this assertion, Reggie's mother's critique of his experience in mathematics relative to the experiences of White students suggests inequitable access and equity in mathematics at the school and classroom level. She stated:

I think the teacher wants them to get through as much of the subject matter that is outlined for the school year. But in having my kids be involved in different activities where the population, the majority was white in a particular school district, but they are coming together as it relates to sports, as it relates to music, that kind of common connection and talking to those parents their curriculum was broader and extensive. More extensive than the curriculum in my kids' schools. When my kids' went away to different colleges, they both said high school did not prepare them for college as much as they would have liked it to. They can talk about the friends that they met in college and how they took AP courses, but they were able to get through much more material during that school year than his class was able to get to and they were able to get four and fives on their AP exams. I'm not saying that they are not being taught, but I'm saying that they might not get that full extension of the curriculum because the teachers are making sure everybody comes along. That means that even if some other people are ready to get the

additional materials, they might not get it because we're going as a group. They're doing a smaller subset of that. Not micro but enough where some of the information that was on those AP exams, they never covered in the classroom.

Gutie'rrez (2002) asserted that the terms equity which means "justice" or "fairness" and equality which means "sameness" have been combined by researchers. Gutie'rrez (2002) argued that these two terms are quite different and that how equity is defined has serious implications as to how education reform efforts will pursue achieving it. She asserted that providing marginalized students with the same resources (i.e. curricular materials, methods of teaching, instructional time) does not ensure equity; rather, in order to address equity in mathematics education past injustices and differences in contextual factors such as home resources, social biases, and student identities must be addressed. In alignment with Gutie'rrez (2002) contention, Ezekiel indicated that although he had taken advanced math high school courses, he was never encouraged to take the advanced placement test in which a successful score could have earned him credit and advanced placement in college. He asserted:

It was accelerated in the sense that we were learning calculus because most of us had already learned pre-calc in middle school, and I learned pre-calc in middle school too. It was Algebra 1, Algebra 2, pre-calc, then calc for our last year. The only thing was we didn't get the college credits for it, but we still learned it, so we would be able to be prepared for it in college....I think it was more of the school planning. We were a new school, so I was in the first graduating class, so we didn't really have it all setup like how other schools would have it where they have the AP courses and things like that.

African American Male Teachers

Some researchers have asserted that African American students are in need of same race models, particularly African American male teachers (Toldson, 2011). The racial imbalance of African American male teachers has gained national attention through organizations such as American Association of Colleges of Teacher Education (AACTE)

and National Commission on Teaching and America's Future (Toldson, 2011). Despite the national attention to this phenomenon, the crisis has not dissipated (Toldson, 2011). African American male teachers make up 1.81% of the teacher workforce (Toldson, 2011). Consequently, African American male students may seldom see teachers that look like them and can identify with them (Wilder, 2000). Parallel to this contention, the findings of this study revealed that Xavier had not been exposed to an African American male teacher throughout his elementary and secondary school career. This is what Xavier stated when asked if there was a need for African American male teachers.

I think so because I don't even remember having an African American male math teacher at any point before I got to college, no I never had an African American male teacher before I got to college....When I got to college, and I had an African American male teacher is when I related to him the most, and the connection was way deeper than, I'm not going to say way deeper, it was the most efficient relationship that I have had to a math teacher. I think it has a greater impact. I actually think about it every day. It makes him more relatable to me. I think that being Black, not only his skin color but his culture is more relatable to me and I respect him more than if he didn't relate to me. We grew up in the same type of urban environment.

When reflecting on his school experiences in mathematics, Ezekiel was reminded of Mr. Stevenson, his 7th grade African American male mathematics teacher. According to Ezekiel:

Growing up in elementary school, I had a lot of female teachers, and I had one African-American teacher. Even now, he was the only African-American male mathematics teacher I had. Mr. Stevenson. He was a hard teacher, and he was definitely disciplinary. He disciplined a lot of students throughout the school. He was renowned too because everybody knew of him. Everybody had to take him who went there. It impacted me because, as I said, he was very disciplinary, so it felt like he was like an uncle, someone who wanted you to go on the right path. He only wanted the best for you even if he seemed like he were maybe picking on you or something like that.

According to Bandura (1997) models that have similar attributes such as race/ethnicity and gender are perceived as much more credible than dissimilar models; thus, they have more

influential power on building the observers self-efficacy beliefs. Likewise, empirical and theoretical literature indicated that African American teachers have been more successful than middle class White teachers with linking content [math] with the cultural lives of African American students (See, Dilworth , 1988; Foster, 1993; Irvine, 1988; King, 1993; Ladson-Billings, 1990; Meier, Stewart, & England, 1989; Reed, 1986). However, in contrast, Mr. Johnson's observation of African American males in his remedial math course revealed the following:

When there's a male in there, I don't know if it's because I'm also male and they think they have to show me they know what they're doing in a certain way or something like that, if there's a ... Sometimes it's hard to get through that, like, I'm not here to tell you what you don't know, and I'm not here to ... I really want to help you with this, but they ... Sometimes there's an 'I got this; I don't need you' thing. Then they don't, and then they'll stop showing up, as opposed to coming for help after that. It's almost as if they embarrass themselves in front of me and they can't face it. I'm like, "No, come here."

The cool pose theory may explain this behavior. The cool pose theory suggests that some African American male students develop ritualized masculinity to cope within an environment that they perceive plagued with racism (Majors & Billson, 1993). Bandura (1986) asserted that self-efficacy is rendered ineffective in prejudicial systems. Thus, students may not ask questions or seek assistance due to their perception of an adverse environment. Thus, this finding does not negate the fact that models who have similar attributes bolster African American males' self-efficacy. However, it does suggest that other supports are needed to build their confidence and, ultimately, improve their mathematics achievement. According to Martin (2007), an examination of the negotiations between teachers and students are needed to understand how race/ethnicity plays a role in African Americans mathematic experiences. It is his belief that an investigation such as

this will reveal reasons for achievement outcomes and the relationship between achievement outcomes and their racial identity.

According to Bandura (1997), dissimilar models are not to be discounted if they possess the knowledge and skills that the observer aspires. For example, aligned with Bandura's (1997) contention concerning dissimilar models Reggie asserted:

For me, I don't say it plays a factor because I've had a lot of different professors just in college these last two years of different ethnicity. They have all been relatively open. It might just be because of the student that I am and how I perform in the classes. I perform pretty well and if I don't perform well I talk to them about why I'm not, and they help me out. I would just say that doesn't necessarily play a role for me at this college. I know at other colleges it's a major factor for some people.

Ms. Gold asserted that Reggie's mathematics teacher, a white male, linked mathematics to real world experiences. She stated:

There is, and this would have been probably his junior or senior year in high school, that's when the math teacher stood out to me. It was more ... It wasn't mechanical; it was relationship based math, and he would come home and say, "Everything that we do, every day of our life has math or science involved in it." He was able to take it from an academic standpoint and make it a relational standpoint and okay watching television, cooking, just relating math in that way.

It is her belief that this form of instruction piqued Reggie's interest in mathematics. According to the tenets of social cognitive theory, the development of intrinsic interest is a function of efficacy beliefs (Bandura, 1997). Individuals display lasting interest in activities from which they derive self-satisfaction and are made to feel efficacious. Thus, parallel to Reggie's contention Ms. Gold did not believe the race/ethnicity of the model matter rather she believed that because at some point in Reggie's life he was reared only by her she felt it was necessary that he be exposed to male models. She stated:

That was one of the reasons why I put him in a four year renewable energy program because it was focused on males only and you had male leaders, you had male instructors, you had kids his age, and all they were doing was getting them

acclimated to STEM. It was great for him to look over and see that there were guys just like him instead of just hearing it from his mom what was important.

I don't know that it matters in terms of race...Most of his career, he's had a lot of female teachers. It was great to have that male dynamic, and I was very happy in high school that he was getting more male teachers than he's ever had in his career. That is one thing that I think that's important in the school system is that we need to have more male teachers, especially for boys. I think for my child, it was important just because at some point in his school career he ended up being in a single parent family. When you have a mom who's pretty much there and directing you, and you see your friends who have both a mom and dad directing them, it's great to have that male in the classroom.

In contrast, Tom's father, Mr. Hanks, asserted that the academic path of an African American undergraduate student compared to a Caucasian student is quite different. This is what he said:

...Whites have a different path to success than black people or minorities in general because they occupy the positions they help each other. Even if you go to some of the post graduate courses in some of the universities, you will not have a mentor, and that's an issue there. You don't see any person like you, even in my dissertation committee I couldn't find anybody except for one Chinese guy who participated.

Thus, Reggie's and Ms. Gold's assertion diverged from the tenet hypothesized by Bandura that posits that because performance capabilities of African Americans relative to mathematics is linked to cultural stereotyping a stronger sense of math-related self-efficacy is derived from a model of similar race/ethnicity. However, in alignment with the contentions made by Bandura (1997), Xavier, Ezekiel, and Mr. Hanks believed that attributes of models, such as race/ethnicity, played a critical role in the development of motivational constructs (i.e. self-efficacy beliefs).

Culturally Responsive Teaching

When describing his teaching philosophy, Mr. Johnson asserted that his primary goal was to develop and improve students' knowledge and skills in mathematics. He stated, "...essentially meet students where they are and try to move them forward..." When

discussing how teacher education programs can be revamped so that pre-service teachers can acquire the skills needed to be more effective with African American male students, Mr. Johnson reflected on his experience. He indicated that his had been middle aged white females.

If you're talking about African American males, they were all white females who had taught in the 70s somewhere in the classroom and then they went on to be professors of teacher education programs and they didn't have any current experience.

As previously mentioned, according to Bandura (1997), “models of similar race and gender are viewed as more credible and instill stronger efficacy beliefs and behavioral intentions than do models of different race and gender” (p. 98). In alignment with Bandura (1997) contention, Mr. Johnson stated that African American male professors are needed to lead discussions concerning the mathematics education of African American male students and that these discussions should be supported by empirical evidence. Similarly, Martin (2007) argued that “African American (and Latino) faculty are needed” (p. 10) “to “serve as stewards and architects of education for African American (and Latino) children” (p.10). Furthermore, Martin (2007) argued that teachers who are deemed qualified to teach African American students are those who are moving toward developing strength and depth in: (a) deep content knowledge, (b) strong pedagogical content knowledge, and (c) a strong culturally relevant pedagogy (see Gay, 2002; Ladson-Billings, 1994).

Mr. Coleman believed that his primary role as a teacher was to ensure that his students had a strong understanding of mathematical content. Yet, he acknowledged that prejudicial systems have impacted African American males’ academic behavior and mathematics achievement. He asserted that students’ experiences opposed to race/ethnicity played a role in students’ performance outcomes. However, he did not believe that it was

the responsibility of professors to undo what society had created, the pervasive preconception that African American males have no self-worth. Although Mr. Coleman did not believe that professors have a responsibility to correct societal misperceptions of African Americans, Gay (2002) suggest that the success of African American students hinges on culturally responsive teaching. “Culturally responsive teaching is defined as using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively” (Gay, 2002, p. 106). According to Gay (2002) culturally responsive teachers are critically conscious of the impact of symbolic models. Thus, they ensure that the images used in the classroom are representative across ethnic groups, age, social class, and gender. Gay (2002) also asserted that another important component of culturally relevant teaching is the creation of a classroom climate that supports ethnically diverse groups learning. Thus, this involves more than applying the best practices recommended by NCTM (2014); rather, it involves the use of pedagogical practices that uses the culture and experiences of its students to expand their knowledge and improve their achievement in mathematics.

Parallel with Gay’s (2002) contentions, Xavier stated that his African American professor employed storytelling in which he linked mathematics to situations that were within the lived experiences and frame of references of his students. He stated “He would tell us stories about when he was younger and where he grew up and stuff. I love when he used to tell us stories about his life, and he’d relate it back to math. He also indicated that the classroom structure was organized into academic and social learning experiences. The implicit message of this practice is to structure positive interdependence. For instance, after the instructor presented a concept students would work in small groups and find solutions.

It bears noting that cooperative learning espouses a collaborative climate opposed to a competitive climate. Comparative studies have shown that cooperative structures wherein students encourage and teach one another promotes higher performance achievement than competitive or individualistic structures (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981). When describing the classroom structure, this is what Xavier said: “there was this culture to bring up the next person or to help train the other person, we had this mindset of training. The mindset was that you need to train your peers” According to Bandura (1997) when individuals perceive that they are working under optimal conditions they select and attend to their enactive mastery experiences and interpret the performance outcomes as being a function of their ability. In turn, individuals’ self-efficacy is bolstered.

In contrast to Martin (2007), however, similar to Mr. Coleman’s perspective, as a college student, Tom made implications that teachers’ awareness of the cultural identity of their students is not necessary, rather, he emphasized that they must have a strong understanding of the content. This implication is in stark contrast to what he admired about his 4th-6th grade white male mathematics teacher. This is what Tom said

Looking back on it, I think he was very understanding of my situation and ethnicity. Being that he also lives inside [the city] not outside metro [city] so he was probably used to being in that type of environment and used to the cultural and social weight of them, per se.

This finding suggests that individuals’ identities and agencies are not static (Gutie’rrez, 2008). Instead, they are constantly evolving as a person transitions from one stage in their life into another (i.e. child, adolescence, adult). Thus, the notion of static identities based on race, class, gender, language, etc... is challenged.

In summary, the findings revealed that two of the participants believed that exposure to African American male teachers exemplifying the knowledge and skills that

they aspire resulted in them deriving a stronger sense of efficacy. They became more assured in their ability to learn mathematics. Whereas, the other two participants believed that the race/ethnicity of teachers had little to no impact on their beliefs in their math competence.

The Deficit Model

When exploring the inequity in the mathematics achievement of African American male students researchers have suggested that deficits in intelligence and diligence are contributing factors of the “achievement gap” (Flores, 2007). Gutie’rrez (2008) argued that these researchers have failed to consider how economic, social, political and cultural discourse of society impacts the school experience and life of African American male students. She also argued that either intentionally or unintentionally, such studies have contributed to the negative stereotypes tagged to the social identity of African American males. African American males have been depicted as uneducable, dysfunctional, endangered, and dangerous (Gibbs, 1988; Majors & Billson, 1993; Parham & McDavis, 1987). Bandura (1997) asserted that individuals tend to believe the negative stereotype types tagged to their social identities and underperform in ways that are consistent therein (see, Steele & Aronson, 2005).

Cortes (1995) asserted that television programs, newspapers, magazines, movies and other forms of mass media are societal curriculums. Mass media is used for more than factual information and entertainment (Gay, 2002); it is also used to construct knowledge concerning political, cultural, advocacy, and ethnic issues (Cortes, 1995). The distorted images and inaccurate representations of African American men have had a negative impact on members of both minority and majority groups (Gay, 2002).

Stereotype threat exists in an academic setting when pervasive negative stereotypes are relevant and individuals must contend with the threat of being judged because of their group membership (Wout, Shih, Jackson, & Sellers, 2009). Mr. Coleman narrative as a college student highlights experiences concentrated with the phenomenon of stereotype threat. Mr. Coleman stated the following when discussing his experience as a graduate student who majored in mathematics.

When you look at TV, in my grad program, I was the only American in my class, not black American, I was the only American in my class so they didn't want to be in my group but can you really blame them? All they've seen about an African-American male was on TV.

The sociocultural discourse that depicts African American males as nonacademic was solidly present in Ezekiel's consciousness. Despite his awareness of the gross inequities that entangle the performance outcomes of African American males, he also (See Stinson , 2013) was convinced of the negative discursive formation of African American males that is socially constructed by the broader culture. Ezekiel acknowledged the damaging effects of sociopolitical factors on African American males' performance outcomes. He asserted that, unlike white students, African American males have the pressure of student loans and a lack of financial support from family members. He stated "They have to work to survive on a college campus and stuff like that. It's difficult in a sense, like I said, to find that time, but some people can manage it. Some people can't." Yet, when asked why few African males pursue math-related fields his response was as follows:

I feel like it's an effort type thing. Not a lot of people, especially African-American males, they don't want to put the time in. I guess they feel they have more obligation to other things, probably to working. A big thing in African-American community now is to get money, to work as fast as you can, to just be this person who just have it all. They probably stay distant from taking all the classes and try to work more

hours in jobs. They don't want to put the time into studying. They want to go out partying every day, every week. You can't do that if you are trying to succeed in college courses. It's hard to do it. I feel like that's what's really keeping a lot of them from excelling so well in it. You have to find the right time to party, find the right time to work, but you still want to make sure that you have your classes under control before you do any of that.

Similar to Ogbu (1998) assertion, Tom asserted that the lived experiences of African Americans are in opposition of the dominant culture and their resistance to assimilation has played a central role in their lack of academic (math) achievement. He stated:

I feel like they do. I feel like a lot of urban black youth don't really see education as something they want to do. I have a couple of friends who are like, "College is not for me. It's not what I want to do. I'm just going to keep hustling." It's the game they're used to. I don't think they see a long term results of getting an education. How it helps you in the future. Maybe that stems from not having the same influential figures that I had in my life. They don't see the world the same. There are some who do pursue mathematics. It's like they're majoring in engineering or mechanics and all that stuff.

According to Reggie, the ratio of African American male students compared to students of other ethnic groups in most of his classes was less than 5%. When asked if he believed few African American males enrolled in math-related fields this is what he said:

Because it's difficult I would say. Depending on where you grow up it's just like, it's easier to do something else than to do math which is not necessarily fun to some people. It would be fun for them to go play a sport or go write or read or something like that. I wouldn't say it's based off of who they are but where they come from, and where they're raised, and who their parents are.

Reggie perceived that the reason few African American males pursued math-related fields was due to personal internal deficiencies as well as their home environment. Thus, like Tom, Reggie asserted that African American males needed to be exposed to mathematics and that school personnel should place greater emphasis on math opposed to sports and music.

Conversely, Xavier indicated that African Americans are at a social and economic disadvantage relative to other ethnic groups. He believed that these factors are impacting African American males' pursuit of math-related fields. This is what he said:

I do think that there is a shortage and that they don't often pursue mathematics, and I think that's because they haven't been exposed or want to exercise their mathematic abilities. The only reason that I'm in electrical engineering is because I had an opportunity to build a solar car and work with electricity and stuff. If I never would have done that I don't know what my major would have been and I don't know if I still would have been in, well I probably still would have been in the...program. In the impoverished community, there aren't many opportunities to expand, or to explore career fields because the focus is not on that, the focus is on eating and surviving and stuff like that. That's what I think.

Similar to Xavier, Mr. Johnson perceived that there was a vast difference in the schooling experiences of African American male students compared to students of different ethnic groups. He stated:

I don't think they have, in general, the same support system outside of here or the ... An environment that allows them just to study. Sometimes they don't have the computer resources at home, so they rely on what we have here. Okay, we've got, you know, MyMathLab on the computers here. They can use it, but it's not the same as being able to at 9:00 at night, you know, wake up from a nap and study or do something.

Thus, Mr. Johnson asserted that African American male students of higher education lack both home and external resources.

Familial Factors

According to Schunk and Pajares (2002), parents are the initial source of self-efficacy of children. Their behaviors and attitudes towards learning plays a vital role in their disposition towards subject matters [math] and their confidence in their capabilities (Schunk & Pajares, 2002). Children's motivation and intellectual development is piqued when they are exposed to interesting and moderately challenging environments that offer opportunities for success (Schunk & Pajares, 2002). Parents build their children's self-

efficacy by introducing them to novel activities such as computerized games, sing-alongs, educational programs, blocks, and puzzles. Research has showed that parent support was a positive predictor of students attitudes towards mathematics(see, Rice, Barth, Guadagno, Smith, & McCallum, 2013), their beliefs in their mathematics capacity (Usher, 2009) and their mathematics achievement (Bowen, Hopson, Rose, & Glennie, 2012; Der-Karabetian, 2004).

When reflecting on his elementary and secondary educational experiences Mr. Coleman was reminded of his parents' role as protector, defender, and advocate. He stated:

The parent is the first teacher. They're a life-long teacher, so they are very, very, very important. If a parent doesn't value learning, most likely the child is not going to value learning. This is so very important. We introduce our values to our children so if we have positive values, and positive is a relative word, so positive, and respect to what we feel is positive in the U.S.....We shape what our children want to be.

He asserted that when socioeconomic status is accounted for children have the same cognitive skills. He argued that racial differences are not the cause of the disparity in the motivation and achievement of children rather the disparity is caused by the home environment. He provided the following vivid examples when making his point:

And this other child was exposed to Public Broadcasting Service (PBS), and they learn about words and science. When they get to kindergarten, one student came in prepared academically. They both have the same cognitive skills, but they were exposed to different things so what they learned was different. One's more ready for life, and one's ready for academics. We reward academics in the U.S. It's what you're exposed to. Culturally, I don't say culture is race; that's different. Culture is your inter-network of individuals which spans race. It's closer to social economic. I could say social and economics together. It's more about the exposure of the child. What you expose your child to is what you value.

I still remember kindergarten when I said I went to the African-American school, in the inner city. I remember the first day of class when the teacher flipped over a red A with an apple on it. I looked around the class; no one knew what it was. I knew it was an A, and that's still vivid in my mind. All the students just looked at it like, "I don't know what that is." I lived in the same neighborhood as these other students, but my parents exposed me to something different.

Similar to the contentions made by Mr. Coleman, theorists have asserted that the differences in children's self-efficacy is influenced by the differential experiences of their lives as early as infancy (Bandura, 1997). Researchers have asserted that children who are exposed to computers, books, and puzzles and whose parents devote time to their education show signs of higher self-efficacy than children who are deprived of a stimulating environment and whose parents do not heavily invest in their cognitive development (Schunk & Pajares, 2002). In summary, aligned with the contentions of researchers (Schunk & Pajares, 2002), Mr. Coleman asserted that children's cognitive development and self-efficacy beliefs are a function of familial factors. He asserted that parent support was a critical component of students' disposition towards math, beliefs in their mathematical capabilities and their academic achievement.

As early as three years old Ms. Gold had Reggie actively involved in educational activities. Thus, various facets of parent support were sources that influenced Reggie's math self-efficacy. According to Schunk and Pajares (2002), parents provide their children with a vicarious boost when they navigate them into large peer groups also referred to as peer networks. The possibility of influence by modeling is enhanced by the similarities within the group (Cairns, Cairns, & Neckerman, 1989). Students have opportunities to interact and observe the interactions of others (Dweck & Goetz , 1978). Consequently, their observations and interactions with their peers influence their choices of activities (Berndt & Keefe, 1992), attitudes and behaviors.

Having enrolled Reggie in Kumon, Ms. Gold arranged for varied enactive mastery experiences. The packets that he was required to complete were moderately challenging, offered opportunities for success, and allowed Reggie to conduct personal self-appraisals.

According to Bandura (1997), the way in which individuals cognitively process successful performance relative to their capabilities may raise self-efficacy beliefs. Assisting him with Kumon packets provided the vicarious experience of school (Schunk & Pajares, 2002; Eccles et al., 1983). By encouraging him to do his best Ms. Gold offered social persuasion (Alderman, 2004, 2013). By informing him of her expectations (or not) she contributed to his physiological and affective state (Eccles et al., 1983).

When discussing his role in building his son's beliefs in his math abilities Mr. Hanks stated that he exposed Tom to literature about STEM related fields. He stated the following:

I used to receive some scientific, and I still receive them scientific things that he became interested in reading just let me see. I made all those things available to them including a thing called communication; The Communication is IEEE publications for engineers. I had them available yes so at times they would read them and those also would help them because I received, I still received them almost every month, and they talk about STEM related courses.

As a single parent, Ms. Jeeter was rearing three children and her only source of income was social security. Parents' perceived self-efficacy is a function of financial strains (Bandura, 1997). Graham (1994) argued that socioeconomic status and parent support are independent of one another, but they are not mutually exclusive. She indicated that her critical examination of studies that explored the motivation of African Americans revealed that socioeconomic factors such as family status and parents' level of education played an important role in how children's motivation constructs (i.e., self-efficacy) were built. The detrimental effects of financial strain is greater for families who live in impoverished communities compared to communities that offer greater resources such as material resources, social supports, and neighborhood controls (Bandura, 1997). A path analysis of a single-parent family revealed that financial strain weakens parents' beliefs in

their care-giving capabilities (Elder & Ardel, 1992). Likewise, the findings of this study suggest that facets of parental support were a function of societal factors. For instance, at an early age, Xavier's mother was an influential source of his math self-efficacy. She exposed him to a computer game which was used to improve his knowledge and math skills. However, as he progressed through school, she was unable to provide such games and became frustrated when he did not understand the math concepts that were taught in class. In summary, this finding challenges research that focuses on deficits of African American parents (e.g., Ogbu, 1987, 1992, 1998). Rather it suggests that there are socio-structural factors that may hinder some parents from actively encouraging their children's competencies at home and outside the home through the assistance of the broader community.

Summary

In alignment with researchers' assertions of highly-efficacious individuals (Usher, 2007), the students had strong self-regulatory repertoires (i.e. self-monitoring, strategic planning, enlisting resources, self-monitoring, and self-talk). In alignment with the tenets hypothesized by Bandura (1997), the African American men selected, weighed, and integrated multiple sources of efficacy-relevant information into their self-efficacy. Bandura (1997) hypothesized that highly efficacious individuals exert effort, persist, and persevere when faced with difficult tasks. Likewise, the findings of this study revealed that these highly efficacious African American men exerted effort, persevered and persisted when faced with difficult challenges. In support of Anderson's (1995) assertion, the findings revealed that two of the student participants held both incremental and entity theories of intelligence; whereas, the other participants held only an incremental view of

intelligence. However, despite the variation in their implicit views of intelligence all of the participants adopted a mastery goal orientation. Thus, their reason for learning was to acquire knowledge and for mastery.

The descriptive portraits and interviews suggest that individually and collectively African Americans have multiple identities and agencies. The sources that each of the African American male students selected, weighed, and integrated was a function of his lived experience. Thus, as the student participants transitioned from one development stage to another, the findings revealed changes in the sources that were selected, weighed and integrated into their self-efficacy.

CHAPTER 5: CONCLUSION

Chapter 5 provides a summary of the study, implications, limitations of the study, recommendations for future research, and closing remarks.

Summary

The purpose of this qualitative study was three-fold. First, this study documented the school experiences of high-achieving African American undergraduate students in order to assess Bandura's (1997) theorized sources of self-efficacy, self-efficacy, and relevant motivation constructs. Second, this study examined whether or not students' selection and integration of the sources hypothesized by Bandura (1997) was a function of race/ethnicity. Third, this study gained insight from parents and African American male math teachers of higher education on how they and societal factors exerted their effect on the creation and development of African American males' efficacy beliefs. The research questions were as follows: RQ1: How do high-achieving African American men discuss their beliefs about their mathematics self-efficacy?; RQ2: What sources of information do high-achieving African American men use to inform their self-efficacy beliefs?; RQ3: Are the sources of information that inform the self-efficacy beliefs of high-achieving African American men a function of race/ethnicity?; RQ4: How do high-achieving African American men explain how their self-efficacy mediates their performance behavior?; RQ5: What insights can parents provide about how parental support and societal factors shape self-efficacy beliefs?; RQ6: What insights can African American male higher education mathematics teachers provide about the situational factors that enhance or hinder the mathematics self-efficacy of African American men? Bandura's (1997) social cognitive theory was the theoretical framework that guided this study. It was used to theorize and

explore the nature and structure and the influence of self-efficacy on human well-being and accomplishments.

It has been argued that counter-narratives that focus on the gains and excellence of African Americans and other students of color are needed to challenge the deficit assumptions of mainstream researchers such as Hernstein and Murray (see Berry et al., 2014; Gutierrez, 2008). Thus, the narratives of high-achieving African American male undergraduate students was explored. Their pathways to confidence in their math abilities was well documented. Their narratives do not suggest a single, monolithic Black voice; rather, there are many of them (Delgado, 1990). According to Delgado (1990), it is the commonality that they share, an experience in a system that is structured by racism, that their stories merit the term “voice”. Tillman’s (2000) culturally sensitive research approach which promotes qualitative methods, recognizes ethnicity, and positions culture as central to the research was applied. Purposive sampling was used for this study. The participants were: African American male undergraduate students (N=4), parents of the student participants (N=2) and African American male math teachers of higher education (N=3).

The descriptive portraits and the interviews revealed five broad themes: (1) college experiences, (2) K-12 experiences, (3) access and equity, (4) deficit model, and (5) familial factors. The themes are not mutually exclusive; rather, there is overlap among the five themes with parental involvement and societal factors being major elements woven throughout the themes. The college experiences theme revealed that student participants had high self-efficacy, strong self-regulatory repertoires, and a variation in implicit theory of intelligence. Both the college and K-12 experience themes revealed that student participants integrated multiple sources of information to diagnose their math capabilities.

The access and equity theme revealed that students experienced limited or no access to both African American male [math] teachers, best practices, and culturally relevant mathematic practices. It also revealed that a traditional education program and/or ongoing professional development did not support the implementation of culturally relevant teaching practices. The deficit model theme revealed that three of the student participants had succumbed to the negative stereotypes tagged to their social identity. The familial factor theme validated the vital role of parents in the creation and development of their children's self-efficacy and successful academic achievement, and how societal factors impacted parents ability to be a source of self-efficacy.

As hypothesized by Bandura (1997) during their early school experiences, a time when students are still developing their skills, these African American males relied on the vicarious experiences and the social persuasions of people that they respected and trusted. The data revealed that during the K-12 developmental phase vicarious experiences of peers, vicarious experiences of teachers, and social persuasions of teachers were selected and integrated into the self-efficacy of three participants. Only one of four participants perceived his parent(s) to be a source of efficacy-relevant information. However, the interview with both Reggie and his mother suggest that she played a strong influential role in providing him with academic opportunities and personal assistance in building his competence in his mathematics during his K-12 school experiences, as well. Reggie may not have perceived her role in building his self-efficacy as significant because he was able to work effectively with little assistance. A lack of both finances and, knowledge and skills may have impacted Xavier and Ezekiel parents' ability to be a strong source of self-

efficacy. However, it is important to note that Ezekiel indicated that his mother had always been supportive of him.

During the students' collegiate careers 3 out of the 4 participants selected and integrated the vicarious experiences of their peers into their self-efficacy. However, unlike the K-12 period of development, during their collegiate careers "all" of the student participants selected and integrated symbolic models into their self-efficacy. According to NAEP surveys, at elementary and secondary schools that are highly populated with working-class African American students technology is typically used for drills and practices (Cole and Griffin, 1987; Kozma and Croninger, 1992; Watt, 1982; as cited by Hedges, Konstantopoulos & Thoreson, 2003). Thus, during the K-12 school experience inappropriate use of technology may have hindered participants' selection and integration of symbolic models into their self-efficacy.

Aligned with Bandura's (1997) assertion that "the process of forming efficacy beliefs is a matter of integrating diverse sources of information" (p.84), the data revealed (see Table 4) that student participants' used multiple sources to construct their self-efficacy.

As shown in Table 4, the sources that each participant selects and integrates into their self-efficacy is not static; rather, the sources are fluid. For example, the sources that a student participant selected and integrated into his self-efficacy during his K-12 school experiences may or may not have been utilized during his collegiate career. Also, Table 4 did not reveal a pattern of selection and integration of efficacy-relevant sources among the African American undergraduate students. For example, during both their K-12 and college experiences, Reggie, Xavier, and Ezekiel selected and integrated vicarious experiences of

peers into their self-efficacy beliefs; whereas, Tom did not indicate that this source was used to inform his self-efficacy. Likewise, physiological and affect state informed Reggie's beliefs; whereas, Xavier, Ezekiel, and Tom did not indicate that this source impacted their self-efficacy. Thus, this finding raises doubt concerning the assumption that self-efficacy may be a function of race/ethnicity and that African Americans may diverge from the tenets of the sources hypothesized by Bandura (1997) because their achievements are few (See Usher & Pajares, 2006; Usher & Pajares, 2008).

Table 4 Cross Subject Comparison

Description		Participants			
		Reggie	Xavier	Ezekiel	Tom
Self-efficacy	Judgment of confidence in ability in a specific academic domain	High	High	High	High
Enactive Mastery Experiences	Reference to mastery experiences	K-12, C	C	K-12, C	
Vicarious experiences of peers	Vicarious experiences from peers	K-12, C	K-12, C	K-12, C	
Vicarious experiences of parents		K-12			C
Vicarious experiences teachers	Vicarious experiences from teachers	K-12	K-12, C		K-12, C
Vicarious experiences of self		K-12, C		K-12, C	

Social persuasions family	Social persuasion from family	K-12		C	C
Social persuasions of teacher		K-12	K-12, C		K-12
Physiological and Affect State	Statement related to anxiety, mood, arousal	K-12, C			
Symbolic Models		K-12, C	C	C	C
Self-regulation	Statements having to do with effective self-regulatory skills	Self-monitor Self-modeling Planning Enlist Resources Self-talk	Self-talk Planning	Self-modeling Enlist Resources	Enlist resources
Theory of Intelligence	Perception of intelligence	M	I	M	I
Mastery goal orientation	Reason for learning is to master or acquire knowledge	Yes	Yes	Yes	Yes
Performance Goal Orientation	Reason for learning is to receive positive recognition	No	No	No	No

Key: C= College experiences, K-12= Early experiences M=Mixed, I=Incremental theorist, Yes=Adopted, No=Did not adopt

There were several different mathematic experiences that contributed to bolstering the student participants' self-efficacy. Those experiences included early engagement in

math programs, tutoring their peers, caring teachers, supportive parents, praise and positive feedback, and successful enactive mastery experiences.

The student participants identified several academic challenges and discussed several factors that were used to overcome them. It became difficult for the parents of two of the participants to assist them with understanding abstract math concepts. These participants believed that their parents' ability to provide academic support was negatively impacted by financial strain and their educational level. All of the student participants experienced a lack of preparation and limited or no access to mathematics that was situated around their cultural framework. The success factors used to overcome these obstacles were a strong belief in their math abilities; enrollment in remedial math courses or a summer-long bridge program; enlisting resources; effective self-regulatory skills; persistence and perseverance; self-direction; and positive reflection. The descriptive portraits and the data collected from the interviews revealed that African American male students may feel disconnected from academic settings. Two of the participants believed that esteemed proficient African American male mathematic teachers as models are needed to build African American males competencies, attitudes, and motivational orientations.

All of the parent participants believed that parents are influential in bolstering children's beliefs in their math abilities. They identified several schooling factors that bolster self-efficacy and have a positive influence on African American males' academic achievement in mathematics. The schooling factors included academic environment, academic enrichment, and high expectations from teachers. The academic environment was described as a rigorous curriculum that promotes critical thinking and self-direction. Academic enrichment was described as co-curricular activities and/or a stimulating home

environment. Mathematics teachers were considered influential if student participants were able to acquire the knowledge and skills needed to advance.

All of the teacher participants indicated that African American male undergraduate students lack prerequisite skills needed for advanced mathematics. Most of the teacher participants believed that parent support is vital to shaping and bolstering children's beliefs in their math abilities. Two of the teacher participants also indicated that the path to academic achievement was quite different for African American males when compared to their counterparts. They believed that they must routinely contend with societal factors such as having to work to meet financial obligation rather than focusing heavily on successful academic performance attainment. The teacher participant who had taken the traditional path towards becoming a K-12 mathematics teacher stated that his teaching preparation program had not exposed him to courses that discussed in depth how to teach African American students and other students of color. Likewise, in-service teachers indicated that culturally responsive teaching was not discussed at within-school professional development workshops. Most of the teachers acknowledged the importance of culturally responsive teaching. However, they questioned its appropriateness in a postsecondary academic setting.

Implications for Practice

The first implication that can be drawn from this study is that there must be continuity between the learner's culture and instruction. The teachers of United States public schools are remaining predominately middle class, white females while the student population is becoming increasingly diverse (Leonard , 2008; White, 2002). Thus, mathematics teacher educators must equip pre-service teachers with the knowledge and

skills that are needed for teaching in a diverse community. Citing Cole and Bruner (1971), Driscoll (2000) asserted that culture influence how learners acquire and use knowledge. Likewise, when discussing the four sub-processes that govern observational learning, Bandura (1997) indicated that “learning from modeled performances involve more than just the learner’s perceptions about the model”. (p. 89); additionally, observer attributes such as acquired preferences (i.e. cultural factors) also influence what individuals learn. According to Keller (1987), learners must view the instruction as having personal value. He also asserted that familiarity is important. “People enjoy more about things they already believe in or are more interested in” (Keller, 1987a, p.4).

In alignment with the abovementioned assertions, mathematics teacher educators must emphasize the use of pedagogies, such as multiculturalism (Kitchen , 2005), culturally responsive teaching (Gay, 2000), culturally relevant pedagogy (Jones , 2004; Ladson-Billings, 2014; 2000, 1997), and social justice teaching (Gutstein , 2003). Multiculturalism address the needs of ethnically diverse groups of students (Kitchen, 2005). Kitchen (2005) asserted that pre-service teachers must be taught how to connect students’ history, culture, and identity to lessons being taught in the classroom. They must have field experiences that exposes them to the language, socioeconomic conditions, and cultures of diverse students (Kitchen, 2005). The misconceptions that some teachers have about minority students’ math competencies may be debunked by this experience (Nieto, 2005). This experience is invaluable because pre-service teachers will have an opportunity to build positive relationships with students and a community different from themselves and develop strategies to assist minority students with achieving academic success. Similarly, when discussing culturally responsive teaching Gay (2000) asserted that educators of

mathematics must assist pre-service teachers with developing the following skills: (a) the development of multicultural instructional strategies; (b) how to identify multicultural strengths and weaknesses of instructional materials and instructional design and; (c) the development of a rich repertoire of multicultural examples to be used in the classroom. Ladson-Billings (2014) asserted that if novice teachers are to become good and experienced teachers are to become better then they must be taught how to teach their students to critique policies and procedures that have a direct impact on their lives. Referencing Ladson-Billings (1994), Gustein (2003) discussed the importance of an emancipatory education in mathematics that does not neglect disciplinary knowledge. Thus, Gustein (2003) emphasized the importance of a social justice pedagogy in which pre-service teachers are taught how to teach their students to use mathematics to understand the relationships of resource inequities, relations of power, explicit discrimination, and disparate opportunities based on race, socioeconomic status, gender, language and other differences.

In an era of state-mandated high-stakes tests, the abovementioned pedagogies must meet the demands of external performance assessment as well as a student-driven learning (Ladson-Billings, 2014). The findings of this study revealed that the student participants not only had limited or no access to learning that was situated in their cultural framework but their learning was also constrained by teachers' misconceptions of the teaching and learning of mathematics. Thus, this finding suggest that the belief was that review, demonstration, and practice were effective for student learning (Banilower et al., 2006; Weiss & Pasley, 2004; Barkatsas & Malone). In contrast, to this belief is the view that mathematics lessons should promote understanding and connections of concepts,

operations, and relations (NCTM, 2014). According to Ladson-Billings (2014) and other scholars, culturally sustaining pedagogies have the ability to meet both demands without eliminating the other.

The second implication derived from this study is that African American students and their parents must be provided the appropriate resources and supports. Central to African American males' academic success is active parental support (Hrabowski et al., 1998). The parents and teachers of this study emphasized the importance of planning ahead, of getting children off to a good early start. Early learning is inclusive of but not restricted to early co-curricular math-related programs (Hrabowski et al., 1998). Another central aspect of the role of parents is showing a consistent interest in their children's homework and schoolwork, and monitoring their children's progress (Hrabowski et al., 1998). Also, a concrete way that parents channel their children's disposition and motivation towards an academic domain is by providing them with resources such as technology, educational materials, and other supports. As this study revealed, providing the appropriate resources and supports may present a challenge for some parents, particularly single-parent families and working-class families. Thus, when creating interventions to improve the motivation and academic achievement of marginalized students equity cannot be conflated with equality (Gutie'rrez, 2013). Gutie'rrez (2013) argued that providing marginalized students with the "same" school-based supports is not enough. In alignment with Gutie'rrez (2013) contention, when discussing the facilitation of learning and improving performance Molenda and Januszewski, (2008) asserted performance improvement consultants must be mindful of creating and using appropriate processes and resources. They asserted that appropriate processes and resources are those that are suitable and compatible with local

users and their culture. In alignment with the idea of appropriate resources relative to the learner and their culture, findings of studies have shown that programs that provide components such as additional learning opportunities, advocacy, caring adults, and a support system improves the motivation and mathematics achievement of young African American males (Berry, 2003). The findings of studies have also shown that collegiate African American males benefit from summer-long bridge programs (Hughes, 2010). When discussing the benefits of a summer-long bridge program that was intended for African American male college students Hughes (2010) asserted that an important element is an African American male mentoring component. The mentoring component links students to successful African American male faculty and staff members at the university. The mentors serve as sources of vicarious experiences and social persuasions. Likewise, when discussing the key components of the Meyeroff Scholar Program at the University of Maryland, Baltimore County Hrabowski (1998) described 13 components that contribute to African American students' successful completion of STEM related fields. Those components were as follows: recruitment; summer bridge program; scholarship support; study groups; program values; program community; personal advising and counseling; tutoring; summer research internships; faculty involvement; administrative involvement and public support; mentors; and family involvement

The third implication of this study is that static images of inequities, deficit thinking and negative narratives concerning students of color and working-class students must be dispelled. Researchers have suggested that self-efficacy is a function of race and that African Americans diverge from the tenets hypothesized by Bandura (1997) because their achievements are few (see Usher & Pajares, 2006, 2008). Both the literature review and

findings of this study have shown that suggesting that multiple identities and agencies do not exist within a race/ethnic group is erroneous and that using a myopic view to investigate the mathematics education of African Americans is counterintuitive. According to Molenda and Januszewski (2008), those interested in facilitating learning (i.e. designing learning environments, organizing resources, and providing tools) must constantly construct and refine their knowledge through research and reflective practice. From the perspective of critical theory, Molenda and Januszewski (2008) asserted that when conducting research or designing interventions leaders of education must conduct research and develop practices that are in the best interest of the learner, the learning environment, and society; they must consider who is empowered, who is included, and who has authority.

Rather than use Bandura's (1997) theory of the sources of self-efficacy to promote a deficit model, I propose those committed to improving the motivation and academic performance of all students, African American males in particular, focus on the usefulness of these sources. Woolfolk (see Shaughnessy, 2004) whose primary research is teachers' sense of efficacy asserted that self-efficacy and self-regulated learning are critical factors that have a positive influence on motivation and academic achievement. Thus, Woolfolk (see Shaughnessy, 2004) asserted that the sources hypothesized by Bandura (1997) can be used to design interventions that render outstanding results. Woolfolk (see Shaughnessy, 2004) provided several general principles to guide teachers. For example, teachers should allow peer models to demonstrate tasks, and verbalize their thoughts and reasoning as they perform. This is a form of storytelling which aligns with topic chaining which is a linguistic structure common among African Americans (Gay, 2000). Additionally, pedagogical practices, such as cooperative learning should be incorporated in instruction (Woolfolk:

see Shaughnessy, 2004). According to Gay (2002), African Americans would benefit from cooperative learning and peer coaching because these practices matches with their communal system. When discussing the use of enactive mastery experiences, Woolfolk stated that teachers should promote incremental views of intelligence and the adoption of learning goals (Woolfolk: see Shaughnessy, 2004). In order to remove anxiety, it was suggested that teachers give feedback and then allow students to redo and improve their work (Woolfolk: see Shaughnessy, 2004). Similarly, Dick, Carey, and Carey (2006) asserted that the sequence of instruction should progress from low to complex skills; furthermore, the instruction should be in small chunks, thus, increasing the probability of success. Another concrete way to utilize enactive mastery experiences is to teach students cognitive and metacognitive skills such as self-monitoring, goal setting, and planning (Woolfolk: see Shaughnessy, 2004). In contrast to Bandura, Woolfolk suggested that attributional feedback that focuses on effort rather than ability be given. Similar to Bandura, Keller's (1997) strategies for stimulating motivation include: "give verbal praise for successful progress or accomplishment. Provide motivating feedback (praise) immediately following task performance" (p.5). Thus, like other students, African American male students will benefit from words of encouragement from individuals they respect and who possess skills that they aspire.

Limitations of the Study

A limitation of this study is its retrospective nature. "Thinking back" on prior experiences can provide distance and perspective; however, memory can be distorted due to the passing of time and the reframing of events. Although convergence across sons and parents provides some assurance, future research should use prospective investigations.

The original design of the study was to conduct member checks in which participants are asked their opinions concerning matters such as themes, incidents, interpretations, and the final narrative. Although I was able to reconnect with some of the participants others were unavailable. Lastly, due to the shortage of African American male mathematics teachers, the teachers identified and selected for this study were not the teachers of the student participants.

Recommendations for Future Research

The findings of this study revealed that there is a need for future research that explores the sources that inform the self-efficacy of African American male students. A longitudinal study that observes African American males school experiences in mathematics through middle school and high school can provide insight about school and classroom factors that enhance or impede how they select and interpret and integrate efficacy-relevant information. Also, evidenced based research that assesses the relationship between the implementation of culturally relevant teaching practices and the student achievement of African American students and other students of color is needed.

Closing Remarks

This study unveils the gross inequalities that entangle African American males' school experiences in mathematics. It counters the research that situates African American males within the deficit perspective in mathematics education. It is meaningful because it solidifies the idea that "Human lives are interdependent. What they do individually effects the well-being of others, and in turn what others do affects their personal well-being" (Bandura , 1997, viii).

This study has strengthened my passion and commitment to capture the voices of African Americans, other people of color, and those living in poverty that are rarely heard in the literature. The findings of this study regarding access and equity, stereotype threat, and the deficit model has caused me to consider using critical race theory of education as a framework to guide future studies. Critical race theory of education considers the role of race and racism embedded in the system of education (Ladson-Billings & Tate, 1995), is dedicated to social justice (Solorzano & Yosso, 2001), and challenges dominant ideology (Solorzano & Yosso, 2001). As an African American female, educator, and researcher I am interested in creating curriculum, pedagogy, and a research agenda that acknowledges the cultural backgrounds and social identities of ethnically diverse groups. Finally, I am interested in eliminating policies and practices in systems of education that work to the disadvantage of people of color.

APPENDIX A-1: QUESTIONNAIRE

Name: _____ Email: _____

Phone number: _____ Gender: _____

Ethnicity (Race): _____ Age: _____

Current Pursued Undergraduate Degree: _____

Program that you are enrolled in: _____

Classification – Circle One

1. Freshman 2. Sophomore 3. Junior 4. Senior 5. Graduate

Student

Cumulative G.P.A. in mathematics (grade point average) – Please circle one

a. 0.0 – 1.9 b. 2.0 – 2.9 c. 3.0 – 3.9 d. 4.0 +

Level of your parent(s) education – Circle One

Mom (or Guardian 1) = 1. Less than high school 2. High school graduate

3. Some college 4. College graduate 5. Unknown

Dad (or Guardian 2) = 1. Less than high school 2. High school graduate

3. Some college 4. College graduate 5. Unknown

Parent(s) Occupation – Please circle one

Mom (or Guardian 1)

1. Managerial, Professional, Technical 2. Sales or Administrative

3. Service Occupation 4. Farming, Precision Crafts, Operators

5. Unknown 6. Other _____

Dad (or Guardian 2) =

1. Managerial, Professional, Technical 2. Sales or Administrative

3. Service Occupation 4. Farming, Precision Crafts, Operators

5. Unknown 6. Other _____

Estimated average annual family income growing up (Prior to entering college) –

Please circle one ...

- a. Less 9,999 per year b. 10,000 – 14,999 per year c. 15,000 – 19,999 per year
d. 20,000 – 24,999 year e. 25,000 – 29,999 per year f. 30,000 – 49,999 per year
g. 50,000 – 74,999 per year h. 75,000 – 99,999 per year i. 100,000 per year or higher

APPENDIX A-2: 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 A-3: 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

Interview Protocol Continued.

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 A-4: PARENT/GUARDIAN INTERVIEW PROTOCOL

This research will explore the mathematical experiences of African American male postsecondary students who have effectively performed in mathematics. In addition, it will explore the situational factors the led to their success. You do not have to answer a question if you do not want to. I will assure your confidentiality. This interview will be audio-taped. The tape will be discarded upon completion of the study. Your name will not be mentioned in the interview protocol. If you decide you do not want to participate just tell me. You can withdraw or discontinue your participation at any time without further obligation. The interview should take about 30-45 minutes to complete. May I ask you some questions now?

Can you briefly describe your educational background and current occupation?

- 1) Describe your son's mathematics history?
 - a) Are there any memorable mathematic moments that you can recall?
- 2) Describe your son's mathematics abilities?
- 3) What factors do you believe contribute to your son's competence in mathematics?
- 4) Describe your son's mathematics performance in regards to his abilities?
- 5) Describe your son's placement in mathematics courses in elementary, middle, and high school?
 - 6) What type of things have you said to your son about his mathematics ability?
 - 7) Describe your role in your child's achievement in mathematics?
 - 8) Do you feel there are factors that African American male students must deal with that other students do not have to deal with in pursuing math-related majors?
 - a) If so, what are those factors?

b) How do you help your son deal with these factors?

APPENDIX A-5: TEACHER INTERVIEW PROTOCOL

1. Tell me something about your background. When and where were you educated?
2. When and where did you begin teaching?
3. How would you describe your philosophy of teaching?
4. What do you believe works?
5. Can you think of any characteristics that African American students as a group bring to the classroom?
6. What kinds of things have done in the classroom that have facilitated the academic success of African American students?
7. How much of what you know about teaching African American students did you learn as a result of teacher training, either pre-service or in-service?
8. If you could revamp teacher education so that teachers would be more effective with African American students what changes would you make?
9. What kind of role do you believe parents play in the success of African American male students?
10. How would you describe the type of relationships you've had with African American male college students you've taught?
11. How do you handle the possible mismatch between what you want to teach and what the administration wants you to teach at the elementary and secondary level? Higher education level? (for example, curricular mandates, philosophies)
12. How do you think the schooling experience of African American male college students

APPENDIX A-6: START LIST CODE

Start Code Used	Description
Enactive Mastery Experiences	References made to mastery experiences
Vicarious Experiences of Peers	Vicarious experiences made from peers
Vicarious Experiences of Parents	Vicarious experiences made from parents
Vicarious Experiences of Teachers	Vicarious experiences made from parents
Vicarious Experiences of Self	
Vicarious Experiences of Symbolic Models	Models relative to Technology (YouTube, TV)
Social Persuasion of Peers	Words of encouragement/discouragement from peers
Social Persuasion of Parents	Words of encouragement/discouragement parents
Social Persuasion of Teachers	Words of encouragement/discouragement from teachers
Physiological and Affect State	Statements made relative to anxiety, mood, arousal
Self-Regulation	Statements made concerning work habits
Culturally Responsive Teaching	Reference to cooperative teaching, storytelling, acknowledgment of social identity and cultural identity
Stereotype Threat	Judged on negative stereotypes tagged to ethnic group rather than personal merit
Cool Pose	Masculinity behavior to cope within an environment that they perceive is plagued with racism
Incremental theory	Belief that abilities are malleable
Entity Theory	Belief that abilities are fixed
Deficit Model	Lack of achievement is due to deficiencies of the individual
Access and Equity	Societal Barriers that impact academic achievement
African American Male Teacher	Access to African American Male Math Teacher(s)

APPENDIX B-1: STUDENT RESEARCH INFORMED CONSENT

SELF-EFFICACY: UNDERSTANDING AFRICAN AMERICAN MALE STUDENTS PATHWAYS TO CONFIDENCE IN MATHEMATICS

Principal Investigator (PI):

Lisa Ann Williams
399 College of Education
Wayne State University
Detroit, MI, 48202
(XXX) XXX-XXXX

You are being asked to be in a research study that explores the information that informs your beliefs about your competence in mathematics because you have been identified as a student who is effectively performing in mathematics. This study is being conducted at Wayne State University. The estimated number of study participants to be enrolled at Wayne State University is about 4. **Please read this form and ask any questions you may have before agreeing to be in the study.**

In this research study, the purpose of this study is to learn about the self-perceived abilities of African American male students who have exhibited academic success in mathematics at the postsecondary level. The expressed beliefs and their sources will be used to explore and better understand the influence of these beliefs on their academic motivation and mathematics achievement.

Study Procedures

If you agree to take part in this research study, you will be asked to provide a transcript in order to verify that you have an overall G.P.A. of a B or better in mathematics and that you are in a program that requires that you take at the minimum Calculus 1. You will also be asked to complete a questionnaire which provides demographic information that will be used to describe you in the study. In addition, you will also complete a 1 to 1½ page, double space mathematics autobiography which purpose is to cause you to think about your experiences in school mathematics. You will participate in a one-on-one 1 hour interview that will address the sources of information that inform your judgment of your competence. You will participate in two 30 minute follow-up interviews in order to clarify any discrepancies.

First, potential participants will be asked to provide a copy of his transcript and complete a questionnaire. Second, selected participants will be asked to complete and return a doubled spaced, 1 to 1½ page mathematics autobiography. This is to be returned one week after receiving it. Third, participants will participate in an initial 1 hour interview. Fourth, the transcribed audio-taped interview will be provided to you in order to determine if you agree with the transcription. During the study two 30 minute follow-up interviews will be conducted in order to clear up any discrepancies.

The total duration of participation will be 6 weeks. Participants will have the option of not answering some of the questions and be able to remain in the study. In order to protect your identity you will be identified in the study by a pseudonym of your choosing.

Benefits

As a participant in this research study, there will be no direct benefit for you; however, information from this study may benefit other people now or in the future.

Risks

There are no known risks at this time to participation in this study.

Study Costs

The study sponsor will pay for all costs and charges from taking part in this research study.

Participation in this study will be of no cost to you.

Compensation

For taking part in this research study, you will be paid for your time and inconvenience in the form of gift cards. Upon receiving the transcript and the completed questionnaire the participant will receive a \$10 gift certificate. Upon receiving the completed autobiography the participant will receive a \$20 gift certificate. Upon the completion of the 1 hour interview and the review of the transcript of the audio-taped interview the participant will receive \$20 gift certificate. Upon the completion of the 2 30 minute interviews the participant will receive a \$20 gift certificate.

Confidentiality

All information collected about you during the course of this study will be kept confidential to the extent permitted by law. You will be identified in the research records by a pseudonym of your choice. Information that identifies you personally will not be released without your written permission. However, the study sponsor, the Institutional Review Board (IRB) at Wayne State University, or federal agencies with appropriate regulatory oversight [e.g., Food and Drug Administration (FDA), Office for Human Research Protections (OHRP), Office of Civil Rights (OCR), etc.] may review your records.

When the results of this research are published or discussed in conferences, no information will be included that would reveal your identity.

If photographs, videos, or audiotape recordings of you will be used for research or educational purposes, your identity will be protected or disguised. Upon the completion of the study the tapes will be destroyed. The participant will have the right to review the tape. The researcher (Principle Investigator) and a professional transcriptionist will have access to the tape. The tapes will be erased upon completion of the study. Personal identities will be shielded by pseudonyms selected by the participant.

Voluntary Participation/Withdrawal

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you decide to take part in the study you can later change your mind and withdraw from the study.] You are free to only answer questions that you want to answer. You are free to withdraw from participation in this study at any time. Your decisions will not change any present or future relationship with Wayne State University or its affiliates, or other services you are entitled to receive.

The PI may stop your participation in this study without your consent. The PI will make the decision and let you know if it is not possible for you to continue. The decision that is made is to protect your health and safety, or because you did not follow the instructions to take part in the study

Questions

If you have any questions about this study now or in the future, you may contact Lisa Williams or one of her research team members at the following phone number 313-577-1728. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call the Wayne State Research Subject Advocate at (313) 577-1628 to discuss problems, obtain information, or offer input.

Consent to Participate in a Research Study

To voluntarily agree to take part in this study, you must sign on the line below. If you choose to take part in this study you may withdraw at any time. You are not giving up any of your legal rights by signing this form. Your signature below indicates that you have read, or had read to you, this entire consent form, including the risks and benefits, and have had all of your questions answered. You will be given a copy of this consent form.

Signature of participant

Date

Printed name of participant

Time

Signature of person obtaining consent

Date

Printed name of person obtaining consent

Time



APPENDIX B-2: PARENT RESEARCH INFORMED CONSENT

SELF-EFFICACY: UNDERSTANDING AFRICAN AMERICAN MALE STUDENTS PATHWAYS TO CONFIDENCE IN MATHEMATICS

Principal Investigator (PI):

Lisa Ann Williams
399 College of Education
Wayne State University
Detroit, MI, 48202
(XXX) XXX-XXXX

Purpose

You are being asked to be in a research study of African American male students who are effectively performing in mathematics because you have been identified as the parent of a participant. This study is being conducted at Wayne State University. The estimated number of study participants to be enrolled at Wayne State University is about 8. **Please read this form and ask any questions you may have before agreeing to be in the study.**

In this research study, the purpose of this study is to learn about the self-perceived mathematics abilities of African American male postsecondary students. The study will explore the sources of information that informs their self-efficacy beliefs in order to better understand the influence of these beliefs on their academic motivation and mathematics achievement.

Study Procedures

If you agree to take part in this research study, first, you will be asked to participate in a 30-45 minute interview which will address the sources of information that inform your son's self-efficacy beliefs. Then the transcribed audio-taped interview will be provided to you in order to determine if you agree with the transcription. The total duration of participation in this study will be 2 weeks. You will have the option of not answering some of the questions and be able to remain in the study. In order to protect your identity a pseudonym of your choosing will be used in the study.

Benefits

As a participant in this research study, there will be no direct benefit for you; however, information from this study may benefit other people now or in the future.

Risks

There are no known risks at this time to participation in this study.

Study Costs

- Participation in this study will be of no cost to you.

Compensation

You will not be paid for taking part in this study.

Confidentiality

All information collected about you during the course of this study will be kept confidential to the extent permitted by law. You will be identified in the research records by a pseudonym of your choice. Information that identifies you personally will not be released without your written permission. However, the study sponsor, the Institutional Review Board (IRB) at Wayne State University, or federal agencies with appropriate regulatory oversight [e.g., Food and Drug Administration (FDA), Office for Human Research Protections (OHRP), Office of Civil Rights (OCR), etc.] may review your records.

When the results of this research are published or discussed in conferences, no information will be included that would reveal your identity.

If photographs, videos, or audiotape recordings of you will be used for research or educational purposes, your identity will be protected or disguised. Upon the completion of the study the tapes will be destroyed. The participant will have the right to review the tape. The researcher (Principle Investigator) and a professional transcriptionist will have access to the tape. The tapes will be erased upon completion of the study. Personal identities will be shielded by pseudonyms selected by the participant.

Voluntary Participation/Withdrawal

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you decide to take part in the study you can later change your mind and withdraw from the study.] You are free to only answer questions that you want to answer. You are free to withdraw from participation in this study at any time. Your decisions will not change any present or future relationship with Wayne State University or its affiliates, or other services you are entitled to receive.

The PI may stop your participation in this study without your consent. The PI will make the decision and let you know if it is not possible for you to continue. The decision that is made is to protect your health and safety, or because you did not follow the instructions to take part in the study

Questions

If you have any questions about this study now or in the future, you may contact Lisa Williams or one of her research team members at the following phone number 313-577-1728. If you have questions or concerns about your rights as a research participant, the

Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call the Wayne State Research Subject Advocate at (313) 577-1628 to discuss problems, obtain information, or offer input.

Consent to Participate in a Research Study

To voluntarily agree to take part in this study, you must sign on the line below. If you choose to take part in this study you may withdraw at any time. You are not giving up any of your legal rights by signing this form. Your signature below indicates that you have read, or had read to you, this entire consent form, including the risks and benefits, and have had all of your questions answered. You will be given a copy of this consent form.

Signature of participant / Legally authorized representative *

Date

Printed name of participant / Legally authorized representative *

Time

Signature of witness**

Date

Printed of witness**

Time

Signature of person obtaining consent

Date

Printed name of person obtaining consent

Time

*Remove LAR reference if you don't intend to consent participants that have or may have a LAR.

**Use when participant has had this consent form read to them (i.e., illiterate, legally blind, translated into foreign language).

Signature of translator

Date

Printed name of translator

Time

APPENDIX B-3: TEACHER RESEARCH INFORMED CONSENT

SELF-EFFICACY: UNDERSTANDING AFRICAN AMERICAN MALE STUDENTS PATHWAYS TO CONFIDENCE IN MATHEMATICS

Principal Investigator (PI):

Lisa Ann Williams
399 College of Education
Wayne State University
Detroit, MI, 48202
(XXX) XXX-XXXX

Purpose

You are being asked to be in a research study of African American male students who are effectively performing in mathematics because you have been identified as an African American male mathematics teacher who has helped African American male students achieve in mathematics. This study is being conducted at Wayne State University. The estimated number of study participants to be enrolled at Wayne State University is about 8. **Please read this form and ask any questions you may have before agreeing to be in the study.**

In this research study, the purpose of this study is to learn about the self-perceived mathematics abilities of African American male postsecondary students. The study will explore the sources of information that informs their self-efficacy beliefs in order to better understand the influence of these beliefs on their academic motivation and mathematics achievement.

Study Procedures

If you agree to take part in this research study, first, you will be asked to complete a 30-45 minute interview which will address the situational factors that enhance or hinder the self-efficacy of African American men who are studying mathematics at the postsecondary level. Second, the transcribed audio-taped interview will be provided to you in order to determine if you agree with the transcription. The total duration of participation will be 2 weeks. In order to protect your identity a pseudonym of your choosing will be used to protect your identity.

Benefits

As a participant in this research study, there will be no direct benefit for you; however, information from this study may benefit other people now or in the future.

Risks

There are no known risks at this time to participation in this study.

Study Costs

Participation in this study will be of no cost to you.

Compensation

You will not be paid for taking part in this study.

Confidentiality

All information collected about you during the course of this study will be kept confidential to the extent permitted by law. You will be identified in the research records by a pseudonym of your choice. Information that identifies you personally will not be released without your written permission. However, the study sponsor, the Institutional Review Board (IRB) at Wayne State University, or federal agencies with appropriate regulatory oversight [e.g., Food and Drug Administration (FDA), Office for Human Research Protections (OHRP), Office of Civil Rights (OCR), etc.] may review your records.

When the results of this research are published or discussed in conferences, no information will be included that would reveal your identity.

If photographs, videos, or audiotape recordings of you will be used for research or educational purposes, your identity will be protected or disguised. Upon the completion of the study the tapes will be destroyed. The participant will have the right to review the tape. The researcher (Principle Investigator) and a professional transcriptionist will have access to the tape. The tapes will be erased upon completion of the study. Personal identities will be shielded by pseudonyms selected by the participant.

Voluntary Participation/Withdrawal

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you decide to take part in the study you can later change your mind and withdraw from the study.] You are free to only answer questions that you want to answer. You are free to withdraw from participation in this study at any time. Your decisions will not change any present or future relationship with Wayne State University or its affiliates, or other services you are entitled to receive.

The PI may stop your participation in this study without your consent. The PI will make the decision and let you know if it is not possible for you to continue. The decision that is made is to protect your health and safety, or because you did not follow the instructions to take part in the study

Questions

If you have any questions about this study now or in the future, you may contact Lisa Williams or one of her research team members at the following phone number 313-577-1728. If you have questions or concerns about your rights as a research participant, the

Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call the Wayne State Research Subject Advocate at (313) 577-1628 to discuss problems, obtain information, or offer input.

Consent to Participate in a Research Study

To voluntarily agree to take part in this study, you must sign on the line below. If you choose to take part in this study you may withdraw at any time. You are not giving up any of your legal rights by signing this form. Your signature below indicates that you have read, or had read to you, this entire consent form, including the risks and benefits, and have had all of your questions answered. You will be given a copy of this consent form.

Signature of participant

Date

Printed name of participant

Time

Signature of person obtaining consent

Date

Printed name of person obtaining consent

Time

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ABSTRACT**SELF-EFFICACY: UNDERSTANDING AFRICAN AMERICAN MALE STUDENTS PATHWAYS TO CONFIDENCE IN MATHEMATICS**

by

LISA WILLIAMS**May 2017****Advisor:** Ingrid Guerra-Lopez**Major:** Learning Design and Technology**Degree:** Doctor of Philosophy

This dissertation is about the stories of African American male undergraduate students who have experienced success in mathematics. Bandura's (1997) social cognitive theory and Tillman's (2000) culturally sensitive research approach which promotes qualitative methods, recognizes ethnicity, and positions culture as central to the research were applied. Student interviews, parent interviews, teacher interviews, and mathematical autobiographies were used to investigate African American men self-efficacy, the sources of their beliefs, and societal factors that impacted their motivation and academic achievement in mathematics.

The descriptive portraits and the interviews revealed five broad themes: (1) college experiences, (2) K-12 experiences, (3) access and equity, (4) deficit model, and (5) familial factors. The college experience theme represents four major elements to include African American men perception of their competence in mathematics, the sources they used to build their beliefs in their mathematics abilities during their collegiate careers, their self-regulatory repertoire, and their implicit conception about the nature of their ability. The K-12 theme represents the multiple sources they used to build their self-efficacy in the K-12

academic setting. The access and equity theme represents three major elements to include their exposure to an effective mathematics program, African American male teachers, and culturally responsive teaching. The deficit model represents the impact of negative stereotypes tagged to their social identity. The familial factor theme represents the vital role of parents in the creation and development of their children's self-efficacy and academic achievement in mathematics.

The findings of this study revealed that the African American male undergraduate students had high self-efficacy and strong self-regulatory repertoires. The data did not reveal a pattern of selection and integration of efficacy-relevant sources among the African American male undergraduate students. Thus, this finding challenged the assumption that self-efficacy is a function of race/ethnicity. The results showed that parental involvement and societal factors impacted the motivation and mathematics achievement of these African American men. This study increases our understanding of African American males' pathways to confidence in mathematics.

AUTOBIOGRAPHICAL STATEMENT

Lisa Williams has a Michigan professional education certification in secondary mathematics and general business. She has 13 years of experience teaching secondary mathematics. She was recognized as one of the premier teachers as a result of students' performance on the Terra Nova Test. As a mathematics teacher at Marygrove College she was responsible for the evaluation and selection of math course materials for adult learners and was responsible for nine of twelve students passing the math section of the GED Test.

As a consultant for Detroit Public Schools Lisa collaborated with a team in the development of the middle school mathematics curriculum guide. She has served on the outreach committee of the International Society for Performance Improvement Michigan Chapter. As a member of this committee she developed a participant workbook for a workshop hosted by Lawrence Technological University that focused on teaching small non-profit business owners how to develop SMART goals and measure whether or not these goals added value to the overall performance of their organization.