

# Mathematics Teacher Identity: The Case of a Black Male Preservice Teacher

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*In this paper, I discuss the complex challenges Black male preservice mathematics teachers face in their pursuit of mathematics learning and teaching. These experiences are illustrated through the story of Marvin, a preservice mathematics teacher who, while navigating his undergraduate teacher preparation program, becomes conflicted over his choice to become a mathematics teacher. The case comes from a larger study involving five Black male preservice teachers who experienced success in K-12 mathematics and chose mathematics teaching as their profession. Marvin was at a crossroads – questioning whether his mathematics proficiency and desires to become a teacher were enough to sustain him through the completion of his mathematics education degree and entrance into the teaching force. Marvin’s story is highlighted in order to investigate what it means to be a Black male in the context of mathematics learning and mathematics teaching. Marvin’s mathematics, gender and racial identities are examined, including challenges to his identity and the implications of these challenges for Marvin’s developing teacher identity. The discussion highlights the ways in which the racialization of mathematics education may drive Black male students out of the mathematics teaching pipeline, but also sheds light on how they endure and persist. I explore the themes that characterize Marvin’s experiences as a Black male mathematics learner and prospective mathematics teacher. I attend to the issues of identity in terms of Marvin’s identity development and the factors that affect his identity over the course of Marvin’s life.*

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Issues of equity and diversity in mathematics education have drawn increased national attention. In particular, the mathematics education and participation of Black students has been addressed in mathematics research and policy (National Center for Education Statistics, 2012; National Research Council, 1989; National Sciences Board, 2003). At the same time, in an effort to diversify the nation’s teaching force, the United States Department of Education has launched the Teach Campaign (2010) as a recruitment initiative for increasing the numbers of teachers of

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color in United States schools, particularly Black male teachers in high demand areas such as mathematics (e.g. Teach Campaign, 2010).

The Teach Campaign responds to what the National Education Association (2012) describes as “the minority teacher dilemma”; the nation’s failure to hire and retain teachers of color in proportion to the minority student population. The teaching force is overwhelmingly White (80.1%) and female (76.6%) (NCES, 2016a), while in 2016, 52 % of US school-age children were White and 48% were students of color, where Black children accounted for 14%, Hispanic for 25%, Asian for 5%, and children of 2 or more races made up 4% of this population (NCES, 2016b).

Urban, public schools serving minority students disproportionately suffer from teacher shortages (Liu, Rosenstein, Swann, & Khalil, 2008). The critical shortage of teachers of color therefore contributes to worsening schooling conditions for students, especially students of color, who may have limited opportunities to learn from a diverse teaching force, the academic, personal and social skills needed to thrive in an increasingly multicultural society (NEA, 2012).

These results support increasing calls for “cultural synchronicity” (Irvine, 1989), the argument that students of color benefit from being taught by teachers of color. Evidence of the positive benefits of a diverse teaching force, indicates that students of color benefit from positive role models who look like them, and that teachers of color hold higher expectations (Chazan, Brantlinger, Clark, & Edwards, 2013; Clark, Badertscher, & Napp, 2013). Further, proponents of cultural synchronicity contend that teachers of color are likely to have greater knowledge of their students’ cultures and lived experiences and that this synchronicity is a valuable resource in teaching and learning. In their study of successful Black mathematics teachers, Chazan and colleagues (2013) examine the knowledge base and resources needed to be an effective mathematics teacher of Black children and conclude that in-depth knowledge of Black culture and steadfast belief in the academic talents and abilities of Black children determines effectiveness.

A growing body of research provides evidence that teachers of color positively impact a number of academic (e.g., standardized test scores, enrollment in advanced courses, retention, college attendance rates) outcomes for students of color (Gershenson, Hart, Lindsay, & Papageorge, 2010; Villegas & Irvine, 2010). Despite the positive influence that teachers of color can have on students, ‘teachers of color remain significantly underrepresented relative to the students they serve’ (The Albert Shanker Institute, 2016, p. 18).

Research provides insights into the ways in which a predominantly White teaching force affects the educational experiences of students, particularly students of color. Even without the deliberate intent to discriminate, White teachers operate on assumptions about students of color that places these students at a real disadvantage (Larson & Ovando, 2001). These teachers may rely on stereotypes they have learned and internalized from the media and/or their families (Delpit, 2012; Milner, 2005). Students of color can often sense these biases, and stereotype threats (e.g. students' fears of performing in ways that confirm negative stereotypes) can hinder their academic performance (Steele, 1997).

The prevalence of negative perspectives and stereotypes of students of color, their culture and their communities is well-documented (Artiles & McClafferty, 1998; Larson & Ovando, 2001; Milner, 2005). These studies show that pre-service and in-service teachers express beliefs that characterize urban and minority schools as unsafe, students of color as undisciplined or violent, and their home lives as problematic and the primary explanation for academic failure among students of color. Further, White educators’ limited interactions with people racially

different from themselves influences them to hold very clear ideas and biases about non-White people and to enact racialized practices that impact the racial minorities in their schools while supporting White students' views of their non-White peers as inferior (Artiles & McClafferty, 1998; Milner, 2005).

As a consequence of these beliefs and practices, Black students may not have the types of education experiences that inspire them to become teachers, particularly in areas such as mathematics, where Black students have been historically underserved. Much of the dialogue about Black students, particularly Black males, frames their mathematics abilities in negative ways. The consistent characterizations of Black students as deficient, particularly in mathematics, has created a narrative that though derisory, has been widely accepted as the norm (Ladson-Billings & Tate 1995; Martin, 2000, 2009). The documentation of stories of Black students, particularly Black males who persist and succeed in mathematics counters the extant narrative (Berry, 2008; Martin, 2007; Stinson, 2006). These accounts move beyond “the same old stories that pervade educational discourse” (Brown, 2011, p. 2052) to provide a more complete picture of the mathematics education of Black male students.

This study provides such an account by documenting the experiences of a mathematically successful Black male student, Marvin (pseudonym), who is also a preservice mathematics teacher. There is a growing body of research that theorizes the intersections of race, identity and mathematics teaching and learning. Yet, historically, there has been limited research examining the racialized mathematical experiences of Black males (Stinson, 2011), much less those who are aspiring to be or who are practicing mathematics teachers.

Marvin participated in a larger study of five Black male preservice teachers majoring in secondary mathematics education or middle grades education with a concentration in mathematics, which examined how cultural, community, and mathematics experiences (Berry, 2008) shape students' mathematics identities in ways that inform conceptions of mathematics teaching and learning and students' decisions to become teachers of mathematics. Marvin's story serves as a representative case in that the themes found in his narrative were also found across the stories of the other study participants.

### **Mathematics Identities and Black Students**

More education researchers are using identity as a lens to increase understanding of the effects of students' mathematics learning experiences (McGee & Martin, 2011; Nasir & Shah, 2011). Mathematics education research concedes that identity is an important element that cannot be separated from mathematics learning (Martin, 2000, 2009; Martin, 2007; Stinson, 2006). Martin (2000) defines mathematics identity as “the dispositions and deeply held beliefs that individuals develop about their ability to participate and perform effectively in mathematical contexts and to use mathematics to change the conditions of their lives” (p. 150). Martin (2000) explains that identities, are shaped within various contexts— sociohistorical, community, school, and intrapersonal, and that at each of these levels, a number of factors impact one's experiences and the construction of identity.

Further, Martin's (2000, 2006, 2007, 2009) research with Black learners and their families outlines intersections of racial and mathematics identities by examining what it means to be Black in the context of mathematics learning and what it means to be a learner and doer of mathematics in the context of being Black. Martin's research shows that racial and mathematics identities are critical aspects of Black learners' self-concepts and that these identities are often

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co-constructed in contexts where both mathematical proficiency and being Black are highly salient.

Examination of African Americans' identity development is well-supported in the counseling literature in terms of how the challenges and psychological stressors African Americans face may negatively affect them academically (Hargrow, 2001; Phelps, Taylor, & Gerard, 2001). Welch and Hodges (1997) contend that studies of African Americans' identity construction could help researchers understand how identity development may hinder academic achievement. Larnell (2013) also notes that identity can be a "central and useful tool for analyzing the mathematics learning experiences of students, particularly, students from groups that have experienced restricted access to mathematics" (p. 154).

There is evidence of the significant implications of a student's mathematics identity. Researchers have found that a positive mathematics identity supports increased engagement, academic interest, and persistence in mathematics (Berry, Thunder, & McClain, 2011; Jilk, 2014). The research also suggests, however, that Black students, and other underrepresented mathematics students, have limited opportunities to develop positive mathematics identities (Polman & Miller, 2010). Supporting positive identity development involves investigation of how mathematics identities are "threatened and/or damaged—by what and by whom, amid what situations, and with what consequences" (Larnell, 2013). Berry and McClain (2009) found three factors that contributed to Black boys' development of a positive mathematics identity: (a) motivation to succeed in mathematics; (b) strong beliefs in their mathematical ability; and (c) caring mathematics teachers.

### **Identity and Mathematics Proficiency**

Berry and McClain's (2009) results align with emerging conceptualizations of mathematical proficiency that identify mathematical disposition as critical to students' success in mathematics (Kilpatrick, Swafford, & Findell, 2001). In particular, Berry and McClain (2009) found dispositional factors (motivation to succeed in mathematics and strong beliefs in one's mathematical ability) contributed to Black boys' development of positive mathematics identity. The National Research Council (2001) conceptualizes mathematical proficiency to capture what it means for anyone to learn mathematics successfully. Mathematical proficiency consists of five components: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. Though the strands are intertwined, not independent, components of mathematics identity are linked, most specifically, to what the National Research Council (2001) describes in the fifth strand, productive disposition. Productive disposition is defined as a "tendency to see sense in mathematics, to perceive it as both useful and worthwhile, to believe that steady effort in learning mathematics pays off, and to see oneself as an effective learner and doer of mathematics" (National Research Council, p. 131).

Identity, then, is an element of the study of the sociocultural nature of mathematics teaching and learning and informs how mathematics proficiency is conceptualized (Martin, 2009; Stinson, 2006). To understand participants' mathematics identities, this study draws upon the National Research Council (2001) conception of mathematical proficiency and Martin's (2007) definition of mathematics identity. There are, then, multiple factors that shape mathematics identity: 1) dispositions and beliefs about participation 2) dispositions and beliefs about performance/competence 3) views of the usefulness of mathematics 4) opportunities to participate in mathematics 5) the impact of mathematics as a life change agent 6) racial and

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cultural factors. These themes form the basis of the framework employed in this study, as well as the data collection methods and analyses.

In this study, the success story of Marvin, a Black male mathematics student is extended to focus on his choice to become a mathematics educator. The aim is to examine the mathematics identity development of Black male preservice mathematics teachers and the implications of their developing identity on their understanding of themselves as teachers of mathematics.

### **Mathematics Teacher Identity Formation**

In order to become part of the teaching community and to identify as a teacher, preservice teachers learn to think and act as members of that community (Perkins, 2006). Prospective teachers bring a professional image of their ideal self as teacher that is created from their own experiences as a student (Knowles, 1992). Teacher identity is then formed within the narratives of teachers' lives, which Connelly and Clandinin (2006) call their 'stories to live by'. Stories to live by provide each person with a "special place and orientation" that is their professional identity. A story to live by is the narrative that teachers draw upon to make sense of themselves and their practice. Teachers' lived stories and the beliefs that are developed through these stories are important elements of teachers' professional identity formation (Knowles, 1992; Sugrue, 1997) that determine how teachers teach, how they develop as teachers, and their dispositions toward educational policy and practice (Bullough, 1997).

Teachers' content knowledge is a critical aspect of teacher identity formation. As a matter of professional competence, it is important that a mathematics teacher has a positive relation with mathematics and a level of expertise in the subject (Smith, Yosso, & Solorzano, 2007). Development of pedagogical content knowledge is also important. Mathematics pedagogy may be defined as teachers possessing the ability to impart knowledge while becoming facilitators of students' learning (NCTM, 1991). Teachers select appropriate mathematical tasks to support learning, promote classroom discourse to deepen understanding, monitor student thinking and adjust instruction, and help students connect new concepts to prior knowledge.

Important work has been done in looking at identity development that attends to issues of students as well issues of mathematics content (e.g., Enyedy, Goldberg, & Welsh, 2006; Van Zoest & Bohl, 2005). Ladson-Billings (1995) has suggested that in addition to being mathematically proficient, teachers must also be culturally competent. Teachers need to understand the lived experiences of students and build on student strengths in the classroom.

Teacher knowledge of mathematics includes proficiency with mathematics content, pedagogical expertise for teaching mathematics, and knowledge of students. By examining Marvin's development of these knowledge domains as he progresses through his teacher preparation program, this study investigates his emerging mathematics teacher identity. In an attempt to more deeply understand this Black male preservice mathematics teachers' identity development, I turn to his narrative to determine his 'stories to live by'. The role of the narrative in understanding identity can be found in the work of Sfard and Prusak (2005) who claim that narrative is identity. Further, Sfard and Prusak (2005) identify two aspects of identity: the actual identity, which consists of narratives about the actual state of affairs, and the designated identity, consisting of stories presenting a state of affairs which is expected to be the case, either now or in the future. Marvin's actual identity as a Black male and mathematics learner emerges not only through the stories he tells but through the actions he takes to position

himself as a certain kind of mathematics learner and future teacher. His actual identity consists of knowledge and lived experiences that weave together to inform his designated identity as a mathematics teacher, shaping his views, dispositions, and beliefs about practices that help him to prepare his future students to be successful mathematics learners.

### **Black Mathematics Teachers**

There is an increasing body of literature that examines mathematics education as racialized experience and that explores the racial identities of students and teachers in the context of school mathematics. This research provides a response to initiatives, such as the Teach Campaign, that aim to diversify the teaching force, as well as to efforts to retain black male mathematics teachers once they enter the profession.

In a study of thirteen Black preservice elementary teachers, McGee (2014) used narrative to examine the racialization of participants' mathematics experience and the development of their mathematics identities. McGee (2014) found that the preservice teachers' accounts of their college mathematics experiences were framed by academic struggle in mathematics that was affected by racial stereotyping from their mathematics instructors. Participants' narratives also showed the significance of culturally affirming mathematics activities at home as well as the influence of Black fathers and close Black male relatives as their first mathematics teachers. These factors influenced participants' views of their future roles as mathematics teachers of Black children.

Chazan et al. (2013) studied two well-respected Black high school teachers serving a predominantly Black student population to identify the knowledge base and other resources that Black teachers bring to teaching mathematics. The study responded to education policy that emphasizes teachers' content knowledge while minimizing teachers' experiential and cultural knowledge. They found that these teachers' in-depth knowledge of Black culture was critical to their effectiveness in teaching their introductory algebra courses.

In a related study, Clark, Badertscher, and Napp (2013) explored the perspectives and practices of the same two Black high school teachers, this time to examine the ways in which they supported their students' mathematics identity formation and development. While the two participants defined positive mathematics identity in different ways, race and racial identities were salient for both. Both teachers used their positioning as Black teachers of mathematics to serve as models for their students' mathematics success and both were motivated to dismantle race-based hierarchies in school mathematics.

Frank (2018) presents the case of Chris Andrews, a black male first year teacher at a predominantly black middle school, who takes a similar sociopolitical stance on mathematics teaching and learning. Chris understood the influence of oppression on black students' opportunities to learn mathematics and believed that teaching mathematics to black students was his moral responsibility and obligation to his community. His own identity was framed at the intersection of his black identity and other identities related to his mathematics ability and social class. Despite his sociopolitical stance and understanding of the cultural experiences of black students, Chris's conceptions of his black students were influenced by existing and persistent deficit views of black students' mathematics achievement. Frank (2018) concludes that even in light of his deficit perceptions of his students, Chris demonstrates how bringing a sociopolitical consciousness to mathematics teaching and learning supports novice black male teachers in their content, pedagogical, and dispositional development.

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Davis, Frank, and Clark (2013) also present a case of a Black male mathematics teacher, Floyd Lee. Floyd, a novice teacher who chose to teach in the same urban school district where he grew up, was heavily influenced by his family structure and upbringing in deciding to become a teacher. Despite his limited life experience, Floyd expresses that the most important aspect of his role as a teacher is to influence his students' lives and educational choices. Floyd also adopts a view of mathematics, shaped by his own struggles with conceptual learning and proof, that emphasizes learning math to achieve a goal, rather than for appreciation of or interest in the discipline. The authors examine the experiences that influence Floyd's practice and consider how his case, and similar cases, might inform efforts of the Teach Campaign to increase the number of Black male mathematics teachers in U.S. schools.

Through the exposition of Floyd's case, Davis et al. (2013) make recommendations for how to further support Black male mathematics teachers. Based upon these key findings, the authors recommend that the Teach campaign 1) reexamine the expectations placed upon young Black males, and find ways to support them in managing the expectations and pressure placed upon them in their role as teachers, 2) consider multiple pathways to teaching that could compel more Black men to become mathematics teachers, and examine the supports provided to Black males math majors navigating traditional secondary mathematics teacher education programs, 3) leverage family support to encourage more young Black men to become mathematics teachers.

While many studies about Black male teachers focus on their teacher preparation and practice, Harris and Davis (2018) shed light on their retention in the teaching profession and in their schools. They present the narratives of three black male mathematics teachers from Africa in order to provide insights into their experiences in a same race and gender peer mentoring program. Harris and Davis (2018) found that retention of the black male mathematics teachers was supported by their district's professional learning infrastructure and commitment to professional growth, positive interactions with district stakeholders, and meaningful relationships with colleagues, students, and supportive mentors. In particular, the same race and gender peer mentoring program, added to the retention of the black male math teachers by providing support and guidance in the face of race and gender related challenges, feelings of isolation, and navigation of hidden aspects of culture in a district predominated by White female staff.

The findings of these research studies point to the saliency of race in the experiences of Black learners and teachers of mathematics and reveals that Black mathematics teachers hold shared knowledge and experience that can inform their success, particularly in support of Black students' mathematics learning. However, the role racialized experiences play specifically in the lives of Black male pre-service mathematics teachers as both students and future teachers of mathematics, remains under researched.

This study examines Marvin's narrative by using interviews to trace the development of his mathematics and mathematics teacher identities. Through these interviews, I examine how his identity as a Black male mathematics student impacts his thinking about mathematics teaching and learning and his developing mathematics teacher identity. This research was guided by the following questions:

- *How do Black male pre-service mathematics teachers define their mathematics identities and characterize what it means to be Black in the context of mathematics teaching and learning?*
- *How do Black male preservice mathematics teachers characterize and respond to learning and participation in mathematics as racialized forms of experience?*

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- *How do Black male preservice mathematics teachers' experiences inform their conceptions of themselves as future mathematics teachers?*

### Methodology

This exploratory qualitative study investigated factors which contributed to participants' mathematics identities and developing teacher identities over one academic year of college. Over the course of one academic year, interviews were conducted with five Black male preservice teachers majoring in secondary mathematics education or middle grades education with a concentration in mathematics at an eastern HBCU. Participants were asked to reflect on their mathematics experiences, and their views of themselves as mathematics learners and future mathematics teachers. Marvin was one of those students. He was interviewed on four different occasions, for an average of about 44 minutes per interview. Marvin's case was selected as a result of his detailed accounts and responses and because his was a typical case in that the themes found in his narrative were also found in the stories of the other study participants.

### Narrative analysis

Narrative inquiry (Connelly & Clandinin, 2006; Clandinin & Caine, 2012) was employed, which required Marvin to tell detailed stories about the life experiences that shaped his identity over time. Narrative inquiry is a way of thinking about and studying experience as story. Bailey and Tilley (2002) explain that, "The underlying premise of narrative inquiry is the belief that individuals make sense of their world most effectively by telling stories" (p. 575). Connelly & Clandinin (2006) describe a story as a way for one to share their experience of the world and at the same time it provides a way in which one's experience of the world is interpreted and made meaningful. People are constantly living out stories, and these stories provide a way to explore who we are and who we are becoming (Clandinin & Caine, 2012).

Narrative inquiry attempts to understand how people think through what they experience, what they value, and the meanings they assign to their experiences (Riley & Hawe, 2005). Participants tell about their lived experience and the researcher then retells those stories through narrative. Stories are lived and told and are a primary data source, while narratives are developed from the analysis of stories. As Riley and Hawe (2005) describe, the researcher's role then, is to "interpret the stories in order to analyze the underlying narrative that the storytellers may not be able to give voice to themselves" (p. 227). While the focus is the individual's experience, narrative inquiry also examines the social, cultural, familial and institutional narratives that provide the context for those experiences. Johnson and Christensen (2014) contend that retelling of the stories allows for construction of meaning that may "begin to shift the institutional, social, and cultural narratives in which they are embedded" (p. 427).

In this study, Marvin's self-narrative is the primary source of data. Self-narratives both express and establish identity (Josselson, 2004). The stories people tell reveal their present selves and connect their past and future selves. The self-narrative is particularly important in this study because it provides the "transition bridge" (Ashforth, 2001) between the old and new roles and identities held by Marvin as he moves from student to teacher. Further, research shows that stories guide action (Somers, 1994). Marvin's lived stories provide an opportunity to learn about his anticipated actions as a future mathematics teacher.



## **Interviews**

The interview protocol consisted of a combination of semi-structured and open-ended questions. Interviews were an appropriate data collection approach to address the research questions because they allowed the participants to describe their experiences and the views of themselves that shaped their mathematics identities and teacher identities, as well as how their identities were changing over time and the factors that contributed to their identity development. Questions were designed to allow participants to share detailed accounts of their lived experiences with respect to family and community, school in general, and mathematics classrooms in particular. The four interview protocols focused chronologically on participants' elementary, middle, high school mathematics experiences and their present college mathematics and mathematics education experiences. For each interview, questions focused on participants' mathematics experiences at home and in school, their views of themselves as learners of mathematics, their dispositions toward mathematics, their thinking about their future as a teacher of mathematics, and their views of the intersections of race, gender, mathematics teaching and learning.

In this study, narrative analysis is used to understand Marvin's mathematics experiences over the course of his life. Transcriptions of interviews were analyzed with respect to themes and codes initially developed based upon the National Research Council (2001) conception of mathematical proficiency, Martin's (2007) definition of mathematics identity, and the principles of teacher identity formation. Additional themes were developed to describe participants' experiences with respect to the research question.

Marvin's statements were coded for his perceptions of himself as a Black male in terms of his mathematics and mathematics teaching identities in order to highlight how he made sense of these experiences. The codes were organized into categories and subcategories. The analysis included multiple iterations of identifying recurring themes, patterns and essential meanings relevant to the study research questions. This analysis helped to organize the data in order to develop and make sense of Marvin's narrative.

## **Findings and Discussion**

### **Marvin's Narrative**

Marvin is a 20-year-old Black male who grew up in a large urban city in the northeastern United States. He is a middle grades mathematics education major. Marvin stood out due to the openness, insightfulness, and passion he expressed during his interviews. During one of the interviews he wept under the pressures of the decision of becoming a teacher of mathematics, his desires to be successful, and his fear of being a disappointment to his family, peers, and students. Marvin had a detailed memory and was able to provide in-depth accounts of his mathematics experiences.

The findings are presented in a chronological narrative that traces the story of Marvin's life. The results are organized into three academic periods of Marvin's narrative: early years and elementary school (P-5), middle and secondary school (6-12), college and future. Throughout his narrative, Marvin's conceptions as a Black male prospective mathematics teacher with respect to

his racial, mathematics, and teacher identities are discussed. Direct quotes obtained from the interviews are presented in the findings.

### **Early years and Elementary School**

When Marvin talked about his childhood experiences, he spoke of his mother, as well as his grandmother, who played a significant role in his upbringing. Marvin's mother separated from his father, after which the two had little contact until Marvin's adulthood. His mother raised him, with support from his grandmother who was also a caretaker and provider. The value of education and pursuit of excellence, as well as the significance of being a role model instilled in Marvin by these two women influenced him to pursue academic success, higher education, and the teaching profession. They also encouraged him in mathematics and were his early mathematics teachers. Marvin's grandmother taught him mathematics prior to his formal schooling began and provided continued support through his middle grades years. Both emphasized the importance of his mathematics education and success.

**Academic Excellence.** Marvin's mother emphasized excellence, "She always said, 'whatever you do, do your best. If you're a janitor be the best janitor there is...She didn't expect me to get straight As all the time, or anything, but she did expect me to do my best. When I showed her my grades, she would always ask me the same thing, 'was this the best you could possibly do?'" Marvin also described his mother as a Christian and a strict disciplinarian who set clear and narrow boundaries and high expectations. "I couldn't do anything. Couldn't have friends over, and couldn't go to nobody's [*sic*] house. My Mom was not having that ... I hated it then, but I understand now that she was just trying to keep me out of trouble and on the right path."

While Marvin's grandmother had earned a Master's degree, his mother had not pursued higher education after somewhat troubled teen and early adult years. Marvin explained that not earning a college degree plagued his mother and affected her self-confidence. He heard his mother talk about how uncomfortable she felt among people who had earned degrees and she expressed to him, that she didn't want him to ever feel that way or to experience the types of financial hardships the family had encountered. While Marvin's grandmother provided support, at times taking in Marvin and his mother as well as providing childcare, the family often faced financial difficulties. Marvin's mother emphasized that earning a college degree would help to ensure that he wouldn't face the same challenges. "She always told me-don't be like me. Make sure you go to college so you can have a good life...Every time there was a money issue or a problem on her job she would say 'you know it's like this because I don't have a degree.'"

**Being an advocate.** Marvin shared several lessons learned from his mother and grandmother that shaped his values as a student and informed his conception of the future teacher he aspired to become. Due to the family's financial status, Marvin rarely had popular or name brand items, including clothing. He recalls that he was "made fun of" (mocked) because of the clothing he wore and that he had to stand up to older kids who teased him. As a result, Marvin expressed strong opinions about bullying and about advocating for others.

When my friends would pick on younger kids or spec ed [*sic*] kids, I was always the one to make them stop. I just wasn't down with that. I can't stand a bully...Sometimes the teachers wouldn't even know what was going on. And when they did, they didn't do

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anything. I'll never let it go down like that in my class. The teacher should be the one protecting the weak ones- you know the kids everybody messes with.

Marvin later connects this type of advocacy to teacher support of Black students in mathematics.

**Persistence and productive disposition.** Marvin recounted several of his early schooling experiences and discussed his early interest in mathematics.

I always liked school ok. I wasn't the best student and I wasn't the worse student. I didn't really like social studies or science, but I liked math. My grades were kind of up and down in math, they weren't all good or all bad. But I liked it. I remember being really good at multiplication." Marvin credits his grandmother with his early school success. He explains that she would help him with math when he had trouble, but also that sometimes he "just didn't get it."

Marvin described his grandmother as his greatest academic supporter and motivator, and he always wanted to please her by doing well in school.

I remember her helping me learn multiplication and fractions. I was good at math until I got to fractions. That's the first thing I really had trouble with. My grandma would help me every day until I got it. She would just make me keep trying and trying and trying. She always told me I could do it and she would get real excited when I finally understood something.

Here Marvin describes how his grandmother encouraged him to persist. According to the National Research Council (2001), developing a productive disposition requires recognizing the benefits of perseverance. Marvin's grandmother showed him that he could 'get it' when he continued to try, and she encouraged him to believe that he could be mathematically successful.

Black families continually create counter-narratives by implementing practices that support the development of positive mathematics identities in their children (Martin, 2006). Based upon Marvin's description, the mathematics instruction he received from his grandmother came with lessons in persistence and self-efficacy in mathematics, both important aspects of productive disposition. Marvin's grandmother helped provide him a strong mathematics foundation and continued to support him in mathematics through most of his schooling.

**Teacher as community leader.** Marvin's grandmother instilled in him a value and appreciation for education and academic preparation. According to Marvin, her example is actually the main reason he even considered becoming a teacher. His grandmother was well-known in Marvin's community because of the academic support she provided for neighborhood parents who would seek her out for assistance with interacting with school teachers and administrators, and for tutoring their children. Marvin spoke highly of his grandmother: "My Grandma is the one who made me want to be a teacher. Everybody knew my Grandma. Everybody loved her in my neighborhood, and she was always helping people...So I figured that's what I wanted to do too."

Joseph and Green's (1986) review of the literature suggests eight themes, or reasons people enter the teaching profession. One reason for becoming a teacher is to be of service and a second reason is to have the ability to influence others, including parents, spouses, other

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teachers, and students. Marvin saw the influence his grandmother had as she provided support to others. She exemplified advocacy as a liaison between community members and school faculty.

Marvin's description of his early years illustrates the significance of family. Marvin's family promoted his academic success, even despite his mother's limited educational background. His experience highlights the importance of Black parents and caregivers in increasing their children's academic achievement generally, and in mathematics in particular. Marvin's home provided positive messages regarding mathematics learning and in his own home he saw models of mathematics teaching in his early years. The narrative of Black parents' lack of awareness of the importance of mathematics learning in their children's education is countered by lessons taught by Marvin's mother and grandmother who encouraged and helped him to pursue mathematics knowledge.

### **Middle and Secondary School**

The middle and secondary school years generally mark a period of transition for students. For Marvin, this was a time that would shape his future in significant and specific ways. The most prominent experience that occurred during this period of transformation was Marvin's time in Ms. Bond's Algebra class. The class marked a new mathematics experience for Marvin in two ways. First, it is the site where Marvin first explains that he recognized gender and race-based disparities in mathematics classes, and it strengthened Marvin's mathematics proficiency and disposition.

**Mathematics proficiency and productive disposition.** Marvin explains the differences between Ms. Bond's class and his previous math classes. "My teacher [Ms. Bond] helped me learn to be organized in that class. She made us write everything in a composition book. It help me be organized in all my classes." Not only did Ms. Bond teach him skills that helped Marvin to be successful in his mathematics class and beyond, but she taught in a way that caused him to develop a new conception of mathematics learning and teaching. He goes on to say:

I liked the algebra class. I kinda found a math I could relate to. Like the proofs and stuff, it made me think more than my other math classes. Algebra showed me that math could be interesting. That was the first math class that was laid back. It wasn't do this - do that; it was a conversation. More of a [sic] interaction."

Marvin saw how these differences in mathematics teaching were connected to differences in students' dispositions toward mathematics. In particular, he notes how lack of engagement with the mathematics affected his Black classmates. He states, "Before that, math just wasn't that interesting. People would always be complaining. Their attitude was 'why do I have to take this? I don't like this.' It rubs off; it's not good. It's not engaging. Then they don't want to participate. I think like most of the Black kids were like that."

Marvin's experience in his Algebra class was significant, especially given that Algebra is considered a gateway course. The National Mathematics Advisory Panel's (2008) final report describes algebra as a gateway to later achievement, including more advanced mathematics, a college degree, and employment. Interestingly, given Marvin's case, it also states that success in algebra is dependent on understanding multiplicative reasoning, including proficiency with rational numbers and proportional relationships. Marvin previously explained that his grandmother helped him increase his proficiency with fractions which may have been pivotal to

his Algebra preparation. This finding provides evidence of the valuable mathematics learning that takes place in homes of Black children despite the pervasive discourse concerning the complacent Black family who is also not typically seen as a source of mathematical knowledge.

**Race and gender-based disparities.** Marvin says, “In middle school I was taking Algebra. A lot of my friends weren’t though. I was like one of only four or five Black kids in my algebra class and there was only two other Black boys.” Marvin’s elementary school was predominantly Black, and so he was used to having all or mostly Black students in his classes. Being one among a few Black students in his Algebra class was significant. He also noted differences in how Black students were treated. “In Ms. Bond’s class it was like the Black boys got all the attention and not for getting in trouble or anything like that. She was so nice to us, like she really looked out for us. I mean the Black girls liked her too, but she made us feel like we were her favorite students. That never happened before. Usually we were the ones everybody thought just caused trouble.” Ms. Bond’s positive treatment of the Black boys was a new experience for Marvin.

Marvin makes additional distinctions between Black students’ engagement in Ms. Bonds’ class and their experience in previous mathematics classes, contrasting her with his 7<sup>th</sup> grade teacher who he described as racially prejudiced.

In 7<sup>th</sup> grade, I think my teacher hated the Black kids. That lady DID NOT like the Black kids. But the school was like a lot of Black kids. So it’s like, if you hate us, why are you teaching here?” Further, he explains that though he felt that his teacher was racially biased, he was able to experience mathematics success in her class. “But I did good that year I just didn’t say anything and did my work. So people would think I like math and then I got to take the Algebra class. I don’t know what everybody else took. That’s when I stopped having a lot of Black kids in my classes.

Marvin describes the types of strategies he employed in the face of what he viewed as racially biased mathematics teacher. Based upon his description he in a sense, withdrew, not fully engaging or being himself in his math class in order to avoid experiencing potential consequences.

Marvin’s Algebra class with Ms. Bond also marks the first time he recognizes tracking in his mathematics classes. The implications are significant, with research showing that students from underrepresented groups are adversely affected by tracking and have considerably fewer opportunities to learn mathematics (Oakes, 1990). Further, research indicates that Black students have reduced odds of being placed in algebra by the time they enter 8th grade and that teacher evaluations of student performance play a greater adverse role for Black students than for their peers (Faulkner et al., 2014). Based upon these findings, Marvin’s strategy of making sure he ‘didn’t say anything’ may have influenced his subsequent algebra placement.

**Black math teacher as mentor.** While his grandma’s influence lead him to consider pursuing teaching early on, it was Ms. Bond’s class that helped Marvin decide upon mathematics. “I was always unsure, but math was in the back of mind. I chose math because I figured if someone got me to like it, I can get someone else to like it. I didn’t love math but Ms. Bond helped me appreciate it. I really had good experiences in some of my math classes.”

Ms. Bond’s role in Marvin’s trajectory appears quite significant. Klopfenstein (2005) finds that curriculum choice is determined by prior academic achievement and student expectations for schooling, both of which are affected by role models. In particular, increasing

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the percentage of Black math teachers is found to have a positive impact on the likelihood that a student enrolls in a subsequent rigorous math course (Klopfenstein, 2005). Further, a greater affect is found when student and teacher are of opposite genders (Klopfenstein, 2005).

Marvin's positive experience with Ms. Bond reflects that Black female teachers are significantly more optimistic about the ability of Black boys, and their completion of high school than teachers of any other demographic group (Gershenon, Holt, & Papageorge, 2016). The optimism Ms. Bond exemplified helped Marvin to think positively about his mathematics learning and gave him the belief that if Ms. Bond could make him feel that way, he could make other students feel the same way about mathematics.

**Racial bias in math.** Marvin describes Ms. Bond as "the only Black math teacher I had until I got to college." He goes on to say,

I really liked her and she cared about us a lot. She kinda reminds me a lot of Dr. Laurie (pseudonym). Like she's a real good teacher, she's nice and everything but you can't get anything over on her. She did not play. Funny thing is, the White kids thought she was prejudiced. It's like when the White teachers favor the White kids no one sees it but when there's finally a Black teacher Black kids can relate to they think they're prejudiced. It's kinda crazy. Like one time we were playing a math review game. She let us pick our own teams, so me and my friends was [*sic*] all on the same team – we was [*sic*] the only Black kids in the class. Ms. Bond was the judge and it seemed like she always ruled for us. This one White girl got so mad and told Ms. Bond that she was cheating for us. She was all cussing at her so Ms. Bond kicked her out the class...But I don't even think anything happened to that girl. But yeah, Ms. Bond was a real nice lady. And we could have fun and be real laid back in her class.

Marvin's analysis of the disparities he observed and his description of other students' views of Ms. Bond as biased are reflective of racial bias in schooling. White teacher bias against Black students is well-documented, yet rarely acknowledged or addressed in intentional ways. In a study conducted by Johns Hopkins University, researchers found that when a White teacher and a Black teacher consider the same Black student, the White teacher is 30 percent less likely to think the student will graduate from a four-year college (Gershenon, Holt, & Papageorge, 2016). They also found that for Black boys having a non-Black teacher in a 10<sup>th</sup> grade subject made them much less likely to pursue that subject by enrolling in similar classes. This indicates biased expectations by teachers have long-term effects on student outcomes.

Given this data and based upon Marvin's recollection, the benefits of having Ms. Bond, a Black mathematics teacher, for his pursuit of mathematics and mathematics teaching were notable. Ms. Bond was an influential positive role model for Marvin. Her example allowed Marvin to see the possibility of his becoming a math teacher. Marvin could, as Milner (2006) states, think 'if they (as Black teachers, principals, and superintendents) can be successful, I can too.'

Milner (2006) identifies some important features of successful Black teachers of Black students that are evident in Marvin's description of Ms. Bond. For example, Milner (2006) describes Culturally Responsive (Gay, 2000) Classroom Management (Weinstein, Thomlinson-Clarke, & Curran, 2004) in terms of teachers implementing a firm no nonsense management style while also successfully involving students and engaging them in the lesson. Marvin

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indicated that both of his Black math teachers (Ms. Bond and Dr. Laurie) implemented this type of classroom management.

Milner (2006) identifies Culturally Congruent (Gay, 2000) Instructional Practices as another teaching component of effective Black teachers of Black students. These teachers refuse to allow their students to fail (Ladson-Billings, 2002). Ms. Bond used culturally congruent instructional practices through which she provided relevant and meaningful learning opportunities for students like Marvin. She made mathematics accessible to him, while equipping him with transferable skills that supported his overall academic success. Ms. Bond also helped Marvin develop a different perspective on mathematics and mathematics learning. Instead of mathematics education being the teacher telling him what to do and him doing it, mathematics learning involved communication and sense making. Marvin's experience in Ms. Bond's class, therefore, supported him in developing a more productive disposition. According to the National Research Council (2001), productive disposition refers to the tendency to see mathematics as sensible, useful and worthwhile, to believe that consistent effort in learning mathematics leads to mathematics success, and to see oneself as an effective learner and doer of mathematics. Ms. Bond set high expectations for Marvin and his classmates; she required their best, and also encouraged them and helped them see they could be successful mathematics learners.

**Math is a door.** Finally, Ms. Bond provided a counter to the narrative of Black inferiority in mathematics. She was a counter-story to the academic struggles that Marvin and his friends had experienced in their schooling – she achieved academic success, specifically mathematics success, and in a past filled with ineffective mathematics teachers, she was effective. While the White students may have seen Ms. Bond as biased, for Marvin she was an advocate for Black students in a place where others had not taken interest in them. Ms. Bond was invested in Marvin and saw his potential. She encouraged him to apply to a summer math and science academy at a nearby university.

It was only like a week but I think the point was to get more Black kids interested in math and science...But I learned a lot there. They showed us how math and science was actually used. We took trips to all kinds of places. We went to NASA. That's how I met Mr. Brooks. I think he had to be the first Black man who was a scientist that I ever actually saw.

While the underachievement of Black students in mathematics is the pervasive narrative, Mr. Brooks and Ms. Bond demonstrated high achievement and persistence. Their example supported Marvin's belief in the possibility of him achieving similar successes.

When Marvin's mother and grandmother described participation in the math and science academy as a door to success. People who did well in math and science could get good, high-paying jobs. Math and science could provide an opportunity for Marvin to experience a 'better' life than his mother had been able to give him. Mathematics knowledge is certainly high status; those who lack mathematical proficiency are denied academic and economic access and opportunity available in today's society (Moses & Cobb, 2001). Marvin's story demonstrates the significant impact of black families on black children's perceptions of mathematics and of themselves as capable mathematics learners, common theme among mathematically proficient black students (Berry, R., 2008; Berry, Thunder, & McClain, 2011; Frank, 2018).

Through his life stories, Marvin's narrative reveals the development of his mathematics identity and mathematics teacher identity, including the factors that both shaped and challenged

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those identities. During his early life, Marvin's identity is largely influenced by his mother and grandmother. Marvin's home life supported academic excellence and the development of a productive disposition for mathematics. Both his mother and grandmother stressed doing his best in school, and his grandmother played a critical role in Marvin persisting in mathematics and beginning to view himself as a successful mathematics learner.

While Marvin did not decide to be a mathematics teacher until his later years, stories of his earlier experiences reveal influences on the development of his identity as a teacher. His grandmother, a Pre-K teacher, provided a model of how the role of teacher was tied to that of community leader. From his grandmother's example, he viewed a teacher as someone who was influential in the community and who served and advocated for others. And as a kid who was once picked on because of his family's financial status and inability to acquire 'nice' things, he valued standing up for those who had low power status.

In his later middle and high school years, Marvin's stories revealed his recognition of the racialized nature of mathematics education, including race and gender based disparities in mathematics classes. Despite experiencing the stressors of teacher stereotyping and tracked mathematics classes that challenged his mathematics identity, Marvin developed coping strategies that allowed him to persist and to further develop his mathematics proficiency, and to leave this time period of his life with the view of himself as a successful mathematics learner.

Marvin's choice to pursue teaching was also strongly influenced by experiences with his first Black mathematics teacher who he saw as an advocate for Black boys, and who provided him an example of what effective mathematics teaching could look like. For Marvin, this teacher was a role model who allowed him to see opportunities and possibilities for his own life, and showed him that mathematics could be interesting and engaging.

Marvin's mathematics and teacher identities evolved through different phases as he pursued mathematics proficiency and as he gained greater understanding of race-based issues in society. Even when Marvin struggled with his mathematics identity and his view of himself as mathematically proficient was in question, his teacher identity and desire to be a role model and advocate informed his thinking about becoming a mathematics teacher. Marvin's perspectives are aligned with Frank's (2018) research in the case of Chris, the first-year black male mathematics teacher who took a sociopolitical stance on mathematics teaching. Marvin and Chris viewed serving as advocates for the black community as a critical responsibility of their role as mathematics teachers. Like Chris, Marvin had insight into the racialized nature of mathematics learning and stood firm in the conception of the black teacher as an advocate who acted against racial bias. Marvin recognized his and others' gaps in mathematics knowledge were reflective of systemic mathematics underpreparedness of Black students. Influenced by his family, and other Black mathematicians and scientists he met along the way, Marvin began to view mathematics proficiency as a door to success, and as a high stakes discipline that would have implications for his students' future opportunities.

Marvin felt the pressure of being a positive role model for students, particularly, other Black males. Research indicates that this is a common experience among Black teachers who, like Marvin, hold themselves accountable to the high standard of being role models within the Black community (Clark, Badertscher, & Napp, 2013; Davis, Frank, & Clark, 2013; Frank, 2018; Ladson-Billings, 2009). Marvin's experiences align with Davis, Frank, & Clark (2013) research that suggests that recruitment programs for black male teachers find ways to support them in managing pressures and expectations placed upon them in their role as teachers. In Marvin's case, despite these pressures, his mathematics identity and mathematics teacher identity



remained strong enough to compel him to continue his pursuit of becoming a teacher of mathematics.

### **Implications**

The results of this study indicate the need to continue to examine the experiences of Black male preservice mathematics teachers and the factors and stressors that shape their identities and lead them to persist in or withdraw from their pursuit of mathematics learning and teaching. Marvin's mathematics teacher identity, teacher as advocate, indicates that his emphasis was not merely the discipline of mathematics, but his understanding of the social and systemic implications of acquiring mathematics knowledge and experience. While he struggled with his mathematics identity and proficiency, his desire to help future students facing the same struggle fueled his pursuit of equity in mathematics and compelled him to persist. Marvin's narrative adds to the existing mathematics education discourse by countering and elaborating extant narratives of Black male students' mathematics experiences and achievement and the impact of those experiences on the pursuit of becoming a teacher of mathematics.

In order to establish and maintain a diverse the teaching force, particularly in mathematics, it is imperative that research continues to further examine the ways that mathematics and teacher identity, and their intersections with race, gender and other sociocultural factors, inform instructional practices and support retention of Black male teachers. Deeper understandings of race must be integrated into the work of mathematics educators. The results of this study provide support for increased and ongoing culturally and racially sensitive K-20 professional development specifically within the context of mathematics that provides deeper understandings of race and uses that knowledge to combat the adverse effects of racialized mathematics experiences on the proficiency and dispositions of students of color. At the same time, this type of professional development would be strengthened by including an examination of how the racialized knowledge base and resources drawn from Black students', pre-service and inservice teachers' shared experiences motivates aspiring teachers to persist in mathematics and informs their practices, particularly, as effective mathematics teachers of Black children.

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