

High-Achieving Black Students, Biculturalism, and Out-of-School STEM Learning Experiences: Exploring Some Unintended Consequences

Ebony O. McGee
Vanderbilt University

In this article, the author discusses the complex challenges of high-achieving Black students who are successful in becoming immersed in predominately White STEM (science, technology, engineering, and mathematics) spaces and how such immersion can exacerbate their experiences of racial stereotyping and other forms of racial bias. The author illustrates these complex racialized experiences through the story of Maurice, a high-achieving high school mathematics student who successfully negotiated the White spaces he occupied yet did not indicate interest in pursuing a STEM-related career. Although Maurice developed sophisticated bicultural competencies that allowed STEM professionals and educators to view him positively, he decided that compromising his own racial, cultural, and individual identities to pursue a STEM college major and career was too costly. The discussion in general highlights how racial and ethnic stereotyping which is endemic throughout STEM education and careers can push mathematically competent Black students out of the STEM pipeline prematurely.

KEYWORDS: bicultural competencies, high-achieving Black students, mathematics education, out-of-school STEM experiences, racial stereotypes, STEM

Just because I know how to play the game doesn't mean I like it.

—Maurice, an African American junior high school student
Overall GPA 3.7 – Mathematics GPA 4.0¹

Maurice is clever and charismatic. As the president of his junior class and his high school's international ambassador, he negotiated successfully among a cadre of racially and culturally diverse in-school and out-of-school authority figures (e.g., school administrators, counselors, teachers, maintenance staff, community members, employers). Maurice was the “go to” person for other Black students at

¹ All proper names throughout are pseudonyms.

New Beginnings Charter High School who wanted to learn how to “play White.” His peers called it playing White because they observed that Maurice had “not lost any of his Blackness” in order to achieve in mathematics and science. His talent for *code switching*² made him popular with both his teachers and his fellow students. Many of the other 23 students in the larger study³ expressed envy as they discussed the various ways Maurice could switch his demeanor to emulate mainstream White ways of speaking and behaving and then in an instant flip back to “being Black.” I informally interviewed and spoke often with Maurice’s mathematics teachers, mathematics coach, and the school principal who all considered him to be one of the “best and brightest” students in the school. Maurice certainly knew “how to play the game,” which he defined as being able to operate in White spaces with the adoption of White cultural and social values (e.g., speech and dialect, mannerisms, dress, charisma, etc.). Nevertheless, he had many negative experiences during his out-of-school STEM (science, technology, engineering, and mathematics) learning experiences that he described as “uncomfortable experiences revolving around my race.” These negative experiences led Maurice to conclude that, despite his interest in and proclivity for STEM-related activities, he was not interested in pursuing a career in STEM.

In this article, I explore how Maurice, a high-achieving high school mathematics student who successfully negotiated the White spaces of STEM, could make the decision not to pursue a STEM related career. First, I offer a review of literature related to Black students in STEM and how Black students negotiate White spaces. I then provide details of a phenomenological case study of Maurice that illustrates the complexities of adopting biculturalism as a means to negotiate White spaces. Biculturalism, or bicultural identity, has been defined as extending one’s ethnic identity and sense of belonging to two or more different cultures without losing one’s original cultural identity (LaFromboise et al., 1993). I conclude the article with a discussion that highlights some probable unintended consequences of biculturalism, suggesting that, in some cases, it might be a failed strategy.

Black Students in STEM

Black Students’ Recruitment and Retention in STEM

The President’s Council of Advisors on Science and Technology (Holdren,

² *Code switching* refers to the ability to shift one’s behavior or the practice of moving between variations of languages in different contexts to fit the norms of more than one group (Jones et al., 2012)

³ This article represents a single case that was part of a larger study. See McGee (2013a, 2013b) and Terry & McGee (2012) for reports from the larger dataset.

Lander, & Varmus, 2011) brought national attention to the low recruitment and retention rates among undergraduates in STEM fields. For many years, the United States has relied on a relatively homogenous STEM workforce comprised, for the most part, of White and Asian men. In 2009, Asian and White students had the highest percentage of undergraduate degree attainment within the STEM fields, approximately 16 and 9 percent, respectively (Aud, Fox, & KewalRamani, 2010). However, the percentage of Whites in specific STEM occupational groups, such as the life sciences, has decreased significantly from 2001 to 2009, and much of that employment has shifted to Asians (2010). Recruitment and retention in STEM college majors is a problem that disproportionately affects students born in the United States; however, the situation is most acute for African Americans. In 2009, Blacks received just 6% of all STEM bachelor's degrees, 4% of master's degrees, and 2% of PhDs (National Center for Education Statistics, 2010), despite constituting 12% of the U.S. population. At all levels of postsecondary education (community college through postdoctoral), the percentage of STEM degrees Blacks received in 2009 was 7.5%, down from 8.1% in 2001. In mathematics and the physical sciences, the numbers are even more striking. In 2009, African Americans received 4% of degrees granted in mathematics and statistics in the United States. In the same year, out of 5,048 PhDs awarded in the physical sciences (e.g., physics, chemistry, astronomy), a mere 89 degrees, or less than 2%, went to African Americans.

Education researchers have begun investigating strategies for recruiting and retaining American students in general and African American students in particular to STEM fields. In 2009, Blacks were only 3% and Latinas/os only 2% of all STEM workers. STEM occupations are projected to grow by 17% from 2008 to 2018, compared to 9.8% growth for non-STEM occupations (Beede et al., 2011). *Rising above the Gathering the Storm* (Committee on Prospering in the Global Economy of the 21st Century, 2007), a report on the STEM fields, documented the fact that underrepresented minorities' completion rates for STEM degrees would at least have to triple to reach a goal of 10% of 24-year-olds receiving their undergraduate degrees in science or engineering. These figures are compounded by the fact that the U.S. STEM faculty is 78% White and 14% Asian (Di Fabio, Brandi, & Frehill, 2008).

Explanations for the small number of historically underrepresented students pursuing academic and career trajectories in STEM fields revolve around their lack of interest in and academic preparation for pursuing college majors in these disciplines (Leggon, 2006). Those who study structural inequalities in education argue that African American students generally do not have adequate opportunity to take the most challenging mathematics and science courses in high school (Martin, 2009, 2012; Tate, 1997). It should be noted, however, that Black students who do take Advanced Placement, International Baccalaureate, or higher-level mathematics and science courses are as likely as White students to pursue STEM

degrees (Tyson, Lee, Borman, & Hanson, 2007).

Gutiérrez (2008) argues that issues of access (i.e., having adequate resources to engage with quality mathematics) and achievement measures (i.e., standardized test scores, participation rates, and the mathematics pipeline) are two critical elements that impede the achievement of Black students. She and others (e.g., Martin, 2009) call for a healthier understanding of identity (i.e., maintaining cultural and racial connections) and power (i.e., agency to create change in schools) when addressing mathematics achievement and equity issues for marginalized students (Martin, 2009). Responding specifically to the low number of Black and Latina/o students who have successfully negotiated mathematics and science success over the last 20 years, an increasing number of programs have been developed to improve student recruitment and retention rates.

Considerable attention has been given to the mathematics and science outcomes of middle and secondary school students, which provides a critical preparation and foundation for enrolling in a college STEM major. For example, The Algebra Project, which is rooted in the civil rights movement, provides culturally sensitive instruction to increase algebra literacy among African American middle and high school students (Moses & Cobb, 2001). Project SYNCERE's (Supporting Youth's Needs with Core Engineering Research Experiments) goal is to increase the number of historically underserved and female students pursuing careers in the STEM fields. The program provides a robust project-based curriculum for grades 3 through 12 (Talbert, 2012). The Latino STEM Alliance partners with schools, private industry, community groups, and academia to bring STEM to underserved youth who would otherwise not have such an opportunity. Latino STEM Alliance identifies and conducts proven STEM enrichment programs in partnership with schools and community groups (Jones, 2012). These programs enable underserved youth to experience hands-on STEM enrichment activities with the goal of inspiring them to consider STEM-related careers. In spite of the existence of programs such as the Algebra Project, Project SYNCERE, and Latino STEM Alliance, which primarily focus on Black and Latina/o STEM students, only modest gains have resulted (National Center for Education Statistics, 2010). Nevertheless, there are historically underrepresented students who do achieve success in STEM and who do so in the midst of multiple inequities that test their abilities to be STEM-resilient.

Black Students' Success in STEM

Investigating Black student success is critically important in addressing the experiences they endure and their abilities to persevere against a host of obstacles, and adds another layer of description and understanding of their academic and educational decision-making (Berry, Thunder, & McClain, 2011; Stinson, 2013). Carter Andrews (2009) investigated the construction of Black students' racial and

achievement self-concepts in a predominantly White high school as an entry point to understanding their Black achiever identity. The students' narratives showed they discussed achieving in the context of being Black. Thus, these Black high achievers provided a critical insight into how race and racism have operated to potentially constrain their success. Her follow-up study (Carter Andrews, 2012) examined how high-achieving Black students at a predominantly White high school respond to experiencing racial microaggressions by integrated forms of hypervisibility and invisibility that she terms *racial spotlighting* and *ignoring*. The students' ability to resist microaggressions helped to enable them to maintain academic and social success despite experiencing racism in the school context. These studies add to the growing research base focused on Black student success (Conchas, Oseguera, & Vigil, 2012; Toldson, 2008).

Investigation of Black high school student success in STEM has also revealed students' determination to cope with academic-related stereotypes and to use their mathematics (and general academic) success as a form of resistance leading to increased resilience (McGee, 2013a, 2013b). Walker (2006, 2012) explored the role of peer influence in cultivating urban⁴ high school students' academic success in mathematics, providing a counter narrative of the importance of support from peers, families, and communities in reinforcing mathematics success. Munro's (2009) and Sullins's (2010) research studies both reveal a strong association between high school students' interest and self-confidence in science and mathematics and their continuing STEM studies through college, beyond enrollment and achievement outcomes. Other studies showed that training for teachers in STEM subjects had positive associations with students persisting in STEM fields (Maltese & Tai, 2011). Out-of-school STEM experiences have been studied as well. For example, Wright (2011) investigated community-based practices for 11th- and 12th-grade African American students and described the ways academically successful African American male adolescents interpret their social and academic lives so they are able to be successful in school while maintaining a healthy racial identity. Taken as a whole, these studies demonstrate that there are broader measures than disaggregated "achievement data" to provide an understanding of the learning, social, emotional, and cultural resources that facilitate African American students' learning and academic achievement in the STEM fields.

⁴ The descriptor *urban* does not merely describe the population density of a school's surrounding community. Among other things, urban describes schools with many students of color, schools for which many contemporary policies are designed, and usually refers to certain unspoken about and thus qualities considered undesirable of the students and community who belong in that space (Chazan, Brantlinger, Clark, & Edwards, 2013).

Black Students Negotiating White Spaces

Educators have long suggested that acculturation—the process of learning or adapting to a new culture—might lead to a partial rejection one’s own ethnicity or race and adopting the dominant culture (Nguyen & Benet-Martínez, 2007). The historical view of Black students who are academically successful is often based on the notion that successful Black students must extend their cultural identity—imitate at one end of the spectrum and internalize mainstream White identity and behavior at the other end—to achieve the best learning outcomes, essentially, they need to become bicultural or even raceless (Fordham, 1988, 1996). Researchers who study biculturalism have long argued that when Blacks and other marginalized students develop bicultural identities and/or competencies they are more successful academically, or, at the very least, they master the dominant culture, which allows them to negotiate the school experience more successfully (Anzaldúa, 1999; LaFromboise et al., 1993). This process requires knowledge of the language, personality characteristics, and patterns of social behavior of at least two distinct cultural groups (Scherman, 2010), and the ability to operate and interact in both cultures without relating to either in a hierarchical manner (LaFromboise, Berman, & Sohi, 1994). In sum, being bicultural is said to allow a person to negotiate two cultures and to know which culture is better to embrace in particular contexts.

Research on biculturalism frequently presupposes that bicultural individuals internalize and make use of their two cultures seamlessly, uniformly, and with little internal conflict (Benet-Martínez, Lee, & Leu, 2006; Phinney, 2003; Tadmor & Tetlock, 2006). African American students are presented as behaving in ways that are predominantly identified with being Black (e.g., speaking Ebonics, playing basketball, wearing pants that sag) and are “schooled” to adopt behaviors and competencies deemed acceptable within White culture as a key to gaining or maintaining academic achievement (Diemer, 2007; Oyserman, Brickman, & Rhodes, 2007). However, there appears to be little room within the U.S. education system for Black students to exhibit their own culture without being subject to misrecognition, misunderstanding, and disciplinary sanctions (Good, Dweck, & Aronson, 2007; Maryshow, Hurley, Allen, Tyler, & Boykin, 2005). Students’ cultural assets are frequently misrecognized (George, 2012; Walshaw, 2011), causing Black students to be misidentified as deficient in their level of learning, language, ideologies, and practices (Hand & Taylor, 2008; Malloy & Malloy, 1998; Martin, 2007, 2009). Misunderstandings occur when authority figures interpret Black children’s behavior as anti-school and self-defeating—at worst, they are seen as “prisoners in waiting” (Alexander, 2010; Noguera, 2003; Smith, 2009). Managing the classroom has become more important than focusing on learning, and Black students are sanctioned more often than their White counterparts for many types

of behavior (Gregory, Skiba, & Noguera, 2010; Thomas, Coard, Stevenson, Bentley, & Zamel, 2009). These multiple forms of educational and social oppression have a deleterious impact on the learning and classroom participation of Black students in the mathematics classroom (Martin, 2012).

Having a bicultural identity or adopting bicultural competencies in the education context is based on the notion that African American students fare best by learning how to operate “properly” within the dominant White cultural milieu. Bicultural competence has been described as being able to balance multiple experiences (dominant and non-dominant forms of cultural capital) and to negotiate different physical and racial borders without compromising the essence of one’s home/cultural identity. Carter (2006) defines the term *cultural straddlers* as African American students who operate biculturally in high school. Carter differentiates cultural straddlers from *cultural mainstreamers*; the former group embraces their own cultural and racial identity, whereas the latter group appears to be fully assimilated into White culture and ideology. Cultural straddlers are also different from *non-compliant believers*, who reject the premise of straddling two cultures and prefer to operate almost exclusively within their own cultural and racial identity. Black students who adopt a bicultural identity and become cultural straddlers are said to embrace and value of both cultures and to negotiate across them with ease. They use both non-dominant and dominant forms of cultural capital to negotiate the education system. Therefore, cultural straddlers are considered to be best positioned to maintain academic success. Phinney and Devich-Navarro (1997) suggest that biculturalism is a way for Blacks to manage racism, achieve academically, and maintain a strong sense of group identity. Carter (2006) reasons that a bicultural identity enables Black students to overcome racially hostile environments.

Grounded in research conducted over a hundred years ago (e.g., Du Bois, 1903/2003; Woodson, 1933/2006), contemporary researchers have vacillated between the notion that marginalized students overwhelmingly practice biculturalism and that to the degree that they experience identity confusion, racism, classism, sexism, and other forms of marginalization, they are forced to conform to a dominant U.S. identity, sometimes at the expense of their original ethnic identity (Harris & Marsh, 2010). An opposing view of biculturalism dismisses the notion that it is a healthy fusion of two identities—the ethnic/home cultural identity and the dominant mainstream identity—and highlights the fact that some students sacrifice their ethnic identities in order to achieve academically and progress through the education system. For example, some researchers (e.g., Rudmin, 2003; Vivero & Jenkins, 1999) have reported that biculturalism can be maladaptive, leading to stress, isolation, and anxiety due to constant pressure to choose between being more like the dominant culture or true to one’s own ethnicity. Rowley and Moore (2002) note that biculturalism could lead to identity confusion

and a sense of resentment toward feeling obliged to operate in two cultures, with the dominant mainstream culture viewed as the ideal. Moreover, researchers who study African American racial identity recognize the contextualized ways identity and race often operate, which may complicate notions of adopting White mainstream culture as a path to achieving academic and career success (Rowley, & Sellers, 1998; Sellers, Morgan, & Brown, 2001; Sellers, Smith, Shelton, Rowley, & Chavous, 1998). In their research on the biculturalism and academic achievement of African American high school students, Rust, Jackson, Ponterotto, and Blumberg (2011) determined that cultural identity and academic self-esteem are important factors for academic achievement, but that biculturalism is not. Similarly, Black high school students who perceive a conflict between their second-class racialized status and their high academic achievement may experience internal strife (McGee, 2013a). However, as Schwartz and Unger (2010) suggest, in some situations and contexts it may make the most sense for students to behave and think in ways that are consistent with the dominant culture. Other theorists have investigated the relevance of racial/cultural identity in unpacking the academic achievement of African American students (e.g., Du Bois, 1903/2003; Arroyo & Ziegler, 1995; Murrell, 2009; Nasir, McLaughlin, & Jones 2009).

McGee and Martin (2011) provides evidence that Black STEM college students can be high achievers in their respective fields but often at a high psychological cost, due to racial stereotyping and other forms of bias. Therefore, adopting a bicultural identity may not be enough to enable high-achieving students to fend off negative racial stereotypes fueled by inequitable academic, environmental, and social conditions as they attempt to survive in an education system that perpetuates an ideology of racial inferiority (Warmington, 2009). The literature on the mathematics education of African American high school students is still largely silent about what happens to students who succeed academically in mathematics and mathematics related fields using a bicultural strategy to negotiate their success.

Exploring Biculturalism

The larger study from which this case is extracted explored the college and career aspirations of 24 mathematically talented Black youth who attended “urban” high schools in Chicago. The focus of the work was to gain a healthier and more grounded understanding of the strategies and competencies these students used to negotiate their environments and to achieve academically. Motivated by 12 students’ narratives, focusing in particular on Maurice’s counter-narrative, additional questions were explored:

1. How did biculturalism and/or the adoption of bicultural competencies operate in mathematically high achieving high school students who pursue STEM internship/employment opportunities that are predominately White?
2. What role if any does early exposure to STEM subjects and high achievement in mathematics play in students' college decision-making?
3. How do the students make sense of their future college and career goals?

This study adds yet another layer to the pros and cons of altering one's character or appearing to be transformed in order to climb the career (and academic) ladder. The study also seeks to explicitly differentiate the internalization of American middle-class values from adoption of these values without internalizing them, and thus using them, as Maurice's interview revealed that his mother instructed him, "to beat them [Whites] at their own game." Acknowledging students' abilities to operate in ways considered markers of success (e.g., the ability to socialize with White employers, high achievement in STEM classes) while suppressing critical components of their cultural/racial identity (e.g., having to lie about their mothers' employment status to avoid reinforcing stereotypes about Black women, smiling and agreeing with derogatory and racist/gendered comments about Black boys) could contribute to a more structural, systemic, and comprehensive explanation of the educational challenges faced by African American high school students (Murrell, 2009), who are academically poised for a future in the STEM fields.

The Participant

In preparing to interview mathematically high-achieving Black high school students who reside primarily in Chicago's low- and mixed-income neighborhoods, I gathered recommendations from mathematics teachers, who identified their top five to seven students, including those who scored well on traditional measures of academic and mathematics success. I conducted interviews with 24 of these students; all had a GPA of 3.0 or higher in mathematics courses. The interviews averaged 65 minutes each and were semi-structured.

Because these students were operating in predominantly Black environments, neighborhoods, and schools, my assumption was that there would be minimal discussion of the role racial stereotypes and other forms of racialized bias play in their lives. However, the coding and analysis showed that the exposure to STEM summer internships at predominantly White businesses gave students their first entry into managing White spaces, as their prior career and academic experiences required functioning in mostly Black educational spaces. Thus these new more racialized situations provided insight into the hierarchical racial and cultural ideologies that exist within these structures. In those discussions, a subset of 12 students shared the experiences they had encountered within predominately White spaces, which were primarily STEM internships or visits to STEM businesses.

However, 11 of the 12 students in this study were not able to offer much perspective on their ability to function within predominantly White contexts because of their limited opportunity to operate in such spaces. According to the high school's mathematics teachers, mathematics coach, and principal, Maurice was the student who appeared most familiar with negotiating both Black and White domains, having four STEM summer and afterschool internships since middle school. However, the other 11 students' experiences in those spaces strongly suggest that Maurice's narrative was similar to what theirs would have been, had they participated in greater numbers of STEM internships, visits, meetings, and speaking engagements in predominantly White environments.

The Methods

A phenomenological frame was applied in conjunction with an augmented form of life-story interview (McAdams, 2008, 2009). The philosophy underpinning phenomenology—in-depth description of particular phenomena or the appearance of these things as lived experience (Milner, 2007)—helped in designing a research strategy that flowed directly from the research questions and goals of this study (Patton, 2002; Van Manen, 1997). The students' lived experience, influenced by their internal perceptions and identities and the external context, helps give meaning to students' perceptions of a particular phenomenon. Life-story interviews were ideal for gaining an understanding of these students' mathematics and life experiences at various critical points in their development (McAdams, 2008, 2009). Life-story narrative allowed for chronology, and enabled me to conduct an analysis focused on how elements were sequenced, how the past shaped perceptions of the present, how the present shaped perceptions of the past, and how both shaped perceptions of the future (Reissman, 1993).

My initial research design included 12 of the 24 students who discussed their racialized experiences in relation to STEM as a result of being in predominantly White contexts. I sought to provide space for these students to articulate their viewpoints individually and within the larger paradigm of educational achievement. The aim was to better understand these students as mathematically high-achieving African American high school students attending urban schools in the same city. Similar findings across all participants had the potential to extend or challenge previous bicultural- and achievement-related theories.

The first reading of the transcripts revealed one striking component: the divide between the participants' stellar mathematics achievements and their intended college majors. I first coded for the rationale behind their chosen majors and careers, and then went into the body of each interview and coded for situations that helped to explain their rationale for majoring in non-STEM college majors. After a second and third reading of the transcripts, however, I realized that only one of these 12 students, Maurice, had discussed in depth a host of experiences

where he accomplished success in dominant spaces by, as he expressed it, “playing White.” I chose to focus on Maurice in this iteration of the study because of his expressed ability to negotiate a number of environments dominated by Whites and while remaining authentic and successful in Black contexts. He dealt with racist language, mannerisms, questions, and dialogue, but, nonetheless, was admired by both peers and White and Black educational and occupational stakeholders for being successful. For example, another participant in the larger study said that Maurice was “just as much admired by super duper White folk as [by] his own boys...and he’s still Black.” Thus, I continued my data analysis by examining Maurice’s video- and audio-tapes, the written transcripts, and his demographic questionnaire.

The Analysis

My interpretation of the research data was ongoing, and the phenomenon of biculturalism and bicultural competencies appeared throughout all iterations of my data analysis. During the coding process, I extracted statements in which Maurice addressed his past, current and *anticipated* future career trajectories, and then coded for experiences during which he said his identity was compromised. For example, he described a situation where he felt hurried into taking a leadership position; feeling as though he was being used as he mumbled, “a token and showpiece” for his high school. I coded for those types of reflections and subsequent decisions he made based on his perceptions of those situations. I applied additional sets of codes that focused on his choice of college major. Various forms of racial bias were evident in his narrative. I coded for these influences, in particular to highlight how he made sense of these racialized experiences.

Once the interview was coded, coordinated, and rearranged, I conducted a thematic analysis (Braun & Clarke, 2006), the aim being to understand Maurice’s social realities in a subjective yet scientific manner. After multiple iterations of identifying core consistencies and meanings, the categories and subcategories revealed several themes related to the aforementioned research questions. This analysis helped to organize the dataset and describe it in rich detail, and to interpret various aspects of the research study (2006). Each theme captured important components of the data relative to the research questions and represented some level of patterned response across time periods of Maurice’s life.

As part of my assumption that a student’s beliefs and responses change as she or he develops, matures, and accumulates life experiences, I organized the results into three overarching academic periods of Maurice’s life, resulting in three overlapping frames—K–8, high school, and future college outlook—taking into account changes as he developed and leaving room for new themes that might emerge. The future college outlook frame is where perceptions about his future identities and college aspirations presented a glimpse into Maurice’s likely

future career choices. This analysis emphasized the importance of unpacking the human development of this mathematically high-achieving African American student in an urban high school who is negotiating predominantly White STEM spaces.

The Findings

Maurice took issue with having to “play the game” by adopting policies and ideologies that were centered on White middle-class culture, although he seemed to have mastered that “game.” Maurice had sufficient experience to be considered an effective cultural straddler (Carter, 2006). He practiced a variety of bicultural competencies (e.g., code switching, appearing comfortable and proficient in both dominant and non-dominant settings, and watching TV shows and reading newspapers that made him knowledgeable about both cultural contexts). Meeting the challenges of appeasing both groups, however, caused him great anxiety and apprehension. Despite being somewhat of an expert at adapting and imitating White mainstream behaviors and mannerisms, Maurice, in fact, made a considerable effort to resist embracing a bicultural identity. In some ways, his story counters the notion that a bicultural identity and competencies provide an optimal path toward postsecondary academic success, particularly in the STEM fields.

The results of this study are presented concisely through Maurice’s interview; however, his story is not told in isolation. Of the 24 mathematically high-achieving high school students who participated in this study, only two indicated a desire to pursue a STEM-based college major. Maurice is just one of the many students in this study who was a consistent high achiever in mathematics and demonstrated the presence of bicultural competencies. However, as discussed below, he had already decided to opt out of a STEM path in college and career.

Maurice was a senior in high school at the time of the interview. He was said to have a “dynamic personality” and an “ability to connect with people of very different backgrounds,” two comments taken directly from a mathematics teacher and the mathematics coach at his high school, respectively. Maurice was known for having innovative bicultural competencies. He did not “totally” deplete himself of Black dialect, style, behaviors, and mannerisms, thus Maurice learned when to use his Black cultural capital to his advantage (Carter, 2003). He was able to learn from and communicate effectively with a variety of people without compromising his affinity for his own Black culture.

Maurice began the interview with vivid memories of his childhood and early schooling. He was grateful that his parents, married over 20 years, transferred him from a “bad” neighborhood school to a predominantly Black Catholic school. During Maurice’s K–5 years, his family struggled financially, but they later achieved what he defined as middle-class status: “two cars, nice house, summer camps, and family vacations.” Maurice briefly discussed his responsibility as a

role model for his younger brother and spoke extensively about his middle school and high school years, praising his teachers, parents, and mentors for recognizing his talent in mathematics and his leadership skills. He commented that he refined his English language and speaking skills in middle school when he attended a culturally affirming poetry and rap afterschool program. He believed this program helped him to learn how to code switch, a term he was already familiar with and described as, “masking my Blackness while wowing them with their own tools.”

Maurice attended several STEM-based afterschool programs and summer camps and secured a paid internship as a civil engineer in training, working with a predominantly White civil engineering company that provided environmentally friendly building and bridge design services. I concluded the interview by asking Maurice a few questions about his college and career goals. Based on my impressions of his talents and opportunities in the civil engineering field, I was convinced that Maurice would choose engineering as a major (even though I was not supposed to draw such conclusions). To my surprise, when I asked him what type of career he would pursue, he replied, “I want to be a football player.” All my training on appearing objective and non-biased evaporated and my jaw dropped. Maurice, being keen on interpreting the behavior of traditionally educated persons, acknowledged the change in my behavior with this poignant comment:

You see, Doc, it’s really not just about the football. If I become a football player, I can get 8 tattoos, have 3 baby mommas, and walk around [with] an entourage of niggas, and throw big house parties in my mansion. I can do all of that and no one is going to question my abilities and talents on the football field. Further, they are going to allow me to engage in all of that behavior, maybe even encourage it, as long as it does not affect my game. Now, if I went into civil engineering and I got my PhD, let’s say I even got two PhDs, every day, someone somewhere is going to question and challenge my ability to do my job. Sometimes it will be subtle, others times it will be in my face, but it will always be there. That I know.

Maurice explained that he had been thrust into situations where he became a victim of racial stereotyping and other forms of racial bias. For example, he recalled being treated liked an anomaly when a member of a prestigious scholarship committee said to him, “Your race should be proud of such a well-behaved, well-mannered young man like yourself.” In another instance, Maurice was assumed to fit the stereotyped of Black male underachievement and deception when a substitute mathematics teacher accused him of cheating because he scored 100% on a quiz. After the principal vouched for Maurice’s intellectual ability and integrity, the substitute teacher admitted that she had never taught a Black male who “was able to get a perfect score.” Although Maurice attended a predominantly Black urban high school, he was constantly being told that he had to work twice as hard academically and three times as hard in engineering because his future was going to be full of low expectations about his abilities in that field. His two summer in-

ternships at an engineering firm, along with his participation in afterschool STEM programs that were sponsored and conducted through a Fortune 500 company, illustrated the spoken and unspoken racial dynamics in a STEM workplace. The companies Maurice visited and interned with had similar racial employment dynamics: non-U.S.-born engineers, White managers, Black female secretaries, and, according to Maurice, “if I’m lucky, a Black [male] janitor.” Maurice went on to say that his frequent and seemingly constructive experiences in STEM-related workplaces actually did him more harm than good. In his words, “I’ve seen too much, I know too much.”

Although Maurice clearly was skilled at exhibiting bicultural behaviors, had exceptional mathematical ability, and was seen as a prized engineering intern, he did not care for what he experienced in the context of his internships. Furthermore, he did not want to spend his career in a field where proving himself or faking his identity would be a normalized daily task. As Maurice made sense of his STEM experiences, he decided that the multitude of racial stereotypes and other forms of bias were “too much” and that he wanted to carve out a more racially affirming career path. It was not that he did not like engineering, but rather, as he concluded, “I just don’t like [engineering] enough to put up with the BS.” Maurice this racialized narrative to discuss his rationale for not accepting a third summer internship at a local engineering company:

The Indian and some of the White engineers in my group section rarely spoke to me, unless my manager was around. Then they [the engineers] treated me extra nice, which disgusted me even more. Most of the engineers hate the managers too. All the managers are White males, except for one White lady. Now you would think that we [the one White female manager] would get along because they treat her kinda like they treat me [invisible], but she treats me like I’m a nuisance. The White managers treat me like an affirmative action, token Negro...all they talk about is my potential. I could design a bridge system that could save the company a hundred thousand dollars and they would still be talking about my potential.

Later in the interview, Maurice admitted that it was not his desire to throw big parties and have lots of “baby mommas,” or tattoos, although he did enjoy hanging out “with [his] boys.” Maurice wanted to follow in his father’s footsteps and be “married forever” and have two children. He used the stereotypical Black male pro football player example merely to make a point about finding a career in which racial and gender stereotypes would not impede other people’s perceptions of his abilities. At this point in his development, Maurice appears unwilling to deal with the trauma that he faced and the distress he expects to occur regularly in the engineering workplace, where being both Black and proficient in engineering is deemed a suspicious exception rather than the rule. Many of the other participants in the study expressed interest in careers where they saw examples of successful Blacks, such as doctors, rappers, or music producers, or in fields they per-

ceived as serving Black communities, such as social workers, psychologists, and civil service workers. These choices reflect the results of Beasley's (2011) study, which documented the experiences of Black students who graduated from elite colleges, finding that their career trajectories were positioned toward less prestigious employment in fields known to directly address social and racial inequities, such as education, social work, and community and nonprofit organizing.

Biculturalism: Unintended Consequences and Flawed Strategy

Okay, instead of asking us [Black students] to get good at playing the game, ya'll should be questioning, why do we have to play the game in the first place?

—Maurice

Maurice practiced biculturalism in ways that both created opportunities (e.g., building STEM competencies, having increased STEM exposure, and receiving financial compensation) and created a culturally repressive set of identity constraints (e.g., feeling the need to master White ways of being). Members of historically underrepresented groups often grappled with how to succeed in fields that are riddled with real and perceived racial, ethnic, and gender stereotypes. Because of this struggle, Maurice decided against a career in engineering, which he felt would obligate him to yield more to the dominant way of being than he was willing to give. He described this dominant ideology as, "White ways of thinking, behaving, and doing. ...I'll probably have to even start dreaming in White if I want to keep up the façade." Although he had developed the skill set needed to be competent in the field if he so desired, Maurice was unwilling to risk compromising his more culturally encouraging identity. It would be difficult to conclude from this data that biculturalism is a necessary skill for negotiating early STEM career opportunities; however, it would be safe to say that being bicultural, for Maurice, was an essential but identity-compromising competency that troubled his aspiration to choose a STEM field as a viable career option. (Of course, it is important to note that Maurice's feelings documented here captures but a brief moment in his life, much can happen that might change his future career aspirations.)

Although Maurice was quite savvy about moving in and out of mainstream culture, he did so with silent resistance and quiet trauma as he gravitated toward a life in which his own culture would be validated. Maurice seemed to conform to mainstream behaviors and ideologies only as a strategy for achieving educational and employment success. His choice of football as a career was undoubtedly risky, as it is more likely that Maurice could become a civil engineer than a professional football player. In 2011, there were roughly 1,119 Black professional football players versus 128,042 Blacks employed in four types of engineering ca-

reers—in other words, there are approximately 114 times as many Black engineers as Black professional football players (National Action Council for Minorities in Engineering, 2011; Plunkett, 2012). Even though he excelled in mathematics and negotiating White STEM spaces while in high school, both of which were viewed as dominant cultural markers and forms of cultural capital, Maurice's identity was primarily embedded in his ethnic and racial cultures, making football, in his eyes, a mentally healthier option to preserve his "good sense."

Maurice's experiences would be hard to quantify on a measure or survey. It would be fairly easy to attribute his career decision-making to a lack of appropriate college and career counseling, if it were not for the extensive career and college counseling his high school provided. Maurice's parents and high school were very skillful in negotiating educational and scholarship opportunities, particularly for students like Maurice who exhibited talent in mathematics and science. Maurice's early and repeated exposure to the STEM fields and courses was initiated and nurtured by his parents and enhanced by multiple forms of support from the high school.

Maurice's narrative should lead us to wonder how many other Black or historically marginalized high school students who are exposed to and, more importantly, who succeed in the world of STEM early in their education are turned off by the multitude of racial put-downs and bias they encounter. This issue applies particularly to students like Maurice, who are able to function and thrive in STEM settings through their skill in STEM disciplines and their bicultural competencies but may be troubled by what they experience. His narrative troubles the definition of biculturalism, which often is framed as *belonging* to two or more cultures (Mok & Morris, 2012), as opposed to *belonging* to non-dominant culture and feeling obligated to *pretend to belong* in a dominant culture (Acevedo-Polakovich, Quirk, Cousineau, Saxena, & Gerhart, 2014). This understanding of biculturalism implies that Black students, through part-time assimilation, can sustain educational ideologies and behaviors that perpetuate the dominant power structure in our society (Boyles, Carusi, & Attick, 2009). For Black students who are persuaded to adopt bicultural competencies and behaviors, assumptions are made about what they know about negotiating White educational spaces, as if adopting a bicultural identity simply means having mainstream cultural values deposited into Black students' culturally empty brains (Freire, 2005).

Biculturalism as a strategy for Black students adopt to achieve success requires closer examination in terms of the particular ways the dominant culture stigmatizes historically underrepresented groups, which puts them in danger of experiencing multiple forms of disadvantage and marginalization. Du Bois (1903/2003) described the trouble associated with Black people experiencing double-consciousness as two warring souls, one Black and one White, where the White soul remains privileged and normalized as ideal, which problematizes the

freedom Black students have in resisting biculturalism. Biculturalism mandates that Black students co-opt educational ideologies that stress individualism, competition, and a host of culturally mainstream policies and practices considered more compatible with the values that are valued by White mainstream culture (Bonilla-Silva, 2001). As a result, some Black students are left with the impression that their original cultural identities are deficient and pathologic and they learn to think of their race and culture as inferior (Boyles et al., 2009). Those who challenge this narrow framing may also resist careers that are strongly associated with maintaining dominant cultural capital, such as STEM careers. This was, in fact, an unintended consequence of introducing Maurice to an early STEM career trajectory.

Concluding Thoughts

Some high-achieving Black students may reject biculturalism and other forms of assimilation and thereby reject an educational system that ignores or dismisses their cultural identities. Denouncing biculturalism, however, may block those students from opportunities to learn and succeed in college. Maurice's resistance to being stereotyped and marginalized, in part, determined his projected post-secondary career choice as a NFL professional football player, where he has .215% chance of success. As a result of his racialized experiences with his STEM summer and employment opportunities—which were deemed successful from the perspective of his school principal, mathematics teachers, mathematics coach, and the STEM employer—Maurice very well may be one of the many mathematically high achieving students opting out of STEM. Maurice acted out bicultural competencies without embracing biculturalism as an identity. I believe experiencing STEM through these biased contexts forced him to become more aware of the racial inequities in this country that create and perpetuate the normalized racial abuse faced by many marginalized yet high achieving students. Mathematically high-achieving Black high school students who disengage from pursuing STEM college and employment opportunities represent a loss of potential and talent for the STEM workforce, which can leave these students dodging from prosperous and innovative career pathways, despite being fittingly qualified for them (Beasley, 2011).

Maurice's story speaks to a larger demand echoed by some critical educators that STEM education and careers be altered in ways that respect and appreciate the intellectual and humanistic qualities of all individuals (Akins, 2013; Strayhorn, 2013). Thus, I argue that that Black students like Maurice will continue to resist working in fields where they must perform in ways that honor the mainstream and subjugate their own culture and identities, which could manifest by foregoing racially insensitive or hostile college majors and career fields. My hope

is that Maurice's story will serve as a reminder that great and seemingly honorable efforts to make STEM experiences equitable for marginalized students are insufficient. Addressing the crisis of Blacks and underrepresented students in the STEM fields must extend beyond the racialized nature of academia and progress to the STEM workplace.

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