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The Lived Experiences of Academically Successful Undergraduate Black Males in STEM Disciplines at a Predominantly White Institution

Abstract

This qualitative, interview-based study was designed to capture the success strategies of 10 academically successful Black males within the junior or senior years undergraduate education, who were enrolled in a STEM program within a predominantly White institution. Results suggest that although academically exceptional, the lack of ethnic diversity amongst faculty and their peer group influenced the academic experience(s) and confidence levels of study participants. Further, the results imply that a sense of belonging is so key to thriving academically that among implanted success strategies is the development of peer groups and seeking mentors from academic departments other than their own. Some of the recommendations for stakeholders include increased, focused recruitment of ethnically diverse faculty, as well as an awareness of how demographics impact learning styles increased inclusive spaces.

Document Type

Dissertation

Degree Name

Doctor of Education (EdD)

Department

Executive Leadership

First Supervisor

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Second Supervisor

Ruth Harris

Subject Categories

Education

The Lived Experiences of Academically Successful Undergraduate Black Males in
STEM Disciplines at a Predominantly White Institution

By

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Submitted in partial fulfillment
of the requirements for the degree
Ed.D. in Executive Leadership

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Ralph C. Wilson, Jr. School of Education

St. John Fisher College

May 2019

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Dedication

This dissertation is dedicated to my beloved and late maternal grandmother, Elouise Wade, and to my nephews, Taj McKnight and Andrew Hodge. I pray that this study encourages predominantly White institutions to continue to take a genuine interest in creating more inclusive learning spaces for beautiful, brilliant Black males like you.

There are many people who have prayed over, pulled, pushed, and given me invaluable support during my doctoral journey. For the sake of brevity, I cannot record each individual here; however, if you do not see your name, know that you are appreciated, and your support will never be omitted from my heart. This doctoral degree is *ours*.

First and foremost, I thank God for providing me with the strength and tenacity to stay the course throughout every adversity, seeing this journey through to completion. Had it not been for His presence, my flesh would have yielded and removed me from the journey at the very first hurdle. I am grateful that Your promises have never returned to me void.

I would like to thank my dissertation committee: Jeannine Dingus-Eason, Ph.D. (Chair), and Ruth Harris, Ph.D. (Committee Member), for challenging me to think more critically. While the process was not always easy, I count it a blessing to have been under the guidance of two exceptional scholars.

To my cohort mates, Cord Stone, Ed.D. and Daniele Lyman-Torres, Ed.D.: Thank you for singing me through hours and hours of instruction and providing me with in-

person emojis, making me laugh until my face hurt. Your willingness to often set yourselves aside and provide insight or encouragement meant so much, making it nothing short of an honor to have traveled this journey with you. I cannot wait to see what each of you will do in your efforts to leave the world better than you found it. To Ms. Lisa M. Thompson: You are such a kind, selfless individual. I appreciate you sharing all your positive energy with me.

To my dear friend, Dr. Lesli C. Myers, thank you for being such a great confidante and prayer warrior who consistently demonstrates sisterhood. I also appreciate you introducing me to Dr. Andrea Cain, who quickly became one of the best coaches and supporters I could ask for. To D. L. Gaston, I appreciate your unwavering support of me during one of the most challenging periods in my life, reminding of my “why” at every turn. Dr. Kimberly Willis, Dr. Kim McKinsey-Mabry, and Dr. Shelitha Williams: In you, I have the trifecta. Your demonstrated professionalism, stick-to-itiveness, unconditional love, and occasional check ins (while gracefully managing your respective families) assisted me in maintaining focus many a day.

To my sisters, Nketia Hodge and Indhira Marchial, and my brother, Edward L. McKnight, Jr.: While you were not always able to physically be with me on this journey, due to the miles between us, to the best of your ability, you showed up when it mattered most.

Kevin McDonald, J.D., Ed.D., thank you for your consistent encouragement and mentorship, even from afar.

Keith Jenkins, Ph.D., I appreciate your support throughout my doctoral journey. To all of my former colleagues in the Division for Diversity and Inclusion, thank you for cheering me on and lending support when and where you could.

LaVerne McQuiller-Williams, J.D., Ph.D., your sense of humor, guidance, and encouragement meant so much. It is an honor to call you “colleague.”

I would be remiss if I did not thank all the young men who participated in my study. The transparency in which you shared your lived experiences shaped this study beyond what I could have anticipated, and it was nothing short of inspirational.

Biographical Sketch

Sharitta F. Gross was born in Rochester, NY. She attended the State University of New York at Albany and graduated with a Bachelor of Arts degree in English with a concentration in Africana Studies. She earned a Master of Arts degree in Liberal Studies with a concentration in Public Administration from The College at Brockport, State University of New York, followed by an Advanced Certificate in Project Management. Prior to starting her doctoral studies, she held positions as a Career Services Coordinator and thereafter as an Assistant Director of Student Development. In 2019, she was hired as the Vice-Chair of the Cheryl Speranza Leadership Institute, housed within Our Lady of Mercy School for Young Women. Her responsibilities include benchmarking in the development, implementation, analysis, and continuous improvement of the Institute's programmatic components. Her duties also include the development of a mentoring component of the Institute, coordinating and executing symposia, and collaborating with the Chair to develop a world-class program for economically disadvantaged Black and Hispanic girls.

Ms. Gross began the Ed.D in Executive Leadership program in the fall of 2014. She conducted her research on academically successful undergraduate Black males in STEM disciplines within a predominantly White institution under the direction of Jeanine Dingus-Eason, Ph.D. and Ruth Harris, Ph.D. Ms. Gross received the Ed.D degree in 2019.

Abstract

This qualitative, interview-based study was designed to capture the success strategies of 10 academically successful Black males within the junior or senior years undergraduate education, who were enrolled in a STEM program within a predominantly White institution. Results suggest that although academically exceptional, the lack of ethnic diversity amongst faculty and their peer group influenced the academic experience(s) and confidence levels of study participants. Further, the results imply that a sense of belonging is so key to thriving academically that among implanted success strategies is the development of peer groups and seeking mentors from academic departments other than their own. Some of the recommendations for stakeholders include increased, focused recruitment of ethnically diverse faculty, as well as an awareness of how demographics impact learning styles increased inclusive spaces.

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Chapter 1: Introduction

The importation of foreign talent by the United States to fulfill demands within the science, technology, engineering, and mathematics (STEM) field has been a long-standing practice. As documented in *Rising Above the Gathering Storm* (National Academy of Sciences, National Academy of Engineering, and Institute of Medicine [National Academies], 2007), the United States ranked 20 out of 24 countries in the percentage of 24-year olds who possessed a bachelor's degree in the natural sciences or engineering. The National Academies (2007) report further suggests that the United States increase its percentage of 24-year-old undergraduate degree holders from 6 to 10%—a benchmark that most countries have attained. This is of particular importance given that the United States draws its software and engineering workforce from persons with at least a bachelor's degree (National Academies, 2011). The number of individuals with the needed skills for the United States to be competitive in the STEM arena and who have been admitted into the United States under the legal quota has been significantly reduced in recent years, despite an estimated 12 million illegal immigrants residing within the nations' borders (National Academies, 2010). The barriers faced by scientists and engineers holding temporary visas further impacts America's ability to obtain and retain talent from abroad (National Academies, 2010).

As of 2010, China's number of undergraduate degrees in the natural sciences and engineering had increased to 42% per year, superseding the United States at 3% per year increase (National Academies, 2010). Following the events of 9/11, immigration

processes were significantly tightened, resulting in a reduction in the number of H-1B visas granted (National Academies, 2010). In the United States, as of 2010, 35% of the engineering faculty was foreign born and 57% of postdocs in the United States were temporary residents (National Academies, 2010). The statistics related to U.S. STEM talent are concerning given the continual shift in immigration policies because they have created a talent crisis for the United States.

In the fiscal year 2010, the issue of a lack of U.S. STEM talent became so pressing that \$3.4 billion was put toward engaging more people in the STEM fields through various training programs (National Science and Technology Council [NSTC], 2013). Research demonstrates that increased participation of underrepresented minorities significantly impacts the talent pool, while improving the nation's global economic leadership (National Academies, 2011). To effectively address this talent crisis and lack of diversity in the STEM field, Palmer, Maramba, and Darcy (2011) suggested the United States will need to increase its emphasis on retention of the underserved population in STEM disciplines within higher education institutions. Black, Latina/o, and Native American students comprise approximately 30% of the national population; however, they earn only 12% of the degrees granted in the field of engineering (Harper & Newman, 2010). Further, Blacks received 6.1% of the degrees in mathematics and statistics, 6.7% of the degrees in physical sciences, and 5.2% of the degrees in engineering (Harper & Newman, 2010). Black males' opportunities to complete baccalaureate degrees, particularly in engineering disciplines, has been identified as a strategy to improve the United States' ability to compete in a global economy, while addressing the lack of diversity in STEM (Flowers, 2015). The U.S. talent crisis and lack

of racial diversity within the STEM field makes focusing on academic success in relation to underrepresented populations essential, particularly academically successful, talented “Black males whose educational plight pushes them to the wayside” (Grantham, 2011, p. 263).

Although initiatives have been developed to attract and retain minorities in the STEM fields, the numbers remain stagnant regarding Black males with “data consistently depicting a widening achievement gap in comparison to their gender and ethnic counterparts” (Flowers, 2015, p. 65). Black males have represented below 5% of the United States undergraduate population since 1976 (Strayhorn, 2010). Due in part to the lack of focus on the individual needs of Black male students, research reflects the many efforts made over the past four decades to address underrepresentation in the STEM field (Brooms, 2017).

In 2013, the NSTC showed that Black male high school graduates earned an estimated salary of \$30,723. Comparatively, Black males with baccalaureate degrees had the potential of earning an estimated salary of up to \$55,655. With the rising cost of living across the United State, the disparity of almost \$25,000 in potential salary could have an impact on the quality of life for Black males. Higher education institutions within the United States will need to identify strategies to cultivate homegrown, diverse talent utilizing existing resources (NSTC, 2013). This will, in turn, contribute to the United States remaining a leader within the global economy (NSTC, 2013).

Since higher education institutions are the primary producers of STEM workforce talent, it is imperative that they provide an inclusive, welcoming environment for prospective students within the underserved populations, particularly Black males (Wood

& Palmer, 2015). The exploration of factors contributing to the academic success of undergraduate Black males in STEM are an integral part in identifying strategies to increase their success rate, to better align their success rate with that of their female counterparts, as Black females outnumber Black males with a 2:1 graduation ratio in the STEM disciplines (Strayhorn, 2010). Although initiatives have been developed to attract and retain minorities in STEM fields, the number of Black males remains stagnant. Given the shift within immigration policies, the importing of talent is not as feasible for the United States as it has been in the past. The delays in visas and other uncertainties have resulted in foreign students and prospective applicants being deterred from pursuing employment in the United States (NSTC, 2013), which is a factor that goes beyond an educational institution's control.

Problem Statement

Despite the development of programs offering full tuition to students interested in the STEM disciplines, the number of minority students completing undergraduate STEM programs continues to be low (Hubbard & Stage, 2010). More than any other gender or ethnicity, Black males are not represented in high numbers within predominantly White colleges and universities (PWIs), which is of concern to many administrators, requiring the attention of organizations such as the National Science Foundation and the White House. Based upon an inventory conducted by the U.S. Department of Education (USDOE), Academic Competitiveness Council (2007), there were 105 programs across 12 agencies, totaling an expenditure of \$3.13 billion in funding for the 2006 fiscal year. Of these programs, 70 were directed toward the undergraduate and graduate education levels, with 57 programs aimed at the underrepresented population (USDOE, 2007). The

National Academies (2011) documents initiatives, such as the Alliance for Graduate Education and the Professoriate, the COMPETES Act, NIH Minority Access to Research Careers, and the NSF Louis Stokes Alliance for Minority Participation, as concerted efforts designed to attract and retain Black students within the STEM field.

Placing emphasis on the success factors of Black undergraduate males in higher education may provide the needed shift toward changing the environment in which Black males are educated (Brooms, 2017). Researchers have found that what seems to work, from an institutional perspective, are (a) utilizing faculty as mentors, (b) encouraging peer group support systems, and (c) offering enrollment in institutional support programs, such as summer bridge programs, all of which are well-tested concepts relating to the academic success of Black males (Brooms, 2017; Harper, 2011; Strayhorn, 2010).

Although signs of progress exist for this group, the racial and ethnic disparities that have plagued many groups of color in STEM persist (Harper & Newman, 2010). Thus, “it is imperative that educational researchers, policymakers, and practitioners continue to better understand how they can foster success among this population” (Museus, Palmer, Davis, & Maramba, 2011, p. 20). This type of understanding may be obtained with research that features the lived experiences of academically successful undergraduate Black males, which this research seeks to provide. As Howard (2013) suggested, to include Black males’ voices would construct a new paradigm on Black males’ experiences and outcomes, bringing sustainable retention solutions to the surface. This can be done with the intent of dismantling dominant discourse surrounding race, class, and gender groups (Howard, Flenbaugh & Terry, 2012).

Black males in undergraduate education. Black males are considered an endangered group because of their deteriorating academic, social, and leadership status in schools and communities (Grantham, 2011). According to the National Center for Education Statistics (NCES, n.d.), the percentage of Black males and Black females enrolled in college between 2003 and 2013 reflected only a slight difference, with Black females enrolled at 36% in 2003 and 38% in 2013. Statistically, Black females not only attend college at a higher percentage, they are also the only racial group in which females appear to frequently attain greater rewards than males (Hagedorn, Maxwell, & Hampton, 2002). Essentially, Black females experience greater professional and academic success than their male counterparts. Compared to 40% White students, only 24% of underrepresented minorities (including Black males) complete a bachelor's degree in science- and engineering-related fields within 6 years of initial enrollment, representing a large and persistent racialized attainment gap (Harper & Newman, 2010).

The literature examining educational outcomes of Black male undergraduate does, however, examine their success from an institutional perspective (Harper, 2010). For example, research has examined attendance at historically Black colleges and universities (HBCUs), the activity of faculty mentorships, the formation of institutionalized peer groups, and the creation of institutional summer programs, such as summer bridge programs (Brooms, 2017).

Institutional success factors. When evaluating the retention of underrepresented students in PWIs, student-to-faculty interaction, peer groups, and summer bridge programs are often viewed as interrelated. This could be due to each factor also being linked to creating a sense of belonging, which is a factor research notes as having a high

impact on retention (Brooms, 2017). The lack of underrepresented student retention in institutions (Flowers, 2015) requires PWIs to take note of the environment created for underrepresented students and the sustainable support mechanisms established therein (Wood & Palmer, 2015).

Student-to-faculty mentorship. Diversification of the student population is key; however, how diverse (underrepresented) students are on their campus matters and how their resources are presented also matters (Brooms, 2017). The successful completion of a baccalaureate degree is largely dependent upon the inclusivity created within the environment. The National Academies (2011) noted that the culture and climate of institutions impacts the entire undergraduate experience for underrepresented students. Faculty who are attentive to student concerns and who are proactively addressing academic progress contribute to an inclusive environment (Wood & Palmer, 2015).

Engstrom (2008) highlighted the importance of faculty demonstrating an awareness and sensitivity to diversity and various learning styles. Engstrom (2008) further implied that it is not sufficient to settle for simply teaching content effectively. Faculty development efforts must be targeted at restructuring how instruction is delivered, as well as how the integration of academic support is supplied to the classroom (Engstrom, 2008). This approach requires faculty to go beyond simple fixes, such as creating a more detailed syllabus in the hopes of quelling the many questions a Black male student might have or by extending office hours (Engstrom, 2008). The effort must be genuine and part of the faculty projects during all interactions (Engstrom, 2008). The suggested level of faculty and student interaction facilitates students learning firsthand, as to how the experts think about and solve practical problems through interacting with their

students outside the classroom (Kuh, 2009). As a result, their teachers become role models, mentors, and guides for continuous, lifelong learning (Kuh, 2009).

It is imperative that Black male students are afforded the opportunity to interact with faculty of color, as many students express the impact of not seeing a Black educator prior to reaching higher education (Brooms, 2017). Harper and Davis (2012) provided an example of a student who experienced a first encounter with a Black male teacher in his freshman year of college. Minority students who do not see people like themselves in positive roles are deprived of the comfortability that such a rapport with others can provide, and having positive role models can assist these students by adding a comfortability with faculty when they enter a collegiate environment (Sinanan, 2012). When students are able to interact on a meaningful level with a faculty member who has obtained the credentials required to become a faculty member, it provides a more viable example of the possibilities that these students have in the world of academia despite their racially driven adversities (Harper & Newman, 2010).

Student-to-faculty relationships have proven to be key in improving the retention of underrepresented students in STEM disciplines within PWIs (Harper & David, 2012). Harper and Davis (2012) discussed the reflections of a student at Florida State who indicated that it was not until his freshman year that he saw a Black male professor. It is imperative for colleges and universities that are concerned about the academic success of their students of color to recognize that academic success or failure is, in part, directly related to unmet cultural and developmental needs (Marbley, Bonner, Williams, Morris, & Ross, 2013). In promoting faculty-to-student interactions in and out of the classroom, faculty members can also make students feel more welcomed, which tends to encourage

their academic performance (Ro & Loya, 2015). The college environment can either facilitate minority students' involvement on campus, or the college environment can marginalize them in ways that deny access to supportive networks that are critical to their success (Strayhorn, 2012).

Several success factors contribute to the success of undergraduate Black males in higher education (Wood & Palmer, 2015). The demeanor of faculty greatly contributes to the institutes' climate and underrepresented students' overall experience (Wood & Palmer, 2015). While the academic success of every student requires positive engagement with all faculty they encounter, faculty have been recognized in research as having a great influence on the academic success of undergraduate Black males (Smith, 2003). Research has shown that Black males' success is impacted at various levels, including the micro level through faculty attitudes and interactions (Marbley et al., 2013). When students feel isolated, they will often seek out peers who have a similar experience, forming a peer group (Bonner & Bailey, 2006). Peer groups are one of the strategies that underrepresented students leverage to create a sense of belonging in a PWI (Brooms, 2017). Summer bridge programs also assist underrepresented students in transitioning from high school to college (Wood & Palmer, 2015).

Underrepresented students enter a PWI environment aware of the cultural differences, and they can have preconceived notions that may or may not exist regarding their ability to excel academically (Dancy, 2010). Dancy (2010) posited that this may, in fact, be due to Black undergraduate males on campus being in constant transition, because there is a constant need for them to transform into the community, which is a task for even the most adept individual. Strayhorn (2008) suggested that there is a need

for colleges and universities to be more intentional about fostering a campus climate where students feel encouraged to develop meaningful relationships with peers of diverse racial and cultural backgrounds (Palmer, Wood, Dancy, & Strayhorn, 2014). Dancy (2010) suggested that men enrolled in PWIs argue that colleges must support the intent of affirmative action efforts, maintaining a commitment to culturally sensitive hiring practices for faculty, staff, and administrators. These men desire a social system in which they feel centered, which essentially refers to their being in an environment that accepts and celebrates them as Black men, while seeing them as capable of academic success (Dancy, 2010). The presence of African American faculty members and administrators contribute to this end goal. This indirectly impacts the students' perception of their environment (Dancy, 2010). Because social and personal isolation and lack of belonging appear to be central factors in many African American students' satisfaction and success on predominantly White campuses, school personnel must understand how these issues operate and develop effective interventions for these individuals (Sinanan, 2012).

Institutionalized peer groups. Black undergraduate males attending PWIs often seek out students to establish a point of relativity, addressing the often-present lack of a sense of belonging (Wood & Palmer, 2015). Wood and Palmer (2015) stated that Black undergraduate males felt that becoming a part of a peer group helped to assist them in facilitating a sense of belonging in an environment that differed from their backgrounds.

Participation in peer groups addresses what Broome (2017) categorized as “the third major concern for students as they pondered their transition [from high school to college] was [a sense of] belonging on campus” (p. 49), which also impacts a sense of self.

The Black male initiatives (BMI) explored by Brooms (2017) described Black male participation in peer groups in which the men coached and guided each other in navigating and negotiating the campus. These “BMIs were included social outings, weekly/monthly meetings, and group discussions relating to their future goals” (Brooms, 2017). Brooms (2017, p. 187) stated that

Peer groups prove to have multiple benefits for Black male participants, including, but not limited to: (a) increased sense of belonging on campus, reaffirming and re-centering their sense of purpose; (b) increased sense of accountability, motivating them to perform academically; and (c) identification of ways to reject one-dimensional images and projections of Black males.

As encouraging as peer groups can be to Black undergraduate males in STEM, some hesitate to participate in such groups because of experiencing stereotype threats and other challenges associated with adapting to a college environment (Wood & Essien-Wood, 2012). “Being men meant that students had to be self-reliant for looking out for themselves and their interests” (Brooms, 2017, p. 185) or, as one student asserted, “being away [from home] makes you a man (Brooms, 2017, p. 185). The benefits peer groups assist in student retention and an increased social integration.

Institutional summer bridge programs. Summer bridge programs facilitate Black male students in becoming better prepared for the rigor of college, while addressing a need to have a sense of belonging via building a sense of community with their peers. Black students in PWIs often seek out peers with similar characteristics, such as similar hometowns, ethnicities, gender, or anticipated academic major(s). Summer bridge programs also allow students to be introduced to and interact with faculty prior to

beginning their academic career (Wood & Palmer, 2015). Early interaction with faculty further assists students in bridging the gap between high school and college, and second to peer groups, it is the most significant aspect of students' undergraduate experience (Cuyjet & Associates, 2006).

The transition from high school to college can be challenging for students who do not reflect the majority of the institution. Brooms (2017) spoke to this reality, stating that Black men within his study expressed that an adjustment and transition to college were critical to their sense of belonging. Additionally, the participants in Brooms' (2017) study aligned finding their place on campus with the development of the coping mechanisms they applied during their adjustment process. Overall, summer bridge programs are known to increase a sense of belonging in students by engaging them in activities with both faculty and their peers (Stolle-McAllister, 2011). "The transition experience is critical to students' early college academic performance and how they believe they matter on campus" (Brooms, 2017). A sense of readiness is encouraged by the resources provided in a summer bridge experience, such as academic support services, introducing students to key campus personnel, and providing the logistical layout of their classes (Stolle-McAllister, 2011). The perspective of academically successful undergraduate Black males can inform institutional practices, leading to enhanced programming and student experiences for this population (Wood & Palmer, 2015).

HBCUs. The discussion of undergraduate Black male retention has often led to the examining of PWIs versus HBCUs. HBCUs have been a long-standing producer of Black male STEM graduates with strategies that could be widely used by PWIs (Harper & Newman, 2010). Goings (2012) and Harper and Newman (2010) explored the

numerous benefits students experienced within HBCUs such as two-way learning systems with peers, small class sizes, and faculty efforts to encourage and promote students' success within STEM disciplines. HBCU environments promote a sense of belonging, Black identity, affirmation, and personal growth, all of which are vital to the success of undergraduate Black males in higher education (Wood & Palmer, 2015). In addition to the aforementioned characteristics, HBCUs also make the provision of resources to strengthen the institutional structure for STEM programs of priority (National Academies, 2011).

HBCUs represent 17 of the top 20 leading producers of the nation's racial and ethnic minority college graduates in STEM (Museus et al., 2011). It should also be noted that HBCUs account for approximately 3% of all 4-year institutions, yet they confer 26 to 31% of baccalaureate degrees in science and engineering annually (Museus et al., 2011). Research demonstrates that HBCUs graduate a higher disproportionate number of Black STEM workers and researchers, as well as provide practices for improving retention of Blacks in the STEM fields (Harper & Newman, 2010). HBCUs have a proven ability to provide an ideal academic experience and in many respects could serve as a model for PWIs in improving undergraduate Black males' overall academic experience (Cuyjet & Associates, 2010).

PWIs have been reported by Black students as having a chilly reception and lacking in diverse faculty, among many other factors of importance to their experience (Bonner & Bailey, 2006). HBCUs have a lengthy history in recruiting, retaining, and graduating a disproportionate number of minorities, particularly at the undergraduate level (National Academies, 2011). The manner in which a PWI embraces the identity of

underrepresented students impacts the overall student experience, which is especially relevant to undergraduate Black males (Goings, 2012). HBCUs, despite their efforts, have a limited capacity to be the lone producer of academically successful undergraduate Black males in STEM (Hubbard & Stage, 2010). If the desire is to move the needle regarding movement from obtaining to *retaining* undergraduate Black males in STEM, PWIs will need to heavily consider a provision of sustainable support (Dancy, 2011).

Lack of asset-based research regarding Black males in STEM. While there are unequivocally challenges that undergraduate Black males face in our society, there are many Black males demonstrating the opposite end of this perspective (Harper & Davis, 2012). Despite the messages that deficit-based research perpetuates, Black males not only care about their education, but are dispelling the dominant message in academic and public discourse (Harper & Davis, 2012). The current empirical research paints a bleak picture of Black males and confines them to a space shaped by crime, drugs, athletics, and academic failure (Harper & Davis, 2012). In allowing the focal point to be on the deficits of Black males, the lack of knowledge of students who succeed in the STEM fields is further perpetuated, further amplifying their deficits instead of their achievements (Harper & Newman, 2010).

This current research may add to the field of research in a manner that highlights the academic successes of undergraduate Black males in STEM and the strategies that have been employed to facilitate their progress. Additionally, this research aimed to reveal some of the success strategies employed by Black males in STEM who obtained and retained a grade point average (GPA) of a 3.00 or above while attending a PWI. This study, however, sought to better ascertain Black males' success strategies from an

individual perspective as opposed to focusing on programmatic approaches. The examination of undergraduate Black males in STEM is specific in nature, however, the discovery of strategies that promote learning and success in STEM can assist in the academic success of all students (Harper & Newman, 2010).

Theoretical Rationale

Harper and Newman (2010) found that despite institutional attempts to leverage programs to improve outcomes of undergraduate Black males in STEM fields, such efforts cannot account for all environmental factors that threaten, make invisible, and deter Black males from academic success. Stereotype threat, for example, provides a theoretical lens through which to better understand how environmental factors within a PWI serve to confirm a self-characteristic, negative stereotype about Black males' ethnic or gender group (Steele & Aronson, 1995). The stereotype threat theory is based on students who may be categorized as academically capable, yet they find that their ability to perform, when exposed to environmental threats, is diminished (Steele & Aronson, 1995). Such threats translate into stress, anxiety, and isolation from peers. Such threats were characterized by Steele and Aronson (1995) as the anxiety of knowing that one is a potential target of prejudice and feels frustrated with an academic task or test as an indicator of inability. This type of anxiety has the propensity to result in the forming of a victim mentality/identity, also categorized as a self-evaluative threat for an individual (Steele & Aronson, 1995). Black male students who experience stereotype threat may experience diminished academic performance, isolation from peer group participation, and reduced faculty-to-student interaction (Wood & Palmer, 2015).

The term *stereotype threat* was established by Steele and Aronson (1995) in a pivotal, three-part study with 114 Black and White students. Within the first study, the students were divided into two stereotype conditions: stereotype-threat conditioned and non-stereotype-threat conditioned. Participants within the stereotype-threat-conditioned group were advised that the test was a measurement of their intellectual ability. Participants of the non-stereotype-threat group were advised that they would be engaging in a laboratory problem-solving task, which was not a measurement of their intellectual ability. The results of the study concluded that when presented with a task related to their intellectual ability, the Black participants performed worse than the White participants. Steele and Aronson (1995) posited that this result was likely due to the preexisting perception that the Black participants had related to their ability to perform well in an environment where they were underrepresented and, in some regard, expected not to perform well. It was also noted that when presented with a scenario in which the task was less reflective of their ability, the Black students' ability matched the performance of their White counterparts. Once the performance of a task was no longer attached to their value as a student or associated indirectly with their ethnicity, the task felt less stressful to complete for the Black students (Steele & Aronson, 1995).

In addition to the intellectual ability characteristics of stereotype threat, Jehangir (2008) posited that one of the most prominent characteristics of Black male college students in a PWI is their lack of familiarity with the culture of higher education. This factor is important, as it impacts their ability to successfully and comfortably integrate into higher education. In many ways, it is as though they are quietly entering an environment in which they must uncover the rules of higher academia, while removing

parts of their identity in the process (Jehangir, 2008). The more integrated a student is able to become in his or her college life, particularly from the academic perspective, the more likely he or she experiences a heightened level of knowledge and skills (Tinto, 1997). In selecting a theoretical framework, Steele and Aronson's (1995) stereotype theory is most suitable because of the way it both impacts students' perspective of themselves, prior to entering college, as well as their overall academic performance while in college. When the lack of familiarity with the culture of higher education is present, this perpetuates sometimes feeling a lack of sense of belonging or academic ability. Stereotype threat theory further illuminates the impact of an institutions' environment on the success of academically successful undergraduate Black males in STEM within a PWI.

Statement of Purpose

The purpose of this study was to obtain a firsthand perspective of academically successful Black males in a STEM program within a predominantly White institution. Through individual interviews, the researcher sought to obtain knowledge that will inform stakeholders within higher education institutions of the retention strategies identified by the study participants. These strategies may positively impact retention and increase a sense of belonging for Black males within STEM programs.

Research Questions

Obtaining a firsthand perspective of academically successful undergraduate Black males in the STEM disciplines would provide stakeholders within higher education institutions with firsthand knowledge of vital strategies (Brooms, 2017). Knowledge of how to apply these factors can impact retention and increase a sense of belonging for

Black males in STEM, which is key to the academic success of Black males within PWIs in general (Harper & Davis, 2012). This current research aims to contribute positively to a field of research that has an abundance of deficit-based literature in relation to undergraduate Black males in college, as well as their presence in the STEM fields.

This study included Black male voices with the implementation of a phenomenological study. As Brooms (2017) pointed out, “the campus climate and college environment are too critical to leave Black men’s voices silenced and reduced to national conversations that do not include them” (p. 185). Howard (2013) further suggested that to include undergraduate Black males’ voices constructs a new paradigm on Black male experiences and outcomes, bringing sustainable retention solutions to the surface. This is done with the intent of dismantling dominant discourses surrounding race, class, and gender group (Howard et al., 2012). This current research aimed to produce findings that will facilitate the development of sustainable programming and curriculum that authentically addresses the needs of undergraduate Black males in a PWI. The following guiding questions were utilized for this qualitative study:

1. What are the perceptions that academically successful undergraduate Black males in STEM disciplines have regarding stereotype threat?
2. Given that this group of undergraduate Black males in STEM disciplines are academically successful, how have they been able to buffer themselves from such threats?
3. What strategies did or do undergraduate Black males in STEM disciplines use to overcome such environmental threats?

Definition of Terms

Academically Successful – a GPA of 3.00 or better

Black – “a person having origins in any of the Black racial groups of Africa”

(Institute of Education Statistics, n.d., para. 6).

PWI (Predominately White Institution) – a college or university with a student population that is 50% or more White; nationally, PWIs are 11% Black (Keels, 2013).

Science, Technology, Engineering, and Mathematics (STEM) Education – “an interdisciplinary and applied approach” to “educating students in four specific disciplines. Rather than teach the four disciplines as separate and discrete subjects, STEM integrates them into a cohesive learning paradigm based on real-world applications” (Hom, 2014, para. 1).

Stereotype Threat – “refers to the risk of confirming negative stereotypes about an individual’s racial, ethnic, gender, or cultural group” (The Glossary of Education Reform, 2013).

White – “a person having origins in any of the original peoples of Europe, the Middle East, or North Africa” (Institute of Education Statistics, n.d., para. 8).

Chapter Summary

Today’s landscape regarding higher education is remarkably different than it was three or four decades ago (Pike & Kuh, 2005), requiring a reframing of how the underserved population interacts with PWIs regarding undergraduate Black males in STEM disciplines. Research indicates that the classroom is the nucleus of the educational experience for all college students (Tinto, 1997), and this is an ideal starting point to begin sustainable efforts toward retaining Black males in PWIs.

This research paper has five chapters. This first chapter reviewed the research problem, the purpose of the study, the research questions, the potential significance of the study, and it included the definition of terms pertinent to this study. Chapter 2 gives a review of relevant empirical literature in the areas of Black male college students in PWIs and academic success factors, such as student-to-faculty mentorship, institutionalized peer groups, and institutional summer bridge programs. The impact that the shortage of undergraduate Black males in STEM disciplines has on the United States' economy in the STEM field(s) will also be discussed. Chapter 3 provides an exploration of the research design and methodology, which includes of the research context, participant criteria, instruments used, and data collection. Chapter 4 presents a detailed analysis of the results and findings, and Chapter 5 discusses the findings, implications, and recommendations for future research and practice.

Chapter 2: Review of the Literature

Given the current state of affairs within the United States' economy and the political climate, the importing of talent from other countries has become an option wrought with numerous citizenship implications, making it a more difficult to obtain citizenship than in past years. With an anticipated growth of 12.5% between 2012 and 2022, Blacks and Latinos will make up only 6% of the STEM workforce (Carpi, Ronan, Falconer, & Lents, 2017). Diversity within the field of STEM is at a deficit (Harper & Newman, 2010). In 2007 and 2010, the National Research Council reported that the United States was not producing enough graduates in the STEM fields to meet the demands of a competitive global economy (Fifolt, Engler, & Abbott, 2014). With an increasing inability to rely on foreign-born talent, it is critical that the United States work to improve the skills and capabilities of citizens, in particular, Black men (Strayhorn, 2015). In doing so, the United States would become more poised to fill the anticipated labor market shortages and compete in an evolving global economy (Karanja & Austin, 2014). The purpose of this literature review was to begin with a high-level overview of Black students' general experience within PWIs, then narrow the scope to the lived experiences of academically successful undergraduate Black males in STEM disciplines at PWIs.

Significant Empirical Findings

The issues surrounding the relationship between African American men and colleges are complex (Dancy, 2011). The studies within this literature review explore the

general academic experiences of Black students in PWIs, Black male college students in HBCUs, as well as Black male college students in the STEM disciplines within PWIs.

The Experiences of Black Students at PWIs

One factor that impacts Black students' level of satisfaction in PWIs is their overall academic experience (Smith, 2003). Despite the substantial advances and extensive efforts to bridge the gap in equity between the educational attainment of minority students and their majority peers, significant progress still needs to be made (Carpi et al., 2017). This section begins with a broad exploration of the student academic experiences of Black students at PWIs, and it ends with the focal point of undergraduate Black male students in the STEM disciplines.

Student academic experiences. Keels's (2013) qualitative study examined the gender and ethnic gaps in relation to college grades and graduation of a cohort of students attending PWIs. The demographic and societal factors that impact minority students at PWIs were closely examined, resulting in the acknowledgement that over 83% of Black students attend PWIs (Keels). Citing feelings of isolation, stress, and personal dissatisfaction amongst Black and Latino students within PWIs, the study notes that Black and Latino males tend to internalize the negative stereotypes or interactions within their postsecondary experiences (Keels). This is significant, because as Keels (2013) pointed out, within a PWI, 11% of the population is Black, and about 65% of those students are female. Black females are twice as likely to complete their degrees in a 6-year time frame than Black males, making the focus on Black male retention of high importance.

Keels (2013) longitudinal study focused on a cohort of 3,728 freshmen from 24 select colleges over a 4-year period. The freshman year is the transition point that places students in a vulnerable position where they are leaving high school and going into territory that is unfamiliar for some, making it a critical point in a student's postsecondary education (Keels, 2013). Phone interviews comprising close-ended questions were conducted, which sought to examine four factors: socioeconomic background, precollege academic preparation, psychological well-being, and supports (Keels).

With the strong suggestion that colleges not only focus on recruiting students, but retaining them, Keels (2013) found that 50% of all postsecondary students drop out of college without ever completing their degree. This percentage is higher among the Black and Latino populations, which causes great concern when looking at solutions to meet the nation's growing need for diverse, college-educated professionals in the areas of STEM. Further, Keels (2013) suggested that many cases of attrition can be prevented by fostering more academic and social connections to an institution. Pascarella and Terenzini (1983), identified the first year as the foundational year to introduce and strengthen the aforementioned connections, as this is the time frame in which most students are met with the challenge of fully integrating into their environments. Additionally, Sinanan (2012) also recommended that college administrators and faculty create formal and informal opportunities for Black males to develop several academically oriented social communities.

Within academic communities that are predominantly White, Black males often encounter experiences that cause a reevaluation of their identity, including their *fit* into

their environment (Baber, 2012). Baber conducted a qualitative study to examine the influence of racial identity on the postsecondary educational experiences of Black males, utilizing a theoretical framework called multidimensional model of racial identity or MMRI. Consisting of four racial dimensions: salience, centrality, regard, and identity, this theory acknowledges that racial identity development is “not a homogenous process across the African American collectivity. Rather, there is an intra-group variation in racial identity development based on interaction with the environment” (Baber, 2012, p. 69). Another reason Baber likely selected this theory was the awareness of DuBois’s (1897) *double consciousness* and the impact that favoring an institution’s dominant culture can have on its students.

Since the “phenomenological approach to interviewing focuses on the experiences of participants and the meaning they make of that experience” (Seidman, 2014, p. 16), Baber (2012) utilized this method to conduct 1-hour recorded interviews. The 9-month study consisted of 15 self-identified, first-year African American students who were attending a mid-Atlantic region PWI. The students were given a journal in which to record their reflections regarding important experiences within their first year of college. These journals were reviewed, along with the interview transcripts, from which four themes emerged: (a) established racial identity, (b) shifting salience and centrality through heterogeneous community experience, (c) complexity of identity, and (d) conflicts between ideologies. Each of these themes pointed to the complexity of identity and how it develops within an experience, particularly as an African American student within a PWI. As stated by Baber (2012), identity is not a static item, thus it shifts with

social context and continually develops, requiring Black males to constantly be aware of their environment and making conscious efforts to adjust.

Another finding in the Baber study (2012) was how students addressed feeling like an outsider by creating a community they felt more a part of. The students' experiences indicated that there is a need for support derived from various levels, which can also be perceived as cultural capital, to impact their ability to integrate into their environment. One of the main implications of the Baber study was the need for further investigation of socioeconomic backgrounds' influences on persistence within the postsecondary system. The socioeconomic divide that exists is both strong and consistent across all races; however, it is quite prominent in relation to African Americans in PWIs (Baber, 2012).

Ovink and Veazey (2010) focused on the impact of cultural capital in their examination of the psychological-social barriers that underrepresented minority (URM) undergraduates faced in their postsecondary experience. Utilizing a university-sponsored intervention program designed for minority science students, Ovink and Veazey (2010) examined how invaluable undergraduate research can be regarding the academics, social development, as well as the cultural capital to URMs. Viewing the lack of URMs in the STEM disciplines and the lack of minority participation in doctoral-level scientific biomedical research as interrelated, Ovink and Veazey (2010) sought to identify sustainable solutions to provide support to URMs who had few or no mentors in their lives. The 106 study participants were high-achieving minority Biology Undergraduate Scholars Program (BUSP) alumni. The selected alumni were those who graduated between the years 1994 and 2004 and had a minimum GPA of 2.70 on a 4.00 scale. Each

participant was interviewed via a recorded, transcribed phone interview that lasted between 60 to 120 minutes. Once all interviews were completed, and 15 randomly selected interviews were analyzed by four research team members. Following their analysis, coding schema was developed collectively by the entire research team. The last step of analysis involved dividing the interviews among three team members for further evaluation (Ovink & Veazey, 2011).

The BUSP was an undergraduate-level intervention program aimed at retaining minorities and increasing their academic achievement in the life sciences. The program also helped program participants with professional development relating to preparation for entry into scientific and biomedical careers. Ovink and Veazey (2011) posited that programs like BUSP can increase minority students' culture of science, expand their social networks, and develop higher career aspirations. These kinds of opportunities for minority students can lead to increased rapport with faculty and potentially provide mentors, which can add to students' social capital while helping to increase retention of this student population (Ovink & Veazey, 2011). Social capital is used to build trust and community norms, which can be helpful when navigating through the dominant culture within an institution (Ovink & Veazey, 2011).

The Ovink and Veazey (2011) study found that all of the alumni identified advisors as contributing significantly to their academic success. Advisors not only assisted with the navigation of an *unfamiliar institutional environment*, but they also acted as advocates, when needed, in ways that the student would not have been capable of doing independently. Social capital and becoming a part of an *alternative intellectual community*, was another finding within the Ovink and Veazey study. The relevance of

this factor is the level to which it was reported as assisting the alumni participants in being ready to interact with others in the field and how career ready they were. Lastly, being a BUSP graduate also created yet another sense of acceptance and, ultimately, community (Ovink & Veazey, 2011).

Jones, Castellanos, and Cole (2002) conducted a qualitative study with a theoretical framework that placed emphasis on the importance of students' voices, examining the college experiences of ethnic minorities in a 4-year PWI. The study was threefold and sought to also examine the students' perspectives of the college climate, support services, and quality of the program offerings (Jones et al., 2002). The 35 students in the study were of African American, Asian Pacific, and Native American descent. Once selected, four focus groups, with a minimum of seven participants per group, were developed to ensure representation of all four ethnic minority groups. Each focus group session was 2 hours in length, and they were audio recorded, with notation of responses as well as notations on the observation of all body language, facial expressions, and nonverbal communication. Following the interviews, data was analyzed to identify patterns that evolved into categories. Each researcher reviewed the interview packet to ensure internal validity of the six categories: (a) general campus climate, (b) student experiences, (c) student involvement, (d) cross-cultural center, (e) departmental units, and (f) student recommendations (Jones et al., 2002).

Jones et al. (2002) called for a "pluralistic perspective in higher education to enlarge the support system for ethnic minority students in terms of access, quality, and persistence" (p. 20). Institutions were encouraged by Jones et al. (2002) to develop and provide appropriate services and resources not simply because of the "browning of

America” (p. 19) because the development and success for all students should be of primary concern for institutions of higher education (Jones et al., 2002).

Among the findings, the Jones et al. (2002) study discussed the importance of providing students with opportunities to positively engage them with the institution’s community. This could be accomplished through cross-cultural centers that would act as an additional source of institutional support; however, this comes with the caveat that the persons leading the center must be cognizant of their demeanor and not present the center’s existence as burdensome (Jones et al., 2002). Students are more intuitive than some may think, making a genuine effort to address cultural needs essential (Jones et al., 2002). Moreover, the efforts to address the needs of a diverse student body cannot solely be the cross-cultural center’s responsibility (Jones et al., 2002). Students in the Jones et al. (2002) study indicated that a lack of collaboration between the institution and the cross-cultural center gave them the perception of an out-of-touch administration that viewed diversity as unimportant.

Black male experiences in higher education. Strayhorn (2010) drew attention to the abundance of existing deficit-based literature relating to Black males, noting that Black men sometimes internalize such negativity. When this level of internalization takes place, it can often have an adverse effect on a Black male’s level of academic performance (Strayhorn, 2010). This is significant because it reinforces the need for PWIs to create an environment that cultivates a sense of community for Black males (Strayhorn, 2012). Strayhorn (2010) further explored the pressures that Black males face in PWI environments that were described as unsupportive, unsympathetic, and “chilly” (p. 311). Citing that, with appropriate support, African American and Latino males may

be able to face the challenges that inhibit their sense of belonging, which prior studies identified as a factor of high influence on Black males' level of academic achievement (Strayhorn, 2010).

The purpose of the Strayhorn (2010) quantitative study was to measure the level of influence background traits, academic preparation for college, and sociocultural capital had on the academic achievement in college of the students as measured by GPA (Strayhorn, 2010). Using a quantitative approach, data was taken from the NCES National Education Longitudinal Study from which males who were enrolled at 4-year institutions were extracted. The study found that the students' ability to engage in activity that facilitated an opportunity for capital accumulation (e.g., student government, community service) can impact the level of academic achievement. Additionally, higher GPAs were present for both Black and Latino males when they were participants in pre-college programs, such as GEAR UP. Within the study, Strayhorn (2010) provided the suggestion of a more "narrowly tailored" (p. 325) approach. A narrowly tailored approach would require the administration to look at race, as well as gender, academic preparation, and class, as they relate to raising academic achievement levels for Black and Latino undergraduates. Reevaluating existing administrative structures within PWIs and providing experiences that recognize cultural differences, while embracing them, is key in creating an inclusive environment for undergraduate Black males in PWIs (Strayhorn, 2010).

Set in a PWI within southern New Jersey, Sinanan (2012) conducted a qualitative study of 13 African American male students, ages 18-25, to explore the perceptions of the academic, social, and institutional forces as contributors to their success. Of the 13

students, eight of the students represented urban cities in New Jersey, three were from suburban New Jersey areas, and two were from rural New Jersey areas. Regarding academic standing, two were freshmen, four were sophomores, four were juniors, and three were seniors. An interview-based method was used to “capture a richer, more detailed perspective of the subject matter” (Sinanan, 2012, p. 3). Sinanan (2012) opted to conduct her interviews via a planned focus group. Using focus groups is a technique that tends to facilitate a less threatening environment, while allowing the researcher to obtain data on a defined area of interest (Creswell & Poth, 2018). Sinanan (2012) used a framework that was utilized to analyze the interview from the focus group, analyzing data from the moment collection began, as well as throughout the process. Detailed notes were taken during each recorded interview from which major themes emerged, and a thematic framework, as well as subcategories, were developed. Sorting out quotes and comparing them via indexing allowed Sinanan (2012) to arrange the original interview content under relevant thematic content.

Sinanan (2012) found that 10 of the participants reported feeling *underrepresented, a lack of belonging*, or being consciously aware of their numerically racial underrepresented group status. Another finding was related to faculty interaction, indicating that the students reported that the quality of time was of more importance than the frequency in which they interacted with faculty (Sinanan, 2012). The ability to connect with faculty and candidly share their concerns was what meant the most to African American male participants. There were also some students who reported feeling uneasy asking professors for help, which was due to the feeling that there may have been a preconceived notion that they needed help because they were Black (Sinanan, 2012).

Success Factors

Researchers have expressed many success factors that Black students at PWIs utilize to positively impact their academic progress (Hines, Borders, & Gonzalez, 2015; Reid, 2013; Strayhorn & DeVita, 2010). Hines et al. (2015) conducted a study with two African American males from rural backgrounds as their subjects, each being a student attending a PWI within the Southeastern Region of the United States. The age of each participant was 31 and 34 years, and they self-identified as first-generation college students. Aimed at answering the call for more asset literature on African American males' success in college, this study examined the asset and success factors that contributed to the completion of a baccalaureate degree (Hines et al., 2015).

The firsthand experiences of the subjects' experiences were recorded and transcribed utilizing a phenomenological approach (Hines et al., 2015). A 15-minute preliminary interview, combined with a supplementary questionnaire, were utilized to prescreen to determine the two participants' eligibility to participate in the study. Qualifying criteria included being a first-generation college student, from a rural area, and a male of African American descent. Two members of the research team independently read the interview transcripts and discussed their findings in team meetings. Thereafter, a third author acted as an auditor, submitting suggested comments and additional feedback for the research team's consideration. The final steps of analysis consisted of placing the clusters and themes into chronological order, followed by having a version of the results section reviewed by two participants for member checking (Hines et al., 2015).

From the Hines et al. (2015) study emerged several themes centered around various forms of capital, namely embodied cultural capital, objective cultural capital, and institutional cultural capital. *Embodied cultural capital* in the Hines et al. study was determined by the influence of one's family and community, and it was often the proponent for doing what was considered the right thing. For example, one of the subject's parents told him that by going to college, he would be an example for other Black men in his community, including his family members (Hines et al., 2015). In another example, a subject's mother threatened to evict him from their home if he decided not to go to college, because that was her way of ensuring that he did better than she and others in her family had done.

Objective cultural capital was expressed by both males as they recounted college being viewed by them to escape the limited opportunities within their respective communities. By attending college, they anticipated an increase in prospective employment opportunities, which was important for one of the subjects who lived in a town where they were closing the mills and other white-collar job sources (Hines et al., 2015).

Institutional cultural capital was used in reference to the recognition each subject received from their institution, as their participation in support programs made their aspirations clear to their school's administration. This resulted in additional supports from the school personnel, and it ranged from having Upward Bound counselors help prepare them for SAT testing to constant giving them encouragement toward ROTC membership, increasing the confidence levels on the part of both subjects (Hines et al., 2015).

Overall, the Hines et al. (2015) study found that there were some societal norms that each subject had to learn, such as the transition from high school to college, as they related the number of hours one should study to excel academically to integrating with people from other nationalities that they had not previously sought rapport with. Although they both struggled at the start of their academic careers, which was due to being underprepared by their high schools, both subjects found ways to creatively create their own community. For example, one of the students was a political science major and decided to join the student government. Given that his GPA disqualified him for student government, instead, he did his best to serve in every role except the one with a GPA requirement. This allowed him to gain institution-wide recognition, while feeling like a “contributing member of the institution” (Hines et al., 2015, p. 238). The conclusion drawn by Hines et al. (2015) was that both of the young men successfully completed their degrees and could thereafter serve as role models for their community, with one of them considering teaching as a profession.

Student to faculty relationships. While the focus of this literature review is derived from a dissertation topic of academically successful undergraduate Black males in the STEM disciplines at a predominantly White, 4-year institution, the empirical work in this section included 2- and 4-year institutions. The intent of this contrast is to demonstrate the commonality in Black male collegiate experiences across various institutional settings. This section explored faculty as one of three factors for Black male student academic success. The impact of faculty on underserved students’ overall academic experience is applicable in any institution or college setting, however, this factor is quite prominent in PWIs and with undergraduate Black males (Reid, 2013).

The lack of academic success for undergraduate Black males in PWIs has been viewed from a perspective of various speculations on low-achievement factors, such as financial constraints and inadequate college preparation; “however, this speculation has been void of the role institutions play in these patterns of underachievement” (Reid, 2013, p. 75).

Reid (2013) conducted a quantitative, statistical study examining academically successful African American males in research PWIs. The success factors of focus were narrowed to three conceptual backdrops: persistence, self-efficacy, and identity. For the purposes of the Reid study, the average study participant had a GPA of 2.97 on a 4.00 scale and arrived with a high school GPA of B+ (equivalent to 88.66). Five research universities, all members of the 94-member National Association of Multicultural Engineering Program Advocates, were chosen as a convenience sample, and a psychosocial lens was applied to Tinto’s (1993) institutional integration theory. Of the five research universities, two were private research institutions in the Northeast Region, with the remaining three public universities located in the Mid-Atlantic and Southwest Regions (Reid, 2013).

“Administered during the spring and summer semesters after their first final examination to capture feelings about recent performance” (Reid, 2013, p. 80), a 65-item, web-based questionnaire was given to each of the 201 sophomores who completed the questionnaire. This questionnaire was a mixture of three instruments: (a) the Self-Efficacy for Academic Milestone Scale (AMS), which rates students’ ability to reach specific academic objectives; (b) the Black Racial Identity Attitude Scale, which was designed to specifically measure the Black racial identity of African American males and

female college students; and (c) two subscales consisting of peer-group interactions and the Institutional Integration Scale, which was added to assist in the measurement of faculty interaction (Reid, 2013). It should be noted that since they had not yet declared a major, the freshmen were eliminated from this quantitative study. Of the 190 Black male students who completed the survey, the average participant was partially through his junior year (3.31 years) and majored in a STEM discipline.

Reid (2013) found that the Black males who had increased interaction with faculty also had higher GPAs, as well as more social integration. The opportunity to interact with faculty in the capacity of a research assistant or in an informal setting was found to be empowering, as their intellectual abilities were affirmed through these interactions (Reid). While faculty interaction was directly linked to increased academic integration, self-efficacy also factored into the study participants' academic success. African American males in the Reid (2013) study indicated that their academic success could be attributed to preexisting confidence in their ability to excel in college, based upon their SAT scores, high school grades, college major, and their parents' education and income (Reid, 2013).

Several valuable suggestions were given, namely, the call for higher education administrators to facilitate opportunities for African American male students to meet and interact with university faculty (Reid, 2013). Some of the ways this could be accomplished was via seminars and through facilitated group discussions and learning communities that allowed them to connect with multicultural groups, faculty, and administration personnel (Reid, 2013). Further, Reid (2013) posited that institutions need to employ a sense of cultural awareness that creates a climate that does not encourage

ideological and reference group isolation. The impact that a college's environment has on a Black male student's experience is one that bears further exploration, because it is tied to a sense of belonging, which was previously identified as a factor that impacts overall student satisfaction (Reid, 2013).

Strayhorn and DeVita's (2010) quantitative study compared good practices by institution type, focusing on the correlation between the factors that impacted the collegiate experiences of Black men and retention. The study "assumed that students who attend liberal arts colleges differed significantly from their peers at doctoral (research) and master's (regional) institutions in relation to positive experiences" (Strayhorn & DaVita, 2010, p. 91). Because of prior research,

It was concluded that the selection of institution type for their study was due to liberal arts institutions being exceptional in comparison to other institutions' best practices. This was mostly due to size, specialized mission, and an emphasis on undergraduate teaching within liberal arts colleges. (Strayhorn & DaVita, 2010, p. 91)

The Strayhorn & DaVita (2010) study utilized the College Student Experiences Questionnaire (CSEQ), which was received by the participants as a secondary analysis of the data, and it was received on a computer disk. The CSEQ consists of 191 items designed to obtain information on the quality and quantity of students' experiences in college (Strayhorn & DaVita). The participants selected were first- and second-year African American male students who completed the survey in 2004. Additional selection criteria included a marital status of unmarried, full-time status, and attending of 4-year institutions of all campus types, including PWIs and HBCUs. The actual sample

comprised 149 Black men, ranging from age 19 (or younger) to 24 years or older. The data analysis was conducted in three stages: (a) application of data reduction techniques, such as recoding of original variables; (b) consideration of the clustering effects of individual students within select institutions; and (3) chi-square tests and intraclass correlations, leading to the conclusion that ordinary least-squares regression was the appropriate regression analysis to apply to this study (Strayhorn & DaVita, 2010).

The study found that Black males' interaction with faculty was a key piece of the collegiate experience, and it could be facilitated through the creation of opportunities to increase student and faculty interaction, through assignments of the faculty as mentors to the students, including acting as an advisor to a club or organization. (Strayhorn & DaVita, 2010). Additionally, it was found that leveraging conferences, staff meetings, and other student-affairs-directed activities could facilitate the sharing of best practices with other colleagues in the field, increasing their knowledge base of strategies to successfully support this population. Some of the limitations identified were the potential inaccuracy of self-reported data, the interpretation of data from volunteers to taking the CSEQ, resulting in an inability to generalize all African American male students and subgroups. The driving point of the Strayhorn & DeVita (2010) study reminded higher education administrators, counselors, and faculty that in order to improve the educational experiences of Black college men, "one cannot apply a one-size-fits-all approach when addressing the complex challenges students often face" (Strayhorn & DeVita, 2010, p. 98).

In their qualitative study, Brooms and Davis (2017) explored the experiences of 59 Black males within three different PWIs. The purpose of their study was to identify

how students constructed meaning from their postsecondary experiences and what factors contributed to their educational successes. Further, Brooms and Davis (2017) determined that “the examination of *how* Black males experience college and *what* they experience to be of great significance in how these factors impact their persistence and educational success efforts,” (p. 306), which was the driving force behind the study. The Brooms and Davis (2017) study was part of a larger project in which the academic, social, and matriculation experiences of Black male college students were evaluated. The larger study utilized a phenomenological approach and involved collecting stories of participants to better capture their lived experiences as they journeyed to and through college. For the purpose of the Brooms and Davis study, the data focused on the meanings students placed on their race and gender, as well as how relationships impacted their level of persistence.

The institutions varied in size and in the percentage of enrolled Black students. Located in a southern state, the first institution had an enrollment of slightly over 15,000 undergraduate students of which 11% were Black (Brooms & Davis, 2017). The second institution was a large research institution in a midwestern state, also with just over 15,000 undergraduate students, and 20% of the population were Black students. The third institution was in a rural, Midwest setting with Black students representing less than 15% of their population of 10,000. Overall, the Black undergraduate students represented less than 40% of all of the three institutions’ on-campus population. Students were recruited using a sampling approach, leveraging Brooms and Davis’s rapport with staff and fraternal organizations within the institution to garner student interest. The students represented a diverse range of majors that included the social sciences (24), engineering

(12), political science (six), business administration (11), and criminal justice (six).

Geographically, the majority of the participants, ages 19-35 years, were from urban cities at the time of the study (Brooms & Davis, 2017).

One-on-one semi-structured, 45-150-minute interviews were conducted with students and transcribed by Brooms and Davis (2017) directly after each interview. By employing a layered data analysis technique, the authors established thematic categories based upon the interview transcripts. The transcripts were first read in detail by each author independently, followed by inductive and deductive strategies to develop codes that would later be used to interpret their data. The themes were later shared with the students to ensure that their experiences were accurately represented.

Brooms and Davis (2017) found the following themes emerged: (a) being Black and male on campus, (b) peer-to-peer bonding, and (c) Black faculty mentoring. The first theme related directly to social integration and the difficulty Black males often encountered when adapting to the collegiate environment. In attempting to build a sense of community, some of the students sought membership in organizations that were not focused on minorities, leading to being questioned as to why they had not, instead, chosen to engage with a minority organization. Peer-to-peer bonding also tied back to building a sense of community in that the feelings of isolation in a PWI caused Black male students to rely heavily on their subculture for academic and social assistance (Brooms & Davis, 2017).

Many of the participants saw the additional assistance and encouragement from Black faculty as invaluable. Further, outside of the classroom interaction with African American faculty was found to be vital to the students' social maturation and

development (Brooms & Davis, 2017). The last theme, Black faculty mentoring, tied back to the aforementioned participant reflections, while solidifying the need for the diversifying of faculty in PWIs that the study calls for. The study found that Black faculty have an impact that transcends beyond academics, leading them to serve as mentors and advisors to Black male students. The rapport established in these relationships directly impacted the overall collegiate experience for Black male students including retention. The important piece stated by Brooms and Davis (2017), however, is that African American professors must be willing to embrace this layered role in PWIs, as faculty contribute to Black male students' sense of belonging in a way that no institutional entity can.

Newman, Wood, and Harris (2015) conducted a quantitative study designed to examine factors that contribute to Black males' sense of belonging with faculty members in a community college setting. Additionally, the monolithic manner in which Black men are often portrayed in scholarly research is also discussed. This study is significant because the vast majority of research on faculty-student interaction focuses on 4-year institutions. "With 46.6% of Black males in the United States beginning their collegiate career at 2-year institutions, it is imperative to understand how Black males enter community colleges and how the colleges' environment shapes their experiences" (Newman et al., 2015, pp. 564, 565).

Newman et al. (2015) used The Community College Survey of Men (CCSM), which "is a needs assessment tool utilized by community colleges to identify factors that impact historically underrepresented and underserved male students' success outcomes" (p. 568). The CCSM was administered to 5,113 men in 37 community colleges within

seven states: Arizona, California, Maryland, Illinois, Pennsylvania, Minnesota, and Arkansas. There were 364 Black/African American respondents in the fall of 2013 data that was collected. For the purposes of this study, the data was taken from the third pilot phase of the instrument, which included 17 community colleges in Arizona, California, Illinois, and Maryland. The use of a 6-point Likert scale, ranging from strongly disagree to strongly agree, asked students questions to indicate their level of agreement with statements such as, “my professors hold negative stereotypes about men from my racial/ethnic group.” To analyze the data from the survey, three primary predictor variables were employed: (a) racial-gender stereotypes, (b) faculty validation, and (3) faculty-student engagement.

The Newman et al. (2015) study found that despite the abundance of faculty-student engagement literature, there is a need for closer analysis of the types of interaction that fosters academic success for Black community college males. Additionally, it was found that issues surrounding racial and gender stereotypes with faculty continue to persist. This, unfortunately, aligns with the existing literature speaking to faculty members’ demeanor negatively impacting the experiences of Black men in college. Similar to Brooms and Davis (2017), the Newman et al. (2015) study also called for a faculty landscape that is diverse, facilitating a more accurate reflection of the student body.

Cokley (2002) replicated and extended his 2000 quantitative study, a comparison between academic self-concept of African American students in an HBCU and a PWI setting. The focal point of Cokley’s 2000 study was to “determine academic self-concept differences among students based on the racial composition of the institution, the gender

of the students, and the students year in school” (p. 290). The implications for how student affairs professionals can assist African American students, as well as faculty, makes this study significant, as there have been marked differences in faculty-student interaction within the PWI versus the HBCU collegiate environments (Cokley, 2002).

Cokley (2002) implemented changes to extend the study:

(a) doubled the sample size, (b) recruited participants from geographically different areas, (c) increased the male sample from a PWI setting to include an HBCU setting, and (d) added faculty’s encouragement of students attending graduate school. The implications for how student affairs professionals can assist African American students, as well as faculty, is in part what makes this study significant. (p. 288)

The 396 participants in the Cokley (2002) study ranged from ages 18 to 57 years for the HBCU sample, and 19 to 37 years of age for the PWI sample. Each group, first, completed measures of academic self-concept followed by the National Black College Student Demographic Questionnaire. This questionnaire utilized a 4-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), and it was preceded by a consent form. To evaluate data related to institutional differences and dependent variables of GPA, academic self-concept, quality of student-faculty interactions, and encouragement to continue studies, *t*-tests were used. Because the purpose of the research was predictive and not explanatory, stepwise regression was implemented to further analyze the data.

The results of the study revealed that the HBCU students experienced more positive student-faculty interaction than those attending a PWI. Additionally, the African

American students at the HBCUs also indicated that they experienced more instances of encouragement to pursue master's degrees than African American students attending the PWIs. These results are significant to those working with African American students in both HBCU and PWI settings, as this speaks to the importance of African American students developing a rapport with White faculty and faculty from other ethnic groups.

Institutionally sponsored peer groups. Peer groups often facilitate a sense of belonging in undergraduate Black males attending PWIs because they affirm identity and create a support system for the members within the group. Peer groups “serve as a sounding board, a virtual training ground to vet assumptions, ideas, strategies, and plans within an encouraging and safe environment” (Cuyjet & Associates, 2006, p. 26). Peer interaction “facilitates academic development, problem solving skills, critical thinking, and cultural awareness for Black men” (Wood & Palmer, 2015, p. 24). The existing literature places an emphasis on the impact peer groups have on those being mentored or receiving the most assistance, as opposed to those acting as mentors or being of assistance to peers (Kiyama, Raucci, Crump-Owens, & Luca, 2014). Kiyama et al. (2014) demonstrated that, realistically, the impact is just as great on the peer as it is on the mentor.

The setting of the qualitative case study conducted by Kiyama et al. (2014) was a summer bridge program within a research Southwest Region university that sought to uncover the impact peer mentoring had on the peer mentors. Following the extension of an invitation and confirmation of 25 peer mentors who would act as study participants, two phases of data were administered through online essays and four recorded, transcribed focus groups. To establish trustworthiness, the researchers employed member

checking, ensuring that the preliminary findings properly reflected their feedback. Additionally, outside consultants assisted Kiyama et al. in verifying the themes and providing overall feedback.

Kiyama et al. (2014) concluded that peer mentors experienced a sense of belonging, acquired new skills, and gained an advanced understanding of the education and retention process. As previously mentioned in this literature review, a sense of belonging is key to Black males in higher education, particularly students in PWIs. The Kiyama et al. (2014) study found that the sense of community was derived from the rapport established among the peer mentors, as well as the coordinating staff. The peer mentors also expressed increased personal and professional skills, leading to a feeling of empowerment. Kiyama et al. (2014) found that acting as peer mentors in higher education contributed undergraduate Black males' sense of belonging, and that sense of belong increased retention.

Summer bridge programs. Research has shown that “experiences that include self-empowerment and access to capital provide Black male students with a sense of belonging, and this results in an increase in campus engagement” (Brooms, 2017, p. 188). According to Astin (1993), summer bridge programs are designed to assist specific groups of students in transitioning from high school to the rigors of a higher education environment (Johnson, 2016). For African American students within the STEM pipeline, summer bridge experiences can assist in addressing high rates of attrition, as discussed in the Johnson (2016) qualitative study, involving 14 first-year students who were engaged in a 5-week summer bridge program.

The Johnson (2016) study focused on assessing the factors that impact students as they transition from high school to college, particularly pre-college student retention. Additionally, Johnson posited that “underrepresented students have a different experience in higher education, which is due to social, historical, and cultural policies that shape the collegiate environment” (Johnson, 2016, p. 208). The participants within the study had a cohort mean high school GPA of 4.00. In addition to the provision of demographic data, each study participant completed a weekly journal, had recorded focus-group interviews, and had an end-of-program evaluation administered by the program staff. The interview recordings and journals were analyzed to develop an open-ended coding process that evolved into new categories. To further assist in the data organization, coding, and retrieval, NVivo 10 was utilized.

Johnson (2016) concluded that the summer bridge program enhanced students’ sense of belonging and acclimation to the rigors of a college environment. The predominant theme expressed in the evaluation results were the students’ acclimation to the college environment. Adjusting to a rigorous schedule was identified as somewhat of a culture shock to the students who were used to “cutting corners or avoiding it altogether” (Johnson, 2016, p. 212). While some students initially lamented this experience, they later indicated feeling better prepared to address the demands within a higher education institution. Further, living on campus and the support provided within the program assisted them in feeling a sense of community, allowing them to trust the peer mentors and program staff to provide support when struggles arose.

Johnson (2016) concluded that K-12 efforts to expose students to science and math wonders should be heightened, combined with positive interactions with campus

community members so that the retention level of African American students in STEM disciplines could improve. Johnson (2016) concluded that if college personnel obtained more perspective on the K-12 experiences of African American students in STEM disciplines, the rate of attrition for this population might diminish significantly within higher education. Additionally, obtaining this perspective would facilitate a deeper understanding of the appropriate interventions and levels of support for academically successful undergraduate Black males within STEM disciplines at PWIs (Johnson, 2016).

The structure of summer bridge programs “tends to include components that address the emotional impact associated with the high school-to-college transition. Summer bridge programs are effective for students because they help them begin to integrate academically and socially into the university environment” (Stolle-McAllister, 2011, p. 13). In a qualitative study utilizing focus groups, Stolle-McAllister (2011) sought to uncover the importance of summer bridge programs through an evaluation of the Meyerhoff Summer Bridge Program (MSP). The Meyerhoff Summer Bridge Program is housed at the University of Maryland Baltimore County has been nationally recognized for its effectiveness in graduating Black participants in STEM disciplines. Statistically, Black students who participated in this STEM program are twice as likely to graduate with a STEM bachelor’s degree and five times as likely to graduate with a terminal degree than nonparticipants.

To unearth students’ perspectives on the MSP summer bridge outcomes, Stolle-McAllister (2011) conducted a longitudinal, qualitative study with 134 students who reflected the Meyerhoff Scholars Program experience in totality. This was accomplished by a purposeful sampling of existing and past MSP participants, which included the new

program participants and those who held a PhD. The focus groups' purpose was to facilitate an understanding of specific programs (in this case, MSP), increase the knowledge base of perspectives represented within the group, and yield rich data overall (Stolle-McAllister, 2011). The structure of each audio recorded focus group consisted of between three and nine participants, with a duration of 1.5 to 2 hours. The open-ended questions asked by two expert moderators within the study were designed to capture students' perspectives on items such as: helpful and unhelpful program content, skills acquired because of their participation, and MSP's impact on the participants' STEM degree or career aspirations. Each interview was transcribed, utilizing an assigned pseudonym for each focus group participant to provide anonymity, analyzed with NVivo7 software, with coding conducted by four researchers (Stolle-McAllister, 2011). To establish trustworthiness, researchers split into pairs, then employed the constant comparative method to ensure proper coding of the data. Overwhelmingly, the data determined that the summer bridge component of the MSP was invaluable to all program participants.

Stolle-McAllister (2011) concluded that the three areas in which skills were obtained by the participants via program participation were academic, social, and professional. Academically, students improved their studying habits, which related directly to course type, establishment of various forms of support (including study groups), and effective classroom strategies, which included leveraging faculty relationships. Socially, students experienced an increased understanding of how to resolve conflict, communicate effectively, and present themselves as leaders. Additionally, students reported learning about diversity, which would help them in a

world where “they would not only be used to being with people that are exactly like them” (Stolle-McAllister, 2011, p. 16). Professionally, students who graduated from the program reflected on how they could apply much of what they learned in MSP’s summer bridge program to their work environment(s). Experiences in the program also assisted in career choice, while clarifying the variances within the STEM field. Additionally, some students also felt it helped them envision themselves in the field, increasing their confidence in their academic abilities. These factors are all of great importance as they contribute to the retention of undergraduate Black males in STEM disciplines within higher education through the provision of strategies to encourage academic success and retention (Stolle-McAllister, 2011).

STEM

Black students in STEM disciplines. In reference to the need to increase diversity in the United States’ STEM workforce, Palmer et al. (2011) eloquently stated “increasing college access, retention, and persistence for students of color in STEM is not merely a matter of United States’ economic competitiveness, but also a matter of equity” (p. 491). Utilizing an epistemological approach, the Palmer et al. qualitative study consisted of 90-110 minute, audio-taped, in-depth interviews with the intent of identifying factors that facilitate retention and persistence in students of color in STEM majors. An epistemological approach was used in order to “get as close to the participants as possible” (Creswell & Poth, 2018, p. 21). The study was conducted in a Northeast Region PWI with an approximate enrollment of 12,000 students. After being identified by the university administrators, the research participants were juniors and seniors who majored in the STEM disciplines with a GPA of 2.5 or above. To identifying reoccurring

themes, and to analyze the data, Palmer et al. (2011) did constant comparative analyses using the research notes, observations, and interview transcripts.

The Palmer et al. (2011) study produced three main themes relating to involvement in STEM and strong high school preparation: peer support, group support, and involvement in STEM-related activities. Similar interactions with STEM faculty, such as being a research fellow during a summer program, created an increased level of confidence in being able to excel in the field on a professional level. This was reinforced by the quote of one African American male study participant, who expressed that having the chance to work with residents and patients daily allowed him to see how remaining steadfast in his studies could be of eventual benefit. He worked with a neurologist, accompanying him on his rounds, which brought perspective to his academic journey, and it was empowering (Palmer et al., 2011).

The Palmer et al. (2011) study also found that supportive environments are directly connected to the retention and persistence of students of color. Various STEM support programs, such as the Pre-Accelerated Curriculum in Engineering, the Pre-Freshman Academic Enrichment Program at the research location, and the Meyerhoff Scholars Program at the research location were explored, with the latter having gained the most notoriety because of its success in diversifying the STEM talent pipeline. The participants of the Meyerhoff Scholars Program experienced higher GPAs and more frequent admittance into graduate programs at rates higher than those outside the program. Creating an environment that allows students to conduct research with faculty, gain hands-on experience in their prospective field, while experiencing a sense of

community are all valid strategies toward sustainable retention solutions for minority students in PWIs or otherwise (Palmer et al., 2011).

Bancroft, Benson, and Johnson-Witt (2016) surveyed three Black, Latino/a, and Native American students, utilizing the McNair Scholars Program. The McNair Scholars Program participants were interviewed as a part of the study, which sought to capture the complexities of that academic underrepresented minority (URM) students encounter when in pursuit of a master's degree. The program features a faculty mentoring component and is designed to encourage and assist URMs in preparing for doctoral studies. Students are also typically provided with opportunities to conduct independently developed research projects with their selected faculty mentor.

Despite having the opportunity to engage in such an enriching experience, Black scholars, both male and female, reported feeling that they must prove their academic ability to their White counterparts, and they also felt an awareness regarding their race. Of all the races profiled in the study, the Black males and females were identified as the most likely group to experience stereotype threat. Just as the feelings associated with gender and race can adversely or positively impact the overall academic experience a student has, the same could be said for the impact from an institutions' structure.

Black males in STEM. African American males remain underrepresented among students pursuing undergraduate degrees in science and engineering, particularly in contrast to their White male and female counterparts (Moore, Madison-Colmore, & Smith, 2003). Moore et al. (2003) conducted a qualitative, grounded theory study designed to better understand the phenomenon of persistence for African American males in engineering. According to the National Health Foundation, in 1998 African American

females represented 97% of the bachelor's degrees awarded to females in science and engineering, and African American males represented 5.7% of the bachelor's degrees in science and engineering. The analysis of African American male persistence is significant (Moore et al., 2003).

The intent of the Moore et al. (2003) study was threefold: (a) it explored why some African American males persist in engineering majors and others do not, (b) it provided a theoretical framework to facilitate an understanding of persistence in African American males in the engineering discipline, and (c) it identified ways to improve retention of African American males in the engineering discipline. The portion of the study included 42 African American males of junior and senior status who were majoring in engineering. A larger study took place in 2000, and it investigated the persistence of African American males in engineering programs. Students of junior and senior status were selected due to their level of exposure to the academics in the field of engineering. Of the 42 original study participants, 24 were included in the Moore et al. (2003) study, and their age range was 20 to 25 years, with a mean age of 22 years, their mean GPA was 2.60 on a 4.00 scale, and their SAT composite scores ranged from 900 to 1,370. Demographic information was obtained utilizing a biological questionnaire, which provided preliminary and supplementary information on items relating to each participant, such as their academic interests, familial socioeconomic situation and support, career aspirations, and social experiences in high school as well as college. Qualitative interviews were conducted with open-ended questions that focused on personal, social, and academic experiences in the engineering disciplines (Moore et al., 2003).

Data analyzation in the Moore et al. (2003) study was completed by a research team of four people of African American descent, consisting of three males and one female. Professionally, two of the research team were doctoral students, one team member was an assistant professor in counselor education, and the fourth research team member was the primary researcher. The researcher utilized the university's Office of Minority Affairs to identify prospective interviewees, and they received the names, phone numbers, addresses, and e-mail addresses to assist in locating interviewees. Initial contact was made with the prospective interviewees by the primary researcher, with 30-60-minute individual interviews; and group interviews, also conducted by the researcher, lasted 2.5 to 3.6 hours long. Both interviews were audio recorded and transcribed verbatim. Once the transcripts were received, they were coded and analyzed utilizing the grounded theory approach. To ensure accuracy, each researcher coded his or her data independently, later sharing their findings with the team to collectively discuss the patterns that emerged. The final stage of the analysis employed the member-checking technique by sending each participant a final version of the data for their input and additional information. None of the participants had information to add, nor were there any discrepancies found as a result of the member-checking technique.

The Moore et al. (2003) study found that the African American male participants faced unique sociological and psychological challenges, causing them to develop traits, embodying what was termed as the prove-them-wrong syndrome. The prove-them-wrong syndrome evolved from the data of this study, and it was created to illustrate and explain the academic and social experiences, attitudes, and personality characteristics of persistent African American males pursuing engineering degrees (Moore et al., 2003).

Howard and Hammond (1985) stated that the prove-them-wrong syndrome was born out of a “psychological phenomenon that arises when a larger society projects an image of inferiority” (Moore, 2003, p. 65).

The quantitative study conducted by Lundy-Wagner (2013) evaluated the completion of STEM baccalaureate degrees from HBCUs by Black males, bringing additional attention to the deficit of Black men in the field of STEM. The relevance of the Lundy-Wagner study lies within its contrast to Strayhorn (2014), what stated that despite 75% of African American collegians attending PWIs, HBCUs are responsible for one-third of all bachelor’s degrees earned by undergraduate Black males. Lundy-Wagner (2013) posited that although HBCUs have been viewed as a talent pipeline for the STEM field, they have been disproportionate, and they have created a marginalized experience for undergraduate Black males within the STEM pipeline.

Lundy-Wagner (2013) utilized the Integrated Postsecondary Education System (IPEDS) data from the years 1993 to 2009, separating them by ethnicity/race, gender, and academic major. To further disaggregate the data, enrollment and completion data were separated into eight STEM fields identified within IPEDS: agriculture, biology, computer and information, the earth, mathematics, natural science, and physical science, as well as engineering. During the course of this study, Lundy-Wagner (2013) discovered a critical gender difference in degree attainment and it separated the Black women from the Black men. Black women in HBCUs made larger gains than men for all of the aforementioned STEM fields. Additionally, in the fields of agriculture, biology, mathematics, or physical science, African American men were not the majority of STEM bachelor’s degree recipients. In making Black females the focal point of research, which is predominantly

what has been done, it further discounts Black male achievement and their overall experiences.

With Blacks representing only 3% of all U.S. scientists and engineers, it is befitting that there is a continued focus on undergraduate Black males and diversifying the STEM field. Strayhorn (2015) conducted a mixed methods study that focused on male identity, as well as interest in math and science learning, placing an emphasis on closing the gap between the national goal of significantly increasing the production of college STEM degrees. Reminding the reader that this is an initiative once deemed worthy of addressing by former President Barack Obama in 2009, Strayhorn (2015) cited former President Obama's challenge the nation to "regain its status as the global leader with the highest number of postsecondary graduates in the world by 2025" (p.45) The overall purpose of Strayhorn's (2015) study was to identify the factors that impact postsecondary preparation and facilitate success in the STEM field.

One of the factors that can impact postsecondary preparation or success for undergraduate Black males in engineering is the family unit. Flowers (2015) conducted a qualitative, single-case-designed study to explore the role of family in Black males' navigation of the educational process. Flowers found that to adequately respond to the technological advancement of countries, such as India, China, and Japan, educational inequalities for Black males must be reduced, particularly in engineering discipline. This Flowers (2015) study sought to identify the factors within the support network needed for undergraduate Black males to be academically successful as engineering majors. For the purposes of the Flowers study, Black males categorized as academically successful had a GPA of 3.00 on a 4.00 scale at a junior or senior status within a rigorous engineering

program. With the Black male narrative typically delivered from a deficit framework, the Flowers study focused on positive academic identity formation of eight Black males from two highly selective southern institutions. The two institutions consisted of a public research university and a public master's college, and there were four participants from each college. The participants were selected based upon recommendations given by the engineering faculty members and the deans.

In an effort to gain access to the institutions utilized within this study, Flowers (2015) met with the academic gatekeepers (e.g., academic deans and program directors) at each of the study sites. Once selected, each participant completed a personal demographic questionnaire, which prompted the scheduling of their individual 45- to 60-minute interview. Each interview was conducted in a study room on the respective campuses. After the data from each interview was transcribed, content analysis was performed, and the data was unitized. The establishment of reoccurring patterns within the participants' narratives evolved into themes once they were submitted to the interviewees to ensure the clarity of the results. The main theme that emerged from Flowers (2015) study was the importance of familial support. Each of the eight participants expressed that family involvement, which included encouragement and reinforced expectations, were critical to their positive academic identity formations.

Participants in the Flowers (2105) study expressed varying levels of familial involvement and support, ranging from vital maternal support to the notion of legacy (e.g., being told that they were going to be the difference maker in their family by being the first to go to college), despite some parents' inability to assist the participants with their studies. To this end, several of the participants noted that once they reached a

certain level in mathematics and science, their parental support became more emotional than intellectual. One participant expressed that when he asked his father for assistance with his science homework, he was told that he was smart and could figure it out on his own. He later realized this may have been his father's way of avoiding admitting a lack of knowledge in chemistry; however, his statement of you're smart, figure it out became the participant's mantra whenever he encountered a difficult academic challenge.

Another student recalled that his mother visited at least twice a term and called at least once a month to check on him to ask how his classes were going. While she never truly went into detail about his courses, she typically redirected the conversation to whether he had enough food for the month. With six of the eight participants being raised in a single-parent household, with either a mother or grandparent as a head of household, the Flowers (2015) study affirmed the importance of familial involvement in the educational process of undergraduate Black males in engineering, because it created a sense of community while the participant was away from home to let the students know they were not alone in their academic journey.

A sense of belonging is a major factor that causes underrepresented minorities to leave the STEM disciplines. Strayhorn (2015) conducted a mixed methods study examining literature in the areas of general information about Black men in higher education in the STEM disciplines, studies about Black students' entry into college, and information about Black males, thereafter leveraging these topical areas as the study's themes. The information is relevant because of its direct link to a major factor that impacts Black male student retention—a sense of belonging. Strayhorn (2015) advanced a theory for belonging in college, which contained seven core elements:

1. sense of belonging is a basic need;
2. sense of belonging is a fundamental motive, sufficient to drive human behavior(s);
3. sense of belonging takes on heightened importance in certain contexts at certain times;
4. sense of belonging is related to and seemingly a consequence of mattering;
5. social identities intersect and affect college students' sense of belonging;
6. sense of belonging engenders other positive outcomes; and
7. sense of belonging must be satisfied continually (p. 49)

The study Strayhorn (2015) conducted was carried out over several years; it was federally funded, systemic, and incentivized; and it consisted of 140 Black, full-time students enrolled in PWIs or HBCUs in the United States. Most of the participants were first-generation college students, raised in urban neighborhoods, with 86% living on campus. The students took a survey that allowed them to indicate an interest in being interviewed, with 38 responding. Those categorized as first-year, first-semester students as well as those living with serious disabilities, were excluded from the study, which was due to a possible inability to comply with the established interview protocol. Phase one consisted of a 50-item survey using the Student Success Questionnaire, with phase two being in-depth, one-on-one, 45-minute interviews designed to capture the lived experiences of each subject. The data was stored on NVivo and they could be reflected upon later if necessary (Strayhorn, 2015).

The Strayhorn (2015) study concluded that establishing a sense of belonging in one's STEM major department, feeling valued in their academic department, and finding

a way to satisfy a sense of belonging were all key to the Black males' success and college preparation in the STEM disciplines. Other contributing factors to success were self-efficacy and faculty involvement in which the faculty members offered opportunities for the students to collaborate with them, which was empowering.

Methodological Review

Of the 18 studies reviewed for this current literature review, 12 were qualitative, with the remaining studies being mixed methods. The majority of the qualitative studies utilized a phenomenological interview style, for example Hines et al. (2015) and Palmer et al. (2011), with Keels (2013) being among the few to apply a longitudinal approach to capture a more textured student experience and to capture a phenomenon over a designated period of time.

Substantive Gaps and Recommendations for Further Research

While there is substantial research relating to undergraduate Black males in higher education or in PWIs, the majority is deficit based. Several of the articles suggested research that is not only asset-based, but they highlighted the positive aspects of Black males and their prospective contribution to the workforce and their respective communities. As suggested by Sinanan (2012), a qualitative method is most valuable for obtaining a richer, more-detailed view of the subject, and it facilitates the capturing of undergraduate Black males' voices within higher education, because there is a deficit of literature that captures the actual voices of undergraduate Black males in higher education.

Strayhorn (2010) offered one key recommendation to increase a sense of belonging, while building social capital, which was to focus on facilitating building

rapport between undergraduate Black males and the faculty and the administration. In PWIs, this is especially important, because faculty of color tends to be scarce (Brooms & Davis, 2017; Jayakumar et al., 2009). Cokley (2002) indicated that African American students should be given the opportunity to build rapport with White faculty, as well as faculty from other ethnic groups. This would include interactive learning communities and undergraduate research (Palmer et al., 2011). Allowing students to engage in undergraduate research can potentially build subcommunities, while encouraging Black male students to take an interest in pursuing graduate school (Ovink & Veazey, 2010). It was also noted that when looking at faculty-student interaction, faculty in all institutions should consider an approach to interacting with Black male students that could include activities such as being an advisor to a student group and take students to national conferences (Palmer et al., 2011).

Integrating an interest in the STEM disciplines earlier on into the K-12 curricula of Black males and other underserved populations, in general, was also suggested by Hines et al., 2015, Palmer et al., 2011; Strayhorn, 2010). This would facilitate an opportunity for students to seek out support programs that they may not otherwise know are available, such as BUSP featured in the Ovink and Veazey (2011) study.

While there appears to be an upward trend in the increase of asset-based literature as it relates to undergraduate Black males gaining a true understanding of their lived experiences in PWIs, is a necessity if sustainable, applicable changes are to be made to support these young men. Academically successful undergraduate males are the ideal persons from which to gain perspective regarding what is required to be academically successful (Hines et al., 2015).

Chapter 3: Research Design Methodology

This qualitative phenomenological study, set in a PWI, was designed to capture the strategies employed by academically successful undergraduate Black males. The following questions guided this study:

1. What are the perceptions that academically successful undergraduate Black males in the STEM disciplines have regarding stereotype threat?
2. Given that this group of undergraduate Black males in STEM disciplines are academically successful, how have they been able to buffer themselves from such threats?
3. What strategies do Black males in STEM disciplines use to overcome such environmental threats?

This chapter presents the study context with an emphasis on the participants, the participant recruitment methods, the participant sampling, the data collection, the data analysis, the participant confidentiality methods, and the study limitations.

Study Context

This current study took place at Malachi University (MU), a private, 4-year higher education institution with four international locations that is headquartered in the Western New York State Region. As of fall 2017, the overall institutional enrollment was 18,963 students. This number includes the institution's international campuses. At the undergraduate level, the institute's overall fall 2017 undergraduate student enrollment was 15,741, with 1,975 of the population identifying their ethnicity as Black. The Black

female headcount was 757, with a Black male headcount of 1,218. This data reflects a population with more than 63% White students, categorizing the university as a PWI (Encyclopedia of African American Education, 2010).

Several of the programs within this institution are 5 years in length, which is due in part to the institution's mandatory cooperative/internship (co-op) experience. The co-op experience requires that students engage in an academic major-related work experience for the equivalent of an academic term. The number of required co-op experiences is determined by the academic major, with STEM disciplines averaging up to at least four total co-op experiences. Because these co-op experiences are designed to provide exposure to the world of work, they often lead to students integrating into a permanent position within their selected field.

Study Methods

Phenomenology is a strategy of inquiry with methodological and analytical particularities that aim to identify and describe the subjective experiences of the respondents. It is a matter of studying every day experiences, often called "lived experiences," from the point of view of the subject (Schwandt, 2015, p. 235); in other words, it makes real-life meaning out of the students' studies experience. Within phenomenological studies, emphasis is placed on what the individual experienced, as well as how the individual experienced a particular event or process (Creswell & Poth, 2018). A qualitative phenomenological method was the most appropriate for this current study, as the focus was on what academically successful undergraduate Black males in STEM majors at a PWI had experienced during their academic career, as well as how

they perceived the environmental threats within their institution had impacted them individually. This study utilized three forms of data collection, as described below.

Study Participants

For the purposes of this study, the participants were recruited through several means. First, to facilitate the recruitment of participants, the researcher sought the input of individuals who, by direct affiliation, could identify participants who best aligned with the participant criteria. Such individuals included the Director of the McNair Scholars Program or a faculty member who works closely with the selected population. The Federal TRIO Programs (TRIO) are Federal outreach and student services programs designed to identify and provide services for individuals from disadvantaged backgrounds. TRIO includes eight programs targeted to serve and assist low-income individuals, first-generation college students, and individuals with disabilities to progress through the academic pipeline from middle school to postbaccalaureate programs (U.S. Department of Education, n.d., para. 1). To further facilitate this process, a letter of support was obtained from the Director of the McNair Scholars program.

Second, an e-mail letter was sent from the Director of the McNair program at MU to the prospective study participants. The letter introduced the prospective participant to the study, which included the participant criteria. The prospective participants were asked to contact the researcher within a specified time frame to have their eligibility assessed to participate in the study. Last, as students were casually encountered on campus by the researcher who had not been, or were no longer being coached by the researcher, they were given a brief document to inquire as to their interest in participating in the study (Appendix A).

This research included 10 Black male participants ($N = 10$) who were selected utilizing a purposeful sampling method. The following inclusion criteria was applied to students who were selected for this research study, they: self-reported GPA of 3.00 or better on a 4.00 scale; were in their academic sophomore, junior, or senior year; identified their gender as male; identified their ethnicity as Black; majored in a STEM discipline; and were not a transfer student. To protect the anonymity of the research students in this current study, pseudonyms were selected by each participant. The data provided in Table 3.1 provides the participants' self-selected pseudonym, academic major, home town, and GPA.

Table 3.1

Study Participants' Profiles

Pseudonym	STEM Major	Hometown	GPA
Adonis	Computational Mathematics	Brooklyn, NY	3.93
Caleb	Mechanical Engineering Technology	Buffalo, NY	3.23
Curtis	Biomedical Engineering	Owings Mills, MD	3.18
Joel	Game Design and Development	Bloomfield, CT	3.05
John	Mechanical Engineering Technology	Rochester, NY*	3.04
Jordyn Lyon	Computing and Information Technology	Rochester, NY	3.02
Karl	Environmental Science	Bronx, NY*	3.30
Lance	Mechanical Engineering Technology	Whitinsville, NY	3.27
Marvin	Game Design and Development	Marion, IA	3.66
Rick	Electrical Mechanical Engineering Technology	Elmont, NY	3.27

Note. *Permanent U.S. Resident.

Given that this study focused on academically successful undergraduate Black, male students who had completed consecutive years of education within the selected PWI, the exclusion criteria included transfer students, students enrolled with a part-time status, male students who did not identify as Black, and Black female students in the STEM discipline. The academic disciplines within STEM at MU included, but were not limited to, majors such as biology, chemistry, electrical engineering, computer engineering, mechanical engineering, statistics, and mathematics.

The inclusion and exclusion criteria were selected to create a broad academic-year profile within the academic years that were selected, facilitating responses from students who had experienced an uninterrupted STEM educational process within a PWI. The range of academic years selected were intended to apply a longitudinal perspective to the study, providing data on students from a range of developmental years to ascertain if the strategies employed differed from academic year to academic year. Additionally, the GPA of 3.00 aligns with many graduate-school admittance standards, as well as many employer requirements when hiring students for co-op experiences (as required by most STEM majors within MU). The participants self-identified as Black, which is defined as a person having origins in any of the Black racial groups of Africa (NCES, n.d.). This definition included any male student who identified as being a part of the Caribbean or African diaspora.

Given the professional position of the researcher at the time of this study, she formerly interacted with Black male students in STEM disciplines within MU. The participants included in this study only included those students that the researcher had not and were least likely to coach. This intentional participant selection method was to reduce

potential cases of over-rapport and a perceived position of power. Over-rapport can occur when there is a high familiarity with the background of a participant, causing a bias when obtaining a participant's perspective, which can encourage the derailing of conversations (Silverman, 2013). Moreover, this selection method helped the researcher to avoid students feeling coerced or pressured into participating in the study. Students who elected to participate in the study were advised that their interview responses or their participation would not negatively impact their status as a student within MU, including the McNair Scholars Program.

Anticipating that there might be a scarcity in identifying participants in the 3.00 GPA and above range, the researcher collaborated with the director of the institution's McNair Scholars Program. The McNair Scholars Program tracks their students following graduation, which could present a richer pool of academically successful Black male students in STEM disciplines, given that the program is designed to encourage entry into graduate school programs. Additionally, access to this data required permission from MU's research board process, as well as St. John Fisher's Institutional Research Board (IRB).

Data Collection

This study utilized semi-structured individual interviews, a demographic survey (Appendix B), and field notes. The utilization of these three forms of data collection is known as triangulation. Triangulation is the process of establishing credibility of the participant's responses via different data collection methods and designs (Creswell & Poth, 2018). This qualitative study also employed member checking, which is elaborated upon within this section.

The prospective interview participants received an e-mail requesting their participation (Appendix C) from the Director of the McNair Scholars program. The letter gave an overview of the interviews, stating that the interviews would be audio recorded, as well as giving the recipient the objective of the interviews. The demographic survey was used to record all the participant information and to verify that they met the criteria for the study. This allowed the interviewer to verify the interviewees identity while having a second method of capturing the interview.

Prior to the start of each interview, the signed consent form (Appendix D) was privately reviewed with each participant. If the interview was conducted over the phone, the consent form was reviewed by the recipient because he received a scanned copy in an e-mail. At the conclusion of the consent form review, the researcher reiterated to the participants that their participation was voluntary, and their identity would be protected via a self-selected pseudonym of their choosing. The participants were informed of the confidential handling and secured storing of all data derived from their interviews.

The interview-based approach was appropriate for this study, as it facilitates the researcher obtaining firsthand experiences of academically successful undergraduate Black males in STEM disciplines with PWIs. With the dominant discourse continuing to marginalize Black males to an extent that it is both pervasive and institutionalized, it has become critical for Black men's stories to be told by them (Brooms, 2017).

Individual Interviews

Each participant interview (Appendix E) was no more than 60 minutes in length and the interviews were audio recorded. Each participant received a \$10.00 dining services gift card after they completed their interview. Although it was anticipated that

the interview location would likely be a reserved conference room in the campus library, to create a sense of comfortability for the interview participants to share their experiences, the participants expressed comfortability in conducting the interviews in the researcher's office. To minimize occurrences of inaudible recordings, the researcher reserved interview times with minimal traffic to the surrounding offices within her suite to minimize interview participant distraction and background noise (Silverman, 2013). If it an in-person interview was not feasible, the interviews were alternatively conducted via phone or video method, such as Skype. The interviews conducted via phone took place in a soundproof space, which was likely be the professional or home office of the interviewer. Only the interviewer was present during the conducting of the interviews.

Recorded interviews allowed the researcher to focus on the actual details of one aspect of social life (Silverman, 2013). Additionally, the recorded interviews facilitated the revisiting of the conversations, resulting in refined transcripts and renewed perspectives on a response after reviewing the recording. The interview questions were formulated to identify the experiences of the participants, as they related to the characteristics of stereotype threat; verify the data received on the demographic form; and to gain a deeper understanding of the participants' strategies to be academically successful within a PWI.

Demographic Questionnaire

The data collected on the demographic survey assisted the researcher in verifying that the prospective participants met the study criteria. Study criteria characteristics for this study were academic major, cumulative GPA, academic year, and a self-selected pseudonym. The researcher reviewed the demographic survey prior to each interview to

ensure that the intent of the survey was clear and accurately completed by the participant. The completion of the demographic survey by each interview participant further confirmed that the participants met the criteria for the targeted population.

Field Notes

An interview is where knowledge and social interaction between the interviewee and interviewer intersects (Creswell & Poth, 2018) providing rich data. Residing in a research environment facilitates the emerging of more layers over time, which can create challenges in a researcher's ability to discern the importance of certain received data. In acknowledgment of how intricate the human experience can be, it is imperative that the researcher capture the interview in a holistic manner (Schwandt, 2015). Defined by Schwandt (2015) as "a kind of evidence on which inquirers base claims about meaning and understanding" (p.117), field notes allow the researcher to capture the raw data as an interview progresses. Additionally, "field notes allow the researcher to identify the practical concerns, conditions, and constraints that people confront and deal within their everyday lives and actions" (Silverman, 2013, p. 243). This raw data is inclusive of the researcher's interpretation of the interviewee's answers and observations of nonverbal communication during an interview. The utilization of field notes also provides a visual record that the researcher can utilize to tie responses to the theory, a priori codes, or to identify the need for the expansion on the codes or themes.

The utilization of these three data collection methods assisted the researcher in achieving several objectives. First, the one-on-one interviews allowed the researcher to obtain firsthand accounts of the participants' lived experiences, learning about the success strategies they employed to buffer them from certain characteristics of stereotype

threat. Second, the demographic survey informed the participant of the population being focused on within the study, while ensuring that all participants met the criteria of the targeted population. Last, the field notes allowed the researcher to capture aspects of the interviews that may not have appeared in the audio recordings, such as body language and emotion, which could have been used to identify additional themes.

Data Analysis

Coding is a process that is central to qualitative research, allowing the text that evolves from documents, observations, and interviews to evolve into meaning (Creswell & Poth, 2018). The data collected within this study was coded via a three-step, interrelated process, using a priori, open, and axial coding. The coding process required the researcher to aggregate data, processing it until it she could denote concepts that stood for the data (Creswell & Poth, 2018). The purpose of these three coding types was to evolve the data from codes to themes. Prior to conducting the interviews, a priori codes (Appendix F) were established based upon stereotype threat, existing literature on undergraduate Black males in higher education (particularly in PWIs), as well as undergraduates and STEM disciplines.

Next, the researcher employed open coding, extracting the main categories of information from the data to create open codes. Schwandt (2015) identified the ability to code for the purposes of understanding the phenomena or, rather, what is going on. Developing open codes allowed the researcher to further dissect the developed open codes and engage in axial coding. Axial coding is a direct outcome of open coding, aligning categories to their subcategories (Wicks, 2010). Once these three coding

activities concluded, the researcher developed themes that aligned with the selected theory, problem statement, and phenomena.

All interviews were transcribed utilizing a transcribing service, Rev.com. In addition to using a transcribing service, the researcher also transcribed the demographic information and field notes. To confirm the accuracy of the transcribed interviews, the interviewer cross checked the data received from Rev online to ensure that any verbiage not readily recognized by the service were properly documented. This cross checking also provided identification of any additional codes that needed to be added during the in vivo stage described below.

A priori codes were established, followed by the development of in vivo codes. The established a priori codes contained characteristics associated with stereotype threat theory, such as being the only or one of the few Black males in a class, or the identification of feelings that emerged when faced with a challenging task in class. In vivo coding, also known as literal coding or inductive coding, was appropriate for this qualitative study because it “honors the participant’s voice” (Saldaña, 2013, p. 61). This allowed the success strategies of the interview participants to be relayed in a direct manner.

Following the development of the transcripts, which were derived from the individual interviews, the researcher performed member checking with each interview participant, providing him with a copy of the transcript and identified themes. The purpose of member checking was to verify that lived experiences of the participants were accurately reflected within the research. Member checking is helpful in further clarifying

emerging themes, as well as executing follow-up questions (Saldaña, 2013). Patterns were developed by identified characteristics such as similarity, frequency, and causation.

Data Management

The recording of each interview is stored in a fingerprint-protected cellular phone as well as in the researcher's personal, password-protected laptop. When not in use, the laptop is stored in a locked cabinet with only the researcher's access to it. The researcher will retain the recording of each interview for a period of 3 years following publication of this work. The electronic files, including the participant-selected pseudonyms, do not include the actual names of the participants or any information that could personally identify or connect the participants to this study. Following the 3-year time frame, all interview data will be purged from the researcher's cellular phone and personal laptop in a manner such that restoring data will not be possible.

Conclusion

This qualitative study gained further insight into the success strategies implemented by academically successful undergraduate Black males in STEM disciplines in a PWI. Through the application of a phenomenological approach, the researcher correlated individual interviews and analytic field notes to capture the lived experiences of the selected population. This research contributes asset-based literature to the existing body of literature. Additionally, the research can provide administrators at PWIs with success strategies that were utilized by the undergraduate Black males participants in this study who were in STEM disciplines at their PWI, ideally assisting in the improvement of retention within this population while creating a more inclusive learning environment.

Chapter 4 presents and discusses the study results.

Chapter 4: Results

Introduction

Chapter 4 presents the study findings, which are represented by four major themes that emerged from the data, including individual interviews, demographic surveys, and field notes. The focus of this study was the lived experiences of academically successful undergraduate Black males in STEM disciplines within a PWI. The participants included 10 undergraduate Black males within their junior or senior academic years who were interviewed to obtain various perspectives on their academic success strategies and overall experiences. The participants represented undergraduate STEM disciplines within a PWI, including biomedical engineering, computing information and technology, computational mathematics, electrical mechanical engineering technology, environmental science, game design and technology, and mechanical engineering technology. Each study participant, as well as any faculty or staff members mentioned within the three forms of data collection, are introduced with a pseudonym. *The impact of Black faculty and staff in STEM* is the first theme discussed, followed by the second and third themes of *faculty of color modeling the way*, and *peer groups as community*, and last, *restraining their blackness in the face of stereotype threat*. The identified themes are directly aligned with the research questions within this study:

1. What are the perceptions that academically successful undergraduate Black males in the STEM disciplines have regarding stereotype threat?

2. Given that this group of undergraduate Black males in STEM disciplines are academically successful, how have they been able to buffer themselves from such threats?
3. What strategies do undergraduate Black males in STEM disciplines use to overcome such environmental threats?

This chapter ends with a summation of the results.

Study Findings

The first theme captures the participants' beliefs that Black faculty had a direct impact on their academic and social success at the institution. The participants' responses indicate the impact that diverse faculty, particularly Black faculty and staff in STEM, had on their overall collegiate experience as undergraduate Black males in STEM disciplines within a PWI. These responses evolved into the first theme, the impact of Black faculty in STEM. The study participants recounted scenarios in which faculty acted as mediators in the presence of conflict with other faculty members—both within and outside of their respective academic programs. Further, the presence of faculty early on in their college career—particularly Black faculty—was categorized as *inspiring* and reassuring of their professional potential by most of the participants.

The first theme, the impact of Black faculty and staff in STEM refers to the existence of a diverse faculty in the collegiate environment and how it impacted the overall academic experience for undergraduate Black males in STEM disciplines. The participants discussed a desire to go beyond the scope of instruction and discuss professional development with faculty who demonstrated real-world, firsthand expertise, which some of the participants found to be challenging with White faculty. Additionally,

having a lack of diverse racial representation within their learning spaces was one of the factors contributing to the participants' doubting their academic ability, and not giving them a sense that they belonged at their institution.

The second theme, faculty of color modeling the way, examines how Black faculty demonstrate effective coping mechanisms for Black students in STEM at a PWI. One of the characteristics of stereotype threat is that students may feel they do not belong in an environment in which they are not ethnically well represented. The study participants voiced experiencing a lack of diversity in their learning environments, which often was brought into question if they had selected the wrong academic major, or if they possessed the academic acumen to be successful. The presence of faculty of color, who had modeled their academic and professional success, provided encouragement to the undergraduate Black males in the STEM disciplines to remain within their respective academic majors, with the end goal of adding ethnic diversity to their field.

The third theme, peer groups as community, explored students addressing the lack of a sense of belonging and inclusivity. Peer groups were also viewed as a source of encouragement, as some participants mentioned feeling fearful of not being academically successful when they did not see more than one or two fellow Black males, or females, in their courses. Additionally, the participants expressed that due to the lack of diversity within their respective academic majors, they addressed this deficit by piecing together peer groups comprising students outside of their academic majors.

The fourth and last theme, restraining blackness in the presence of stereotype threat, demonstrated how stereotype threat presented itself in multiple facets of the students' collegiate experience. Interestingly, the experiences shared with the researcher

related to this theme ranged from constant adjusting of one's authentic self, in the presence of White classmates and faculty, to acknowledging the difference the participants' presence made in the workforce. The latter refers in part to the co-op experiences and the microaggressions they experienced. The following sections explain each of these themes in detail. Table 4.1 provides a narrative for each participant, which includes pseudonym, GPA on a 4.00 scale, and their narrative.

Impact of Black faculty and staff in STEM. As Black male students in STEM disciplines maneuver and navigate through academic spaces within PWIs, the presence of diverse faculty, or lack thereof, often serves as an example of students' professional possibilities. While conducting individual interviews, the participants were asked to provide their perspective on how seeing or engaging with Black faculty and staff impacted their academic experiences within their institution, as well as the importance of diverse faculty and staff in STEM. The relationships that the participants spoke about during their interviews, as well as on their demographic survey, were purposefully sought out and maintained. While most of the relationships with Black faculty and staff developed from the participants' desire to receive guidance from someone who looked like them or with whom they could relate, others were assigned a faculty or staff member via institutional programs, and thereafter, they evolved into mentorships.

Table 4.1

Study Participants' Narratives

Pseudonym	GPA	Participant Narrative
Adonis	3.93	A Computational Mathematic major, Adonis, formerly majored in Chemical Engineering. The switch in his academic major was due to his inability to find a co-op experience near his home of New York City, as he desired to be close to his family and friends. Adonis was drawn to the STEM field by his high school Biology and Chemistry teachers. His U.S. History teacher inspired him by teaching history in a way that brought “the unvarnished truth about American history” and told the students that “one of the best things for Black people to do is pursue things like higher education and quantitative fields,” where diversity is lacking. Admittedly unaware of the demographics of the institution, he focused solely on the co-op component when searching for an ideal college, making peer support very key to his academic success within his freshman and sophomore years.
Caleb	3.23	An only child raised by a single mother in Upstate New York, Caleb attended an entry-by-exam-only public, technical high school in Upstate New York. The caliber of his K-12 education facilitated an ability to easily understand the fundamentals of engineering at the collegiate level. He recognized his interest in Mechanical Engineering early on in his educational career, and he categorized himself as a problem-solving critical thinker who also possessed exceptional technical skills. His college choice was in part based on proximity to his mother. Majoring in Mechanical Engineering Technology, he was an active leader on campus, acting as the president for one of the institution’s largest, prominent student organizations.
Curtis	3.18	Captain of the varsity basketball and a Resident Advisor, Curtis is the son of a civil engineer (his father passed in 2015). His mother is an addictions counselor, who, along with his father, impressed the importance of education on him in his youth. During the summer of his younger years, it was not uncommon for Curtis to be assigned workbooks or reading the dictionary, which he credited for his inherent mathematical and linguistic abilities. The high school he attended was private, predominantly White, and well-funded, providing the students with a robotics lab. Curtis’ first Biomedical Engineering co-op experience evolved out of rapport with a faculty member, and it had given him confidence in securing his remaining required co-ops.
Joel	3.05	A Game Design and Development major, Joel, attended a private, liberal-arts-focused high school. The school offered a host of AP courses, and he elected to take AP computer science. The content and course instructor were what he credited for igniting his interest in STEM. Identifying as a “problem solver,” Joel chose his institution in part because it provided him with an opportunity to play basketball. He found that his team mates were the core peer group he relied on, and he continued to rely on them heavily in social circles.

John	3.04	A permanent U.S. resident originally from the Democratic Republic of the Congo, John, is a Mechanical Engineering Technology major. A self-proclaimed lover of math, he was enrolled in a computer-based learning program during high school. His parents are advocates for the pursuit of education and of his nine siblings. He is the sixth child and the next in line to graduate from college. He expressed that he addressed his academic challenges by utilizing the counseling and tutoring services provided by the Higher Education Opportunity program within the institution.
Jordyn Lyon	3.02	Jordyn Lyon attended a high school in Upstate New York that encouraged students to take advantage of an array of AP courses. Electing to take AP Literature, AP Calculus, and AP Computer Science, AP Calculus was the course he identified as “challenging.” His AP Computer Science course was taught by a Black woman who was passionate about coding, and she encouraged him to seek it as a profession. His high school experience was the driving force behind his interest in STEM, and it resulted in him selecting Computing and Information Technology as his academic major. He identified his healthy sense of humor as a coping mechanism to deal with racial tensions that he experienced during his high school years and beyond.
Karl	3.30	A permanent U.S. resident from the Ivory Coast, Karl faced many academic challenges, beginning with having to repeat high school from the 10th grade after arriving to the U.S. His native language of French, as well as not having a strong sense of belonging, presented difficulty in his ability to communicate his academic challenges and areas of difficulty. Karl leveraged the Higher Education Opportunity Program (HEOP) for counseling and tutoring, aiding him in obtaining and retaining academic success. Eventually, Karl became a tutor, helping his peers excel in some of the courses he once found challenging. He is an Environmental Science major who aspires to be a PhD candidate in Sustainability.
Lance	3.27	Lance attended a predominantly White, small, high school and “always knew, since high kindergarten, that he wanted to be an engineer.” His high school had a competitive environment, often requiring him to stay up late to tackle his heavy workload. Majoring in Mechanical Engineering Technology, he combatted the lack of diversity in his colleges’ faculty by consistently communing with his peers. Additionally, he utilized numerous institutional programs to aid him in academic success, such as the Louis Stokes Alliance for Minority Participant.
Marvin	3.66	A biracial student who identified as Black, Marvin, was inspired to enter into the STEM field by his father, who is a human resources manager. Although his father’s profession is not STEM related, it is his father’s ascension into the human resources field and encouragement of Marvin to pursue his professional dream(s) that motivated him. Majoring in Game Design, Marvin decided to apply his degree to a career of web development. There are few students of color in his academic major, however, Marvin made it a point to form a peer support group with students of color from other majors, like Psychology.
Rick	3.27	Identifying as a Haitian who is first-generation American, Rick, is an Electrical Mechanical Engineering Technology major. Despite a strong interest in the arts (drawing, specifically), he chose a STEM major mainly for cultural reasons. He indicated that “within his family and within the Haitian mentality, the expectation is for you to go to college . . . options are to be a lawyer, doctor, or engineer.” The decision to enter a STEM major also evolved from having excelled in math and science while in high school. He found the STEM fields to be very White Anglo-Saxon Protestant, however, growing up in Haiti empowered him to envision himself as a successful engineer.

The theme impact of Black faculty and staff in STEM is an indicator of how the Black faculty and staff can enhance or reduce the positivity of the collegiate experience for undergraduate Black males in STEM within a PWI. The faculty members identified by the study participants as being of the most assistance or most of an inspiration to them were those who typically went beyond the action of delivering curriculum and testing their comprehension. They acted as mediators when the students had issues with other faculty that they did not know how to deal with (Brooms, 2017; Harper & Newman, 2010). Karl, a fourth year Environmental Science major, provided an example of how a faculty member helped him navigate academic challenges. A Black male faculty member, who was originally from Jamaica, within the College of Science, aided him in maneuvering through the institution's culture.

A permanent U.S. resident born in the Ivory Coast, Karl, faced many academic challenges when he came to the United States, beginning with having to repeat high school from the tenth grade. He described his high school as “a bubble . . . where it was mostly children of immigrants, Hispanic people, Black people, Africans, mostly.” His interaction during his high school years with White people was limited to the classroom, creating quite the culture shock for him upon entering college. The native language of Karl's country is French, resulting in his having a thick accent. He felt intimidated by peers that he assumed would be smarter than him, because in his mind, they had been in receipt of a better K-12 education than he received. Karl's family life caused additional angst for him, as his parents separated shortly after he was born, leaving him with no paternal presence in the household. In the absence of his father, he often assumed the role of supporter to his mother.

Despite all these stressors that Karl brought to college with him, he credited one of his professors as not only being key in his academic success and development as a student but in his adaptation to United States culture, stating,

In my third year, I met with Dr. from the College of Science. He took me under his guidance. So, I started learning a couple of things from him. How to communicate efficiently, how to ask for help, talk to professors who are not the same race as me. So, I had to adjust, learn from him, and take those steps on my own. I started doing more and more approaching of the professors, although I feel like I never had really support from professors of my major, I had more support of professors outside of my majors than professors in my major.

The experience that Karl had with his professor was invaluable and affirming on many levels. Through his engagement with his professor, Karl was taught basic communication skills with those he deemed as being superior to him (White faculty), while identifying and securing the faculty support that did not exist in his academic major. Black males are frequently categorized and defined as those within the group who perform less well (Brooms, 2017). For undergraduate Black males in STEM disciplines like Karl, having a mentoring professor facilitates their ability to experience a living, breathing example of what is possible for them professionally, encouraging them to trust in their academic ability despite earlier feelings of inadequacy.

Another study participant, Jordyn Lyon, graduated from a high school in Upstate New York with few teachers of color. One of his courses, AP Computer Science, was taught by a Black woman whom he cited as a great influence on his decision to further explore coding and the STEM disciplines when selecting his postsecondary education

major. He is a Computing and Information Technology major and when asked to provide his perspective on the level of importance ethnically diverse faculty in STEM was to him, he stated,

Yes, it's definitely really important because the whole school is predominantly White, but there are, I would say, MU is like 75%, 70% White? So, I mean that leaves 30% up to Latinos, African Americans, Native Americans, Asians, and people from the Middle East. So, you definitely need to have some diversity, somebody that they have [to] relate to because we're not all the same.

Jordyn Lyon's perspective was shared by several participants who viewed the presence of Black faculty and staff as having a great impact on their academic success and overall confidence levels. As with several of the young men interviewed for this study, Jordyn Lyon spoke with an awareness of his and his peers' individuality. This awareness alluded to the importance of higher education institutions considering the impact of faculty and staff mirroring the students they serve. As mentioned earlier within this chapter, the participants often found comfort in seeing Black faculty and staff walking across campus, or they felt an increase in their confidence in their academic ability when they were taught by Black faculty. The interaction between Black faculty and staff and Black students within a predominantly White environment allowed the Black students to see people who looked like them in positive roles (Marbley et al., 2013) providing a point of connection while further solidifying their prospective career paths.

Caleb expressed that diverse faculty were not only of great importance to his overall academic experience, stating,

I don't say I don't do my best, but I would do even better, but they are in my classes like, gen ed and things like that, that are not really in my field, but that same aspect in my core classes would be a game changer; it would be completely different.

Black faculty often act as mentors, encouraging students to imagine their potential simply by coexisting in the same space for a short or extended period of time. For example, during the institution's summer bridge program, students are introduced to several faculty members by way of mandatory course enrollment. The summer bridge program is designed to prepare freshmen students for the academic rigor of MU. Access to the program is not limited to those only interested in the STEM disciplines.

Preparation includes assigned study hours to assist in establishing effective study habits and time management, as well as the participants attending the courses are assigned based upon anticipated academic major. For example, if a student is planning to enter a STEM major, they would likely be assigned to the precalculus course and perhaps a writing course. During the program, students are also placed in courses that are outside of their anticipated majors, with the intent of exposing and preparing them to enter the culture of the institution.

One such course, Intercultural Communication, was taught by an African American professor. Joel completed this course and cited his Black professor as the first and last faculty member he encountered at MU as a part of the summer bridge program. At the time of the interview, Joel was a third year Game Design and Development student. During his individual interview, Joel expressed that although another university was his first choice, he was drawn to MU because it presented him with "an opportunity

to play basketball as opposed to trying to walk on at a D1 school.” The early exposure to a Black faculty member left a lasting impression on Joel and created a foundation for future rapport. Joel recounted his summer experience, including the impact of seeing Black faculty early on in his academic career:

I’d say the one relationship I sensed, in particular, was one with [professor] in the rhetoric of race relations or something But it’s just like, uhm, I’d say he’s probably the only professor I’ve . . . I don’t want to say respected, but someone who I can emulate, and see how he lives his life, and how he interacts with people and carries himself, and try to emulate that He’s the only Black professor that I feel like [has] helped me develop as a student and as a young man here.

Joel went on to express that his professor was the first and last professor of color, because the faculty he had, and continued to be instructed by, were White.

This study found that while it is important to have cultural competence in an inclusive learning environment, cultural competence within the White or non-Black STEM faculty was not an adequate substitute for a lack of diversity in STEM faculty. One of the questions asked of the participants was the importance and validity of the cultural competence of the White faculty members in the absence of diversity. Marvin, who at the time of his interview was a third-year Game Design and Development student, expressed this sentiment:

It’s important to have faculty that can communicate with your students and understand your students. Let’s say you want to be an astronaut, but all of the people teaching you how to be an astronaut are people that have read a lot of books about going to space and rockets and stuff, but none of them actually work

for NASA, none of them were ever astronauts. How much more beneficial would it be if somebody who set foot on the moon and went through the whole process were to come and say, “Let me show you how to navigate this. Let me show you how to get to where you want to be.” It’s not that the people who read a lot of books have nothing to teach you, they do. But they don’t understand, fully, exactly what you’re going for; exactly what you are.

In addition to Black faculty, the participants also expressed the impact of Black staff. Such rapport is key to an ideal academic experience when students are in academic departments lacking ethnic diversity. Study participant, Lance, raised the point that when ethnic diversity does not exist among faculty, diverse staff members may also be of assistance to students as they navigate through the college’s environment. He described a significant encounter with a staff member who provided him with a level of guidance and encouragement that assisted him in adapting to the campus culture, while affirming that his voice mattered:

I don’t know if you know [name], . . . she’s helped me a lot, with getting exposure to different groups on campus and building connections. And, I think that’s something that really helped my experience here. And, that really helped the struggle of feeling like you’re not heard sometimes. And just being able to, like, I said again, congregate with people that look like you.

Karl, an Environmental Studies student, who immigrated from the Ivory Coast and at the time of the interview, was a permanent resident of the United States, echoed Lance’s sentiments, by recounting the invaluable assistance he received as a participant in the Arthur O. Eve HEOP. During his first 2 years at MU, Karl had challenges

communicating his academic needs to his White professors, causing him to hesitate to ask questions or to fully participate in class for his first 2 years. Karl cited his K-12 experiences, combined with feelings of inadequacy, as the source of his lack of comfortability engaging in class discussions or going to the professor's office hours. He specifically credits his HEOP counselor with assisting him in working through these issues:

“I had [her] as a counselor at the time, and she was always on the front line to help me whenever I was dealing with grades; whether I had an issue with a professor, she would always step up and help me through that confrontation.”

While students may be assigned to staff or faculty members as a participant in a program, their decision to build further rapport and trust with an individual is a conscious and purposeful act. In addition to the strategic building of rapport with Black faculty and staff, the students also generated support from one another. The commonality presented in Black students' battling against stereotype threat, as well as their concerns regarding academic ability in a PWI, often created a bond between the students. However, in some cases, the students connected with the few Black students in their courses, and in other cases, they identified students who were Black (or of another ethnic background) to create a community with that did not adequately exist in MU.

Faculty of color modeling the way. The participants within this study exhibited an ability to ascertain the challenges within their environment, including the identification of coping mechanisms needed to adapt to their environment. Black students on predominantly White campuses face a universal issue: constant confrontations with racial stereotypes (Fries-Britt & Turner, 2002). Observing the action(s) of faculty was

among the coping mechanisms the study participants developed. The presence of faculty of color who had demonstrated success within the institution, while maintaining their ethnic identity, resulted in the faculty modeling the way for their students.

Modeling the way is an integral part of effective leadership—within all industries—including higher education settings. Kouzes and Posner (2012) defined an individual who is a leader that is “modeling the way as someone who ‘practices what they preach.’ They show others by their actions that they live by the values they profess” (p. 42). This practice provides those who are being led, or in this case, taught, with examples of how to not only survive, but to thrive in their selected profession. Faculty who behave as previously described are, in essence, modeling coping mechanisms for Black students who are trying to establish academic success strategies and seek out prospective career paths, hence the theme of faculty of color modeling the way.

Study participant, Marvin, expressed the importance of faculty being aware of how they set the tone for the way ethnic groups are embraced by creating an inclusive community within their classrooms. Faculty and their actions within the classroom can impact how students engage with one another, as well as how they respect and embrace one another’s uniqueness. Marvin described an experience he had in a course taught by an Asian, female faculty member:

I felt more a part of that class than a lot of my classes just because I did feel accepted. So, instead of quietly and strongly being me, I could openly and strongly be me. I could just engage with the class, even with the other students. It just felt like I had an air of acceptance. It was contagious, I guess. I feel like a lot of that [had] partly to do with because she also had a different culture, and she

was very loud and proud about it. So, if the students weren't okay with that, then essentially, they had to . . . they essentially had to remove themselves from being a part of the class, instead of me having to remove myself from being a part of the class for having a multicultural mind.

As Marvin clearly expressed, it was the faculty member's stance on diversity and the pride she displayed in her ethnicity that empowered him to embrace his own. Earlier, in his one-on-one interview, Marvin mentioned how stereotypes can create conflict in one's ability to genuinely be themselves, stating, "They [White people] either want you to completely align with their stereotype of what they think Black people will be like, or they want you to throw away everything and act exactly how they do."

Curtis, a third-year Mechanical Engineering student whose father was a Civil Engineer, shared Marvin's sentiments regarding the feeling that you cannot be your authentic self, which created an internal battle that he and other undergraduate Black males had to deal with on daily basis, stating,

Also, just the whole atmosphere of, at least [in] my major, I notice a lot of people in tech fields tend to have a certain perspective about Black people, which sort of transfers to the students as well. So, it just feels sort of exclusive, in some ways.

The faculty member Marvin described also made it clear with her actions that environmental threats, such as stereotype threat, had no place in her classroom, creating what seemed to Marvin to feel like an inclusive learning space for him. All of these factors contributed to a Black male in a STEM discipline feel that he could be his authentic self and interact with his non-Black classmates in a way that would be viewed as nonthreatening—even if his perspective differed from theirs. When there was a

cultural disconnect in a classroom due to a faculty member's ethnicity and lack of cultural competency, the Black males continued to feel misunderstood. Lance recalled a social challenge he experienced in a classroom that he associated with his race:

I remember, there was one instance where there was . . . I'll just explain what happened. I think it was probably first semester, second year. And, I was wearing a hat that said "hustle" on the top of the hat. And, my professor, he was kind of making a joke. He was like, "Does that hat mean you're going to like hustle me for money?" And I was like, "Nooooo." And, in the back of my head, I'm like, "If I was a White student, he probably never would have made that comment." But, I just took it [as] a grain of salt, and didn't assume anything.

In contrast, John expressed that he felt an instantaneous connection when interacting with the possibility of growing beyond the classroom:

It'd make it easier for a student of color to approach the teacher. But it'll still be like a disconnection. So, just for me, personally, I can, when I'm introduced to a Black professor, like, right away we have a good connection; we're making jokes and everything. But if something happens with a White professor, it's mostly the connection is formal. Yeah, so the relationship will likely stay formal.

Study participants, Karl and Jordyn, indicated that a lack of diverse faculty in the STEM courses creates concern as to how important faculty diversity is to the institution, as well as what this may mean for their future potential, professionally. Karl stated,

There is no Black professor, no Hispanic professor in the whole major—it just tells you a lot. Sometimes I question what I got myself into. There's no professor I can relate to, no professor that is supporting me, other than Dr. . . .

Additionally, the participants also expressed the utilization of humor to buffer themselves against the effects of stereotype threat when faced with being one of a few or the only Black male in a classroom or when being mentored by a non-Black faculty member when diverse faculty are virtually nonexistent. Jordyn Lyon remembered the poignant words of advice given by his mother on this very topic, which he shared in his individual interview:

Even from when I was a young kid, my mama always taught me that “people are going to be different than you, and they might always have things to say, but don’t let that get the best of you.” I definitely don’t let their remarks or anything like that influence how I’m going to do in school or how I’m going to succeed in life. If they want to crack jokes, I’ll crack jokes back at them, and we’ll see who gets the last laugh.

The study participants also mentioned, in their individual interviews and on their demographic survey that Black faculty and staff modeled the way for them as future leaders in the STEM fields. Faculty modeled the way and students, in turn, become advocates for themselves, but more importantly, advocates for others by taking on roles as tutors, leaders in student organizations, and peer mentors.

Faculty modeling the way also impacted their future actions, as they decided what their legacy would be and how they would change the course of diversity once they were employed. The faculty member who were identified as role models often served as a reminder that they represented more than just themselves. Adonis, who at the time of his interview, was a third-year Computational Mathematics student, recalled briefly speaking

with a Black, male faculty member who visited one of his classes, when speaking to the impact that his mere presence had on him:

Just his presence and being able to speak to him, I think that helped me a lot. Just seeing that he's so successful—like he's a professor and he's done all these amazing things. I think just knowing that it's possible for someone of color to do that, I think that's what really did a lot for me. Having a professor in STEM, a Black professor rather, or any resource that could help you navigate how to . . . I want to say carry yourself and just how to be successful. At the end of the day, just be successful, and just know that you're representing more than just yourself too.

Jordyn Lyon, who at the time of his interview was a fourth-year Computing and Information Technology major added that he found this method of modeling the way to be inspirational on many levels:

It makes me feel great because it inspires me to know that I can be in their shoes one of these days, or just even when they're able to give their experiences, not just outside of MU, so things they have done from the time they graduated, if they go on to get their Master's, or getting their PhD, or something like that, working at these big companies and stuff. It definitely encourages you to definitely seek more than what you're trying to do, and they encourage you to keep going on, to keep the whole cycle going because we need more people here to help others, and to drive more people to come here as well, that are diverse. It's definitely really encouraging.

With the continual lack of diversity in STEM faculty at PWIs, Black male students often develop peer groups as a strategy to accomplish academic success. Establishing of peer groups was an intentional and strategic action by the participants of this study, as the decision to form such a group came from an awareness that although they were academically talented, social engagement was an integral part of their academic success. Peer groups can be formed in multiple ways, ranging from assigned groups (as prescribed in summer bridge programs) to a simple introduction via a staff or faculty member. Brooms (2017) suggested that in any scenario that an introduction to potential peer group members occurs, a conscious effort must still come from the students to ascertain an alignment between them and the peers because such groups are also viewed as a means of social mobility. The next theme, Peer Groups as a Community, further discusses the value and impact peer groups have on academically successful undergraduate Black males in STEM disciplines at a PWI.

Peer groups as a community. The first two themes within this study outwardly explored the support of Black faculty and staff in assisting the Black male students in STEM to develop coping mechanisms, as well as build self-efficacy. The third theme, Peer Groups as a Community, examined group dynamics that empowered and encouraged the high-achieving Black male undergraduate STEM majors within a PWI.

Research has indicated that “peer groups serve as a sounding board, a virtual training ground to vet assumptions, ideas, strategies, and plans within an encouraging and safe environment” (Cuyjet & Associates, 2006, p. 26). Brooms (2017) stated that Black males cannot be educated in a monolithic manner, therefore, it is a necessity to bear in

mind the complex and layered needs of undergraduate Black males from their point of entry through the concluding point of their postsecondary experience.

Within an environment that lacks broad-ranging racial diversity among faculty and staff, peer groups create a sense of community for undergraduate Black males in the STEM disciplines, facilitating a sense of belonging. Students within this study employed this academic success strategy, even if it meant going outside their major or relying heavily on another core group (as in a student organization) of which they were a part. Students whose peer selection reached outside of their academic major was due to a lack of racial diversity within their core classes or, generally, in their academic department.

Lance expressed how he relied heavily on a student group he was a part of, the National Association of Black Engineers (NSBE) to connect with his peers, as well as to identify other opportunities that he could leverage as a Black male in STEM at a PWI. Commenting on how NSBE provided a local, regional, and national network, he commented:

NSBE was one that was a really good outlet for me to just go and see what opportunities I can find as a Black man at MU. So, it was a good outlet to see what other people are doing, and connect with others. And, I met friends through that, and through that more connections.

NSBE is a national, regional, and local professional networking and development organization designed to “increase the number of culturally responsible Black engineers who excel academically, succeed professionally and positively impact their respective communities” (NSBE, n.d., para. 1). Despite the identification of institutional programs, such as the NSBE, only one of the 10 study participants cited the organization as being

key to their ability to obtain information on opportunities that applied directly to themselves as Black males in a STEM discipline. This is not to discount the impact or usefulness of NSBE, rather, it suggests that supports that are implemented with a national reach, yet established locally, are not always the first resource utilized or sought after when support is needed. However, such organizations can provide social capital, widening students' social circles and professional networks.

In addition to providing support, as students maneuver through the academic terrain of the institution, for some students, peer groups assist in adjusting to the institution's culture. For students like John, who at the time of his interview was a permanent U.S. resident, who was originally from the Democratic Republic of the Congo, peer groups extended beyond institutional culture adjustments, and they assisted with cultural assimilation. Similar to Karl's dependence on a Black, male faculty member from Jamaica to aid him in communicating with White faculty members, John viewed his peer group as a guide to social cues and the establishment of studying habits, saying,

“I just had to learn while I was here. I had to observe my groups—how they do things. I wasn't good at studying, you call it. How to learn more about the subject. I wasn't good at it back then. Yeah. So, when we had to do a group project, I would just look at how they did their work . . . and that's how I learned.”

For the other participants, the building and maintenance of a peer group was a matter of survival in an environment in which racial diversity was scarce. The connection that the undergraduate Black males in STEM established with their peers was highly impactful during what some of the participants described as an uncomfortable or scary journey. This can be especially true when a student is the only Black male or one of a few

in their courses. Study participant, Caleb, shared during his individual interview that there were only three Black males in his academic major, which had, at times, made him question the institution's awareness of the lack of ethnic diversity that impacts Black males. Jordyn Lyon spoke to this experience during his individual interview, stating,

It is very challenging to be an African American. Sometimes you're looking for somebody you can instantly build a connection with within your class, and when you're the only African American or Black person or person of color within that class, you kind of have to figure out how you're going to interact with these people and how you're going to find a similarity so that you can . . . find a similarity or something like that to spark a conversation.

Marvin, who at the time of his interview was a Game Design and Development, third-year student, discussed how his peer group, comprising Black students outside of his academic major, assisted in sustaining his focus in an environment where he did not see himself represented widely in the faculty or staff. Although his major is in the STEM disciplines, he advised that his peer group represented majors that were within Liberal Arts, including one peer group member who he advised was a Psychology major. Marvin did not fully assemble his peer group of support until his second year when he felt more confident in his ability and what he needed to maneuver through the environment of MU,

So, freshman year, I got to know a lot of the people, especially the people of color, but I wouldn't say that I got to know them closely up until at least the end of my second year. But now, I think the fact that I have such a strong friend group and support group that does understand, we're all navigating the same thing side by side, and we're not on the other side yet, we haven't passed it. But just to have

each other, we're going through the same thing. We understand each other. It just helps a lot.

Adonis viewed peer groups as a great accompaniment to office hours, helping him to more efficiently work through academic tasks that he found challenging when attempting to address them independently:

I think, also, working collaboratively is good, because I noticed, as I got to second year, some of the assignments I couldn't really do myself, so I have to work with other people. It's good because I can explain things to them, and they can explain things to me. I took more out of working in groups because then you all sit down and try to figure things out together. I think that's better than going to office hours.

Marvin and Adonis's statements alluded to the challenges within what some of the participants termed as "the Black experience." Existing studies on undergraduate Black males have focused on undergraduate Black males' behavior and how it differs from their White counterparts and how to assist them in correcting their behavior so that it aligns with mainstream society (Brooms, 2017). This Black experience is addressed in the fourth and last theme, restraining their blackness in the face of stereotype threat, which discusses the various ways that Black males seek to maintain their individuality while adapting to a predominantly White space.

Restraining their blackness in the presence of stereotype threat. The term restraining is used to describe the participants' intentional holding back of their cultural identity or true feelings about their environment and experiences. Stereotype threat facilitates a better understanding of the impact environmental factors have regarding the

confirmation of a negative stereotype about an ethnic group or a self-characteristic (Steele & Aronson, 1995). The participants were given an operational definition of stereotype threat to provide clarity on the study focus during their interviews. The definition given was explained as the perception of their ability or inability, based on their appearance, which could range from corn rows to skin tone. Stereotype threat manifests in various ways, with some study participants having expressed a higher level of comfortability with external expressions of Blackness; however, there are a myriad of ways to be Black or to express it. For example, Joel gave a statement that encapsulated the perspective shared by the students who experienced this theme in the context of restraining their blackness to avoid fulfilling a stereotype, saying,

Seeing how people interact with people who aren't White; it's kind of troubling, where it's like you either have to tone down your blackness, or you have to make sure you're on point because any mishap or mess up is amplified that much more. People are like, "Oh, I kind of expected that from you," somewhere in their minds.

In contrast, for another participant, Rick, restraining his Blackness translated into a complete disassociation from his ethnicity, because although he identified as Black, he emphasized originating from and spending the majority of his childhood in Haiti. When asked about how he felt his blackness could impact his academic experience at a PWI, he responded with an acknowledgement that he was seen as Black in America, but he did not constantly bear in mind his Blackness or the judgement that his skin tone could bring to the mind of others. Additionally, he also stated he felt his being a Black male in STEM courses does not hold him back; rather, he said that it should not be a factor and the

barriers that exist for undergraduate Black males in STEM are a matter of upbringing.

Expounding on his point, he further stated,

Statistically, it just so happens that many people that are Black don't necessarily come from, like, a great environment that would encourage you to go into engineering, for a lot of reasons, such as going to a good school. Going to a high school that had a proper curriculum that could expose you to advanced math courses and a higher learning physics courses, such as the AP and AP Calculus and AP Geometry and stuff like that You usually tend to see that type of opportunity in middle class, upper-middle class, or even [in] very affluent areas. If you were someone that grew up in a very poor neighborhood, your high school would definitely be underfunded, and they wouldn't have these advanced courses. So, even if you decided to go into engineering, which wouldn't be impossible, you would already be behind your peers in that aspect.

Restraining blackness in the face of stereotype threat is less about the perception of blackness and more about how one maneuvers through the environment, interpreting the racial and gender messages the campus emits. This emotion is also associated with the feeling that there is a need to prove one belongs at the institution, requiring a constant demonstration of one's academic capability (Bancroft et al., 2016). Restraining their blackness, for some of the study participants, also meant the avoidance of participation in Black male initiatives, which was out of their concern that they might not appear self-reliant (Brooms, 2017). In contrast, there were also instances in which restraining one's blackness might have included the denial of blackness. Such denial can be pronounced in their appearance, such as opting to wear a hairstyle that is low-cut instead of styled in an

afro or braids, or choosing not to wear clothing that could be categorized as urban. These actions are associated with the desire and attempt to fit into one's environment and often create racial battle fatigue, as it does not promote an ability to organically be oneself (Baber, 2012).

Providing students with an environment that is welcoming should not only be conveyed at events like the new student orientation. Being welcomed should be an experience that the students would like to see throughout their academic experience. Study participant, Caleb, recalled his new student orientation session, which he attended with his mother and grandmother. Together, they each took in the predominantly White environment—each seeking fellow black and brown faces that Caleb could potentially connect with in the near future. In his recounting, Caleb stated,

The push that they speak of actually needs to be shown, because it's so funny to me that they are saying "we are so diverse and we are so inclusive" at orientation, but there is no actual aspect of orientation that includes students of color, like nothing specifically, and that's interesting—something I didn't even really notice as a freshmen.

Caleb's voice exhibited the perspective of a student who has little faith in the alignment between the institution's marketing and the consistent, genuine initiative displayed. Consistent, genuine initiative in action means breaking the status quo in popular, high-profile student organizations relating to the STEM fields. The ways in which the environment, which includes classrooms, social and academic clubs, relationships with White faculty and how they responded to the participants, impacts the students' perceptions of their Blackness. Caleb spoke specifically to how providing foundational

knowledge to students of color to cultivate their own organizations could ease the discomfort they might feel in existing organizations, saying,

We have a lot of students who are also interested in automotive as engineers, which is a big field, so it's expected, but like the Baha Team and Hot Wheels and there is another Formula team, they push a lot of students to go into that to get more experience before they go into co-op interviews, but those are predominantly, like, White clubs, already. I am not saying that someone needs to be, like, "you need to be in this because you need to represent," but there is not even a focus to get students of color that are in these small clubs to get into these bigger organizations or at least start their own.

Acknowledging the subtle barriers that exist in the classroom, as well as before students enter the workforce, is also key, as expressed by Adonis, when he recalled the fear he experienced upon changing his major from Chemical Engineering to Computational Mathematics:

One of the things that kind of scared me about changing my major was [that] I was the only Black student in my class. I mean, the only Black male student. There was a Black female student. But then I was kind of wondering what it looks like if I change my major, because I didn't do it because I couldn't handle it. It makes me really self-conscious all the time, like, when I get an answer wrong in class.

The experiences undergraduate Black males in STEM encounter in a PWI is inclusive of the awareness of the demographics each student brings with them. Within these encounters, the participants expressed an exhaustion in battling the negative

perception of their ability to perform well in that environment. Additionally, the participants expressed that courses are often taught in a way that assumes the knowledge base that each student should have, when, realistically, no two students are alike in the K-12 education they received. The assumption that a student has learned a certain concept in high school or should have an ability to quickly grasp a concept perpetuates that sense of inadequacy that many undergraduate Black males in STEM face, which was expressed by Biomedical Engineering student and varsity basketball captain, Curtis:

I'd say the biggest challenge as a Black male in STEM, as I referenced earlier, is just that feeling of inadequacy. Once you get to failing, you start asking yourself why you're failing, especially if you've been successful before. Because it's gonna be like nothing you've ever been through before unless you went to a really college, preppy-like high school.

John expressed similar feelings to Curtis's, stating that he engaged with more than one White faculty member who mentioned that students should have a foundational knowledge of the academic subjects prior to their college course(s). From John and Curtis's perspectives, the varying levels of K-12 education were not taken into account when the college course curriculum was designed or executed. John summarized his experiences with these types of assumptions by saying,

It felt like the teachers expected us to already have knowledge about the subject, and I didn't. So, when I look at other students, they're, like, "Oh, we know this. Oh, we took classes in high school." I never did that. So, the subject was new to me, and the teacher expected . . . it felt like the teacher expected . . . I don't know.

It felt like the teacher expected me to already know the subject . . . it was this being self-taught, like my classes was like teaching themselves.

Marvin had a similar experience in one of his math courses with a White, male faculty member, particularly as it related to specific concepts that were not taught in a prerequisite course, however, it would have created base knowledge in the course for Marvin and his classmates,

He'll mention a mathematical concept that wasn't taught by the college, but then he'll say, "Didn't you learn this in high school? Remember from high school?" Or something like that. And I'm, like, "Well not everybody had the same type of high school education." So, it just seemed like [it was] White centric, for a lack of a better way to say it, but like, way to put it, because not everybody has the same access to the same high school education. You can't guarantee where somebody was. And in a country where everybody is systematically divided and the predominantly White schools had more access to learning, I guess, it just seemed wrong to me, to say that. Especially if a lot of people don't know what you're talking about. Maybe just teach it.

Joel shared thoughts about his experiences as a Black male in a predominantly White space, transitioning his individual interview into a discussion on how the mere presence of a Black male or female in a classroom can shift the atmosphere. He further posited that White faculty seem to be oblivious to the reality that students often face, and if aware, they are unsure how to address the matter without awkwardness. This shift in atmosphere transcends the general classroom space and permeates small group activities,

further impacting the overall collegiate experience for undergraduate Black males in STEM.

When a Black male or female enters a room, there's more than just . . . What's the best way to say it? Basically, it's not the same experience. There's always something. I can't describe it exactly, but it's kind of intangible where you enter a room, and people's auras change, like they feel awful. It's something weird. I guess the best way to describe it for me is in one of my groups, people always act different towards me, and I've noticed it. I'd say one of the barriers is just people not being aware, or knowing, or being knowledgeable that the way they carry themselves or interact with different Black students, like, that kind of affects us.

Adonis expounded on this feeling, mentioning how the lack of diversity within his courses could sometimes cause him to question his academic ability or if he was perceived as destined to fail, since the representation continued to be visually scarce, stating,

Sometimes when I'm sitting in class and I'll be the only Black person there, so I'm kind of wondering, "Why aren't there other students of color?" Or I'm wondering if maybe there were, or maybe a lot of students of color enter into college in a STEM field and then transfer out later on. Sometimes I wonder if people think I'm gonna transfer out and things like that.

The participants expressed feeling the presence of stereotype threat prior to even entering their classroom due to the typical makeup of the STEM field. Rick, a first-generation, U.S.-born Haitian, but raised in Haiti, reflected on his childhood in which he saw affluent, successful professionals in his community, enabling him to see his

potential. His perspective, however, changed when he came to the US and was judged based on biases developed from Black male stereotypes, as they related to typical professions Black males enter or Black males' academic capability. He was consistently shown examples that spoke to the success of undergraduate Black males being consigned to the areas of sports or music. He categorized the STEM field as being very "WASPy," aligning the field with being White-male dominated and adding to the difficulty for Blacks to assimilate into the culture within the STEM field. Entering a field that is expectedly void of diversity was viewed by the study participants as problematic. Rick stated,

Like the culture, itself, in the engineering field is very more like White Anglo-Saxon Protestant, where it's very uptight, stiff, a lot of dry humor. So, if you're not someone that comes from that type of background—you don't necessarily have to be Black—but just someone that doesn't come from that background, trying to assimilate into that environment can be quite frustrating. I mean, I've only experienced it once in my life here, and I didn't really enjoy it, but I noticed there are certain places on the MU campus where they do have a good group of minority engineers that have their own culture. We could relate to different backgrounds, so I appreciate that. In the outside world, they tend to have that type of WASPy environment.

Rick gave an additional perspective by speaking to the evolution of realizing biases existed before his knowledge was tested, simply based on the color of his skin,

I spent most of my early childhood in Haiti, so I guess from the age of 5 to like 10. Pretty much, when you grow up in a place where everyone has the same skin

tone as you, and you've seen Black people that are successful, and Black people that are not successful, the concept of racism Well, how deep-rooted racism is in society doesn't really come to you, since in that society, there's not really a lot. There isn't racism. I mean, we have other prejudices, but racism isn't one of them. It wasn't like I wasn't aware of what racism is, I just thought it was some backwards concept that no longer applied to me. So, I wasn't fully aware of racism until I went to the United States. I came to the United States, and I started to live here, and then I started to fully understand the aftermath of racism, and even the current effects of racism to this day. So, if I was raised in America, I would subtly have messages in my head saying I'm inferior. "Oh, hey, you're Black, so this is what to expect."

These biases were also perceived as having the potential to impact the students' ability to secure their first co-op experience, which if not completed, can prevent students from completing their degrees. During his individual interview, Curtis was asked to share his perspective on what racial barriers he felt existed at the institution that could negatively impact the academic success of undergraduate Black males in a STEM discipline. His response was centered around the task of obtaining one's first co-op experience. Students at MU are required to complete their co-op experiences, with the number of co-op experiences contingent upon their academic majors.

For example, Curtis's major of Mechanical Engineering required that he complete 50 hours of co-op experiences, which are typically completed within two semesters and two summers. Co-op experiences are designed to assist students in preparation for the rigors of the world of work. Within the co-op experiences, students ideally develop the

skills necessary to be successful in their anticipated field. While students are expected to independently secure co-op experiences in the same manner that one would seek employment following graduation, they did have access to an office specifically designed to assist in the co-op education and job-search processes. This office provided services ranging from resume development and interviewing techniques to the identification of resources by which co-op experiences could be obtained.

Although the aforementioned office was designed to be helpful and may have proven successful for many, Curtis pointed out the importance of something that must be cultivated early on in one's academic career: networking. Having an established network of people to vouch for your character or potential can be invaluable in the competitive field of STEM co-op applicants. Curtis expanded on these points regarding the value and necessity of networking, stating,

I think the barrier is that first co-op, because employers aren't hiring you if you don't know how to do anything. So, you basically get that first co-op based off of connections. And, just the fact of the matter is, White people have more connections because more of them are in STEM disciplines, so they're more likely to get that first co-op just based off the strength of a relationship they might have with someone. Obviously, it's not unheard of within the Black community, but it's less likely. Luckily, I was able to form a relationship with a professor of color, not Black, but a professor of color in my major, and he was able to hire me just based off the relationship we had from my first co-op, and now for my next few co-ops, this experience I'm getting now will definitely help me in the hiring

process. But not everybody has that luxury (to have a network that assists them in the co-op search process or prior, engaging work experiences).

Collectively, the study participants expressed concerns surrounding resisting and responding to racial stereotypes within MU. Racial microaggressions are a subtle yet persistent form of racism that has significant adverse effects on the overall experiences of Black students in STEM, such as racial anxiety, minority status stress, and thoughts and actions of leaving STEM altogether (McGee, 2016). Enduring such environmental threats has the potential academic and psychological implications to negatively impact academic success (Harper, 2015). Being a Black male in an environment lacking ethnic diversity among peers and faculty encouraged the participants in this study to be creative in the simultaneous development of success strategies and strengthening of self-identity. It is a complex and delicate assimilation for Black males to attain and retain their sense of belonging within a PWI. The participants in this study expressed their coping mechanisms inclusive of the various ways they processed the challenges within their environment, further demonstrating their resilience and academic excellence that negated the narrative perpetuated in the existing body of literature.

Summary of Results

When evaluating the success of undergraduate Black males in STEM disciplines within a PWI, culture matters. The culture and the climate therein can often increase students' difficulty in establishing meaningful connections on campus, while still maintaining their cultural background (Palmer et al., 2011). The participants within this study represented a variety of K-12 experiences and ethnic backgrounds, influencing the

various coping mechanisms they employed when faced with scenarios involving stereotype threat or the pursuit of academic excellence.

The high achieving Black males within this study utilized several methods, which were discussed in the four themes within this chapter. The first two themes, the impact of Black faculty and staff and faculty of color modeling the way, expressly explored the support of faculty and staff in the study participants development coping mechanisms and building self-efficacy. The third and fourth themes, peer groups as communities and restraining their Blackness in the face of stereotype threat, examined the strategic coping mechanisms built and retained by the study participants. Within these two themes, the resilience and intentional strategic development of the study participants came to the surface via the recounting of personal experiences within MU. The latter two themes showed the study participants valuing the risk of stepping outside their comfort zone to select peer group members outside of their academic major to create a sense of community, while also finding ways to maintain their identity in a way that would retain parts of their authentic selves. These are the methods by which the study participants managed to buffer themselves from environmental threats within their collegiate environment and obtain academic success despite the adversities they encountered.

The next and final chapter recounts the details of this study. Additionally, Chapter 5 discusses the limitations of the study, as well as the implications and recommendations for future research.

Chapter 5: Discussion

Introduction

This chapter provides an in-depth discussion on the themes derived from the study, while further exploring strategies employed by the academically successful participant undergraduate Black males in STEM disciplines at a PWI. The research for this qualitative study was guided by the following questions:

1. What are the perceptions that academically successful undergraduate Black males in STEM disciplines have regarding stereotype threat?
2. Given that this group of undergraduate Black males in STEM disciplines are academically successful, how have they been able to buffer themselves from such threats?
3. What strategies do undergraduate Black males in STEM disciplines use to overcome such environmental threats?

The research questions and their alignment with the selected stereotype threat theory of Steele and Aronson (1995) is also explored in further detail. This chapter also discusses the implications for practice, study limitations, and recommendations for future research. The chapter ends with summative remarks featured in the conclusion.

Following the execution of individual interviews, combined with demographic surveys, and field notes, the implications of this study revealed that the study participants addressed the environmental threat within their PWI by implementing self-developed academic success strategies. The narratives relayed within their individual interviews

indicate that their academic success was in part attributed to an awareness that in order to not merely survive, but thrive, in their environment, supplemental resources would need to be put into place. While the academic success strategies varied from participant to participant, the one constant was that each method was tied to establishing a sense of belonging in an environment in which ethnic diversity was not present in their peer groups or faculty members. Studies have indicated that a sense of belonging is the key factor to the success and retention of undergraduate Black males in PWIs, as the environment has often been described as nothing short of unwelcoming (Cuyjet & Associates, 2006; Strayhorn, 2015). Engagement with faculty of color was looked upon by the study participants as an example of how to cope with environmental threats in a predominantly White space. Specifically, engagement ranged from simply seeing faculty of color on campus in passing within the summer bridge programs or in the capacity of instructors during the academic year. The ability that faculty of color demonstrated in their retention of, and promotion within, their role provided an example of how to buffer oneself against environmental threats, namely stereotype threat. Additionally, faculty of color modeling the way also provided potential career aspirations for the study participants, as some participants mentioned how inspiring it was to “see someone that looked like them” in a leadership role.

Within their individual interviews, as well as in the field notes taken by the researcher, the participants voiced their need to feel a sense of belonging within their STEM academic departments. Strayhorn (2015) cited that an inclusive environment that affirms Black males belonging within a predominantly White space as having the potential to satisfy the need for a sense of belonging for undergraduate Black males in

STEM disciplines. Creating such an environment also provides the support that nurtures Black males comfortably establishing their presence, while affirming or further establishing a sense of cultural identity (Sinanan, 2012). The continual lack of ethnic and gender diversity among faculty in PWIs makes such an environment imperative to the academic success of Black male in STEM disciplines. Sinanan (2012) indicated that Black males found connections with faculty and being able to share their concerns in a nonjudgmental environment was of great importance, influencing their satisfaction with their overall academic experience. In recognizing that diversifying the ethnic landscape of STEM departments is not always feasible, it is imperative that faculty also provide opportunities for students to collaborate with faculty members as a part of their efforts to demonstrate sensitivity to ethnic and gender diversity.

The provision of opportunities for undergraduate Black males in STEM disciplines to collaborate with faculty is empowering, potentially presenting the participants with clarification for their prospective career paths. While they certainly have the potential to increase rapport between students and faculty, collaborative opportunities with faculty increases students' social capital, which can aid in their navigation of the culture of a PWI (Ovink & Veazey, 2011). It should be noted that collaboration with undergraduate Black males in STEM disciplines is not limited to a laboratory setting. Faculty can also engage students through alternative activities, such as acting as an advisor to an existing student club, or as a guide to a club that is in the process of being established. While the suggestions of faculty engagement are positive in nature, they do not absolve the academic department of their responsibility to continually to make efforts to diversify the faculty landscape.

Research posits that “PWIs often lack an awareness of the role they play in the patterns of underachievement” (Reid, 2013, p. 75), which also further encourages self-efficacy and creativity by which means undergraduate Black males in STEM disciplines can attain and retain academic success. The academic success strategies expressed by the participants were purposeful and strategically created—particularly those relationships established with Black faculty. Faculty members have an impact on the overall student experience, setting the tone for how their students do or do not effectively learn the course material. It is imperative that faculty demonstrate a sensitivity to ethnic and gender diversity in the classroom as well as having an awareness to different learning styles (Engstrom, 2008). There are several methods suggested in the literature, such as creating a sense of belonging within students’ STEM academic departments, the offering of opportunities to collaborate with non-White faculty, and demonstrating an astute awareness of culturally sensitive hiring practices.

Black males within a PWI desire a social system in which they feel centered (Dancy, 2010). The presence of a feeling of centeredness creates an experience in which undergraduate Black males are in an inclusive learning space that honors their life perspectives without basing their academic ability on racial stereotypes. An inclusive learning space would possess an awareness of culturally sensitive hiring practices, requiring action that says students’ concerns regarding ethnic and gender diversity have validity with those in leadership within their academic departments’ administration. Students could be actively and appropriately engaged in the hiring process via activities, such as being invited to share their perspective on a prospective faculty member or extending an invitation to students to attend a potential faculty member’s presentation(s).

Overall, the creation of formal and informal opportunities that facilitate the development of academically oriented social communities, such as a student ambassador or student advocate role that involves direct communication and meeting with the college dean and other departmental leadership, can also be of assistance to faculty (Keels, 2013).

Implications for Practice

Peer groups as a community. Peer groups, as a community for the Black male study participants, is heavily linked to the success strategy of eliminating feelings of isolation, while creating a subculture that provides academic and social assistance (Brooms & Davis, 2017). Social and personal isolation are realities that are experienced by undergraduate Black males within PWIs (Sinanan, 2012). Such isolations occur when they are in an environment that feels void of full acceptance of their ethnic and racial diversity in their peer groups. This void was noted as an observation that made the Black student participants concerned about how much priority PWIs place on creating inclusive learning environments for them. The stress and personal dissatisfaction among Black males in PWIs evolved from these experiences, and they will only shift if the administrations within these institutions increase their awareness of Black students on their campus and by paying close attention to the environment they convey to Black students (Wood & Palmer, 2015). In addition to the aforementioned sources of feelings of isolation, this study identified that the students' demographics were also a contributor to feeling of isolation.

Summer bridge programs, as they relate to Black students in STEM disciplines, are defined by Astin (1993) as being of assistance in the transition from high school to college. Black students within the STEM talent pipeline have experienced lower rates of

attrition when they have participated in summer bridge programs (Johnson, 2016). Although challenges can arise with adjusting to the realities of being in the general population after being in an environment consisting of a select group of peers, summer bridge programs can help Black males in STEM disciplines with the initial acclimation into the social and academic aspects of their institutions' environment (Stolle-McAllister, 2011). The challenges that are sometimes faced by the students following a summer bridge experience may be attributed to the PWI environment, which some Black students have described as unwelcoming, making the environmental variable a key component to Black males' ability to be academically successful (Brooms, 2017). When the lack of engagement and welcome takes place, students often begin to assess whether or not they belong. The acclimation into the institutions' environment is derived from early interactions with faculty during the summer bridge program. This aspect of Black males' experience is key and is viewed as being just as important as peer groups (Cuyjet & Associates, 2006).

As demonstrated in this study, the participants expressed the necessity to go outside of their academic major to create peer groups, because there was not enough self-representation within their respective academic majors. Additionally, the study participants appeared to find value in peer-to-peer admissions of academic and personal struggles, as it created a common bond, while allowing the sharing of success strategies and coping mechanisms. On one hand, the lack of racial diversity among peer groups is problematic, further perpetuating the idea that undergraduate Black males cannot effectively exist in STEM majors or within a PWI; however, Palmer et al. (2014) posited that colleges and universities have an increased focus on intentionally creating an

environment that encourages students developing diverse peer groups. Such focus would include creating collaborative, instead of competitive, learning environments; encouraging a random selection of work or project groups based on academic interests; and promoting diversity in thought regarding problem-solving methods. In doing so, colleges and universities can provide their organizations with the ability to simultaneously address issues surrounding retention.

Impact of Black faculty and staff in STEM disciplines. Many of the study participants viewed the simple presence of Black faculty as embodying that which is feasible for them as STEM majors in a predominantly White and male field. The feasibility is in reference to the students' ability to see themselves in a role that is not being modeled in their current academic environment via contact with a Black faculty member. Research indicates that many undergraduate Black males have no interaction with a Black educator prior to entering college (Harper & Davis, 2012). This creates a scenario in which Black faculty member's role within STEM disciplines transcends the traditional faculty role, directly impacting retention. To this point, in a study involving 190 Black males in their senior year of college majoring in STEM disciplines, Reid (2013) cited that interaction with Black faculty resulted in improved GPAs and increased levels of social integration. The opportunity to interact with faculty in the capacity of research assistant or in an informal setting was found to be empowering, as their intellectual abilities were affirmed through these interactions.

This study further affirms the impact of Black faculty member's presence in every facet of Black male students' academic experience, from teaching to mentoring to simply having a presence on campus. Further, this study also cites the importance and the

significant impact of early student interaction, which can be experienced in programs such as the summer bridge program.

Black faculty's presence within the STEM field impacts how students perceive their learning environment, linking it to one of the greatest institutional concerns: student retention. As demonstrated within this study, this is due to how central personal and social isolation correlates with the level of satisfaction Black students have in relation to their academic experience within a PWI (Sinanan, 2012). Students do not only seek out peers to establish rapport and build community, but they strategically seek to build similar points of connection with faculty. When Black faculty build rapport with students, it not only provides further quality engagement outside of the classroom—which many students in the literature expressed a desire to experience—it also demonstrates a sensitivity to their presence by the faculty members.

This study was set in an institution that required students to engage in a set number of cooperative experiences. Co-op experiences differ from internships in that they are full-time, paid work experiences that are related to the anticipated profession the student will engage in following graduation. As noted by one of the study participants, obtaining the first co-op experience can feel quite stressful due to the candidate not having as expansive a professional network or college exposure due to the ethnic makeup of the STEM field in contrast to their personal networks (Jehangir, 2008). A Black faculty member who possesses strong rapport with his or her White peers within a PWI, for example, those who are deans in their college or have been acknowledged within the college community, demonstrates success in the field to Black students in STEM at a PWI. Faculty members with this characteristic, among others, are ideal to coach students

on how to navigate through a predominantly White space, with their successes validating the acceptance of their White counterparts. To that end, several of the study participants expressed a desire to be provided with resources to aid in the co-op education search by Black faculty, as well as faculty in general.

Restraining their blackness in the presence of stereotype threat. Historically, race-based stereotypes and other types of justified social stratification, such as policies and commonplace practices, have conveyed to Black students that they lack the capabilities to flourish in STEM disciplines (Martin, 2009). PWIs that are more concerned with retaining Black students rather than creating an inclusive learning space for said students, leads to students feeling that the onus is on them to adjust to their environment, as opposed to the environment adjusting to them. If a PWI were to adjust its environment to genuinely better assist academically successful undergraduate Black males, the overall environment would not be one that meets Black students with a chilly reception, which is often narrated within research featuring populations similar to those within this study (Sinanan, 2012). An inclusive learning environment would also reflect a collaborative and not competitive spirit in the classroom, which is important given that much of the work in STEM courses is done via group works. Being met with a spirit of competitiveness when one already feels they do not belong can also equate to a reluctance to be inquisitive in class or to feeling uncomfortable advocating for oneself. The latter is challenging, as when faced with race-driven conflict, many students' fear of being categorized as aggressive or incapable of taking constructive criticism, leads to situations where students silence themselves to align with the norms in their environment.

The way in which gendered and racialized messages are internalized by undergraduate Black males attending a PWI impacts their ability to be fully be comfortable and confident in their blackness, creating a scenario remedied by the fostering of increased social and academic connection (Keels, 2013). The environment that undergraduate Black males enter within a PWIs often requires them to relinquish parts of their cultural identity and assimilate by dialing back on their Black masculinity. This experience requires Black male students to find ways to find identities that align with the general culture within their environment as a form of protection that is not limited to academic spaces. The altered identity is such an adjustment to their authentic selves, that the true self is restrained in the process (Golden, 2015). The weight of processing such messaging and environmental threats can leave Black students exhausted and thinking twice about their place in STEM (McGee, 2016). However, despite this being the sentiment shared by some of the undergraduate Black males in this study, this initial thought did not impede their ability to become academically successful in the STEM fields at a PWI.

The experiences of the participants in this study serve as a reminder that PWIs must take ownership for the environment they do or do not create for Black male students by facilitating an experience in which students do not simply survive, but they thrive academically (Strayhorn, 2012). At some point in their academic career, the student participants were aware of how imperative it is to create one's own community, since what was needed to create a sense of belonging was not reflected in the overall student body, faculty, and staff. Granted, most of the study participants expressed having prior knowledge that they were attending a PWI, however, they did not all seem to anticipate

that their racial diversity would not be somehow integrated into the college's environment. Considering that of the 10 study participants, about half engaged in some form of a summer bridge program, PWIs cannot solely rely on such institutional programs to literally bridge the gap for a select group of students. Additionally, to receive optimal academic performance, PWIs must also create nonthreatening environments that encourage collaboration instead of competitiveness (Taylor & Walton, 2011).

Restraining their Blackness in the face of stereotype threat was expressed by this study's participants as a feeling often occurring due to the discomfort associated with being the only one person of color in their classrooms. In addition to the weight of representing an entire gender and race, there was a struggle to balance coming into their own identity. The struggle in reference evolved from the task of adapting to a new environment that did not necessarily first view them as being scholars and, instead, placed emphasis on the color of their skin and the stereotypes associated with it. Such grave concern resulted in the Black males placing a priority on the often-challenging task of conforming to their institution's culture (Dancy, 2010).

Black male students. Throughout the body of the literature, Black male students in STEM disciplines within a PWi expressed the need for a sense of self, which greatly impacted their sense of belonging (Brooms, 2017). The academic success of undergraduate Black males in STEM disciplines within PWIs hinges on their ability to establish connections early on to engage in their collegiate community, while maintaining their individuality. Within this study, it was noticed that this process was included the study participants learning about the institutional culture, how to determine what is of

value within the culture, and, more importantly, how to “be” within a predominantly White space that did not always exhibit racial diversity.

The culture of an institution is a partial function of historical events, which are deeply embedded, and there is very little probability of changes being implemented (Schoenberg, 1993). The participants within this study reflected a variety of K-12 experiences that assisted in their ability to identify the culture within MU. Such experiences allowed many of them to be anticipate certain environmental threats that existed in a PWI, including the ways in which to best align themselves with sustainable coping mechanisms and academic resources. For example, some of the study participants observed the study habits of their peers and modeled their own behavior after their peers. This was also inclusive of strategically pairing themselves with said peers when the opportunity presented itself in their classes, creating an alliance, because, in some cases, the students employing this method were the only ones identifying as Black.

As these alliances formed, students also were able to identify what was of value to them as future academic scholars in a space that often first and foremost saw their blackness and not their exceptional academic ability. Within these alliances, conversations took place, and just as professionals in the business world, the students shared best practices with one another, including their academic success. Strategically, the study participants sought to form relationships that assisted in the navigation of the institution’s environment, while aiding them in their quest to attain and retain a GPA at or above a 3.00. Some of these relationships were a revisiting of those formed during a summer bridge program, while other relationships were formed by the recommendation of a peer or staff member overseeing a program they were enrolled in. These alliances

and experiences were significant, as they contributed to the building of a solid community (also known as a peer group) that increased their sense of belonging at MU.

White faculty. Cokley's (2002) research indicated that early interaction between White faculty and students of color can positively impact Black students postsecondary experiences within a PWI. Additionally, Cokley proposed that these experiences should include learning communities and research opportunities. These interactions left the participating students with a sense of empowerment in how they viewed their academic potential and their consideration of graduate school, as well as potentially entering the STEM field as faculty members. Some of the additional issues relating to White faculty and Black students included classroom bias and college environments that lacked diversity in ethnicity and thought and the execution of curriculum that assumed students' foundational knowledge base.

Engstrom (2008) cited the importance of faculty exhibiting sensitivity to diverse and varying learning styles. An acknowledgement of various learning styles goes beyond cognitive, auditory and visual; rather, it takes into consideration each student's demographic information. As mentioned by the participants within this study, there are disparities that exist within K-12 experiences, which may create notable variances in students' foundational knowledge within any given subject matter. Such awareness would also include the structure of course syllabi, as this would acknowledge that some students require additional information in order to successfully learn and retain the information. The biases displayed by faculty within and outside of the classroom, including at the micro level, can greatly impact Black males' academic success (Marbley

et al., 2013). When such scenarios occur in or outside of the classroom, it diminishes the inquisitive nature of Black male students.

Student support personnel. The interaction with and guidance provided by student support personnel is, in many cases, as vital to the academic success of undergraduate Black males in STEM disciplines as the support provided by faculty of color. Within a PWI that lacks ethnic and gender diversity in faculty, outside of peer groups, Black male students in STEM disciplines seek guidance and encouragement from the student support personnel, thus including them in their community. Student support personnel must recognize their importance—despite the perception that can sometimes exist in higher education that student support personnel are not as essential as faculty. Within this study, a participant recalled how a student support individual connected him to someone with invaluable resources, which was inclusive of a peer upperclassmen mentor, as well as a research opportunity. Resources like these are imperative to the vitality of undergraduate Black males' success in PWIs.

Limitations of Study

This study focused solely on academically successful undergraduate Black males in STEM disciplines, at a PWI, who were within their junior or senior year, with a GPA of 3.00 or better. The requirements for this study were created from an asset-based perspective, focusing on academically successful undergraduate Black males, to better ascertain their academic success strategies. This study criteria omitted the experiences of students with a GPA lower than a 3.00. The GPA criteria may have eliminated the researcher from obtaining the lived experiences of Black male students with viable success strategies or means of buffering themselves against stereotype threat. Further, it

may have given greater perspective in viewing the added layers that other students faced as academic challenges and how this influenced their selected strategies and coping mechanisms.

A second limitation was in the gender selected for this study. Black females in STEM disciplines within PWIs also experience stereotype threat, and they are presented with challenges associated with stereotype threat, such as being the only one in several of their STEM courses and dealing with the misogynistic practices that exist in a field dominated by White males. In analyzing retention by gender and race, Black females outnumber their male counterparts in their STEM degree completion (Hagedorn et al., 2002). A longitudinal, comparative study that is inclusive of Black females may yield data that reflects both similar and vastly different academic success strategies and coping mechanisms within each population. The results of such a study could provide the body of research, as well as administrators within higher education, with strategies to create a more inclusive community, while increasing retention within Black male and female populations.

Last, this study only included the perception of the students, as it was designed to solely focus on the lived experiences of academically successful undergraduate Black males in STEM disciplines within a PWI. The added perspective of faculty may have also provided additional context from Black faculty and their experiences in a PWI. Such perspectives could have been inclusive of the success strategies they would insist that undergraduate Black males in STEM employ in order to thrive in an environment that studies have described as not feeling inclusive, which is essential to the success of any underserved population (Wood & Palmer, 2015).

Recommendations for Future Research

Conducting a qualitative study with a focus on undergraduate Black males in STEM who are permanent residents of the United States may also contribute an added dimension to the body of literature that further speaks to the importance of demographic information. Participants in this study who immigrated from a country outside of the United States appeared to have rather different perceptions about their racial identity, interaction with White, authoritative figures, and the methods they employed to attain and retain academic success. As an institution with a high international population, such a study could provide MU with greater perspective on creating inclusive learning spaces and the impact that demographics could have on one's learning process.

This study could be executed quantitatively and designed to ascertain the perceptions of undergraduate Black males in STEM disciplines who are participants in the Meyerhoff Scholars Program. This program is world-renowned for its ability to attract and retain diverse STEM students, creating a talent pipeline to graduate- and doctoral-level programs. Through an anonymous survey, the study could look to analyze the satisfaction level of Black males and females participating in the program. The survey could ask questions that might facilitate an understanding of how coping mechanisms and resources evolve as students progress through their academic years, also drawing upon what older peers shared with them as best practices. The participant profile could consist of male and female Black students in the first semester of their senior year of a STEM discipline program to glean experiences from two populations that experience gendered and racialized messaging within PWIs.

Conclusion

The field of higher education is the main producer of the STEM workforce, with most of the Black student population opting to attend PWIs. HBCUs are the highest producers of Black STEM graduates, and the factors that collectively create this profile of student are quite challenging to duplicate given the small number of existing HBCUs. It is imperative that PWIs work toward more sustainable solutions in which Black students are not only given access through the PWIs' actions, such as free tuition based on family household income, but through support systems that truly help these students facilitate attaining and retaining academic success.

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Appendix A

Casual Recruitment Letter for Study Participants

Greetings, (Student Name)!

My name is Sharitta F. Gross and I am a doctoral student at St. John Fisher College in the College of Education, working toward a Doctorate of Education (EdD). I am conducting a qualitative research study and writing my dissertation on the *lived experiences of academically successful undergraduate Black males in STEM disciplines in a predominantly White institution*.

I would like to interview you to obtain information on your experiences as an undergraduate student enrolled in a STEM major. The interview will last no more than 60 minutes (1 hour) and would take place in a mutually agreed upon space on Malachi University's campus or via phone. If you choose to participate in the study and fit the criteria, you will be given a \$10.00 Dining Services gift card for your time.

If you would like to participate in the study, please know that the information you share will be kept confidential and your name and any other personally identifying information will not be associated with your comments or shared perspectives. Each participant will be given a pseudonym that they select by which they will be identified by within the study. Please be assured that participation in this study will have no impact on your relationship with Malachi University. To discuss this opportunity further, please call me (585) _____ to schedule your pre-screening meeting with me.

Thanking you in Advance for Your Consideration,

Sharitta F. Gross

Appendix B

Demographic Survey for Study Participants

Name _____

Home city and state _____

Cell phone (including area code) _____

E-mail address _____

Pseudonym* _____

(*This is a name you self-select that can start with the first letter of your first or middle name.)

College Information:

Name of college currently enrolled in (place a checkmark next to the college your major is in):

___ College of Applied Science & Technology

___ Golisano College of Computing & Information Sciences

___ Kate Gleason College of Engineering

___ College of Health Sciences & Technology

Please write your academic major in the space provided below:

Appendix C

E-mail Requesting Participants' Participation in the Study

Introduction Script – Program Directors(s) and STEM Faculty

Text and Script for Introduction of Research Study

Dear _____:

My name is Sharitta F. Gross and I am a doctoral student at St. John Fisher College in the College of Education, working toward a Doctorate of Education (EdD). I am conducting a qualitative research study for my dissertation on the lived experiences of academically successful undergraduate Black males in STEM disciplines in a predominantly White institution.

I would like for you to introduce me and my study to Black males in STEM disciplines who you may know and who may be interested in volunteering to participate in the study. The participants of this study must identify as Black; a Science, Technology, Engineering, or Math (STEM) discipline major; possess a cumulative grade point average of 3.00; of sophomore, junior, or senior status academically; and not a transfer student. If there are males you would recommend, please inform them of the study and send me their e-mail address and phone number once you have obtained their permission to do so. I will contact them through email or phone to introduce myself, as well to determine if they are interested in volunteering as a participant in the study. Additionally, their alignment with my participant criteria will also be confirmed via this correspondence.

Thank you for your consideration and assistance.

Sincerely,

Sharitta F. Gross

Appendix D

Informed Consent Form

Title of study: The Lived Experiences of Academically Successful Undergraduate Black Males in STEM Disciplines in a Predominantly White Institution

Name(s) of researcher(s): Sharitta F. Gross

Faculty Supervisor: _____

Phone for further information: _____

Purpose of study: The purpose of this study is to obtain a firsthand perspective of academically successful undergraduate Black males in STEM within a predominantly White institution. Through individual interviews, the researcher will seek to obtain knowledge that may inform stakeholders within higher education institutions of retention strategies identified by the study participants. These strategies may positively impact retention and increase a sense of belonging for Black males in STEM, which is key to the academic success of Black males within predominantly White institutions.

Place of study: _____ **Length of participation:** 60 minutes

Method(s) of data collection: The three methods of data collection that will be utilized are: semi-structured individual interviews; a demographic form and field notes.

Risks and benefits: The expected risks and benefits of participation in this study are explained below:

There is minimal risk associated with this study. Participants will contribute to the body of research and expanding of knowledge.

Method for protecting confidentiality/privacy of subjects: Participants will self-select a pseudonym by which they will be identified throughout the interview. Your information may be shared with appropriate governmental authorities ONLY if you or someone else is in danger, or if we are required to do so by law.

Participation in this study will not negatively impact the participants' status as an MU student or McNair Scholars Program participant. This study is not directly affiliated with the McNair Scholars Program.

Method for protecting confidentiality/privacy of data collected:

The recording of each interview will be stored in a finger-print protected cellular phone as well as the researchers' personal, password protected laptop. When not in use, the laptop will be stored in a locked cabinet that only the researcher will have access to. The researcher will retain the recording of each interview recording for a period of three years following publication of the dissertation. Electronic files will include participant-selected pseudonyms; they will not include actual names or any information that could personally identify or connect participants to this study.

Following the three-year time frame, all interview data will be purged from the researchers' cellular phone and personal laptop in a manner such that restoring data will not be possible. All printed materials, including notes or paper files related to data collection and analysis will be locked inside a cabinet in the private home of the researcher that will only be accessed by the researcher. The digitally recorded audio data and any paper files will be kept by the researcher for a period of three years following publication of the dissertation.

Your rights:

As a research participant, you have the right to:

1. Have the purpose of the study, and the expected risks and benefits fully explained to you before you choose to participate.
2. Withdraw from participation at any time without penalty.
3. Refuse to answer a particular question without penalty.
4. Be informed of the results of the study.

I have read the above, received a copy of this form, and I agree to participate in the above-named study.

Print name (Participant)

Signature

Date

Print name (Investigator)

Signature

Date

If you have any further questions regarding this study, please contact the researcher(s) listed above. If you experience emotional or physical discomfort due to participation in

this study, please contact your personal health care provider or an appropriate crisis service provider.

The Institutional Review Board of St. John Fisher College has reviewed this project. For any concerns regarding this study/or if you feel that your rights as a participant (or the rights of another participant) have been violated or caused you undue distress (physical or emotional distress), please contact Jill Rathbun by phone during normal business hours at (585) _____ or irb@sjfc.edu. She will contact a supervisory IRB official to assist you.

Addendum regarding audio recordings and other written materials:

Signed informed consent documents will be kept for three years after publication. All paper records will be cross-cut shredded and disposed of in a non-transparent container.

Appendix E

Interview Protocol

The Lived Experiences of Academically Successful Undergraduate Black Males in
STEM Disciplines in a Predominantly White Institution

Date of interview: _____

Start time of interview: _____

End time of interview: _____

Interview Duration: _____

Interviewee selected pseudonym name*: _____

*(*This is a name you self-select that can start with the first letter of your first or middle name.)*

Introduction of my study:

Hello, my name is Sharitta F. Gross and I am a doctoral student in St. John Fisher's Department of Education studying to obtain a Doctorate of Education in Executive Leadership. I am writing my dissertation on the lived experiences of academically successful undergraduate Black males in STEM disciplines within predominantly White institutions and am appreciative of your participation in my research. As an expression of my gratitude to you for your participation, you will receive a \$10 Dining Services card.

Before we begin the interview, I would like to review the informed consent form you completed, which will include reviewing the description of the study, confidentiality

and privacy, potential risks and benefits. It is anticipated that this interview will not exceed 60 minutes (1 hour). I will be asking questions to gain a sense of your overall academic experience in a predominantly White institution, specifically strategies you utilized to be academically successful. If there is any question that you are uncomfortable answering, please let me know immediately. I will then move on to the next question. Also, this interview will be recorded, however, if at any point you find this to be uncomfortable, please let me know. In this case I will defer to taking detailed notes until you indicate that you would like to resume having the interview audio recorded. This interview will be transcribed, which you will be sent upon completion to review and verify that it is an accurate depiction of your interview responses.

The information obtained in this interview will be included in my dissertation as a requirement to earn a doctoral degree from St. John Fisher College. In my study I will use a pseudonym for you as opposed to your actual name. What pseudonym would you like me to use from this point forward when referring to you? (*pause for response*) If you have any questions during the interview, please ask. Also, if you feel a break is needed during the interview, do let me know. If you are comfortable and ready to begin, I'd like to start the interview, if that works for you? (*pause for response*)

Interview Questions

- 1.) Please tell me about yourself and your background.
- 2.) Tell me about your high school experience(s), including any scenarios that peaked your interest in science, technology, engineering, and math (STEM) disciplines.
- 3.) How would you describe your impression of the overall environment within Malachi University today?
 - 2a.) What feelings do you have regarding the colleges' environment within your current year that differs from your first year and can you describe the reason for the difference(s)?

- 4.) What or who inspired you to choose a STEM major?
- 5.) What made you select Malachi University and was it your first choice?
- 6.) What barriers do you feel exist that can negatively impact your academic success as a Black male in a STEM discipline?
- 7.) Tell me about a time where you felt challenged during your academic career at Malachi University.
 - 6a.) What brought on this feeling and what did you attribute it to?
 - 6b.) What strategies or resources (e.g. academic support center, advisor, peer group) you use to resolve the challenge(s)?
 - 6c.) Did you use more than one resource? What were your first choice and last choice/option? Please specify why.
- 8.) Are there any other challenges at Malachi University that you dealt with in a different way or used different resources for?
 - 7a.) Were there any social or emotional challenges experienced that you interpreted as being related to your identity?
 - 8a.) What was your strategy to resolve these challenges?
- 9.) What social supports do you feel have been most beneficial to you as an undergraduate student at Malachi University?
- 10.) Tell me about your experiences with faculty members at Malachi University?
 - 10a.) How have those relationships influenced your academic experience at Malachi University?

Appendix F

A Priori Codes

Code	Definition	Abbreviation
Academic Achievement	Obtaining and retaining of exceptional grades on a consistent basis.	AcaAchv
Academic Challenge(s)	Any barrier identified by the student that had potential to negatively impact their academic success.	AcadChllg
Academic Resource(s)	Resources utilized by the student to positively impact his academic progress (e.g., tutoring services, supplemental instruction (SI sessions), professors' office hours).	AcadRes
Black Male	A person having origins in any of the Black racial groups of Africa (NCES, n.d.).	Blkmale
Campus Environment	Characteristics of the campus as described by the student. This environment is inclusive of its impact on the overall academic experience.	CampEnv
Classroom Environment	Characteristics of the academic classroom environment as described by the student. Faculty expectations (e.g., teaching as though students have prior, foundational knowledge), encouragement to participate, lack of diversity in the students within the class, competitive instead of collaborative behavior.	ClssEnv
Co-op Experiences	Cooperative experiences the student engaged in as a part of their academic program's requirements.	CoOp
Faculty Support	Interaction, positive or negative, with faculty within or outside of the academic major.	FacInter
Familial Support	Related to the direct role of extended family members in encouraging academic success including siblings, maternal or fraternal grandparents, aunts, uncles, and cousins. This differs from parental support in that it does not include the core parental unit.	FamSupp
Institutionalized Program	Programs the student has enrolled in or utilized the services of that is a formal, institutionalized program.	InstProg
K-12 School Influence	Any K-12 experience the student had while in the K-12 system that inspired STEM achievement.	K-12Infl
Parental Support	Interaction between the student and parent that is identified as support. Support can range from words of encouragement, care packages, to positive message or other actions that assist in their academic progress.	PareSupp
Peer Group Support	Support provided by peers within an informal group including peer study groups, student clubs, or Greek fraternal organizations.	PeerSupp
Religion	The religious belief of the student as it relates to it being a part of their motivation or coping strategies (e.g., prayer, attending services, reading or recalling a specific biblical scripture).	Relig

Self-motivation	Academic success strategies identified as coming from within or other phrases associated with finding the will to persevere without actual interaction.	SelfMot
Sense of Belonging	Inclusive of the integration into the collegiate environment by way of interaction with peers who are from their ethnic or a diverse group.	SensBel
Stereotype Threat	Any experiences within the college environment related to the theory established by Claude Steele and Mark Aronson in 1995. Characteristics include but are not limited to being the “only one” in a course and feeling awkward as a result, experiencing microaggressions or seemingly racial-driven bias.	S.T.
Summer Bridge	Related to any summer program at the college attended prior to beginning the first academic year.	SBridge
Race	Any experience a student has that they associate with their race. This would include items such as an expression of feeling the need to be high-achieving to change a stereotypical view of persons of their same race (male or female).	Race (or 'RCE')
Success Strategies	Actions students engage in to aid them in achieving academic success. Such strategies could include, but not be limited to, peer groups, student organizations, academic support centers, and Greek organizations.	SuccStrat