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Source: *The Journal of Negro Education*, Vol. 88, No. 4 (Fall 2019), pp. 493–508

Published by: Journal of Negro Education

Stable URL: <https://www.jstor.org/stable/10.7709/jnegroeducation.88.4.0493>

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Black Men in Engineering Graduate Education: Experiencing Racial Microaggressions within the Advisor–Advisee Relationship

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The underrepresentation of Black men in engineering graduate programs contributes to the low numbers of Black faculty members, and in general, role models who could teach and inspire future generations of students in STEM. Addressing this national concern requires stakeholders to identify prevailing obstacles such as racial microaggressions, and where they occur.

This article focuses on the advisor-advisee relationship and its effects on students' persistence. By addressing practices and activities that turn students away from sustained participation in engineering, we may be able to increase the number of Black males who enroll, remain in, and graduate from engineering programs.

Keywords: Black males, broadening participation, racial microaggressions, persistence, identity

Of critical importance to the nation's infrastructure and workforce is the ability to access talent from underrepresented populations by influencing institutional and systemic change (Chubin, May, & Babco, 2005; Committee on Equal Opportunities in Science and Engineering (CEOSE), 2016; Foor, Walden, & Trytten, 2007; Moore, 2006). According to Yoder (2015), in 2015, Black men comprised only 1% of those enrolled in engineering graduate programs (master's and doctoral), or 1,574 out of 156,407 students. In the same year, less than 1%, or 112 out of 11,702 doctoral degrees conferred in engineering were awarded to Black men. These data do not include Black men with international status. These alarming yet consistent statistics highlight a missing segment of the population who could contribute to the knowledge economy (Hurtado et al., 2008; Lundy-Wagner, 2013; Palmer, Maramba, & Dancy, 2011; Tsui, 2007). An increase in the number of Black men in engineering could lead to an increase in Black faculty members, education and thought leaders, mentors, and role models who could teach and inspire future generations of students in science, technology, engineering, and mathematics (STEM). To address this national concern, however, stakeholders must first identify prevailing issues that threaten the long-term participation of Black men in science and engineering. One such issue is the prevalence of racial microaggressions within the advisor–advisee relationship.

In this article, the authors define *racial microaggressions* and illustrate how and in what ways they manifest within an important engineering educational context, the advisor–advisee relationship. The deleterious effects racial microaggressions have on Black men graduate students in engineering is highlighted and evidence is presented about how students cope with those effects. Finally, the authors offer implications for research, policy, and practice that can improve the advisor–advisee relationship, as well as the broader engineering educational environment, for Black male students who regularly face racial microaggressions. By addressing this critical relationship, which has the potential to deter students from sustained participation in engineering, engineering educators may be able to increase the number of Black men who enroll, complete degrees, and remain in engineering.

This work was supported by the National Academy of Education/Spencer Postdoctoral Fellowship Program, and the National Science Foundation CAREER Award (under grant 1651808).

The nature of the advising relationship impacts a number of student outcomes; the most commonly cited in higher education research are time to degree, productivity, academic sense of self, and completion rates (Barnes, Williams, & Archer, 2010; Felder & Barker, 2013; Lovitts 2001; Nettles & Millett, 2006). Because of these potential outcomes, the advising relationship is often considered a mentoring relationship where the advisor helps the advisee learn about and become socialized to the academic field of study, the university, research, ethics, and many other important aspects related to being a graduate student (Wrench & Punyanunt, 2004). Additionally, the advisor can help students network by making new contacts and gaining exposure to other faculty, advanced students, and members of their broader professional community (Bargar & Mayo-Chamberlain, 1983; Paglis, Green, & Bauer, 2006).

The advisor–advisee relationship is complex and life changing; an advisor can help to generate ideas and support students’ postgraduate career choices, and help influence students’ professional identity (Burt, 2019). In fields like engineering, where the academic advisor may also serve as a student’s research supervisor (Burt, 2017), the advisor–advisee relationship includes myriad power dynamics. As a result, the advising relationship could have positive and/or negative effects on graduate students, including but not limited to promoting feelings of accomplishment and progression, or disappointment and failure (Barnes, 2009-2010; Barnes, Williams, & Archer, 2010; Felder & Barker, 2013; Fountaine, 2012; Johnson-Bailey et al., 2008; Palmer, Maramba, & Dancy, 2011). The extant higher education literature on advising tends to discuss these relationships across fields of study, including samples from social sciences, humanities, and, natural sciences (see for example Baker, Pifer, & Flemon, 2015; Gardner, 2007, 2008; Golde, 2005, 2007). A more nuanced approach that focuses specifically on students within engineering would provide detailed examples of how engineering advising relationships impact students.

CONCEPTUAL FRAMEWORK

The construct of racial microaggressions is gaining a considerable amount of attention in higher education and psychology literatures (Pittman, 2012; Torres, Driscoll & Burrow, 2010), and even in news outlets (Beaman, 2016; Garcia & Crandall, 2016). This increased attention highlights a growing discourse around the experiences of individuals from underrepresented groups. Racial microaggressions are typically described in the literature as subtle (or not so subtle) comments or behaviors, unfair treatment, stigmatization, hyper-surveillance, and personal threats or attacks on one’s well-being (McCabe, 2009; Minikel-Laccocque, 2013; Smith, Allen, & Danley, 2007; Smith, Hung, & Franklin, 2011). Racial microaggressions can be brief or recurring and tend to surface through daily verbal communication, as well as behavioral and environmental policies and practices, whether intentional or unintentional. Several studies have found that some perpetrators of racial microaggressions are unaware that they engage in such communication and behaviors when they interact with people of color (Sue et al., 2007; Sue et al., 2008). This lack of familiarity with how one’s own actions impact other individuals poses some challenges to eradicating these behaviors. Whether brief or ongoing, intentional or not, the message remains the same: racial microaggressions denote “otherness” and are interpreted by recipients as insulting. The consequences of racial microaggressions are still being explored, but existing scholarship acknowledges the psychological stress experienced by victims of microaggressions (Johnson-Ahorlu, 2013; Smith et al., 2007).

Racial microaggressions exist in a variety of contexts (e.g., academic and non-academic), which indicates that no matter where people of color go, they are inundated with messages that they are different. Furthermore, their differences are often seen bad or negative. However, this article focuses on how racial microaggressions take place on college campuses. In existing scholarship on underrepresented students of color attending predominantly White institutions, students overwhelmingly describe the campus climate as being hostile, isolating, and unwelcoming (Brooms & Davis, 2017; Burt, Knight, & Roberson, 2017; Burt, Williams, & Smith, 2018; Dortch, 2016; Felder & Barker, 2013; Harper, 2012, 2015). For example, Black students on these campuses routinely report confronting negative comments and stereotypes from White instructors and peers (Fries-Britt & Griffin, 2007; Johnson-Ahorlu, 2013).

In Smith and colleagues' (2007) exploration of 36 Black men across five institutions, they found that among other things, Black men were hyper-surveilled while engaging in common collegiate activities such as using the computer lab on a weekend to complete an assignment. Kevin, a student in their study, was stopped and asked for his identification by a campus police officer after someone called to report suspicious activity. In this particular case, Kevin was perceived to represent a criminal threat, someone who was not likely to be in a computer lab on a college campus on the weekend. To Kevin, however, the action by the police officer, and the initial call by an anonymous campus peer, signaled a racial microaggression, based on the common criminalization trope regarding Black men. Both the caller and the police officer made assumptions that he did not belong, not because he did anything wrong, but based on their own perceptions of what a stereotypical college student looked like. The result of Kevin's case, and those of other Black men in their study, was severe psychological stress induced by persistent racial microaggressions. Similar to the findings of Smith and colleagues, McCabe's (2009) multi-race study of racial and gender microaggressions, which included six Black men, found that Black male collegians perceived themselves as being treated as threats to their professors and peers as they, too, received unprovoked attention from police.

As a result of such confrontations, students feel obligated to validate their intellectual competence in the classroom and affirm their rightful position at their institution (Fries-Britt, 1998; Fries-Britt & Turner, 2002). In other words, students feel required to, and as a result, attempt to disprove implicit and explicit assumptions made about them (Moore, Madison-Colmore, & Smith, 2003). At colleges and universities, students of color are not only striving to complete academic work, they are simultaneously finding ways to mediate challenging feelings of inadequacy brought on by racial microaggressions (Johnson-Ahorlu, 2013; McCabe, 2009; McGee & Martin, 2011; Truong & Museus, 2012). For instance, Johnson-Ahorlu's (2013) racially diverse study (participants were African American, Asian American, Latinx, Native American, and White) explored how, if at all, students experienced stereotypes and stereotype threat related to their racial identities. Most germane to this study, African American students experienced racial stereotypes, which were presented to them as attacks on their academic capabilities (e.g., shock from faculty and peers when they achieved in the classroom and inquiries about their abilities to handle the course workload). In addition, the fear of fulfilling these stereotypes further debilitated students and negatively affected their academic performance. McGee and Martin (2011) also investigated how stereotypes impacted Black students' academic achievement. In their study of 23 Black undergraduate and graduate students in mathematics and engineering across four institutions, they reported occasions—both within the academy and within society—where the students' capacity to excel in mathematics and science were questioned based on stereotypes about their Black identity. As a result of these experiences, Black students formed strategies (i.e., stereotype management) to cope with the stereotypes they faced on campus. Such strategies included disproving their academic inferiority, attempting to maintain control of their environment, which included being prepared for future racial assaults, oscillating between cultural ways of communicating (for example, between one's Black peers and White individuals within the academy), rejecting existing stereotypes about Black learners and instead defining their own sense of academic self, and seeing themselves as contributors to future students by serving as mentors. By incorporating these strategies, students experienced increases in their academic performance and persistence.

While there is a growing body of scholarship regarding the racial microaggressions college students face, the majority of these studies center on undergraduate collegiate students. Comparatively absent from this corpus is research on how graduate students experience racial microaggressions. Even less scholarship details how racial microaggressions present themselves in domain-specific contexts (e.g., engineering). Taking a more nuanced approach to identifying these harmful behaviors at the graduate level is important because racial microaggressions are likely to also manifest in field-specific ways that may go unnoticed without deeper investigation. Furthermore, microaggressions that occur at the graduate level, and in the case of this study, specifically, in one's field of study, impact student retention, achievement, sense-of-self, and identity in that field (Burt, 2019; Burt, Williams & Smith, 2018). Highlighting the voices of students who experience racial

microaggressions within engineering will provide helpful illustrations of messages and behaviors perceived as being detrimental to their academic achievement and persistence in engineering.

Using “racial microaggressions” as a conceptual framework, the following research questions guide this study:

- What do racial microaggressions look like within the advising relationship for Black men in engineering graduate programs?
- What are the impacts of racial microaggressions on Black men in engineering graduate programs?

METHODS

Data Collection

Data were drawn from interviews with 11 Black men in engineering graduate studies from a large Midwestern research institution (referred to as “Midwestern University” from this point forward). Students varied in their engineering specializations. They also ranged in class level (i.e., the year they were in graduate school during the time of data collection). It should be noted that in this study the term “Black” is used to denote the more global diaspora of race. Thus, Black is not synonymous with African American; six participants considered themselves Black but not necessarily African American (i.e., Nigerian, West African, Caribbean, Ethiopian, and Ghanaian). One student had attended a historically Black college and university (HBCU) and another had attended an undergraduate institution outside of the United States, whereas the rest attended predominantly White institutions (PWIs) for their undergraduate studies. Finally, at the time of data collection, five students were interested in obtaining industry positions upon graduating, one was interested in a faculty career, and five were uncertain of their post-graduate plans. See Table 1 for participants’ demographics.

Table 1
Demographic Data for Study Participants

Pseudonym	Class Level	Engineering Specialization	Undergraduate Origin	Post-Graduate Career Intention
Alphonso	5 th	Electrical	PWI	Industry
Chris	5 th	Chemical	PWI	Industry
Jackson	3 rd	Mechanical	PWI	Uncertain
Jaden	2 nd	Electrical	HBCU	Industry
James	4 th	Biomedical	PWI	Faculty
Marcus	3 rd	Mechanical	PWI	Uncertain
Paul	4 th	Electrical	PWI	Uncertain
Quentin	5 th	Electrical	PWI	Uncertain
Terrence	2 nd	Material	International	Uncertain
Trai	4 th	Mechanical	PWI	Industry
Victor	5 th	Chemical	PWI	Industry

The majority of students were identified through snowball sampling (Merriam & Tisdell, 2016), in which the principal investigator (the first author) identified a small purposeful sample of eligible participants (i.e., Black, male, doctoral student in engineering) who then referred other eligible Black graduate engineering students. The principal investigator conducted all interviews using a semi-structured interview protocol (Merriam & Tisdell, 2016) in which a standard set of questions guided interviews but there was flexibility to ask follow-up questions where necessary. Interviews ranged from one to approximately two hours. Participants were asked about their collegiate background, doctoral experiences, and identification with and intentions to remain in engineering. After data were collected, audio recordings were transcribed verbatim to capture participants’ meanings in their own words.

All researchers (this study's authors) conducted data analysis using thematic analysis to analyze the interview data. Thematic analysis helps to identify patterns in text data (Braun & Clarke, 2006; Fereday & Muir-Cochrane, 2006). This analytical method was selected because the preliminary data were to be reviewed by multiple researchers, and the flexibility of the method allowed for the discovery of patterns, discussion among us, and explicit connections to existing literature (Braun & Clarke, 2006).

Data Analysis

For the first round of analysis, we divided transcripts among ourselves so that each transcript was reviewed by at least two of us. We first searched for evidence based on existing knowledge related to racial microaggressions in higher education. Each of us read through the transcripts and identified areas that captured how students experienced racial microaggressions within the engineering context. Additionally, we noted the ways in which racial microaggressions impacted the students who were interviewed. After highlighting potential areas that addressed the research questions, we met as a team to discuss initial thoughts. Based on the preliminary findings, we decided to focus on instances of racial microaggressions between students and their advisors. During the second round of analysis, we considered how students' interpretations were similar and different, and where different, discussed the nuanced dimensions. For example, we noted considerations pertaining to how interactions between students and advisors exemplified racial microaggressions, participants' feelings after being microaggressed, and effects of these offenses on students. After these steps, the findings were organized into two themes: Racial Microaggressions within the Advisor–Advisee Relationship; and, Threatening Effects of Experiencing Racial Microaggressions within the Advisor–Advisee Relationship.

Ensuring Quality

Several steps were taken to ensure the quality of the findings. First, after the transcripts were produced, the audio recordings were checked against the transcripts to verify the accuracy of the data. Second, the transcripts were sent to the participants to verify the accuracy of content and meaning; no participants responded with changes to their transcripts. Third, the authors intentionally assigned multiple researchers per transcript to improve the interpretations of the data. Engaging in this peer debriefing, which also included ongoing discussions around preliminary findings and themes, provided checks to the interpretations and allowed consensus on the study's findings. Finally, because five researchers analyzed the data, and we had different backgrounds and perspectives, we reflected on our positionalities and subjectivities (Cooper et al., 1998; Peshkin, 1988). This process of being reflective helped to acknowledge who we were and the biases we held relative to the data. By engaging in these practices, we were able to acknowledge, and to the extent that it was possible, to separate our biases from the data analyzed.

Limitations

This study has some notable limitations that should be considered. First, the sample size of 11 is not representative of all Black men graduate students in engineering at Midwestern University nor of all Black men in graduate programs in engineering in the United States. Therefore, readers should be aware that this study's findings provide a nuanced understanding of a select group of students at one "high research activity" institution. Similarly, because of Midwestern's heavy emphasis on research, it is possible that certain kinds of racial microaggressions, related to students' research abilities, were more likely to surface between the student and advisor at this institution. It is possible that at other types of institutions (e.g., teaching-focused), other kinds of racial microaggressions would surface. As an example, if at other institutions students are required to hold teaching assistantships, they may encounter racial microaggressions from the students they teach. Those messages, too, could inform Black men of what a future academic career in engineering might entail. Second, engineering students' experiences vary by their specializations because they are involved in different sets of courses and interact with different departmental faculty and peers. Finally, existing higher education

research suggests that students experience graduate education differently depending on their current stage in their doctoral program (Gardner, 2009). It is possible that students' recognition of racial microaggressions were related to their levels of class status (i.e., students who were more advanced could more easily speak to the microaggressions they had experienced).

Despite these noted differences, research on the experiences of Black students in STEM suggests that these students tend to share some common racialized experiences (e.g., racial microaggressions, tokenism, imposter syndrome, stereotype threat) with regard to race (Fries-Britt, Burt, & Johnson, 2012; McGee & Martin, 2011). These racialized experiences tend to occur despite students' STEM field of study, specialization, year in graduate school, and institutional type. In other words, regardless of these potential factors, Black men in STEM report similar challenges that threaten their persistence in STEM.

FINDINGS

Findings from this study illustrate that Black men in engineering graduate programs engage with their faculty advisors in a variety of educational spaces, including one-on-one meetings, the laboratory, and occasional casual conversations. In particular, the authors discuss these findings across two broad themes. Students reported that through these interactions with faculty advisors, they encountered experiences that shaped how they valued the advisor–advisee relationship ("Racial Microaggressions within the Advisor–Advisee Relationship"). Equally important, students revealed how they processed subtle and overt racial microaggressions within the engineering educational community ("Threatening Effects of Experiencing Racial Microaggressions within the Advisor–Advisee Relationship").

Setting the Context

At the time at which these data were collected, all participants had witnessed the election of Barack Obama as President of the United States. Like many other college campuses, Midwestern University was a location where race, gender, and politics permeated the campus environment (Jaschik, 2008; Tatum, 2008). Because race was at the forefront of the national and international discourse, students in this study were participants, passive or otherwise, in campus efforts to address racial discord. Simultaneously, the more advanced students noted previous successes in recruitment efforts to diversify the engineering community. In fact, many of the advanced students stated that they were targeted and strongly recruited to attend Midwestern University, and that if not for such strategies, they might not have attended the prestigious institution. However, they also explained an abrupt transition when all recruitment efforts ceased as a result of attacks on affirmative action at the federal (Supreme Court) and local (state referendums) levels. Thus, their experience of being underrepresented and isolated became further exacerbated as fewer Black students were recruited for the engineering graduate program. To provide further context, Table 2 indicates the number of students enrolled at Midwestern University at the time of data collection. Note that Black graduate student men across the entire university only comprised 1.4% of the student body; the specific numbers of Black men in engineering were severely low and are masked to protect the anonymity of the institution and participants. Consequently, while the study's sample size of 11 may appear to be small, the men included in this sample represent the "critical mass" of Black men engineering graduate students at Midwestern University at the time of data collection.

Table 2

*Graduate Enrollment by Race and Gender at Midwestern University
(Academic Year 2009-2010)*

	White	Asian	Black	Hispanic
Men	2,810	531	169 (1.4%)	198
Women	2,800	503	325	195

Racial Microaggressions within the Advisor–Advisee Relationship

The participants defined their perceptions of the role of an advisor and the advisor's importance in shaping the graduate school experience. For example, Jackson, a third-year mechanical engineering doctoral student, compared the advisor–advisee relationship to a marriage:

Well some people liken the advisor, advisor–advisee relationship to a marriage in that you know you are likely to be together four/five/six/seven years, depending on how long you are here and so. Being able to come in and kinda foster that relationship is important.

Jackson's interpretation of the advisor–advisee relationship acknowledges the potential extended time that an advisor and advisee could be "together" and the importance of "fostering" their relationship for the duration of the academic experience. In addition, Jackson's quotation sets the tone for how participants described their expectations of their relationship with their advisors. All participants described having or wanting a supportive relationship, one where they learned and received encouragement from an expert in their field. Jackson's quote also represents how students entered into their relationships with their faculty advisors with respect to their understanding of the power dynamic between student and faculty advisor; this relationship suggested, at least to some of the participants in this study, that one should not do anything that could jeopardize the "marriage," as Jackson called it. The participants in this study stressed the importance of the connection between engineering student and advisor in terms of the mediating roles faculty played in students' academic careers, or at least students' perceptions of the role faculty would play in their academic careers in the future.

When graduate students reach out to potential advisors, their first interactions are crucial to their relationship, which make microaggressions occurring during these interactions particularly problematic. In the present study, two participants described prospective advisors who did not respond, which influenced early negative perceptions of their prospective advisors and shaped their perceptions of how the advisor–advisee relationship might continue. Jaden, a third-year electrical engineering doctoral student, described his first interaction with his advisor:

When I did my initial grad search I only found a few advisors who I considered working with. Um. A lot of them wouldn't respond to email and I thought, "this won't go well." The one who did, I went to his office and he gave me this bizarre look. I'm not sure if he expected me to be Black honestly, that's what I think it was.

In the statement, Jaden connects the interaction with his advisor to race. Jaden's initial interaction with his advisor produced subtle feelings that caused internal dissonance, and made him question himself—"Is my advisor not talking to me because I am Black?" In this case, Jaden interpreted his initial meeting with his advisor as being a racial microaggression based on the quizzical look. As explained by Solórzano, Ceja, and Yosso (2000), racial microaggressions can be subtle, but because they also tend to accumulate over time, they nonetheless trigger feelings of inadequacy in those who experience them.

Jackson, too, was uncertain about how well the "marriage" was going between him and his advisor. Because of the infrequency of interactions with his advisor and their different personality styles, Jackson had concerns about the relationship:

At the same time, I had reservations about my advisor. At the time I had only met with him once. I was unsure as to whether or not our styles would mesh, whether we would get along for the extended period of the Ph.D., whether he would provide the right type of support and interaction that I thought would be beneficial.

As students progressed through graduate school, however, they all described both positive and negative interactions with faculty advisors. What was perhaps most enlightening was how some students' early perceptions of the advisor–advisee relationship set the foundation for their future interactions. Jackson explained,

I slowly started to realize that the advisor who I was kind of unsure about became more and more solid in my mind . . . From my first half an hour interaction with him, of course it's difficult to tell how he is going to be for the next five years.

If the early interactions were uncomfortable, it took more time, and perhaps required more mental energy, for students to trust their advisors. This might suggest that students were fearful that their assumptions about mismatches between advisor and advisee may have been accurate.

While this treatise primarily focuses on racial microaggressions from academic advisors, one student described receiving racial microaggressions from others in positions of intellectual authority, such as the instructors of their courses. Similar to experiences expressed by Jaden, James, a fourth-year biomedical engineering doctoral student, also experienced an interaction that prompted him to question his status and belonging in graduate school. He described a scenario of indiscernible grading practices from his professor:

My second year I was taking this class and the professor said one thing and did something else. . . he gave me grade that I wasn't—I think—he gave us—overall, it was a group, it was a team, it's a teamwork class. . . Yet, he decided, he would give the grade to the individual he felt did the most work. I don't know how he came about doing that, but there was people in our group that made higher grades than other people and we did similar amount of work. . . I felt like it was a bump because he gave me a grade I wasn't or that I didn't deserve or expected. And therefore that was something I didn't have control over.

To mentally overcome the effects of what he perceived to be unfair treatment, James compartmentalized and rationalized his experiences:

Stuff doesn't always go your way, but you know, you suck it up and fight some more. . . I mean I'm happy. . . I've obtained what I expected other than like, I guess, the small bumps that really, I guess have no control over.

It is clear from James' quotations that he nonchalantly deemphasized the uphill struggle he faced in order to move past the negative experiences. In order to deal with microaggressions and persevere, he rationalized his negative experiences and minimized them as "bumps along the road." While James does not explicitly name race or racism in the context of his story, he recounted the above scenario when asked to describe the experiences of being a Black male graduate student in engineering and the challenges that arise. That is, while he did not mention race, the context in which James spoke points to racial microaggressions.

Threatening Effects of Experiencing Racial Microaggressions within the Advisor–Advisee Relationship

Findings from this study illustrate that some Black male graduate students interpret racial microaggressions in a variety of ways that threaten their understanding of their professional identity as engineers and influence their decisions regarding whether or not to persist in engineering. One finding suggests that students' perceptions of racial microaggressions were primarily related to oral communication with their faculty advisors. For example, James, explained that his advisor communicated with him in ways that appeared to belittle his intelligence and level of academic preparedness:

Um—so like . . . it's like when he tells you stuff it's kind of . . . if you approach him, and he asks you questions and it was like some fundamentals you don't know, or you were never taught it as far as software stuff, he just—I don't want to say he belittles you, but he'll kind of be like "yea, you learned this as a junior in undergrad, and the sophomores here are doing it, blah, blah, blah", and I'm like, "ok" (laughter). It would go in one ear and out the other, but yeah, you know you don't really feel good afterwards. But then I guess talking to other students in the lab that's been there longer than I have, supposedly that's how he is, and that's the way he approaches, I guess approach you when you have "x, y, or z" lack of knowledge.

In this quote, James painted a picture of what appears to be a typical interaction with his research supervisor/advisor. While one could argue that the advisor was merely assessing James' pre-existing knowledge and skills, James suggests that this conversation and communication style was not an isolated incident, but rather that his advisor routinely enacted microaggressions against him by asking questions to verify whether or not he was qualified to engage in the work of their discipline. The messages the advisor sent to James caused him to question his ability to successfully engage the engineering material. Furthermore, evidence is seen of the psychological effects that racial microaggressions can have on students. Although James hesitated to name the verbal assault as "belittling," perhaps a conscious move to help cope with the stinging effect of the comment, he acknowledged that he did not "really feel good" after hearing the diminishing comment. Another way James dealt with receiving the comment from his advisor was, to some extent, to ignore the microaggression, as if to help reduce its psychological effect. While it is likely that he could not completely ignore what was said, allowing the comment to go "in one ear and out the other" provided temporary relief from what could otherwise be psychologically paralyzing to one's sense of academic self. Unfortunately, James provided an example of what he was learning as an engineering graduate student: do not ask questions for fear of being perceived as intellectually inferior.

Another facet of dealing with the racial microaggressions that Black men students are subjected to is internalizing what they hear, rationalizing it, and as a result taking ownership of the harassment as a means to cope. This was apparent when Jackson commented on feedback he received from his advisor: "And, I guess my feeling is that maybe I'm subject to other judgments that if I were in the majority I wouldn't be necessarily subject to." Jackson's comment suggests he believed that he was being judged and subjected to different levels of scrutiny from his advisor because he was part of an underrepresented ethnic group rather than being in the majority (i.e., White and Asian students). Equally important to acknowledge, Jackson does not just recognize what he perceives to be unequal treatment; he appears to rationalize and possibly normalize the treatment he receives in order to cope with receiving microaggressions.

The outcomes of receiving racial microaggressions, across the engineering context, from the same and different people, made students feel less comfortable in the field of engineering. Alarmingly, all students expressed exhaustion due to having to navigate and negotiate what they perceived as an unwelcoming academic space. Chris, a fifth-year chemical engineering doctoral student, explains his exhaustion:

Now, when those get uncomfortable for the Black male, and especially the advisor relationship might get uncomfortable coupled with the prejudice people may have with you being a minority male, in a field dominated by White men, the pressures can get to you and can see the fact that you can't do it.

Chris spoke of both the abstract and local effects for Black men specifically, and for minority men in general, in engineering. He explained that the pressure of being in a White male-dominated field contributed to his thoughts of failure. As a result of not feeling supported as a "minority male," Chris was uncertain of completing the doctoral program. In addition to trying to decipher what was and was not racial prejudice within the engineering field, and in society more broadly, Chris and his peers also had to contend with how race and racism was infused in their advisor-advisee relationships. Similarly, Paul, an electrical engineering doctoral student, described interactions with his advisor that challenged his sense of academic self and professional engineering identity. Paul explained, "I don't know why, I still don't know why he, he basically said, you know, 'why don't you go out and work first for a few years,' that was his opinion." Sometimes individuals who encounter racial microaggressions may not be immediately aware of the offense, and might overlook such behavior and comments in the moment (Constantine & Sue, 2007). In this particular case, Paul had difficulty understanding whether his advisor was trying to be helpful or offensive, causing Paul to rationalize the nature of their interaction. Paul attempted to make sense of his advisor's recommendations. To work in the field, rather than continue with his education, seemingly challenged what he had believed about himself as an emerging scholar and an engineer. Although Paul and his Black male peers experienced important decisive points where they felt questioned about their status as graduate

students, *all* of them remained enrolled and engaged in their programs. Taking Chris's and Paul's statements together, these findings reveal why interactions with one's advisor and professors are such critical factors for Black men completing their doctoral program: interactions within the College of Engineering mediates students' learning, influencing their decisions about whether or not to persist in the graduate program, and perhaps whether or not to remain in the field of engineering.

Appearing to be indifferent about experiencing racial microaggressions was a reoccurring strategy practiced by participants in this study. The authors noted several instances when participants laughed or chuckled, another form of appearing nonchalant, while simultaneously describing their emotional pain and frustrations related to negative experiences with their advisors. Microaggressions tend to create a sense of helplessness and can make individuals feel powerless to do anything about them. For example, as described by James, he felt as if he had no control over the grade that was given to him. That particular situation caused him unnecessary stress because he thought it would "affect me staying here and continuing for my Ph.D." While this coping strategy may be a form of "cool pose" to maintain one's sense of pride (Harris, Palmer, & Struve, 2011; Majors, 2011), the strategy of diminishing one's experiences with race and racism may also be an effect of victimization (Smith, Hung, & Franklin, 2011). This finding is similar to observations by McCabe (2009), who noticed that participants occasionally laughed when describing the offenses made against them. Words alone could not capture how students were feeling, particularly if their learned coping strategies included not discussing their pain and challenges. Thus, it is clear that the combination of verbal and nonverbal data, afforded through qualitative analysis, provided further additional clues into how students internalize and then cope with experiencing racial microaggressions.

DISCUSSION

The decision to pursue doctoral studies represents a sacrifice to forego a potentially lucrative engineering career with a bachelor's degree (Brazziel, 1987). But students make the choice to attend graduate school to meet their personal and professional goals. In the current study, the excitement and allure of being a graduate student and reaching one's goals dissipated as students entered Midwestern University. Upon matriculation, and throughout their academic journey, students faced racial microaggressions (e.g., meeting the advisor, receiving a grade during a second-year class, moments of being insulted later in the process). Although it is important to recapitulate the cumulative effects of racial microaggressions over the lifespan of the students, the purpose of this article was to provide a focused view of racial microaggressions toward Black men in engineering graduate studies at one "high research activity" institution and their academic advisors. When the Black men in this study entered graduate school, they did not anticipate facing consistent antagonizing insults from those who were supposed to be their main sources of professional support, their faculty advisors. Rather, they expected mentorship throughout their academic experience and their entrée into the broader engineering professional community. This contextual background is similar to Felder's (2010) findings on Black doctoral degree completers who attended a large prestigious institution. While the participants in her sample were not in STEM graduate programs, she reported how students perceived faculty advisors to be necessary partners to their socialization in graduate school and their field of study. The students, however, also noted times when they felt disrespected by their advisors. These behaviors by advisors, Felder asserted, further marginalized study participants. Her recommendations, with regard to improving advising experiences, appear to align with the needs of the Black men in the present study who held higher expectations for a healthier advising relationship.

The extensive, direct contact that faculty advisors have with students across multiple contexts (e.g., classroom, research experiences, academic meetings) raises concern about the number and severity of racial microaggressions Black men experience over the life-cycle of their graduate education. Undergirding the racial microaggressions experienced by students might be conscious or subconscious stereotypes of Black men. As highlighted by existing scholarship, there remain assumptions (i.e., stereotypes) that Black students are academically ill-prepared and incapable of achieving academic success (Dortch, 2016; Hernstein & Murray, 1994; Johnson-Ahorlu, 2013).

Although students in this study did not report perceptions of feeling like criminals (McCabe, 2009; Smith, Allen, & Dantley, 2007) within their advising relationships, deep-seated historical perceptions of Black men may still be consciously or subconsciously at play. When preconceived stereotypes of Black students persist, behaviors such as questioning the integrity of students' work or work ethic and interrogating students' commitment to graduate study or specific field of study, for example, may be perceived by students as racial microaggressions. As a direct result of being "othered" or intellectually attacked by their faculty advisor, students described experiencing several psychological and health difficulties, with thoughts of dropping out, or leaving engineering. Thus, persistent racial microaggressions from their advisors further isolate students from their institution, graduate studies, and potentially their field of study.

To be clear, none of this study's participants chose to pursue graduate studies with hopes of later dropping out. Rather, similar to other Black doctoral students (McCallum, 2016), participants in this study excitedly enrolled in graduate studies with dreams of fulfilling their goals, making their families proud, and improving their cultural communities with their academic and professional talents. To accomplish these feats, however, they learned to cope with the experiences they faced within the isolating and hostile engineering community. This finding contributes to existing scholarship that reports other instances where Black students—across gender, undergraduate and graduate studies, and fields of study—implemented coping strategies in efforts to make progress in the academy (Brooms & Davis, 2017; Burt, Williams, & Palmer, 2019; Fries-Britt & Griffin, 2007; Johnson-Ahorlu, 2013; McCabe, 2009; McGee & Martin, 2011; Truong & Museus, 2012). In each of these studies, as with the students in this study, to be successful, Black students had an additional task to perform beyond that of course-taking: students had to psychologically manage the hostile messages they received within their educational communities. These adaptive strengths (i.e., coping strategies) were necessary to survive and thrive in their engineering community.

IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

This article identifies several opportunities for future research and implications for future professional practice. First, faculty advisors were identified as being perpetrators of racial microaggressions against Black men. However, evidence suggests that there are other individuals within engineering contexts that also cause harm to Black men through racial microaggressions. More research and analysis are needed to identify who those individuals are, their relationships with Black men, and the contexts in which those racialized incidents occur. Such an examination would provide a more expansive picture of how some Black students experience engineering, including how their retention in the STEM field is threatened. A second area for future research would interrogate the campus or college climate. A study that explored the environmental factors from a campus climate perspective might provide clues to the systems and structures that give rise to racial microaggressions within a college of engineering.

Addressing racial microaggressions through professional practice needs to be a priority. Findings from this study indicate that after experiencing racial microaggressions, some students express a diminished sense of self as related to their academic ability, which has the potential to threaten their retention in the STEM field. Additionally, it appears that some students struggle to develop an identity consistent with engineering after facing racial microaggressions. These findings suggest that there might be a relationship between one's educational experiences (including one's negative interactions with a faculty advisor) and one's engineering self-concept and identity as an engineer. To address this concern, faculty, staff, and administrators need to be more aware of their Black men students, and understand that while many graduate students struggle at times, Black men may face additional challenges caused by the engineering context.

Besides helping to eradicate racial microaggressions, those in positions of power should create more intentional support structures that strengthen historically underrepresented students' academic sense of self and help to buffer, at least in part, the negative impact of experiencing racial microaggressions. In addition, faculty advisors need to become more culturally competent in the ways they behave and interact with students from underrepresented groups. Addressing racially charged

behaviors and comments, whether those are intentional or not, is a small yet important step in the direction of increasing and sustaining Black men's participation in engineering.

Black men engineering graduate students have high expectations of a supportive advising relationship. In the event that their reality falls short of their expectations, they must seek out alternative people and experiences that can assist them in fully participating in the engineering community. Although this final recommendation places an additional burden on Black men instead of fixing the systemic issue of focus (racial microaggressions in engineering), their long-term persistence in engineering could depend on it.

CONCLUSION

The findings in this article provide a clearer understanding of racial microaggressions within an engineering context. Centering participants' voices revealed a shared pattern of experiences between students and their advisors. Understanding their collective lived experiences can better inform the engineering education community of some of the challenges faced by Black men in engineering graduate programs. It is important to acknowledge that since data collection, all participants have graduated with doctorates from Midwestern University. Although their persistence should be celebrated, the pattern of Black men having to overcome consistent negative experiences is not cause for celebration. The engineering education community cannot continue to explain away students' racialized experiences, no matter how challenging these experiences may be to remedy. This call to action provides an opportunity for engineering educators and other members of the engineering community to interrogate various actions and behaviors; for example: "How might my actions be perceived as unwelcoming to students from underrepresented groups"? If we, as a scholarly community, are serious about broadening participation, we must investigate the systematic practices and activities that threaten to push students from underrepresented groups out of engineering.

While this study focuses on racial microaggressions between Black men in doctoral studies and their advisors, there are other contexts within colleges of engineering where racial microaggressions occur (e.g., between peers, with staff and administrators, through systematic policies). Scholars should continue examining racial microaggressions and the implications they have for the field of engineering, especially because there remain those who do not believe that racial microaggressions occur (e.g., Harris, 2008; Thomas, 2008). More scholarship on this topic might serve to affirm students who have historically endured unwelcoming and isolating experiences in engineering, but who have never had the language or evidence to "prove" that their experiences were valid.

The findings in this article have the potential to better inform those who interact with students from underrepresented groups. Reducing the number of microaggressions that occur in advisor-advisee relationships and dismantling the systems and structures that allow these behaviors to continue need to be priorities. With this understanding, engineering educators can help to create supportive educational spaces for academic achievement; engineering can then become a more welcoming field of study for Black men.

We would like to thank the participants who courageously shared their stories with us, members of the Burt Research Group (BRG) who helped with peer review, and the reviewers for providing valuable feedback and helping to strengthen this work.

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