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LEARNING WHILE BLACK: IDENTITY FORMATION AND EXPERIENCE FOR FIVE BLACK MEN WHO TRANSFERRED INTO ENGINEERING UNDERGRADUATE PROGRAMS

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Research on engineering identity has often been conceptualized independent of racial identity, presumably because the engineering discipline does not place explicit value on nondisciplinary or nonacademic dimensions of the student experience. This article seeks to address this gap in the literature by exploring the degree to which the racial and ethnic identities of five Black men, who are engineering transfer students, influenced their precollege and collegiate trajectories. Drawing from various conceptual frameworks or theories across multiple disciplines, we explore the ways in which our participants' perceptions of race undergirded their pathways toward engineering degrees. In addition, our data attempts to unpack within-group differences among our interviewees and the ways in which these differences may have impacted their own senses of "Blackness" in engineering. Findings reveal somewhat significant variations in participants' propensities to identify as Black. For instance, some Black American participants described disconcerting racialized experiences, and noted being incentivized to persist in engineering to increase the representation of Blacks in the field. On the other hand, Black African respondents expressed stronger cultural/ethnic affinities, rarely described their experiences through the lens of race, and tended to reference cultural or linguistic challenges that they faced as immigrant students. Implications for practice include a call for campus-sponsored programs to provide students with the agency to develop their own affinity spaces that most closely align with their values, identities, and experiences. Implications for research include the need for more racial, ethnic, and/or cultural identity-based studies in engineering education scholarship.

KEY WORDS: *African American, African, community college, transfer, race, culture, engineering, identity*

1. INTRODUCTION

Several policy documents have lamented the lack of diversity in STEM disciplines (National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, 2007; President's Council of Advisors on Science and Technology (PCAST),

2012). Scholars note that engineering, in particular, suffers from relatively low numbers of women and underrepresented racial and ethnic minorities (Bruning et al., 2015; Honey et al., 2014). The proportion of Blacks/African Americans receiving engineering bachelor's degrees was only five percent in 2010, much lower than their 13% share of the U.S. population (Honey et al., 2014; U.S. Census, 2016). Unlike other demographic groups (women, Hispanics/Latinos) who have experienced steady gains in their share of engineering graduates, Blacks/African Americans have actually declined in their share of engineering degree holders (American Society for Engineering Education, 2019).

One means of increasing and diversifying the engineering/STEM pipeline is through the nation's community colleges (Bahr et al., 2017; President's Council of Advisors on Science and Technology, 2012). However, as Wang (2013) asserts, "current empirical research on STEM education at the postsecondary level mainly focuses on four-year institutions, whereas community colleges and their students are underrepresented in the literature" (p. 665). Where scholars *have* begun to explore ideas of increasing diversity in STEM through the community college pipeline, they have tended to examine the pathways of Hispanics/Latinos more than Blacks/African Americans (Malcom, 2010; Dowd, 2011). The few reports that have been completed on Black/African American students in two-year schools have generally sought to understand these students' progress across *all majors*, rather than reviewing their progress in engineering or other STEM disciplines. McPhail (2015) summarizes the state of the literature on engineering students, noting that "studies focusing specifically on African American students matriculating from community college to engineering programs at four-year universities are limited" (p. 313). It is therefore challenging to adequately conceptualize experiential or intrinsic distinctions between Black engineering majors who begin at community colleges as compared to those who first enroll at four-year schools.

Until recently, scholars also tended to essentialize Black students in STEM by cultural background and nationality (Hill and Green, 2007; McGee and Martin, 2011; Perna et al., 2009). This approach inadvertently disregards the nuanced and distinct experiences of specific Black subpopulations. In recent years, however, an emerging group of scholars have begun to document within-group differences in the experiences of Blacks in engineering and other STEM disciplines (Berhane et al., 2017; Fries-Britt et al., 2014a; George Mwangi et al., 2016). By explicating these differences, these studies have broadened the definition of diversity to include not only race but also factors like country of origin and year of migration to the United States (Berhane, 2017).

These works have also explored the ways in which engineering experiences differ within Black subgroups. Black engineering students who are born and educated in the United States have been found to have some collegiate experiences that are distinct from Black sub-Saharan African/West Indian students and vice versa (Berhane, 2017; Fries-Britt et al., 2014a; George Mwangi et al., 2016).*

*In this paper, the term sub-Saharan Africa(n) is frequently used as opposed to Africa(n). The decision to use this nomenclature was derived from the tendency for scholars to distinguish educational, health, and economic trends in sub-Saharan African countries from nations in North Africa (Hargreaves et al., 2008; Michaelowa, 2001).

More recently, scholars have interrogated the role of *racial identity* in the pursuit of STEM degrees across multiple subgroups of Black undergraduates (Fries-Britt et al., 2014a; George Mwangi et al., 2016).

This paper builds on these scholars' works by analyzing the interplay between racial identity and Black men's engineering trajectories in college. Using paradigms garnered from both higher education research and science/math/engineering education research, our paper unpacks the nuances of Black racial identity in an undergraduate engineering program. It examines the formation and salience of racial identity for five transfer students who internalize varying degrees of a Black racial identity. Our work further illuminates the extent to which these identities impact persistence and engagement in an engineering degree program. Besides adding to the literature on Black student identities in STEM, this paper may also have implications for higher education institutions focused on improving diversity and inclusion.

2. LITERATURE REVIEW

2.1 Black College Students and Success in STEM

Several scholars have documented Black students' underrepresentation in undergraduate STEM education and have called for a greater understanding of their experiences in these fields (Bonner II et al., 2009; Palmer et al., 2011; Perna et al., 2009). Within the body of literature that has taken up this objective, there are more studies on the general population of Black STEM collegians (Adams et al., 2013; Fries-Britt et al., 2010; McGee and Martin, 2011; Museus et al., 2011) than studies that look exclusively at Black transfer students in STEM (Jackson, 2013; Reyes, 2011). Similarly, within the extant body of scholarship on Black engineering students (Brown et al., 2005; Hughes et al., 2011; Igbinoba, 2015; Moore, 2006; Newman, 2011, 2015; Rice and Alfred, 2014; Sanders, 2010), only a few studies center the unique experiences of those who have navigated or plan to navigate the transfer pathway (Berhane, 2016, 2018; Berhane et al., 2017; McPhail, 2015).

Research studies on Black STEM students, and engineering students in particular, have noted several recurrent themes in their collegiate experiences, including negative peer interactions, low expectations from faculty, race-related discrimination, social isolation, and invisibility (Fries-Britt et al., 2010; LaMotte, 2016; Maton et al., 2000; Newman, 2011; Strayhorn et al., 2013). At the same time, studies that have adopted a success-oriented approach to examining these students' experiences have underscored the crucial roles that institutional initiatives (e.g., bridge programs), peer groups—particularly those composed of same race/ethnicity peers—familial support, faculty/staff encouragement, self-efficacy, and personal accountability play in facilitating their persistence and achievement (Fries-Britt et al., 2010; LaMotte, 2016; Palmer et al., 2010; Perna et al., 2009; Sanders, 2010; Williamson, 2010).

As it concerns Black transfer students in STEM, and engineering specifically, there is a consensus among scholars that these students often endure subordination and/or

intimidation by classmates, negative presumptions by peers and faculty about their preparedness for college-level (STEM) coursework, isolation, invisibility, and maladjustment to their four-year institution and department's cultures (Berhane, 2016; Jackson et al., 2013; Reyes, 2011). These scholars, however, discuss that Black transfer students in STEM and engineering benefit from receiving consistent information from their two- and four-year schools, developing a strong STEM identity, and being made aware of the variety of career opportunities available in their respective STEM fields (Jackson, 2013). Additionally, much like their nontransfer peers, factors including mentoring and advising, supportive climate, peer networks, self-determination, hands-on research experiences, and academic support services (e.g., tutoring) improve their chances of persistence and graduation (Berhane, 2016; Jackson et al., 2013; McPhail, 2015).

2.2 Racial Identity Salience for Black Collegians in STEM Fields

A separate body of work has commented on the role that racial identity plays in the experiences of Black STEM students, as well as in the construction of their disciplinary identities (Charleston et al., 2014; Fries-Britt et al., 2013; McGee, 2009; Porter et al., 2018). These research studies have originated from a variety of disciplines, including higher education (Fries-Britt et al., 2014b), science education (Hazari et al., 2013), math education (McGee and Martin, 2011), and engineering education (Foor et al., 2007). These disciplines bring different approaches and emphases to the scholarship on Black racial identity development and salience in STEM. Below we discuss the affordances and limitations of some of these analytical approaches to Black STEM student racial identity development.

In the higher education sphere, a few scholars have sought to understand how Black STEM students come to terms with race and how such awareness, or lack thereof, informs their college experiences and persistence decisions (Charleston et al., 2014; Fries-Britt et al., 2013, 2014b). For example, researchers have explored how Black women in physics and the computing science majors grapple with their racial and gender identities in STEM disciplines (Charleston et al., 2014; Fries-Britt et al., 2013), and the development and salience of a Black racial identity among Black foreign-born physics students (Fries-Britt et al., 2014b). Fries-Britt et al. (2013) note that some Black women in physics become keenly aware of their "racial sense of self" after being in classroom settings with no Black professors or peers (p. 24). Charleston et al. (2014) finds that some Black women in computing sciences majors waver between identifying as "Black" or as a "woman" depending on the situation or context. Irrespective of how students identify within the confines of their STEM disciplines and institutions, they report that their identities as Black women foster their commitment to do science and give back to their communities (Fries-Britt et al., 2013; Charleston et al., 2014). With regard to Black foreign-born physics students, Fries-Britt et al. (2014b) suggests that they are sometimes at early stages of racial-ethnic identity development, given their assertions that they "are not from here" (p. 8), "don't see color" (p. 5), and do not view themselves as minorities. As the researchers also note, these students' positioning as foreign-born students

temporarily shields them from the distractions and negative impacts of race-related issues in the United States and allows them to focus exclusively on their academic and personal goals. Although higher education scholars have made important contributions to thinking about racial identity development among Black college students, they have generally done so with less exploration of the specific disciplinary context of the STEM disciplines, including the development of a STEM disciplinary identity.

Within STEM education, mathematics education has offered foundational contributions in employing racial and cultural constructs for understanding the disciplinary identities and experiences of Black students. Indeed, a small but robust body of literature in math education has investigated the self-perception and lived reality of being "Black" and a "doer of mathematics" in both K-12 spaces (English-Clarke et al., 2012; Martin, 2009a; McGee, 2013; Nasir and Shah, 2011) and collegiate environments (McGee, 2009, 2015; McGee and Martin, 2011; Noble, 2011). These authors have decried the tendency in STEM research and policy to employ racial categories for the singular purpose of disaggregating data on the differential outcomes between STEM students of different races (Martin, 2009b; McGee and Martin, 2011). Instead, they have called for a deeper understanding of the intersecting racial and mathematical identities of Black students, particularly those who despite experiencing various forms of marginalization have maintained high levels of academic achievement in mathematics. Among the findings discussed in these research studies is the complex experience of a biracial mathematics major who viewed himself as Black first and foremost, yet admitted to reaping the benefits and also incurring the costs of appearing racially ambiguous to his mathematics peers and faculty (McGee and Martin, 2011). Additionally, these studies address Black mathematics students' development of a racially charged "prove them all wrong" agency that fostered their resilience, achievement, and desire to dispel well-entrenched stereotypes about Blacks' inability to excel in the hard sciences (McGee, 2009, p. 98, 2015; McGee and Martin, 2011, p. 1360). Ultimately, following a thorough analysis of the academic trajectories of Black mathematics majors, McGee (2015) posits that the sustained success of Black mathematics students hinges on their ability to progress from a fragile mathematical identity—one that is motivated by the desire to counteract deficit narratives—to a robust mathematical identity. She posits that a robust mathematical identity for Black students is fostered by a passion for mathematics and cultivated through a deeper appreciation of one's racial identity. McGee (2015) adds that the robust mathematical identity is enhanced by surrounding oneself with faculty and peers who validate their high achievement. By investigating the co-construction and interplay of Black mathematics students' racial and academic identities, math education scholars provide important insight into these overlapping disciplinary and racialized experiences.

In the engineering education scholarship, a prominent strand of identity research has focused on disciplinary identity "as an engineer" (Stevens et al., 2008, p. 1; Meyers et al., 2012). Additionally, the engineering identity framework has been frequently applied to understand engagement and persistence in engineering in K-16 and the workplace (McKenzie, 2016; Ross et al., 2017). Despite this progress, only a few researchers have

attempted to expand identity research in engineering education to include the exploration of racial and other nondisciplinary identities (Foor et al., 2007; Kypuros et al., 2016). Furthermore, among these researchers, rarely have any offered in-depth exploration of Black racial identity formation and salience among engineering students. In some instances, researchers may produce quantitative correlations between being Black and attaining various outcomes in engineering (e.g., Litzler et al., 2014). In other instances, researchers discuss the cultivation of an engineering identity among Black undergraduates (e.g., Fleming et al., 2013). However, these works tend not to articulate the role, or lack thereof, that their perceived racial identity plays in the process. Also, while some scholars have published research on racial/ethnic identity development in engineering, it is unclear if and to what extent Black students were represented among their studies' participants (Foor et al., 2007; Tate and Linn, 2005). The shortage of research that thoroughly explores racial identity development and salience among engineering students is especially problematic, considering that engineering students who do not possess the normative attributes of being socioeconomically privileged, White or Asian, and men may feel pressure to suppress or even deny their marginalized identities to successfully navigate the engineering culture (Foor et al., 2007; Kypuros et al., 2016; Porter et al., 2018).

In consideration of both the contributions and limitations of extant literature, our study explores the formation and salience of a racial identity among Black men in undergraduate engineering. Largely in the spirit of racial and disciplinary identity work in math education, our study also expands on it by examining the nuances of Black racial identity development among Black American, Black American biracial, and Black African men. Finally, acknowledging the longstanding role of community colleges as a major entryway for Blacks in STEM, this paper highlights the identity formation and social experiences of Black men who transfer from a community college to a four-year engineering college.

3. POPULATIONS OF INTEREST

This article explores the experiences around racial identity for three populations of students that often are only broadly classified as "Black" in institutions of higher education. In the following subsections, we begin by defining each population. In the Findings section, we then articulate the results of the study that emerged out of interviews with the respective group of students that would be classified according to that definition. By effectively grouping participants into different subgroups of Black students, we acknowledge the inherent tension between trying to capture the nuanced dimensions of racial identity while still attempting to define somewhat distinct smaller groups. Nonetheless, we believe that our approach to grouping students moves further toward more detailed and broader conceptualizations of Black students than are typically attempted, which may help scholars and practitioners to respectively frame and support particular subgroups in the future. The subpopulations of Black undergraduates that are of interest for this work are described as follows.

3.1 Black American Students

Black Americans can be understood to be the group of African diasporic peoples whose familial histories are connected to historical racial oppression in the United States. Palmer (2000) delineates African diasporas from ancient history until the modern era, defining five different major "streams" of African people that have moved throughout the world. Black Americans can be understood to be the fourth and (most commonly examined) stream, which is connected to the African slave trade throughout the Atlantic Ocean. For this reason, and in order to disambiguate Black Americans from a population of Black Africans who have a closer or more recent affinity with African countries, we refer to this population as Black Americans.

3.2 Black American Biracial Students

By historical "one drop" definitions of Blackness, biracial individuals who have any African ancestry are often subsumed into broader discussions of Black Americans (Khanna, 2011). When applied independent of the nuances of biracial or multiracial student identity, this approach can fail to conceptualize the unique ways in which these students view themselves. In Khanna's (2011) study, for instance, approximately 40% of Black-White biracial respondents did not see themselves solely as Black but rather more as White or as a person who was both Black and White. For the purposes of this work, we focus on biracial students who may still broadly be included within the population of Black Americans in institutional college/university data. However, at times we discuss them separately in recognition of the fact that they have unique perspectives as biracial students.

3.3 Black African Students

Drawing from Palmer's (2000) work on the streams of movement of the African diaspora, a fifth stream of nonforced migration commenced once slavery ended in the Americas and has endured until the present. Building on Palmer's (2000) research, we define Black African undergraduates in this study as emerging out of this fifth stream. Although once again the terminology "Black African" is not universally embraced, "Black" has nonetheless been used as a term that encompasses students born in sub-Saharan African countries† as well as those born throughout the modern African diaspora (Berhane, 2017).

4. THEORETICAL FRAMEWORKS

4.1 Racial Identity Theories

We drew on several social science theories to help understand and unpack the meanings of students' racialized identities and experiences. To unpack one's racial identity is to

†Sub-Saharan Africa is often identified separately from the rest of the continent of Africa because scholars describe educational, economic, and health data in sub-Saharan Africa separate from that of North Africa (Hargreaves et al., 2008).

grapple with the nature of race in the U.S. context (Fries-Britt et al., 2014b). A prevailing body of critical social science scholarship has concluded, largely, that race is a myth, without the biological and socially predictive underpinnings it once allegedly conferred (Omi and Winant, 2015; Painter, 2010). Nevertheless, race is a powerful myth with material consequences which continually undergirds American societal norms (M'Charek, 2013; Coates, 2015).

One of the earliest frameworks developed around Black (American) racial identity is Cross's (1971) Nigrescence model. Cross (1971) posited that Black Americans may undergo a racial "conversion experience" that begins with *pre-encounter*; at this point, a person will likely not exercise a strong pride in their "Blackness." After racialized experiences become more salient, Blacks may move away from *pre-encounter* and instead become hostile toward White Americans; Cross (1971) defines this next stage as *encounter*. Eventually, a person will become more conscious and engaged with the Black American experience (the *internalization* stage), and at this point hostility will diminish and a social consciousness may ultimately develop.

Later work by Cross and Phagen-Smith (2001) situated Cross's (1971) earlier work within the context of a life cycle. Suggesting that Cross's (1971) original model was more relevant to adults than for younger people, this newer research suggested that Blacks begin receiving tacit messages about race as early as in childhood and preadolescence. During these early stages, Cross and Phagen-Smith (2001) suggested that parents and other relatives, as well as people in families' social circles, informally introduce children to the relevance of Blackness. Largely due to the influence of parents and other adults, the importance and culture around Blackness for some is exceptionally important (Cross and Phagen-Smith, 2001). The authors further suggested that this higher prioritization of Blackness can lead to engagement in more monolithic peer groups that all place similar value upon the salience of Blackness (Cross and Phagen-Smith, 2001). Among other Black children and youth, the significance of Blackness is not as crucial to their own identities, leading to more heterogeneous peer associations (Cross and Phagen-Smith, 2001).

The scholarship of intersectionality has explored themes of racial oppression and juxtaposed them with other systems of oppression and inequality, including gender, sexuality, and socioeconomic status (Crenshaw, 1989). Intersectionality is predominantly a theoretical lens examining how society is structured differently for groups which fall in the overlap of two or more systems of oppression (e.g., race and gender). This paper, likewise, pushes toward further nuance and complexity, explicating differences in nationality,‡ immigration, and ethnicity within the analysis of racial identity and social experiences in U.S. engineering contexts.

A number of scholars have also begun to explore varying dimensions of identity within Black communities. These scholars posit that there is not a unitary narrative that can conceptualize what it means to be "Black" and in some cases recognize that one's own sense of Blackness may fluctuate in terms of its salience over time. Renn (2008), for example,

‡ Although we do not presume that nationality and immigration are always functioning as a system of oppression in this analysis, we note the alignment with trying to unpack differential experiences among subgroups of a larger oppressed group.

argues that there are a number of distinct categories that may depict how students with biracial backgrounds may self-identify. Among these categories, Renn (2008) describes students that may have a single racial identity but explains that the elements of their identities may change depending on the environments in which they are at a particular time.

Last, although a unifying framework for understanding the experiences of "Black" students from Africa in STEM has not yet been articulated, Kibour's (2001) *dual imbroglio* theory may be applicable for understanding their experiences. Kibour (2001) explains that Black students from African countries often identify themselves in ways that are consistent either with their country of origin or culture associated with their home country. The dual imbroglio theory acknowledges the cultural richness that benefits African immigrants in their home countries and contrasts that with the strain of being labeled a Black person in the United States. As such, we assert that Black Africans must contend with adopting a de facto Black racial identity in a U.S. context while also attempting to retain a cultural, national, or ethnic identity connected to their home countries, tribes, etc.

In trying to understand student experiences of Black men's identity in engineering education, we are cautious of the "danger of a single story" for this large and varying population (Adichie, 2009). Instead, we try to add cohesive theoretical insight across those experiences. The racial identity and racialization theories reviewed above have helped guide our thinking about the contours of differential and unifying experiences across Black population groups and have served as a lens for deeper insight into the experiences of our individual student participants.

4.2 Anthropological Identity Theories

Although several racial identity theories emphasize the contextual nature of racial identity, there is still a tendency across popular culture and research to see racial identities as static across our lifetimes (Martin, 2009b). Contrary to this perspective, the anthropological theory of identity developed by Skinner and Holland (1998) treats identity as developed within figured (cultural) worlds. In this perspective, identity formation is a blend of agency and improvisation of what one chooses to enact and assert, and constraint based on what roles and narratives are available in a particular culture or figured world. Although each individual is in part also helping to navigate the broader, figured world, their own identity and movements are constrained by the respective cultural work of the rest of the actors in a culture.

These scholars' view of identity is consistent with the understanding of racial narratives as constraining and predisposing the racial identifications of students while also being permissive of a level of individual agency in the process of assuming an identity. In this study, we note that the abilities of five students to express their self-identities and narrate their social experiences represent a fundamental act of agency that the study afforded. At the same time, the names and meanings of the racial/ethnic categories with which undergraduates can express a meaningful identity are constrained by the broader context (figured world) of race in U.S. society. In some ways, by investigating racial/ethnic identity, we asked students to relate to these broader racial categories. While possibly

drawing on similar racial/ethnic categorizations as used by institutions such as the U.S. Census and university admissions offices, the students in the study each drew on or redefined the figured world of these categorizations to form a racial/ethnic identity that was much more personal. Thus, the process of self-identifying within a context of broader social categorizations was both a unique strength and constant tension of this research.

Skinner and Holland's (1998) identity framework has also informed the understanding of identity in learning contexts, in particular, in viewing the development of an engineering identity as a key component in becoming an engineer (Foor et al., 2007; Stevens et al., 2008). In the engineering identity literature, students often become supported in or diverted from becoming an engineer by a complex interactional and individual process to gain an engineering identity. Although the engineering identity literature very often examines the circumstances leading to an engineering identity disconnect for marginalized groups, it often does so without an explicit lens that examines multiply held identities, the relative salience of those identities, and the tensions that those relative saliences might present. For instance, students from more marginalized communities might see themselves as a member of underrepresented/underserved communities first and as engineers second. For this reason, an attempt to try to increase the strength and salience of the engineering identity may or may not be a necessary and constructive intervention to support this student. This study will begin to problematize and unpack the dilemmas faced by students with multiple identities in order to help expand on the work of racial, anthropological, and disciplinary identity theories.

While racial identity theories have been applied to legal and social science studies, they have often not been utilized in engineering education research. Arguably, engineering disciplines can benefit from the application of these theories to studies involving students of color. At the same time, anthropological identity theories allow for the careful interplay of dynamic, shifting identities across multiple dimensions. Whereas racial identity has not always been at the forefront of the multiple dimensions that have been considered by engineering education scholars, this work will explore the ways in which racial identity and anthropological identity theories can jointly inform multilayered work involving diverse engineering students.

5. RESEARCH QUESTIONS

This paper draws from an extensive project completed by the lead author, which examined the components that six academically talented Black undergraduates perceived to be valuable for transferring from a community college into a nationally recognized engineering college. Three of the students were born and attended high school in the United States. Two of these three students are biracial. The other three participants received most of their primary and/or secondary school education in sub-Saharan African countries. All interviewees cited faculty support, peer engagement, role models, and K-12 experiences as being helpful in their academic journey. This study explores the postsecondary experiences of five of the six students, all of whom identified as men.

This particular paper explores the unique racial and ethnic self-identities that these five participants in the broader project expressed. These self-identities, and the extent to which these identities have impacted their pathways toward an engineering degree, are examined at length in this article. We explore the following primary research questions in our work:

How are Black engineering transfer students' racial and ethnic identities shaped?

How do these identities influence students' undergraduate experiences and general academic trajectories?

A secondary research question that we address is:

How do these racial/ethnic identities intersect with students' academic identities?

6. METHODOLOGY

In addition to investigating the components that all Black study participants perceived to be useful for transferring, the broader study also explored within-group differences between the Black African and Black American interviewees. While the recruitment of Black African and Black American students was intentional, the recruitment of biracial Black American students was not planned. Thus, the study involved both an intentional exploration of within-group differences (Black Americans and Black Africans) and an emergent exploration of biracial Black Americans as a distinct subgroup.

6.1 Qualitative Study Setting

The research was conducted at Tech College of Engineering (a pseudonym), which is a highly ranked degree-granting institution in the Mid-Atlantic region of the United States. All participants in the study transferred to Tech College from Eastern College (EC, a pseudonym). EC is the top feeder community college to Tech College and is also located in the same state as Tech College. In 2014, over one out of three engineering students at EC was classified as Black. Fifty-five percent of the Black engineering students at EC are identified as non-U.S. citizens, which indicates that there is considerable within-group diversity among Black collegians at the school.

6.2 Participants

As stated earlier, this study focuses on the self-identities and experiences of five Black men who are engineering transfer students. In the broader study, there was one additional participant who identified as a Black woman. We chose not to describe this sixth participant for the purposes of this article because, unlike the other participants who did not articulate the significance of their gender, her comments suggested that her academic

trajectory was defined by her race as well as her gender. The lead author believed that because of the significance of race *and* gender for this participant, her narrative may need to be unpacked more comprehensively in a separate article. It is worth noting that at Tech College, approximately 15% (or one in six) of transfer students identify as women. Thus, the gender demographics of all six students referenced in the broader study closely mirror the transfer student population at Tech.

All five participants who are the subject of this article transitioned to Tech College of Engineering from EC after completing a series of required math and science courses. They also were required by the institution to maintain a 3.0 cumulative grade point average in all college coursework prior to transferring. In addition, each interviewee met the following criteria: (1) The student identified as a Black student on his college application to Tech; (2) According to the application, the student attended secondary school either in the United States or a sub-Saharan African country.[§]

Working with the admissions office affiliated with Tech College, the primary author obtained a list of Black students who transferred to Tech College after first attending EC. Responses were solicited from prospective participants, interested students were e-mailed to verify that they met the aforementioned criteria. From this communication, participants were identified and interviews were scheduled. Interviews and the initial review of the data took place between the summer and fall of 2015.

6.3 Data Collection

The research team reviewed three sources of data that were collected for the broader study. The first was a demographic questionnaire that prompted respondents to indicate their countries of birth, and self-identified races and ethnicities. Table A1 in Appendix A provides an abbreviated list of questionnaire prompts to which each interviewee responded. The second source of data was an interview in which study participants responded to a series of questions related to their community college and precollege experiences. Individual interviews were audio recorded on a computer, and each interview lasted an average of one hour and sixteen minutes. On average, each interview generated 38 transcript pages, and in sum, the total number of transcript pages produced by this study was 192. Appendix A also provides sample interview protocol questions (Table A2).

Building on the aforementioned work around within-group diversity among Black STEM collegians, participants were separated into two subgroups (Black African and Black American) for group interviews, following the individual interviews. Individual interviews were conducted by the lead author. A colleague of the lead author, who brings experience researching and supporting students of color in engineering, cofacilitated the group interviews. The purpose of separating students into subgroups was to unpack themes that were noted among individual Black African and Black American re-

§ We note that other scholars (e.g., Burrell et al., 2015; Fries-Britt et al., 2014a) have included both students from sub-Saharan African and West Indian countries in their studies documenting the experiences of Black students from other countries. EC has a much larger sub-Saharan African population than its West Indian population, however, and for that reason, all participants from other countries were from sub-Saharan African nations.

spondents during their interviews. The interview with each subgroup of undergraduates served as validity checks for the themes that seemed to be emerging during the individual interviews (Frey and Fontana, 1991) and as the third and final source of data for the study. Individual interviews were conducted during the summer of 2015, while group interviews were facilitated during the fall semester of 2015.

For the purposes of this manuscript, the Black African subgroup consisted of two participants who identified as men. The Black American subgroup was composed of three undergraduates who all identified as men. Within this second subgroup, there was a second dimension of racial/ethnic diversity, in that two of the three participants had one parent who they identified as Black or of African origin, and one parent who they identified as White. This second dimension of diversity within an already classified subgroup added a level of complexity to any analysis that could be performed on the subject of racial identity. That is, although the initial, broader study was designed to unpack within-group differences based mainly on country or continent of origin, within the Black American population there was a second type of within-group diversity that was unanticipated. For this reason, this article, which explores racial identity, allows for an exploration of biracial identity within the larger discussion on Black American engineering student identity. This third dimension of identity, the biracial identity among students broadly classified as Black Americans, coincides with the second racial identity classification in the *Populations of Interest* section.

The prompts and questions to which interviewees responded generally pertained to their education at EC. Therefore, as they discussed racial identity, they typically were referring to the idea of race in the context of the community college that they attended rather than at Tech College, where they were currently enrolled. In a small number of cases, participants also referenced precollege experiences; these comments are generally only included if they appeared to impact their postsecondary careers.

6.4 Data Analysis

In order to provide a detailed analysis, several reviews of the data took place. First, the lead author obtained transcripts of the interview data and e-mailed the transcripts to the research participants. All participants had an opportunity to provide feedback on the data, such as necessary modifications. Then, the lead author reviewed the data and used systematic and inductive coding methods to make meaning of the participants' responses to interview questions (Saldaña, 2011). One of the codes that was developed through the coding process was termed Identity. After coding for identity-related quotes, the lead author created a set of categories to parse the data coded under Identity into smaller and more nuanced classifications. One category, African/Cultural Identity, was developed specifically to further illuminate how a Black African student identity shaped the ways in which interviewees reacted to observations and everyday occurrences in the United States. A second category revealed the ways in which individual identity among Black Americans and Black Africans may have elicited similar (or different) responses to situations that they faced, both on and off campus. After this initial categorization process, data were reanalyzed through racial and anthropological identity theoretical lenses.

Table B1 in Appendix B includes both major codes that were used to capture identity-related quotes, as well as the classification schema developed to further parse data into categories. The categories provided in this table were beneficial in that they allowed the researchers to both understand how each individual dealt with racialized experiences, and how or to what extent respondents adopted a racial consciousness in dealing with the larger society. Although Black Americans and Black Africans both spoke to these issues, the categories allowed the researchers to better understand the ways in which the two subgroups responded differently to situations that they faced.

To ensure that the data collection and analysis met the criteria for robust qualitative research, several steps were taken, which included sharing individual and group transcripts with the research participants (Tracy, 2010). In addition, analytic memos were recorded by the lead author, and codes and categories were reviewed by senior researchers. These senior researchers included three tenured, one tenure-track, and one research associate professor at the [Large Public University on the East Coast]. They acted solely in an advisory role and were therefore not part of the formal team that reviewed and analyzed the interview data. However, the research team for this study, which consisted of the lead and coauthors, engaged in several discussions about the data produced in the study. The team also revisited multiple pages of transcript material in order to verify the trustworthiness of the data. Although the lead author was responsible for facilitating and analyzing the interviews originally, the coauthors engaged in productive conversations about several of the quotes, at times challenging the interpretation and applicability of the information that was collected. The lead author's colleague, referenced in the previous section, did not have a role in formally analyzing data; however, his colleague was instrumental in helping the lead author to discuss aloud some of the emergent findings at the conclusion of the group interviews. Through these discussions, the lead author was able to better situate and make meaning of a number of the most salient outcomes. These steps helped establish *sincerity*, *credibility*, and *truth value*, which Tracy (2010) asserts are three fundamental components of robust qualitative research.

7. STUDENT VIGNETTES

Table C1 in Appendix C provides a brief overview of the five research participants described in this study. The first three participants listed are Black American students, while the last two participants are Black African students. Among other demographic components, the table indicates the ways in which participants self-identified in terms of their race as well as their ethnicity. We present five postassembled vignettes aimed at providing an in-depth exploration of each individual, their identities, and their experiences. All names are participant-selected pseudonyms.

7.1 Ben

Ben was born in 1994 to immigrant parents. His father, who is of African descent, emigrated from Trinidad and Tobago. His mother, who is White, emigrated from Finland.

Because he was raised in the United States and not in either of his parents' home countries, Ben was classified for the study as a Black American. Between his two parents, Ben said that it was his "dad [who] really...influence[d] [him] to go into STEM." He even went so far as to give Ben mathematics books when he was a young boy. By comparison, his mother was "kind of more...in the moment" and seemed not to particularly impact Ben's academic trajectory. Like all respondents, Ben was given the opportunity to self-report his race and ethnicity. He indicated that he was "Mixed Race" in his racial designation, and for ethnicity he wrote "Black/White." Ben reported on his demographic questionnaire that both of his parents have no formal education beyond high school, and he will likely be the first in his immediate family to earn a bachelor's degree.

Overt conversations at home concerning race while Ben was growing up seemed to be limited. As a child, Ben recalled:

> *Since my mom is White, blonde hair...and then my dad is from the Caribbean, which is Black, I don't think there was really anything for them to talk about [regarding race]. So my dad did occasionally...mention things like institutional racism every once in a while, but never out of a certain context.*

Despite the lack of discussions at home about race as a child, Ben admitted that he has "become more conscious of [race] as time has gone on." His emerging race consciousness was evident when he recounted being alarmed by the paucity of Blacks in chemical engineering, his specific engineering major. He also recalled feeling in one particular research internship that, "I shouldn't be the only Black person here. Like, we make up 13% of the population. There should be at least 13% of this group being Black." Although he reported being "Mixed Race" in the questionnaire, he referred to himself as Black during this part of the interview. This suggested that Ben's self-identity regarding race may change when in certain circumstances where he is identified by others as Black and in conversations about the underrepresentation of Blacks in his discipline.

Ben's cognizance of the disproportionately low number of Blacks seemed to be an important focal point for him. According to Ben:

> *So [my identity] kind of has motivated me in that...I saw that...the amount of Black chemical engineers is like three percent...I'm going to be the one to help it get to four percent or five percent.*

Thus, part of Ben's impetus for high achievement was borne out of his concern about the underrepresentation of Blacks in his specific discipline.

7.2 Goku

Goku was born in 1992 in the United States and identified his race as "African American/Black." Goku said that his mother, a single parent, "has played a big role." Un-

like most participants in the study, Goku did not mention knowing his father at all. In response to the question, "How do you identify in terms of your ethnicity?" he wrote "I have been told that I have African, Native American, and Caucasian ancestry." Like Ben, Goku saw his racial identity through the lens of disparities and prejudices that Black Americans have faced. Because of these prejudices, Goku felt compelled to succeed. Goku explained his desire to achieve in this way:

> *I always felt like African Americans weren't expected to excel in academics, and it was kind of expected. So I kind of liked to be an outlier, just...to stick it in people's faces. Like yeah, I can be smart as well.*

Goku was cognizant of negative stereotypes about Black Americans and verbalized his intention to move beyond what others may have expected of him. He referenced the idea that Blacks were often associated with excellence in athletics rather than academics:

> *I kind of thought it was like generalized that usually, Black people were good at athletic things...And one of those things that I kind of thought before going to EC was that all people thought that sometimes Black people weren't as smart because they were more athletic, so sometimes, I felt that that meant that I had to like prove myself because I was Black.*

Again, Goku's comments implied that his racial identity as a Black student was prominent as he progressed throughout his academic career. Additionally, his remarks suggested that he was very conscious of racial stereotypes as well as the underrepresentation of Blacks. While Ben addressed the need to increase the *number* of Black engineers, here Goku was alerted to both the lower numbers and limited *expectations* for Black students. He seemed to internalize these perceptions as motivation to continue in his pursuit of academic excellence.

7.3 Carter

Carter was born in 1987 in the United States. His mother, a Black American, holds a doctoral degree and his father, who is White, has earned a master's degree; both of his parents were also born in the United States. When prompted to indicate his race and ethnicity in the demographic questionnaire, Carter identified himself as "Multiracial," and as ethnically "Black, plus more." Carter suggested that his mother had a strong Black racial identity, due in part to experiences that she faced earlier on in life:

> *[My mother] grew up during the Civil Rights movement [in] education [with people] who are thinking...'The fact that you're here is too soon. It should have happened more naturally. Why are you in this space? Why are you asking these questions?'*

While both of Carter's parents were involved in his life, it was his mother who appeared to have the greater influence over his academic development. Carter further explained that because of the challenges that she faced during the Civil Rights era, "her scrutiny of the local education system turned out to be...extensive." Carter also said that she "pushed" him academically.

Despite his mother's perspective, which seemed to be influenced by her experiences as a person of color, in school Carter did not appear to internalize experiences built around a strong Black racial identity. Whereas both Ben and Goku seemed to be motivated to succeed in part because of their racial/ethnic identities, he said that being one of the few American students of color "was more of an observation that didn't have an impact." Moreover, Carter was interested in exploring dimensions that had more to do with the engineering profession than race. He explained, "I've sort of embraced the fact that I am more than just what my parents' heritage is...I…[identify] first and foremost as a materials engineering student."

Carter articulated a perspective that attempted to transcend racial/ethnic issues. This is not to say that Carter was oblivious to racial prejudice or any of the challenges that Ben and Goku noted. In fact, he also noted that "you're going to have certain experiences with authority...that may be different from your peers who happen to be a different skin color." He even alluded to experiences of "people...following [him] around the store," suggesting that it was because of being an Black that these encounters took place. However, his general comments indicated that while these challenges existed, he wanted to be able to define "aspects of [his] personality" that focused more on engineering than on race.

7.4 Oussou

Oussou was born in Niger, West Africa, in 1994 and is the younger of two children. His mother earned a bachelor's degree and his father earned a master's degree. While he spoke of his parents in less direct terms than previous interviewees, Oussou explained that his parents paid for him to receive tutoring in Niger.

Oussou said only that he is racially "Black" and ethnically "Zarma," a reference to a tribe indigenous to Niger and a small number of neighboring countries. He viewed his racial identity in a less significant way than the Black American students when it came to challenges that he might face, and added the following:

> *[Race/racism] didn't really matter for me at all. Like for me, everyone is the same so I don't really care...For me I think we're all the same so regardless of where you come from, your race..., your ethnicity, and everything.*

However, Oussou expressed that:

> *The [experience]...that was really frustrating for me was...my first semester at EC. I took an art class so when I came...I spoke English because I went to that Turkish school so we spoke English but...the accent was not like this accent.*

Whereas being viewed as a "Black" student did not appear to be salient for Oussou, what was "frustrating" to him was the challenge that he encountered as a result of his "accent." This suggests that Oussou may have encountered some level of ethnic or cultural bias due to cultural incongruence at EC. His encounter aligned with another comment related to language that he made during the interview, when he talked about "hang[ing] out with those that [spoke] French" in college. Indeed, he appeared to believe that it would be prudent for a prospective college student with limited English ability to first enroll at EC prior to enrolling in Tech:

> *So I would just tell the [prospective student] to come straight here [to Tech] if he can speak English. Otherwise, like if he's not good at it, I would just tell him to go to [EC] for a year or two.*

When he moved away from the subject of language, Oussou, like other respondents, acknowledged that racism and/or racial underrepresentation existed in the United States. He noted that part of his rationale for choosing to attend Tech College was that he heard about racism at another competitive engineering school:

> *I heard about the racism over [at another competitive school] so…last night a friend was telling me he...saw one person from my country who went there...it was really hard.... He even lost his mind because of the racism. They used to call him the dog of the school.*

Oussou's comments inferred that while he did not encounter racism personally, he believed that racism was a reality for other Black college students.

7.5 Titan

Titan was born in the United States in 1987, but he moved to his parents' home country of The Gambia, West Africa, when he was three years old. Because he spent nearly all of his childhood in The Gambia when his family returned there from the United States, he was classified as a Black African student. A first-generation college student, he explained that "[his] father has bragging rights, so failure was not an option." By comparison, he was less vocal about the impact of his mother upon his academic success.

Titan described his race as "Black/African American" and his ethnicity as "African." "Even though [he] was born in the United States," Titan said that when people ask him, he says, "I'm from Gambia." Yet although he had more of an African or Gambian ethnic identity, Titan did allude to the impact of having to endure many of the same challenges that Black Americans face in the United States. As an example, Titan referenced an occasion in a public setting that appeared to have undercurrents of racism:

> *In 2009...I was taking the public...bus...and there was an old lady sitting in one of the seats and I just sat next to her. And then she just looked at me and then*

stood up…but I didn't really care about it...It…never affected me. It's just a story I just...laugh about.

Like Carter, Titan was able to describe perceived racist or prejudicial actions that he faced. However, also like Carter, Titan did not appear to fully ascribe others' race-based treatment of him to his own racial identity. In other words, another person's negative treatment of Titan did not seem to cause him to become emboldened as a "Black" person in the racialized context of the United States. His self-perception as African or Gambian generally appeared much more salient than these other labels or dimensions.

8. ANALYSIS

The sections below unpack participants' self-identities described above through the lenses of the extant literature. We revisit the three groups described in the *Populations of Interest* section and attempt to make meaning of the ways in which respondents' comments aligned with or diverged from each other and from the findings of previous studies. Once again, we describe Black American and Black African identities in distinct ways and note that Black biracial American students are in effect a subset of Black Americans for the purposes of this paper. Thus, the identities of Ben and Carter are described first in terms of their Black American student identities, and second, in terms of experiences directly related to biracial student identity.

8.1 Analysis by Population of Interest

8.1.1 Black Americans

Each of the Black American men seemed to acknowledge society's categorization of them as Black students, although the salience of their racialized identities varied considerably. Likewise, although each respondent contended with and responded to societal constraints imposed upon Black Americans, each worked to subvert these constraints in their own ways. For example, while Ben said that race was not a major topic at home, he became more conscious of his Black identity in the context of the underrepresentation of Blacks in his EC classes. Goku viewed his ethnicity as a combination of "African, Native American, and Caucasian ancestry," however, he was particularly concerned with the perception that "Black people weren't as smart." Although Carter described certain experiences that would be "different" because of one's "skin color," he hoped to develop an identity focused more on the engineering profession than on race.

Ben and Goku's "Blackness" seemed to be especially piqued when they observed either the underrepresentation or negative stereotyping of Black students. Ben's narrative, in particular, appeared to closely coincide with Cross's (1971) Nigrescence model, as well as with Cross and Phagen-Smith's (2001) more modern conceptualization of the evolving significance of race. Whereas early on in life it seemed as though Ben was not especially focused on challenges that Blacks faced, he seemed to adopt more of a Black

identity in response to who he did—or did not—see in his courses. Goku seemed to be driven by the same "prove them all wrong" type of impetus that drove minority students in McGee and Martin's (2011) work to be successful.

By contrast, Carter seemed less prone to consider his Black identity at school but spoke more freely about his mother facing racial prejudice during her earlier years. These comments suggested that each student's need to identify as Black at EC may have been different. For Carter, it may be that he understood what being Black meant, yet he may have preferred to view race in a limited historical context than to make it part of his primary identity. Race appeared to be a domain into which Carter did not want to be constrained, while engineering offered him a different and more appealing space.

Perhaps more than any other participant, Carter's comments reveal the tension between racialized experience and racial identity formation. Although Cross's (1971) Nigrescence model would suggest that strong racial identities form out of a political contestation of an oppressive racial reality, Carter acknowledges that reality while resisting taking up a strong racial identity. This duality is more appropriately explained by Cross and Phagen-Smith's (2001) research, which acknowledges children who clearly understand the implications of Blackness in the United States but who may nonetheless choose to identify with more of a cross section (not exclusively Black) of society. Carter's identity as an engineering student was more salient for him, and so his comments tend to align more closely with those from the identity literature in engineering education (Stevens et al., 2008). Thus, developing an engineering identity may be in tension with developing or maintaining a Black student identity for Carter. Although heretofore racial identity theories and engineering identity theory have typically occupied separate and distinct spaces, our analysis reveals the power of combining both theories to unpack the tension that students like Carter may experience.

Indeed, engineering identity is usually assumed to be representative of the totality of students. As such, very little consideration has been given to students' lived realities of having multiple salient identities and their resulting challenges and tensions. Future studies can further explore the impact of racialized or postracial identities on undergraduate engineering careers.

8.1.2 Black Biracial Americans

Carter and Ben, who each had one Black and one White parent, made more references to the positive impact that their Black parent provided during the interviews than their White parent. However, it is noteworthy that their self-identities seem to diverge. While Carter seemed to prefer an engineering identity to a racial identity, Ben was "motivated" in engineering by being "Black." Bratter and Heard's (2009) work on racial classifications among mixed-race adolescents suggests that biracial men will be more likely to develop the racial identity of their *father*. Bratter and Heard's opine that this is especially true if a father is more involved in his son's life. This may help to explain the reason that Ben, who has a Black father who "influence[d] him," seemed to adopt a stronger Black identity in his academic development than did Carter, who has a Black mother.

To some degree, Ben's comments also coincide with Renn's (2008) multiple identity framework, which posits that Black students may adopt different identities depending on the context in which they find themselves. For example, Ben identified as "Mixed Race" but later explained that he was concerned about the paltry numbers of Black chemical engineering students. Taken together, Ben's responses in both the demographic questionnaire and interview suggest that while he acknowledges his mixed-race background, the way he chooses to self-identify regarding race may change when he is engaged in conversations about, or in settings defined by, academic racial representation.

8.1.3 Black Africans

Black African respondents spoke more about their cultural or ethnic identities as children raised in an African context than their racial identities as Black students. Compared to their Black American counterparts, they almost never brought up the subject of race. Titan was unconcerned when recalling the one time in which he felt treated unfairly in the United States because he was Black, saying that he just "laugh[ed] about it." Additionally, Oussou seemed to be similarly unperturbed about an EC teacher who he suggested treated him differently and focused on the overall positive experiences that he had at the school.

Their statements converge with those of Reed et al. (2010), who acknowledge "tensions" as "African immigrants struggle to be recognized as not just 'African American' or 'Black'" (p. 1). In an article that addressed identity among Black students, Mwangi (2014) similarly asserted that Black Africans may view race as less crucial than their national or cultural identities. Their comments also echo Fries-Britt and colleagues' (2014b) findings on undergraduates who pursued physics degrees. Foreign-born Black students interviewed in the aforementioned study saw their identities through a cultural lens that was connected to their home countries. Fries-Britt and colleagues (2014b) posit that Black students from other countries may eventually adapt to a United States racialized context. However, they add that their awareness of their *de facto* Black American identities may take a period of time to fully realize. This suggests that among Black Africans in this study, their identities may evolve in the years that follow their time at Eastern College.

As an extension of the theory, intersectionality may also be applicable for revealing shared experiences of Black Africans in the United States. While developing more of an awareness of their de facto Black classifications (Kibour, 2001), students like Oussou may silently struggle with pervasive stereotypes that they face as international students. To the degree that African students are perceived negatively either because of their accents or other factors that are faced by many international students, they are in effect negotiating two systems of oppression: (1) racial oppression in a U.S. context and (2) cultural bias directed toward groups of immigrants that do not reflect Euro-normative characteristics. Furthermore, although the two Black African men in the study did not allude to hardships in their home countries, other Black African undergraduates in American engineering colleges may be negotiating a third oppressive factor—the vestiges of

European colonialism directed toward many sub-Saharan African countries. As numerous scholars have explained, this factor has had a great deal to do with health, economic, and other maladies facing much of the African continent. Likewise, other aspects of relative socioeconomic and family educational privilege may characterize many of the Black African students with respect to Black American students. An example of such privilege could be Oussou's access to tutors that his family was able to provide him. In conceiving of students' experiences via intersectionality, we uncover the complex combinations of multiple axes of privilege and oppression which create unique challenges and resources to overcome obstacles.

9. CONCLUSION

9.1 Racial Identity Formation in Cultural Worlds

At times in the educational or psychological research literature, racial identity is conceived of as living inside the body and self in a relatively static way (Martin, 2009b). Racial identity is conceptualized as a stable inward sense which is expressed outward and shapes one's experience. Anthropological approaches to identity often emphasize the embodied enactment of identity and the impact of context and culture on the constraints within which identity is formed and expressed (Skinner and Holland, 1998). Many of the participants' narratives resist unidirectionality and reveal processes of ongoing racial identity formation and contextual identity shifts. For example, when telling of what might be a simple fixed identity as mixed race, Ben begins by telling a story of his relationship with his parents (one White, one Black). He then qualifies his origin story and identity as mixed race by revealing the contexts in which interactions socially positioned him with respect to broad cultural narratives of race in STEM. Ben's engagement with these narratives seemed to foster a strong positive racial identity for him as a self-perceived Black person. His perceived identity was further strengthened by his social interactions in academic spheres. Each of the students expressed a similarly complex story: racial identity as a stable sense of self that is perennially shaped and shifted by social experience.

Racial identity, as all identity expressions, is not an arbitrary or flippant statement of self. For one's racial identity to be meaningful it inevitably contends with and responds to a "figured world" and context of race, which makes the identity meaningful. Thus, racial identity in the United States can never be completely separated from histories and current realities of racism in the United States (Omi and Winant, 2015; Painter, 2010; Bonilla-Silva, 1997). We see this particularly in what is uniting the identity formation narratives of Ben, Goku, and Carter; each participant acknowledged being positioned as Black within racist narratives and racialized lived realities (e.g., of underrepresentation in STEM, of being racially profiled). Ben and Goku appear to respond to this marginalization with a strengthened Black racial identity. Carter, by contrast, appears to embrace a postracial engineering disciplinary identity rather than a strong racial identity. Yet, in acknowledging the racist narratives that he wishes to resist, Carter ironically reveals all

the more that the engineering discipline is not, in fact, postracial. It seems it is not the *irrelevance* of a Black racial identity in engineering that Carter resists but its *danger* if one is identified in these ways. This disavowal contrasts with those coming from students with relative racial privilege for whom racial identity is more truly irrelevant and unacknowledged; individuals with this privilege have often not had to think about their identities in engineering classrooms.

Black African students like Titan and Oussou seem to share less firm racial identities, less weariness with and firmness in acknowledging U.S. racism, more African cultural and ethnic affinities (i.e., Kibour's dual imbroglio theory), and more likelihood to draw on colorblind meritocracy and the idea of succeeding at the American Dream. One can also sense a growing experience with racist interactions, racial narratives, and other U.S. racial realities. Sometimes a racist experience is acknowledged but dismissed as it was for Titan, and sometimes a fellow peer's experiences of overt racial prejudice adds caution to one's optimism as it did for Oussou. With further longitudinal data we might sense an unfortunate learning curve for Black African participants gaining experience with U.S. racial oppression in an elaboration of or an alternative progression to Cross's Nigrescence model. At present, our ability to articulate this type of progression is speculative at best, since Cross (1971) and Cross and Phagen-Smith's (2001) conceptualizations do not explicitly attend to Black immigrants' racialized encounters in the United States. These earlier conceptualizations understandably—in historical context—tended to be appropriated toward only Black Americans. However, more recent work by Fries-Britt and colleagues (2014b) at least offers that with repeated racial encounters or incidents, Black immigrant college students begin to consider "their own positioning within a U.S. racial context" (p. 9).

If societal experience with racism is conceived of as a learning curve, it might suggest that Oussou and Titan will at some point grow in resolve in their racial identities. The models of Carter on the one hand and Ben and Goku on the other could represent possible responses in racial identification, either resisting or embracing association with a Black identity. Although student identity development may take certain respective courses, it seems unlikely that we can or should conceive of some identification as more valuable than others. While participants like Carter who embrace postraciality may undermine their claims to disciplinary colorblindness with their resolve, these identities are nonetheless individually formed, deeply felt, and authentically lived. It seems more important to meet students like Carter, Ben, Goku, Oussou, and Titan where they are in terms of their chosen identities and lived experiences, as this study attempts to do. We conclude by noting further challenges for scholars and practitioners concerned with underrepresentation in engineering yet accounting for these divergent identifications and experiences.

9.2 Implications for Policy and Practice

Given the broad ways in which Black students in engineering and other majors may self-identify, our work suggests that existing and future campus outreach initiatives may need to be revisited. If students like Carter, for example, are more concerned with devel-

oping an engineering identity than an identity that contextualizes the field of engineering through the lens of race, then college/university programming may need to be created or at least amended. An undergraduate like Carter may experience and even recognize racial marginalization in coursework and in other encounters, but that same student may not feel an affinity for, or strongly identify with, a racial affinity group aimed at providing him support. An earlier study of the same participants, conducted by the lead author, revealed that Carter was not drawn to National Society of Black Engineers (NSBE) because it seemed to be more of a racial affinity group than an engineering-discipline affinity group (Berhane, 2017). In this Catch-22 situation, Black students like Carter may feel most supported joining an engineering discipline–specific organization like the American Chemical Society rather than an organization specifically focused on supporting Black engineering students.

On the other hand, students like Oussou and Titan may not often find programming which resonates with their experiences as Africans living in the United States. Moreover, their collective experiences may be distinct enough that it is impossible to make support programs specific to their individual experiences, or else they might all fracture into an infinite regress of intersections and "small n" demographics (Secules et al., 2018). This reinforces George Mwangi et al. (2016) and Porter et al.'s (2018) assertions about the need for new strategies in programming which do not assume a monolithic set of Black students in order to begin having supportive conversations and building relationships. Conversations across identity groups (e.g., men/women, biracial/monoracial, Black American/Black African) would seem critical to developing support programs that engage a broad cross section of students (Sorensen et al., 2009), such as the undergraduates in this study.

At the same time, not every student may be inclined to take advantage of programs that represent a myriad of cultural and ethnic backgrounds. The aforementioned earlier study by the lead author also found that while Goku and Ben tended to develop this cross section of peer associations (including both Black African and Black American undergraduates), Oussou and Titan generally socialized with students who, like them, were from African countries (Berhane, 2017). Berhane's (2017) study established that Black American students' peer networks tended to be much more heterogeneous, while Black African students' networks were more homogenous. These networks seemed to mirror the ways in which participants self-identified: Goku, who is of "African, Native American, and Caucasian ancestry," had a multiethnic set of peers, while Titan, who described his ethnicity only as "African," typically engaged with other Black Africans on campus.

In fact, extant scholarship reveals that more heterogeneous peer associations can have a positive impact on Black undergraduates who plan to transfer from community colleges. In his study of over 9,000 prospective Black men transfers, Wood and Palmer (2013) noted that "exposure to diversity greatly increased [Black men] students' odds of being 'very likely' to transfer" (p. 282). This suggests that, at least in larger datasets, students who are more aligned with Goku and Ben's orientation for racial and ethnic diversity in their peer groups may generally be more prone to transfer than those who do not have this type of orientation. Yet, Younger's (2009) study of Black collegians who had already transferred revealed that "transfer trump[ed] race," meaning that the

significance of being a transfer student was perceived by her informants as of greater consequence than being a student of color (p. 97). Interestingly, for all five respondents in this study, being an engineering student at times appeared just as, if not more, important to them than their racial identity. Whether their identities as engineering *transfers* were particularly salient was not clear from the results of this work. More work would be needed to ascertain the ways that an engineering identity relates to a transfer identity.

Across community colleges and four-year engineering schools, faculty, administrators, and other staff should be trained on the meaning of students' racial identities and engineering identities. Practitioners should be aware of the salience of all three of these identities, as well as other identities that were not investigated in this article (e.g., transfer, gender, sexual orientation, language). In the case of Black engineering undergraduates, advisors and other campus administrators should be encouraged to direct students to a broad array of campus-sponsored organizations that reflect multiple identities. Quite often, new transfers encounter "transfer shock" when they transition to four-year schools (Hills, 1965). Transfer shock may be especially acute when undergraduates are disengaged from the broader campus community in general and when they do not find organizations that are consistent with ways in which they view themselves. Rather than assume that Black engineering transfers will find their way to the National Society of Black Engineers, the American Chemical Society, or laboratories in which they can conduct cutting-edge research, sending and receiving institutions should partner to proactively share with students the full scope of campus offerings. Furthermore, campus leaders should collaborate to discuss institutional climate differences from one school to another and how one or more of undergraduates' several identities may be more salient at one college/university than another. For example, in a majority-minority community college with a large percentage of Black immigrants, racial identity may be less pronounced—and language or ethnic identity more pronounced—than in a predominately White four-year engineering school.

Given these findings, campus-sponsored programs should consider providing students with the agency to develop their own affinity spaces that most closely align with their values, identities, and experiences. Nonetheless, it is critical that campus administrators promote dialogue between and across identity groups (Sorensen et al., 2009), which will encourage collegians to be able to see each other as allies and partners. Such a dialogue may mitigate the tendency for people groups to entirely insulate themselves based on their common affinities. Engineering undergraduates from multiple backgrounds—in this case, undergraduates from across the African diaspora—should be encouraged to appreciate the value of within-group diversity and how that diversity can enhance their own sense of identity.

9.3 Implications for Research

This paper demonstrates the utility of identity-focused research while also revealing some of its limitations. We affirm that all dimensions of student identity are important and worthy of research and yet understand that these dimensions are numerous and complex. Acknowledging this difficulty, we offer several directions for future work in

this area, particularly as it relates to Black and other underrepresented racial and ethnic minorities (URMs).

Within the context of engineering education research, racial identity work has been an underexplored topic. More often, engineering identity as separate from racial identity has dominated the scholarly discourse. This focus may result from the reality that majority students do not necessarily feel the need to navigate multiple identity arenas, chiefly because their culture and historical contexts are considered normative in U.S. STEM disciplines (e.g., White, men, middle class). By contrast, URM students whose cultures and identities do not neatly align with those of majority engineering faculty, students, and professionals may benefit from exploring the tensions between multiple salient personal and disciplinary identities.

Additionally, this work has particular implications for studies involving Black Africans who study in the United States. A future investigation that queries the Black African students in this article about perceptions of race *after* transferring might provide different insights into how they view their Blackness. Furthermore, a longitudinal study that explores the evolution of racial identity—from postsecondary school to the engineering workforce—might also demonstrate the shifting significance of race.

For the most part, racial identity research tends not to explore the complex bidirectionality of identity formation and identity expression. Students "learn" that they are Black in the United States, which shapes their actions and social groupings, thereby strengthening their sense of identity, and so on (Fries-Britt et al., 2014b). Further work exploring these complexities can help us assess and relate to the moving target of multiple identity salience in Black engineering students' lives. How can institutions and researchers engage students' senses of racial identity when they are always changing, developing, and shifting with context? When racial identity work is employed to unpack engineering identity formation, it can allow for a fuller exploration of how Black students develop their sense of identity in engineering disciplines. This article and associated future work can extend our understanding of what it means to "learn" to be Black in a White and Asian-dominated field like engineering. More broadly, it can add to our conceptualization of what it means to "learn" to be Black in the United States, as well as in a global context.

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APPENDIX A

TABLE A1: Selected demographic questionnaireprompts used in research study

Question Number	Prompt
A	Please list the country in which you were born.
B	If you were born outside of the United States, please indicate your age when you moved to the U.S.
C	How do you identify in terms of your race?
D	How do you identify in terms of your ethnicity?

TABLE A2: Selected questions asked during individual interviews

Question Number	Prompt
A	How has your cultural, ethnic, racial, family, or social identity impacted your education?
B	How has your self-identity changed in the different countries or communities in which you have lived, if at all? How has/have that/those identity/-ies impacted your educational experience, if at all?
C	How has your identity changed, if at all, since deciding to pursue engineering? How has that changed before and after your time in college? For example, do you see yourself more aligned culturally or socially with members of your home country, native language, Black Americans, other Americans, students in general, etc.?
D	Do you identify or have you identified with any particular groups or communities on campus? Do you identify with any particular groups or communities off campus? If so, please explain whether those groups are the same or, if they are different, how they differ?

APPENDIX B

TABLE B1: Qualitative data categories related to identity and sample quotes

Code	Category	Sample Quote
Identity	Experiences with race and ethnicity	"I always felt like African Americans weren't expected to excel in academics, and it was kind of expected. So I kind of liked to be an outlier, just like to stick it in people's faces. Like yeah, I can be smart as well." *Goku, Black American Student*
Identity	African/cultural identity	"The entire upbringing that we have is different from the upbringing that some people have, let's say, for example. For example, the upbringing of a single parent will be different from an upbringing of someone with two parents and the upbringing of someone who grew up in like in Africa will be different from someone who grew up in the United States." *Titan, Black African Student*

APPENDIX C

TABLE C1: Summary of participants

Name (Pseudonym)	Race (self-identified)	Ethnicity (self-identified)	Year of Birth	Country of Origin
Ben	Mixed Race	Black/White	1994	U.S.
Carter	Multiracial	Black, plus more	1987	U.S.
Goku	African American/Black	I have been told that I have African, Native American, and Caucasian ancestry	1992	U.S.
Oussou	Black	Zarma	1994	Niger
Titan	Black/African American	African	1987	The Gambia