

## **Race, Veteran, and Engineering Identities among Black Male Student Veterans**

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## Abstract

Using interviews with seven Black Student Veterans in Engineering (BSVEs) at three predominantly White institutions (PWIs), we explore how the identities of Black, Male, Veteran, and Engineering student are enacted during their undergraduate engineering experience. We approach this study informed by multiple dimensions of identity using an intersectional lens to answer three research questions: 1) Why did BSVEs join the military? 2) Why did BSVEs choose engineering? and 3) How do BSVEs enact their veteran, engineering, and racial identities while in school? We find that family influences, a desire to be part of something bigger than themselves, and economics were factors in BSVEs' decision to join the military. Technical jobs in the military that often included exposure to engineers and engineering problems led them to the belief that as engineers, they would be able to solve many of the problems they faced while maintaining military hardware. All seven BSVEs claimed that their military and engineering identities were central, or nearly so, to their core identity. Of the five who mentioned racial identity, all indicated that it was central to their core being, often intersecting with their male identity to an inseparable identity as Black Males.

## Introduction

Emerging research has begun to explore the experiences of Black students and Black men in particular in engineering [1] - [5]. Other research explores the experiences of student veterans in engineering [6] - [13]. This work brings together these perspectives and examines the experiences of those whose voices have not been heard in engineering education research: Black male student veterans in engineering (BSVEs). This paper explores the reasons that BSVEs chose to serve in the military, enroll in an engineering discipline concurrent with or following their service, and how their identities as Black, male, veterans, and engineering students intersect.

We approach this work using an intersectional lens, informed by multiple dimensions of identity to answer three research questions.

1. Why did BSVEs join the military?
2. Why did BSVEs choose engineering?
3. How do BSVEs enact their veteran, engineering, and racial identities while in college?

Our seven interviewees were all men. Although they are in the gender majority of engineering students, they are ethnic minorities and non-traditional students as veterans who are also generally older than typical college-aged students. These seven students served in the four major branches of the military on active duty as well as the National Guard and Reserves. All participants were attending Predominantly White Institutions (PWIs).

## Literature Review

In this literature review, we discuss briefly Black students in engineering at PWIs as well as Student Veterans in Engineering (SVEs) to frame our study.

### *Black Students in Engineering in Predominantly White Institutions*

While the percentage of non-White enrollment in undergraduate engineering has increased over the years [14], [15], most of this gain has come from Hispanic, Asian-American, and foreign students, while the proportion of Black students has been steadily declining over the last 10 years to under 4% [15], [16]. Furthermore, in 2013 Black males represented only 4.7% of all male enrollment in engineering [16]. In the 2012-13 academic year, over 80% of all bachelor's degrees in engineering awarded to Black students were conferred by PWIs. Of these, 416 were in mechanical engineering, 432 in electrical engineering and 52 in aerospace engineering [17, p. 100].

Slaton chronicles the history and continuing legacy of racism against Black students in engineering [18]. Black students at PWIs face the particular challenge of being under represented on campus and in their classes, which can lead to stress, lower grades, isolation, and exhaustion [19]- [22]. Students in Fries-Britt and Turner's study describe feelings of isolation and exhaustion based on the need to educate their White peers or to represent the Black experience. The participants attribute this not to hostility from their White peers, but to a "limited perception of Blacks" amongst their White peers [20, p. 325].

Long, Kitchen, and Henderson describe the successes of "Black Male Buoyant Believers" in engineering [2]. McGee and Martin [21] found that those students who are academically successful in this environment have learned to manage stereotypes attributed to them through demonstrating their intellectual aptitude, although the constant need to do so causes them a high level of stress. Black male students, in particular, felt particularly challenged by societal stereotypes and negative stigma leading them to fail to get the academic assistance they may need. In many cases they responded by choosing to give back to the Black community through careers in teaching and other efforts to be good role models for future generations of learners. McGee and Martin call for additional studies of how Black students simultaneously construct their disciplinary and racial identities, and suggest that future research to explore multiple identities such as race, gender, and class, with their disciplinary identities to better understand how students manage stereotypes [21, p. 1379].

### *Student Veterans in Engineering*

Due to the drawdown of military forces from the wars in Iraq and Afghanistan as well as enhanced GI Bill benefits, the number of student veterans on campus is expected to increase to the largest number since the end of the Vietnam era. The Post 9/11 GI Bill provides the most generous educational benefits since the original GI Bill following World War II [23]. This, coupled with new laws that require state institutions to offer in-state tuition to all service members and veterans [24] as well as Yellow Ribbon benefits that help offset the total cost of attendance for veterans at public and private institutions [25], means that many have more

opportunity to pursue higher education than at any time since the late 1940s and 1950s. Although veterans have not previously been strongly encouraged to go into engineering undergraduate programs, recent research suggests that they may be well-suited to pursue engineering degrees. According to the NSF Workshop on Enhancing Post-9/11 Veterans Educational Benefit, the veteran population holds great promise for expanding and diversifying the engineering and sciences workforce [26].

It is important for researchers to investigate how student veteran experiences may differ based on various sociodemographic characteristics, such as gender, race, or first-generation status. For example, prior research on the GI Bill found systematic differences in how Whites and Blacks benefitted from the GI Bill, especially in the late 1940's [27] and during the tumultuous years after the Vietnam War [28]. Peters' [29] qualitative study of six Black student veterans found that the "veteran" status often protected them from the disadvantages that accompanied their status as Black men. These students also expressed that their military service had a transformative impact on their life course. Jenner [22] discusses the overlap between being a veteran and being a minority and encourages the integration of scholarship on student veterans and on under-represented minority students. Our study aims to add to this literature on the experience of Black student veterans, with a particular focus on BSVEs.

Our prior research on veteran subpopulations and identity has shown that for First Generation Student Veterans in Engineering (FGSVEs) military and engineering identities were more central to their current experiences than their first-generation status [30]. The decision to pursue engineering was primarily to pursue a career that offers financial stability [12]. For women Student Veterans in Engineering (WSVEs), we found that the decision to pursue engineering was often related to their military job and that their military experiences supported their academic experiences. These women also did not generally mention their gender identity as being central to their experiences [31].

The pool of students who are Black, veterans, and studying engineering is small. Cate and Davis reported that eight percent of student veterans are African-American and of these, eight percent were studying engineering; 90% were former enlisted personnel [32], [33]. We were fortunate to be able to interview seven of them. Our work responds to the calls by McGee and Martin [21], Lim et al. [10], and Jenner [22] to study race, gender, engineering, and veteran identities together and contributes to this literature by focusing on BSVEs, their experiences, and their identities as enacted in engineering education.

## **Interview Methods and Data Analysis**

Seven BSVEs were interviewed as part of a larger study of 60 student veterans in engineering at four institutions throughout the USA. All study participants volunteered to be interviewed in response to invitations by campus personnel who work with veterans, social media posts, and flyers posted on campus. All SVE volunteers of color (including Hispanic and Asian SVEs) were selected to be interviewed, subject to schedule compatibility, and the seven who identified as Black or African American are the subjects of this study. We used a semi-structured interview protocol, which allowed for consistency of questions across sites and interviewers, but also allowed the interviewers to probe questions of identity and experience in depth. Interviews took

place in the Spring and Fall of 2016. One student was interviewed during the pilot phase of the study and provided some additional information in a follow-up interview after all other interviews had been completed.

The perspectives of the authors are shaped by their position as researchers and academicians; none of us are veterans. Catherine Brawner is a White woman with 25 years of qualitative research experience. She is a professional researcher specializing in engineering and computer science education. Susan Lord and Catherine Mobley are also White women who are full professors of electrical engineering and sociology respectively. Michelle Camacho is Latina and a full professor of sociology and Joyce Main is Filipina and an assistant professor of engineering education. All of the authors have extensive experience in engineering education research. The research team was advised by an external advisory board consisting of a retired U. S. Marine Corps General, a retired U. S. Marine Corps Colonel, two formerly enlisted student veterans in engineering, and two White women who regularly conduct research about veteran students.

During the interviews, participants were asked about their reasons for joining the military, their reasons for choosing engineering in general as well as their major, and how their military experiences have shaped their experiences as engineering students. In addition, participants completed an identity circle exercise in which they were asked to place various identities on three concentric rings around their “core” self; closer rings represented more central identities than rings farther out [34]. They were provided with prompts as shown on Table 1 and were invited to add any additional identities to their circles that they felt were appropriate. As part of this process, participants were asked to elaborate on the reason they chose certain identities and their placement relative to their core self. More information about the identity circles’ development and use can be found in Mobley et al. [34].

Participants’ placement and discussions of their identities revealed the potentially overlapping nature of the various identities and their relative salience to the BSVEs’ experiences. For this paper, we focus on the relative importance of race, ethnicity, engineering identity, and military identity, although our respondents also chose other identities in their circles.

**Table 1.** Identities Provided to Participants as Prompts for the Identity Circle

<b>Self</b>	<b>At home</b>	<b>Student/worker</b>	<b>Service-related</b>
Gender	Spouse/partner	Engineering student (general)	Veteran in general
Race/ethnicity	Parent	Engineering student (Major _____)	Veteran: specific branch (Branch: ____)
Socioeconomic class (SES)	Caregiver	Transfer Student	Combat Veteran
Sexual orientation	Single	First-generation student	Reservist
Age	Family	Employee	Disability
Religion		Volunteer	

All interviews were transcribed and verified by the research team. To summarize each student’s experiences holistically, we began by writing an episode profile for each interview, highlighting

key points and illustrative quotes [35]. Our three-step coding process followed the guidelines of Strauss and Corbin [36]. A final round of review and coding involved identifying passages related to identity enactment that were not directly in response to the interview questions about the identity circle. Quotes used here have been modified slightly for readability.

### *Sample description*

The seven BSVEs attended three of the four study institutions and ranged in age from 21 years old to late-40's. They had served in the four main branches of the military, including the National Guard and Reserves, all in the enlisted ranks at the non-commissioned officer level (E4-E6) and had served from fewer than five years to more than 20. Demographic information about the study participants is shown in Table 2. To preserve each students' anonymity, they are referred to here by a school code (A, B, C) and interview number. We use the terms "Black" and "African-American" interchangeably.

Table 2. Demographic profile of respondents

<b>ID</b>	<b>Branch</b>	<b>Years of Service</b>	<b>Age (years)</b>	<b>Major</b>	<b>Military job</b>
A15	Air Force Reserves	<=5	29	ME	Jet engine mechanic
B10	Marine Corps	11-15	34	ME	Ejection seat mechanic
B12	Air Force Reserves	<=5	21	AE	KC-135 crew chief
B16	Army + National Guard	6-10	29	ME	Bradley mechanic
C1	Navy	<=5	37	EE	Nuclear tech
C4	Navy	20+	mid 40's	EE	Sonar tech
C10	Army + Reserves	11-15	late 40's	EE	Light wheeled mechanic

Note: veterans were asked their age up to 34; ages older than that were revealed during or inferred from the interviews. ME = mechanical engineering; AE = aerospace engineering; EE = electrical engineering

## **Findings**

### *Reasons for Joining the Service*

Five participants indicated that a family history of service motivated their decision to join the military. B10's mother served in the Army to escape poverty; B12's brother-in-law's graduation from Army Officer Candidate School showed him the camaraderie of the military as he "loved the feeling of being part of something, being part of a family"; B16's grandfather was a high ranking Air Force officer; C10's father served in the Naval Reserves; and A15 has "a lot of family, my granddad, great granddad, great uncles, a lot of cousins, a couple of uncles as well, who were in the military." There were other important motivating factors, however, beyond simply the pull of these familial relationships. B16 wanted to serve his country and needed "to do something better than myself," though he did not feel the need to fill his grandfather's shoes. B10 had been exploring the military as an option to pay for college, but credits the events of 9/11 as the "tipping point" for his decision to join the Marine Corps. Economics likewise were the primary motivation for C10 to join the Army at the age of 29 on the advice of his father, a Navy Reservist, and due to his lack of a college degree. C10 completed his contract in 2000 but returned to the Reserves eight years later as a result of the Great Recession.

While B10 joined the service in order to go to college and B12 joined the Reserves to both serve and go to college, A15 and C4 enlisted in the military because they simply did not want to be in school anymore. A15 had always “wanted to do the military thing,” perhaps due to his family’s long history of service, and decided to join the Air Force.

### *Reasons for Choosing Engineering*

All seven of these BSVEs had technical jobs in the service. Three worked on aircraft, two on wheeled vehicles, one maintained nuclear submarine engines, and one was a sonar technician. These hands-on experiences often allowed them to interact with engineers and gave them a desire to find ways to solve the problems that they encountered.

Some chose engineering because of their technical experience in the military. B10 regularly interacted with engineers when certain problems couldn’t be fixed because “they’re the ones that built this thing, they’re the ones that designed it and built it” which led him to believe “that’s really cool; I can do that.” C1 had learned about engineering related topics during his nuclear training and liked the engineering pathway, but when he realized that he “wanted to move up,” he discovered that “the technicians have a glass ceiling.” Thus, when he finished his contract with the Navy, he chose to go back to school to study engineering. Others, like B12, “picked my career field for my degree because I was wanting to do aerospace engineering, so I picked being a Crew Chief.”

The first-hand knowledge of how various systems and equipment worked and often failed to work meant that solving problems and designing the equipment better, both to prevent failure and for maintenance, was a big motivator for some of these veterans. For B10:

There was so many times that we were working on something, or we’re trying to troubleshoot or fix something, or we’re trying to put something together or take something apart, and you spend man-hours, upon man-hours, upon man-hours trying to accomplish this task and you’re like why is it like this, you know? Or, you need to consult the engineers in order to accomplish the task and it’s just like, “Well, I think I can do a better job.”

The opportunity to solve problems similarly motivated B16, whose sergeant major gave him 48 hours to decide what he wanted to do with his life. He chose mechanical engineering because he

wasn’t content with things being messed up and so I always just wanted to fix it, right because you shouldn’t have to deal with crappy things. If there’s something that you can do about it, then do it. And this is me doing that something about it.

C4 became a sonar tech because he loved fixing things, but he became an engineer because he was exposed to technicians “on the civilian side” who made him want to “see if we can do a better job making some of that equipment....Right when I decided to go into engineering, it was because I wanted to create something better.”



Another student (C10) described all the factors interacting “like a soup” in his decision to pursue engineering.

They all play a major impact in my desire to go back to school and earn my engineering degree. The economy, the technical advancements, my desire to work in that field and enjoying working in engineering, solving problems, troubleshooting, working in a team, it all [plays] a significant role.

### *Intersecting Identities of BSVEs*

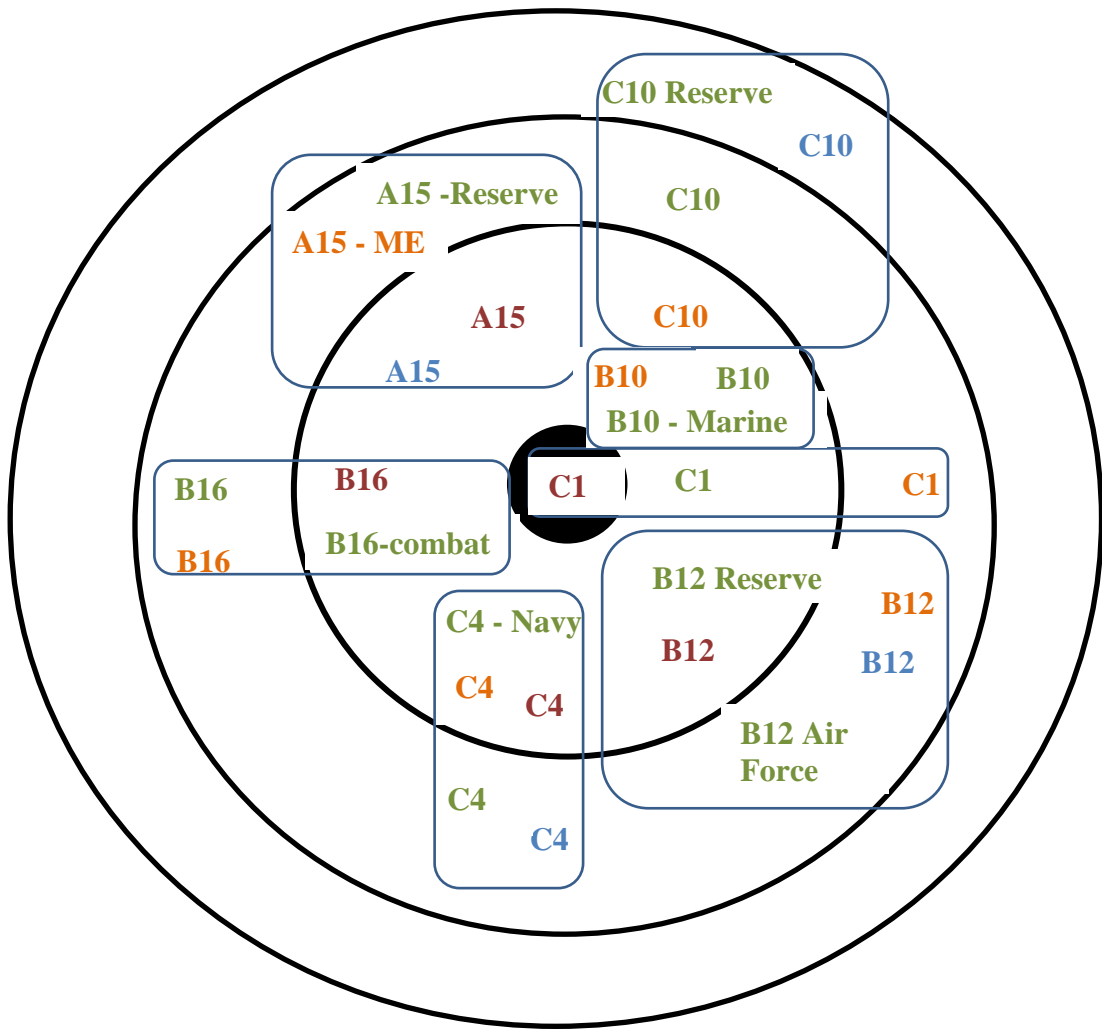
Figure 1 on the next page is a composite of the identity circle responses regarding Race/ethnicity, Gender, Veteran, and Engineering student identities for the seven BSVEs. Of these, both military and engineering identity were included on the identity circle by all seven. In fact, their military-veteran identity was enacted 12 times as they distinguished between their branch of service, combat experience, Reserves, and simply “veteran.” Where race was included, as it was for five of the BSVEs, it was always inside the first ring whereas gender was included only on four. We turn now to the stories that these students shared about their military, engineering, race, and gender identities.

#### Military identity. “*I want to be a part of something bigger than myself*” (B12 (also B16))

Although the military identity was most frequently selected by participants for placement into the identity circle, it was the least discussed of this set of identities. Six of the 12 placements of military identity were in the center ring. For B10, both his general veteran status and his experience in the Marine Corps were central to his identity. Three of the other veterans split the different parts of their veteran identity into the first and second rings. B16 discusses his connections to other veterans, putting veteran in general in the second ring because “I don’t feel more connected to Army vets than I do Navy vets or Marine vets” whereas he decided to “put combat vet close because...there aren’t very many of us and when I do find somebody to click with, it’s typically another combat vet.” For B12, “I love being in the Air Force and so I don’t think I’d ever want to be in any other branch, so I guess I’ll put that one on [the second ring]” yet on the first ring, he put his Reserve service because

One of the main things about why I do what I do is I want to be a part of something bigger than myself and have a significant impact. So, right now the Reserves is like the main way I can achieve that by being in Air Force, and so that’s why it’s very close to my heart.

C4 put being a Navy veteran in his center ring because “it helped shape me into what I am now” but “just being a vet is what I want people to know,” and thus he placed “veteran in general” on the second ring. While for most of the participants, their veteran identities are generally disclosed, or at least not hidden, C1 said that he tries to “stay in the background” and not “advertise my status or anything” even though his veteran identity is close to his core.



Color Coding:

**Vet (general (unspecified), combat, Reserve, branch),**

**Race/ethnicity, Gender, Engineering Student**

*Figure 1. Composite identity circle for 7 BSVEs*

Engineering identity. “I wanna be an engineer, so that’s me” (C4)

Like the military identity, all seven BSVEs claimed that at least one engineering identity merited placement on their identity circle, with three participants putting it closest to the core and four putting it on the second ring. The key difference was that for those who put it closest to the core, engineering was who they were while for the others it was what they did. For those close to the core, being an engineering student represented their future “I need to keep it close to the core; to be successful, it needs to be here” (B10); “Engineering student I think is important, too, because of the fact that that is showing where I wanna be” (C4). In contrast, those who placed

engineering in the second ring expressed sentiments such as, “Engineering’s something I want to do, but being an engineering student’s not my defining thing” (B12).

Black Male identity. “*I’m always going to be myself*” (A15 (and B12 and B16 (“*genuine*”)))

In these settings of predominantly white institutions, it was not difficult for those embodying the minority status of being Black to separate that from their identity as males, which in both the military and engineering disciplines is a majority status. As B12 articulated, “I know being a male provides me with privileges that being a woman doesn’t” yet he doesn’t “exist with knowing” he’s male because it is not as important a part of him as knowing he’s “an Air Force Reservist or knowing that I’m an African-American...” So, in these environments, being African-American, when mentioned, is the central identity.

For these BSVEs, being African-American is rarely mentioned without reference to also being male. On the one hand, A15 put race and gender side by side in the middle of his circle because “if you strip away everything else about me, those are not going to change.” On the other hand, B10 expressly declined to put race or gender in his identity circle because “it doesn’t make up who I am. It makes up who I am to other people, not to me.” B12 discussed at length the nuances associated with the intersectionality of being both African-American and male since those identities were presented separately as prompts for filling out the identity circle [see Table 1]:

I’m looking at this in the general sense of being a male, but if you’re looking at it like if African American male was on [the list of prompts] that would be right there [in the center]. ...I’m thinking of it separate than being like not my race versus my gender, it’s just all together, you know. I mean not all together, ...it’s two separate things. But, when it comes to those things, putting them together I do very much care that I am an African American male because obviously, we’re perceived a different way than others are.

While discussing their racial identity, the idea of role models emerged. B12 and B16 talked about both being role models for others and lacking role models for themselves. B16 noted that “it’s hard enough not having any STEM Black role models other than Neil DeGrasse Tyson” and notes that Geordi LaForge (the *Star Trek* character played by LeVar Burton and an engineer) was his role model. However, he strives to be a positive Black male role model for his niece and nephew. As one of only a handful Black students in aerospace engineering, B12 finds it “exciting because not many African American males get to go into aerospace engineering so it’s more of an opportunity.” He hopes to set an example for kids who might be discouraged from entering the field because “some of the reason why [certain fields are] not diverse is because when you’re a kid, you may not think that something could be good for you because you don’t see anyone who is like you in that field.” By contrast C1, who like B16 laments the lack of diversity on his campus, rejects the notion of being a role model fighting the tide of a homogeneous student body:

When you’re on the outside of that it puts a lot of pressure on you to somehow like influence people, since that’s what school’s about. But, I feel like I’ve taken the approach of I just don’t want to be the outside person trying to show people a different way.

## Discussion and Future Work

In this paper, we have discussed the centrality of the veteran, engineering, Black, and male identities for Black male student veterans in engineering. We are informed by an intersectional lens, understanding that various aspects of people's identities work together to form their whole selves. Although these students embodied all four of the identities under study, all seven of them only claimed the engineering identity plus various aspects of military identity as being salient enough to put on their identity circle. With multiple military identities to choose from (veteran, Reserve, combat, branch), the prompts offered may have skewed the results toward a predominance of the military identity. However, the students were clear in their separation of the different aspects as being relatively more or less salient to them. For instance, for B16, having been in combat was far more salient than his more general veteran identity and having served in the Army was not important at all. This contrasts with B10 and C4 whose branch identity was in the central ring because their service in the Marine Corps and Navy respectively contributed to making them the men that they are.

The engineering identity was likewise chosen by all of these BSVEs because for most, it represents their pathway to their future. While some fully embraced their engineering identity as who they were at their core, others described it as more of a transitional state, an important one to be sure, but one from which they could and expected to move on.

For the five of seven participants who included their race in their circle, it was central and for those who did not include it on their circle, they discussed race as though it were central but they vociferously rejected the notion that it should be and thus refused to place it on their circles at all. Being Black is much more central to these BSVEs' identities than being first generation [30] or a woman [31] was central to those student veterans' identities. This centrality may have been influenced by contemporaneous events to the interviews (a nearby shooting of an unarmed Black man and racist discourse at institution B), but it is undeniable that being a Black man at a PWI in particular is difficult owing to stereotype threats and the need to manage them [21], even if there is an inoculating effect of being a veteran [29]. Like the students in Fries-Britt and Turner's study [20], B12 and B16 attributed most microaggressions that they perceived to ignorance rather than hostility, though campus events caused B16 to lament the loss of a "teachable moment" for the perpetrators of overt racism.

Three of these students discussed serving as role models, two as a privilege and one as a burden. B12 discussed at length his pride in being one of only a few African-Americans studying aerospace engineering (only 60 or so annual graduates in the USA according to [17]) and the hope that he might be able to inspire younger students to aspire to an engineering degree, taking on a role similar to one described by McGee and Martin [21]. B16 lamented the lack of Black role models and embraced being a role model and mentor to his niece and nephew. C1, who like B16, wished for more diversity on his campus, chafed at the notion of being the one who is called upon to educate his student peers about the Black experience, reflecting the unfair expectation that Black students serve as experts in discussions of culture and ethnicity [20].

As our study focuses on students who attended PWIs, future research should explore the experiences of Black student veterans who attend historically black colleges and universities

(HBCUs) as prior research indicates that such institutions provide a supportive environment for Black students in general [19] and BSVs in particular [37]. Further research will also explore other aspects of BSVE identity, such as family relationships and religion not included here.

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