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Social Support: How Hispanic and Black Engineering Students Perceive the Support of Peers, Family, and Faculty

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Abstract

Research on minority and gender differences in STEM (science, technology, engineering, mathematics) education continues to suggest that underrepresented students face unique challenges when navigating post-secondary education. Higher attrition rates for women and minorities in engineering indicates that engineering lags behind other STEM disciplines in ethnic and gender diversity. Although much of the research on this topic concentrates on the experiences of minority students at Predominately White Institutions (PWIs), little research concentrates on the experiences of minority students at Minority- Serving Institutions (MSIs). Current research argues that unparalleled social supports systems exist among MSIs that may be linked to increased degree completion for underrepresented students in engineering majors. However, few researchers have offered an in-depth description of the specific social supports and barriers Black and Hispanic students encounter at MSIs; particularly those students who major in engineering. The current study draws on the experiences of 106 Hispanic and 94 Black engineering sophomores (N=200) at four separate Minority-Serving Institutions. Participating sites include two Historically Black Universities (HBCUs) and two Hispanic-Serving Institutions (HSIs). The Engineering Fields Questionnaire was used to solicit responses regarding social support and social barriers. Additionally, one-on-one semi-structured interviews were employed to collect qualitative data on how students come to value social support. Results indicated that Black and Hispanic students encounter both social support and social barriers as they navigate their engineering education. While students reported similar high values for the educational and career support received from families, friends, and faculty, Black and Hispanic students reported less value for the educational and career support received from classmates. Although Black HBCU students reported varying ways in which their faculty demonstrated support, these students frequently reported that their faculty prepared them for engineering careers though the promotion of graduate school and internships. In contrast, Hispanic students at HSIs frequently reported that their faculty demonstrated support by encouraging them to excel in their coursework and earn strong grades. This data supports prior research indicating that MSIs provide a supportive learning environment for underrepresented students by catering to the unique needs of their students.

Introduction

Recent educational research and statistics indicate that White and Asian students are outperforming Black and Hispanic students in academic achievement and persistence in post-secondary education. Presently, White and Asian students are more likely to score higher on standardized tests, graduate from high school, and enroll into 4-year colleges[3, 30]. The National Center for Education Statistics[26] reports that the six-year graduation rates for Hispanic (50%)

and Black (39%) students are several percentage points below six-year graduation rates for Asian (69%) and White (62 %) students. This data demonstrates the achievement disparity that exists among Black and Hispanic students when compared to their White and Asian counterparts.

Black and Hispanic students not only lag behind White and Asian students in college completion, but also in participation in STEM disciplines. Despite current efforts to recruit underrepresented students into STEM majors, disparities continue among Black and Hispanic students. This disparity becomes evident when tallying the number of bachelor degrees awarded in STEM majors, particularly those in engineering. According to 2009 data from the National Science Foundation[26, 27], Black and Hispanic undergraduates earned more than twenty percent of the degrees awarded in psychology (21.4%), biological sciences (14.7%), social sciences (19.3%), and in mathematics (11.2%). However, Blacks and Hispanics received only 4.3% and 7.8 %, of all bachelor degrees awarded in engineering, respectively[27]. This representation of Black and Hispanic graduates indicates that these students are more likely to graduate with a degree in a social science such as psychology or sociology than in engineering. Although engineering graduates receive a higher starting salary than those graduates in other STEM disciplines, low enrollment and high attrition rates persist in engineering programs despite the monetary advantages[35].

As the U.S. and other countries push towards an increasingly innovative economy, STEM disciplines, characterized by their focus on science, technology, engineering, and/or mathematics, represent an economic necessity. In response to this need, the White House has issued several STEM promotion initiatives (STEM Master Teaching Corps, Educate to Innovate, and the STEM Jobs Act) to encourage STEM education and innovation in the United States[34]. STEM industries now represent a fast-growing labor market within an otherwise stagnant economy. By 2018, economists estimate that there will be 2.4 million new STEM jobs for U.S. graduates. In addition to the increased demand for STEM graduates, competitive salaries equip STEM students to demand more money after they graduate. More than half of all baccalaureate –holding STEM graduates are earning more annually than non-STEM graduates with a master's or doctorate[5]. These educational and career opportunities offer unique advantages for STEM majors thus highlighting the socioeconomic significance of underrepresented students' access into and persistence in STEM education.

Investigation on underrepresented students' persistence in engineering disciplines indicates that research on Minority-Serving Institutions may offer valuable information on underrepresented students' experiences in higher education[9, 28]. Minority-Serving Institutions such as Historically Black Colleges and Universities (HBCUs) and Hispanic-Serving Universities (HSIs) continue to recruit a large number of Black and Hispanic students who successfully matriculate in higher education. Compared to Asian, Native American and Hispanic students, Black students have a relatively higher rate of attending universities whose student body consists of 75% or more students who share their same ethnic group[25].For example, over 11% of all Black students in the U.S. attended a HBCUs in 2007[25]. These HBCUs represent 104 colleges and universities that are federally-recognized MSIs established prior to 1964 with a primary mission to educate African Americans. Although HSIs were federally-recognized more recently in 1992, HSIs enroll nearly 65% of all Hispanic college students and nearly one-third of all U.S. underrepresented students[11].

Theoretical Framework

The current study utilizes Social Cognitive Career Theory[21] as a framework to highlight the significance of social support and barriers for underrepresented engineering students. SCCT builds on Albert Bandura's Social Cognitive Theory[1] which emphasizes the relationship between social interaction and self-efficacy. SCCT not only explores social interaction, but aims to explain how students make academic and career choices. Concentrating on the interplay between behavioral, environmental, and personal characteristics, SCCT acts in this particular context to suggest that social support and social barriers have significant influences on academic and career behaviors. Lent, Brown & Hackett[21] suggest that academic interests, such as engineering, can be influenced by self-efficacy, outcome expectations, environment (support and barriers), and individual characteristics such as race and ethnicity.

Lent and others have since examined the utility of SCCT in exploring interests, goals, and performance of college students in science and engineering programs[22, 23]. More recently, Lent applied SCCT to examine the social cognitive factors of Black engineering students at HBCUs[23]. This study examined certain variables including social support and social barriers that, according to SCCT, should predict the academic and career goals and interests of Black engineering students. Lent et al.'s[23] application of SCCT makes a case for the current study examining the perceived value and receipt of social support from peers, family and faculty.

Social Support and Barriers

Cobb[7] defines social support as belonging to one of three cases: "1) Information leading the subject to believe that he is cared for and loved; 2) Information leading the subject to believe that he is esteemed and valued; and 3) Information leading the subject to believe that he belongs to a network of communication and mutual obligation"[7]. Cobb first operationalized the widely- understood concept of social support to argue that adequate social support may protect those in crisis from pathologies including illness and death. In the 1980s, Cohen and Wills[8] expanded Cobb's research to investigate the relationship between social support and general stress. Their research supported Cobb's initial finding that social support is a positive mechanism for protecting one's well-being. Expanding the effects of social support beyond the limits of illness and pathology, Cohen and Wills reported that social support offers additional protective factors that buffer against stressful situations regardless of whether effective coping skills are developed.

Shortly after Cohen and Wills' investigation, social support shifted from research focusing on well-being to investigations on social support's application in education. In a discussion of social support and academic achievement, Tracey & Sedlacek[32, 33] reported that non-cognitive variables such as availability of social supports were predictive of academic success for underrepresented college students. This research suggested that non-cognitive support variables for students were more influential than cognitive variables such as SAT scores. More recently in an investigation of acculturative stress, coping skills, and social supports among Hispanic college students, researchers reported that students who perceived high availability of social support reported fewer symptoms related to stress than those who perceived less social support[10]. In Dennis, Phinney & Chuateco's[12] study of first-generation Hispanic college students, results indicated that both family and peer support were related to key college outcomes including grade point average (GPA) and college adjustment. Specifically, their results suggested that peer support had the most influence on Hispanic students' grade point average.

Social support as a significant predictor of persistence among underrepresented students in STEM continues to be the focus of several investigations[9, 12, 19, 20]. Hurtado, Eagan, Tran, Newman, Chang & Velasco [19] argued that faculty interaction and support are crucial factors behind the success of the HBCU-STEM model. This study compared the stark differences in faculty support at MSIs and PWIs; they concluded that PWIs had more social barriers for minority students than at HBCUs. Hurtado et al. also suggested that renewed social support at PWIs could lead to significant improvements in their underrepresented students' STEM persistence. These researchers also reported that their findings were consistent with past research that shows that "HBCUs tend to promote stronger connections between Black students and faculty than their PWI counterparts"[19].

Other research has also discussed how successful STEM models at MSIs contribute to greater degree attainment and higher achievement among underrepresented students in STEM[29.] Perna et al.[29] used Spelman College, which ranks 4th in the nation in STEM degrees awarded to African American females, to suggest that Spelman's small class sizes, ease of student access to faculty offices, efforts of faculty to encourage and promote students' success in STEM fields, and accessibility and use of academic support resources ultimately make the college a successful STEM model. Like Perna et al.[29], Bonner, Alfred, Lewis, Nave, & Frizell[3] have discussed the relationship between high-achieving students and MSI support systems. This study explored the factors that most significantly impacted the success of academically-gifted African American STEM students enrolled at an HBCU. Qualitative data indicated that successful engineering students across several HBCUs had supportive study group sessions inside and outside of the classroom. Also, when asked about the value of their support systems, most successful students contributed their academic success to the support given from their parents and family.

Participation in engineering outside of the classroom is consistently noted as an institutional support and a strong predictor of underrepresented students' persistence in STEM. Hurtado, Newman, Tran & Chang found that Hispanic students who participated in research with STEM faculty as undergraduates showed a small decrease in performance-avoidance goals toward school over the course of the study, whereas those who did not participate in research showed an increase in avoidance goals over time[20]. Additionally, this research found that underrepresented students who attended universities that supported first-year students with research opportunities were more than four times more likely to actively engage in their STEM majors than students at universities without such research programs. These researchers also encourage educators to study successful STEM models to explore how institutional changes may improve the academic achievement of underrepresented STEM students.

A separate study conducted by Foor, Walden, & Trytten[15] discussed the link between social support and engineering identity in an engineering discipline. They offer findings from their ethnographic study focused on an underrepresented female engineering student at a PWI. These researchers describe the story of Inez (participant pseudonym) who described support barriers such as isolation and unease among her peers. Inez acknowledged her minority status in her engineering major and stated, "I wish that I belonged more in this whole engineering group"[15]. Inez shared her experiences related to her engineering education through a discussion of perceived social support and barriers. Unlike her classmates, Inez did not feel welcome to participate in cooperative experiences, internships, research, or engineering organizations. Foor et al.[15] discussed Inez's self-reported low engineering identity as a function of social barriers such as lack of cooperative experiences, cultural, and social capital.

Given the wealth of data that indicates that underrepresented STEM students at MSIs experience increased social support than their PWI counterparts, this particular study aims to challenge prior research and uncover how students value the supports they receive. Additionally, the purpose of this study is to describe students' engineering experiences related to the social support and barriers that they encounter at MSIs.

Research Questions

The study asked three main research questions: (1) What social support and social barriers do Black and Hispanic engineering students encounter at MSIs? (2) To what extent do Black and Hispanics students value the social support from family, friends, classmates and engineering faculty? and (3) In what ways do Black and Hispanic students come to value this support?

Methodology

Data for this longitudinal study were collected from Black and Hispanic sophomore engineering students matriculating at a MSI during their second year of study. The research methods are described below.

Participants/Institution Profile

Data were collected from two HBCUs and two HSIs (see Table 1). According to the National Science Foundation, HBCU-1 is a private, urban institution that ranks among the highest producers of African-American undergraduates with science and engineering degrees who earn doctoral degrees nationally. This institution offers BS degrees in five engineering disciplines— chemical, civil, electrical, mechanical engineering and systems & computer sciences. The undergraduate engineering enrollment is 659 undergraduates; ninety percent of these are Black students. HBCU-2 is a public, urban institution that is one of the top producers of African- American undergraduates with engineering degrees as well as a top producer of female engineers. This institution offers BS degrees in Chemical & Biological Engineering & Bioengineering, Civil, Architectural & Environmental Engineering, Computational Science & Engineering, Computer Science, Electrical & Computer Engineering, Industrial & Systems Engineering, and Mechanical Engineering.

HSI-1, a public, urban institution, is one of the top producers of Hispanic engineers in the continental United States at all levels. The undergraduate engineering enrollment is 3424; fifty-six percent of these are Hispanic students. It awards degrees in engineering from the bachelor's to the doctorate level in areas including biomedical engineering, civil and environmental engineering, electrical engineering, industrial engineering, and mechanical engineering. HSI-2 is a large public university that is recognized for the quality of its engineering program. The undergraduate engineering enrollment is 4,694, ninety percent of whom are Hispanic students. All of the engineering programs at all participating sites are ABET-accredited which ensures that the curriculum is similar.

Table 1. *University Demographics*

	HBCU-1	HBCU-2	HSI-1	HSI-2
Undergraduate Enrollment in Engineering	659	1344	3424	4694
Minority Enrollment	90%	70%	56%	90%
Type of Institution	HBCU, Private, Urban	HBCU, Public, Urban	HIS, Public, Urban	HIS, Public, Urban

Two hundred engineering sophomores were selected to participate in the current investigation using convenience sampling. Ninety-four (94) were Black and one hundred and six (106) were Hispanic. They were recruited via email invitations promotional materials posted in the engineering departments on each campus, and at informational sessions. Male and female students from each major offered on each campus were included. Of the 200 students who participated in the study, 172 students completed an online survey. Of these students, 65% were male and 35% were female. Students majoring in all engineering disciplines offered across institutions were included in the sample (see Table 2.). Seventy-eight (78) of recruited students participated in semi-structured interviews.

Table 2. *Participant Demographics*

Demographics	Percent
Male	65
Female	35
Aerospace	3
Chemical	7.2
Civil/Environmental	18.6
Computer	15.6
Electrical	15
Industrial	1.8
Mechanical	26.3
Systems	1.8
BS-Engineering	1.2
Other	9.6

Instrumentation

A mixed-methods approach was used to collect qualitative and quantitative data from the participants and examine the experiences of students along the variables of social support, gender, ethnicity, and type of institution—HBCU or HSI.

Survey

The Engineering Fields Questionnaire[21] was used to probe the extent to which students' social support and support barriers were related to Social Cognitive Career Theory. Participants' demographic data was also collected. The selected items of the Engineering Fields Questionnaire are scored on a five (5) point Likert-scale ranging from "Not likely at all" to "Extremely likely". Examples of item prompts include: *How likely would you be to… Feel support for the decision from important people in your life (e.g. teachers); …Get helpful assistance from your friends for pursuing this major; …Feel pressure from parents or other important people to change your major to some other field; …Get helpful assistance from your advisor.* These prompts aimed to solicit information about student's perceptions of social support and barriers from influential social groups.

Semi-Structured Interviews

One-on-one semi-structured interviews were administered to 78 participants. The semi-structured interview included a list of standardized questions that allowed for additional inquiry when responses were incomplete or unclear. Interviewers engaged students by adjusting probing questions to ensure that students understood what was being asked[2]. Oftentimes, students were able to provide rich anecdotes and commentary on their specific and general experiences. One section of the semi-structured interview that will be of focus in this particular study asked participants to describe and rate the value placed on specific social support. On a 10-point Likert scale ranging from 1-10, participants are asked to rate the value placed on the educational and career support from family, classmates, friends, and engineering faculty. Participants were also asked whether these groups provided support, and if so, what types of support(s) they received.

Results

Quantitative Analysis: Survey

Black and Hispanic engineering students' responses on the Engineering Fields Survey provided quantitative data to examine students' perceptions of social support and barriers related to their academic and career goals. Means and standard deviations were calculated to quantify perceptions of social support and barriers. The responses for social support and barriers were assessed on a 5-point scale, with four potential choices: 1- Not likely at all, 2- A little likely, 3- Moderately likely, 4- Quite likely; and 5- Extremely likely. The higher the score indicated the greater the extent to which students' experienced or expected to experience varying types of social support or support barriers. Descriptive analysis revealed that on average, students reported that receiving support from family and friends was most likely to occur during their engineering education (see Table 3). The analysis also discovered that students were also more likely to receive social support barriers from family and friends.

Table 3. *Mean Values for Social Support and Social Barriers, Black and Hispanic Students*

	Mean Value	Standard Deviation	Range
Social Support			
General Support	3.94	.83	1-5
Family Support	4.66	.70	1-5
Classmate Support	3.98	.66	1-5
Friend Support	4.30	1.00	1-5
Faculty Support	3.98	1.00	1-5
Social Barriers			
General Barriers	3.46	.97	1-5
Family Barriers	4.39	1.00	1-5
Classmate Barriers	3.76	.88	1-5
Friend Barriers	4.39	1.22	1-5

Table 3 illustrates that students reported that they encounter both social support and social barriers as they navigate their engineering education. Although not overwhelmingly significant, students reported that they were more likely to encounter social support than social barriers. Students mostly agreed that they were most likely to feel that their family members supported their decisions (Mean=4.66). Students were less likely to feel they would encounter receiving negative comments from others that engineering would require too much time or schooling (Mean= 3.43).

Qualitative Analysis: Semi-Structured Interviews

Researchers coded rich qualitative data to uncover central themes regarding students' engineering experiences. Three iterations of coding, from broad to specific, were completed to further pinpoint the overarching themes that appeared to best describe students' unique experiences. During the semi-structured interview, students were asked to rate on a scale from 1- 10 the value they placed on the academic and career support from their families, classmates, friends, and engineering faculty. After providing a rating, students were then asked "*Do they provide support?"* and "*In what ways do they provide support?"* Scaled response were operationalized into three classes: High Value (values 8-10); Average Value (values 4-7), and Low Value (values 1-3)

Results indicate that most Black and Hispanic students placed a high value on family and faculty support; however, fewer Black and Hispanic students placed a high value on classmate and friend support. Sixty-seven percent of Black students and 80% of Hispanic students placed a high value on family support while only 3% of Black students and 5% of Hispanic students placed a low value on family support. The reported value of engineering faculty support was high for 56% of Black students and 65% of Hispanic students; however, 0% of black students and only 5% of Hispanic students placed a low value on engineering faculty support. Thirty-one percent of Black students and 33% of Hispanic students placed a high value on friends' support while 21% and 20% of Black and Hispanic students placed a low value on friend support, respectively. Fewer students—8 % Black and 13% Hispanic—placed a high value on classmate support. The percentages of Black and Hispanic students who placed low value on classmates support were 48% and 37%, respectively (see Table 4).

Table 4. *Low and High Value Ratings for Social Groups, Hispanic and Black Students*

Social Group	Value Rating	Hispanic	Black
Family Support	High	80%	67%
	Low	5%	3%
Faculty Support	High	65%	56%
	Low	5%	0%
Friend Support	High	33%	31%
	Low	20%	21%
Classmate Support	High	13%	8%
	Low	37%	48%

Although Black students reported varying levels of how they valued family, friends, classmates and faculty support, four dominant themes emerged from the qualitative data: Family Financial Support, HBCU Faculty - Career Preparation; HSI Faculty - Academic Assistance; and Mutual Peer Support.

Family Financial Support

When asked what ways their families provided support, both Black and Hispanic students consistently reported that financial support was one way they felt their families encouraged their academic and career choices.

"[They] send me money when they can. [They] send me food sometimes" –Stacy, HBCU-1

"*Well, for one, my mother… supports me financially, you know. She tries to help me as much as they can. You know, she makes food for me. She makes me as comfortable as she can. And, uh, well, my dad always encourages me, uh, study hard, you know, hit the books. So, yes, they support me a lot."*-Maria, HSI-1

"They provide support by helping me pay for my tuition. They help me ... financially in all aspects -- tuition, housing, transportation. [And] in moral support, they help me." – Jose, HSI-2

"Well, besides money, they show it over the phone because I can always talk to them. And they always just reassure that they love me and they miss me and they're proud of me. So, yeah, that's it."- Toni, HBCU-2

HBCU Faculty Support- Career Preparation

When asked what ways engineering faculty provided support, HBCU and HSI students' responses varied. HBCU students were more likely to report that their faculty provided support through career preparation and planning, often suggesting that students prepare for graduate school, internships, cooperative experiences and other opportunities outside of the classroom.

"*I think the faculty provides support because they're the ones that have all the information about… the different graduate schools. And a lot of them have been to certain graduate schools. That can really help me out in the future, like if I want to know, like, 'hey, you've been here, how was your experience,' do you think that would be a nice place for me to go, and different things like that."* – Russell, HBCU-1

"I guess, my advisor, I can go and talk to him pretty much any time that he's in his office. And I could talk to him about…options, about graduate school…I could go to my advisor and he could give me different options about different schools that I can go to or programs that I could pursue or scholarships that I need to fill out when I want to apply to graduate school." –Walter, HBCU-1.

"One of my mentors, he actually is pushing me to get my doctorate... I felt -- I was, like, I would never see myself getting my doctorate. But he was, like, I could definitely see you getting your doctorate, so I would definitely encourage you to keep doing good in school. Keep your GPA up, and you'll be on a good track for grad school." –Candace, HBCU-2

"Ah, they also tell me about schools I can get into, and they ask me about my goals, and try to help me, guide my way… through the next couple of years, getting out of school. So just give me advice on schools I can get into and schools I should think about applying to, after graduation." – Josephine, HBCU-2

HSI Faculty Support - Academic Assistance

When asked what ways their engineering faculty provided support, students at HSI frequently reported that faculty offered assistance in course advisement and encouragement in academic performance and coursework.

"I was just in a meeting with my adviser at the Engineering Center and he was talking to me about… my classes ... what I might have to do ... for the next semesters. And he was giving me a lot of advice and a lot of tips… and, and really helping me in, in trying to… do as best as I can [in] all my classes ... And, and he really showed a lot of interest and care in me doing [well]." –Jaime, HSI-1

"If…I would have to take another course from a different department, I am guessing they would be willing to provide any assistance in being able to get that course in my curriculum."
Antonio, HSI-2

"My adviser ... is so supportive. You go to her for advising, you won't come out like maybe an hour later. But you'll know that, you know, 'Okay, I'm gonna do better next semester.' You know, even if you failed a class that semester…she'll hold your hand, she'll caress your hand and say, 'It's okay, sweetie. There's tutoring. You can do better.'" – Carlos, HSI-1

"They offer their support by always stating their office hours [and] that they are here to help us in our education. ... if we have a problem, we can approach them…[and] when I have trouble finding a course, if it's full during the semester, they can ... force an open space." – Miguel, HSI-2

Mutual Peer Support

When asked what ways friends and classmates provided support, many students had some difficulty articulating specific examples of how their peers provided support. Generally, both Black and Hispanic students agreed that peer support was provided by "talking about it" or providing mutual support.

"I think just being able to talk to my peers and have conversations about what we each want [in] our lives… to get different feedback and to see different views on the future." – Evelyn, HBCU-1

"Motivationally, like we're talking, and we always have talks about it, and they help me out"- Tito, HSI-1

"Well, we do homework together. We motivate each other [to] get up and go to class. [We say,] 'Let's go to the library, let's get this homework done'. So I think they're definitely very helpful in that aspect." –Cassandra, HBCU-2

"If I don't understand something for a class, they are very willing to help. If I have any problems, they also help and I [also] help them so we are very close… if anybody needs help in our… group …we're … always helping each other and trying to [achieve] the best for each other too." Julio, HSI-2

Discussion

This data supports prior research indicating that MSIs provide a supportive learning environment for underrepresented students. Quantitative data revealed that while students felt that their families and friends generally supported their decisions to persist in engineering, they also reported that it was also quite likely to also encounter barriers from their family and friends. A closer look into student responses regarding social barriers reveals that students mostly agreed that it was quite likely that they would encounter negative comments about their major from friends and felt pressure from parents and others to change their major. Interestingly, these social barriers have little impact on student's belief that their friends and family are, in fact, socially supportive. Commentary from interviews reveals the nature of social barriers from family and friends. Students often mention to friends and family the difficulty or challenge in their engineering coursework and many students reported that their non-engineer friends complained that the rigors of engineering prevented engineering students from having adequate social and leisure time. Similarly, students reported that parents suggested a change in major when they noticed that the student was experiencing increased stress. Still, students overwhelming agreed that they were supported by friends and family.

Emergent themes from the qualitative analysis revealed how students came to value the support from family, friends, classmates, and faculty. The most valued social support—family support, was consistently noted as providing financial assistance and encouragement for both Black and Hispanic students. As engineering undergraduate programs demand a significant financial commitment from students, it is not surprising that students would value a social support that offers financial sustenance. Without this support, a degree in engineering would not be a possibility for many of these students.

While emergent themes regarding faculty support differed for HBCU and HSI students; both groups reported similar high values for faculty support. Faculty approaches to providing support to students may have been influenced by cultural differences, or perhaps institutional characteristics. Students at HBCUs appear to value their faculty's willingness to assist students with opportunities to allow them to be more experienced, well-rounded students and ultimately, more competitive in the engineering workforce. Students at HSIs reported that they valued professors who showed interest in their academic performance and encouraged them to get better grades or grasp course concepts. Students also frequently reported that course advisement was method their faculty showed support.

When discussing peer support (classmate and friends), students showed difficulty in expressing how their peers provided support even after agreeing that their peers, indeed, were supportive. This hesitance to respond may reveal some insight into the low values placed on friend support, and more specifically, classmate support. Unlike the clearly influential support given by family and faculty, students may not readily grasp the value in the support given by peers, characterized by talking about mutual goals, providing assistance with coursework, and offering encouragement. Whereas the support from family and faculty is directly linked to students' meeting their engineering goals, the support from peers is only indirectly helpful. As students mature into upperclassmen and rely on the support from their classmates more often, researchers will be interested to find whether the value of classmate support changes over time.

One limitation in this study includes the use of students' self-report in data collection. Also, in the qualitative data, some students did not answer the questions that were asked and therefore, their responses have been excluded from the analysis. This particular paper only reports on year-one data from a three year longitudinal study. Lastly, no causal relationship between students' social support and their engineering persistence was investigated in this study. Future research should seek to correct these limitations.

Conclusion

Several researchers have discussed the unique role that MSIs, namely HBCUs, play in increasing the degree attainment of underrepresented students in STEM[9, 19]. Supported in prior literature, Hurtado et al.[19] found that despite some differences in the level of resources found at HBCUs, students reported that they felt as though the institution cared about them as students and thus contributed to the quality of their STEM education. At HSIs, Crisp et al.[9] discovered that Hispanic students were more likely to declare a STEM major. Additionally, Dayton, Gonzalez-Vasquez, Martinez & Plum[11] suggested that Hispanic students had increased success at HSIs because "students gain a valuable support system and are able to learn more about themselves in a comfortable and safe environment where they share many common experiences with their peers"[11]. Given the results of prior research that indicates that MSIs offer unparalleled support for Black and Hispanic STEM students, this investigation of how underrepresented students value their support systems is useful in developing effective and strategic support initiatives to increase the persistence of underrepresented STEM majors.

This particular research adds to the body of knowledge about students at Minority-Serving Institutions by describing the nature of social support and barriers that Black and

Hispanic students encounter. Furthermore, this study describes how Black and Hispanic students at MSIs come to value social support. These findings suggest that MSIs may be particularly successful in retaining minority students because they allow a variety of strong support systems to work concurrently within an educational experience. A deeper understanding of how underrepresented students value support can help PWIs that wish to provide a more supportive environment for Black and Hispanic students. While many would agree that all students value social support and find it beneficial to some degree, this study revealed that ethnic differences exists in how engineering students value and describe support—specifically the social support received from faculty. This information may be valuable to engineering educators as they seek to provide appropriate social support for underrepresented STEM students.

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