

Strategies Promoting Undergraduate Retention (SPUR): Identifying Strategies to Help Students Reach Graduation through a Student-Driven Approach

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I. Project Overview

In research studies on student retention, authors observe a range of factors impacting retention that tend to vary by demographic groups. These studies often highlight how groups that are underrepresented within engineering face additional challenges to persistence due to marginalization [1,2]. They demonstrate how BIPOC (Black, Indigenous, and Peoples of Color), female, and first-generation college students face barriers to persisting in their education, especially at STEM universities. These barriers have a social element that point to a lack of belonging, inclusion, acceptance, and community from the college environments [2]. COVID has also called attention to the mental health component of the student experience that is proving to have a greater impact on student retention than in previous years.

Strategies Promoting Undergraduate Retention (SPUR) was created to understand the potential different retention challenges between white and BIPOC undergraduate students at our institution by creating a survey to focus on sense of belonging and mental health. SPUR was crafted to uplift student voices by giving them the opportunity to share their stories through a combination of open-ended, short-answer questions and Likert-style survey items to unpack how students experience our institution. SPUR dissects how belonging, community, and mental health have impacted their decisions to withdraw or consider withdrawing from our institution.

In this work-in-progress paper, we focus on the literature and institutional data supporting the themes behind the survey design, recommendations from our research and data, and next steps. SPUR results can impact the broader STEM community by helping other institutions better identify and understand challenges from their own students, especially institutions with low BIPOC retention.

II. Justification and Need

Our institutional data show that BIPOC students had an immediate increase in their withdraw rates during COVID, depicted in Figure 1, while White students had a decrease in their withdraw rates, depicted in Figure 2. This trend is particularly alarming because historically before COVID, BIPOC withdraw rates were lower than White students withdraw rates. However, during COVID, BIPOC students withdraw rates were higher than White students. Further investigation revealed that when comparing withdrawn students by race, student classification, and residential status pre-COVID (Spring 2017-Fall 2019) and during COVID (Spring 2020-Spring 2022), BIPOC Sophomores and BIPOC residential student populations saw large proportional increases in total number of withdrawn students, depicted in Figure 3 and Figure 4 respectively. BIPOC First-years and BIPOC Juniors also had increases in the total number of withdrawn students, but to a lesser extent. Our distinction shows fewer terms during COVID compared to pre-COVID, so the data demonstrate how the number of total withdrawn students during COVID are already surpassing the number of total withdrawn

students pre-COVID. By differentiating withdraw totals between student classification and residential status, the data further detail how withdraw totals have decreased for some populations, but have increased for others, demonstrating disparities between the different populations. The increase in withdrawn students from pre-COVID to during COVID for certain groups could also indicate additional barriers and/or challenges that exist for these groups within the BIPOC student population. It also emphasizes the populations of BIPOC students who may have better mechanisms in place to persist in school, such as BIPOC non-residents and BIPOC Seniors, who both saw decreases in their total withdrawn students when comparing pre-COVID to during COVID.

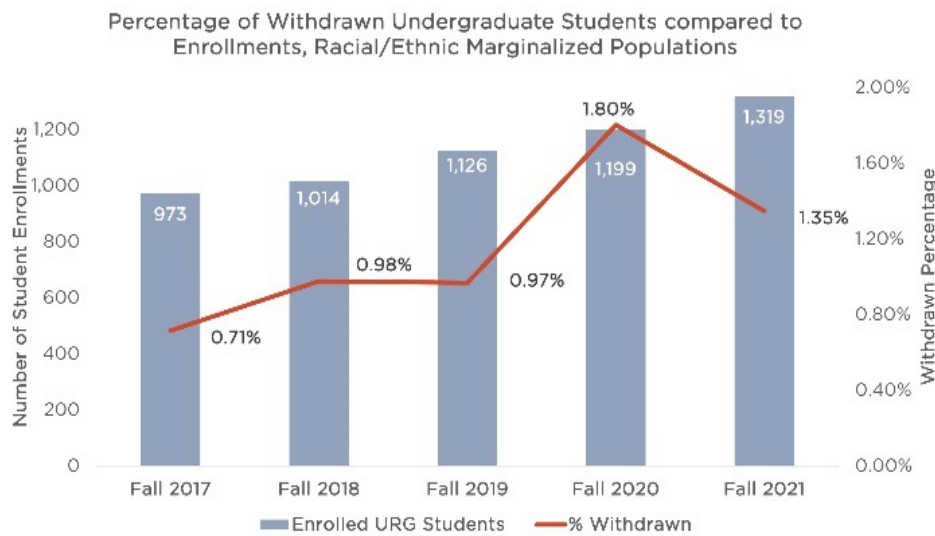


Figure 1. Percentages of Withdrawn Underrepresented Groups of Students during COVID

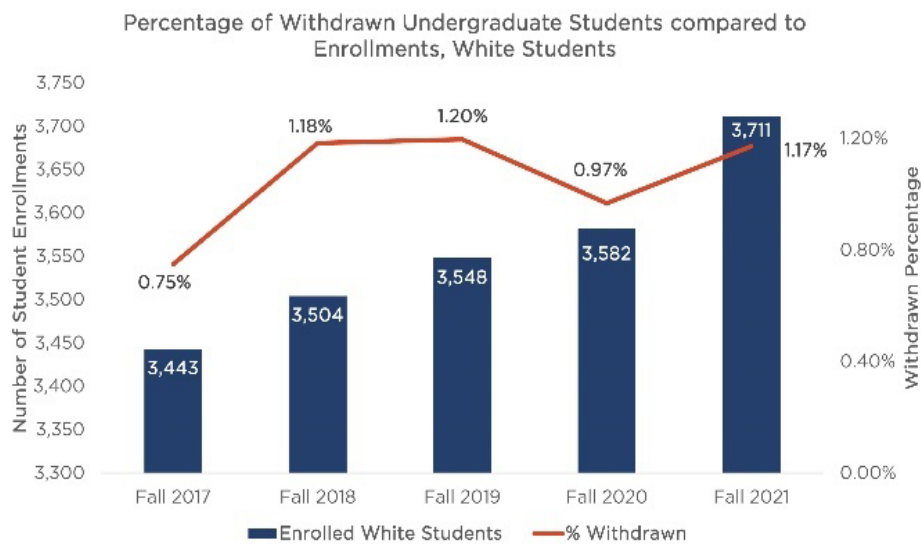


Figure 2. Percentages of Withdrawn White Students during COVID

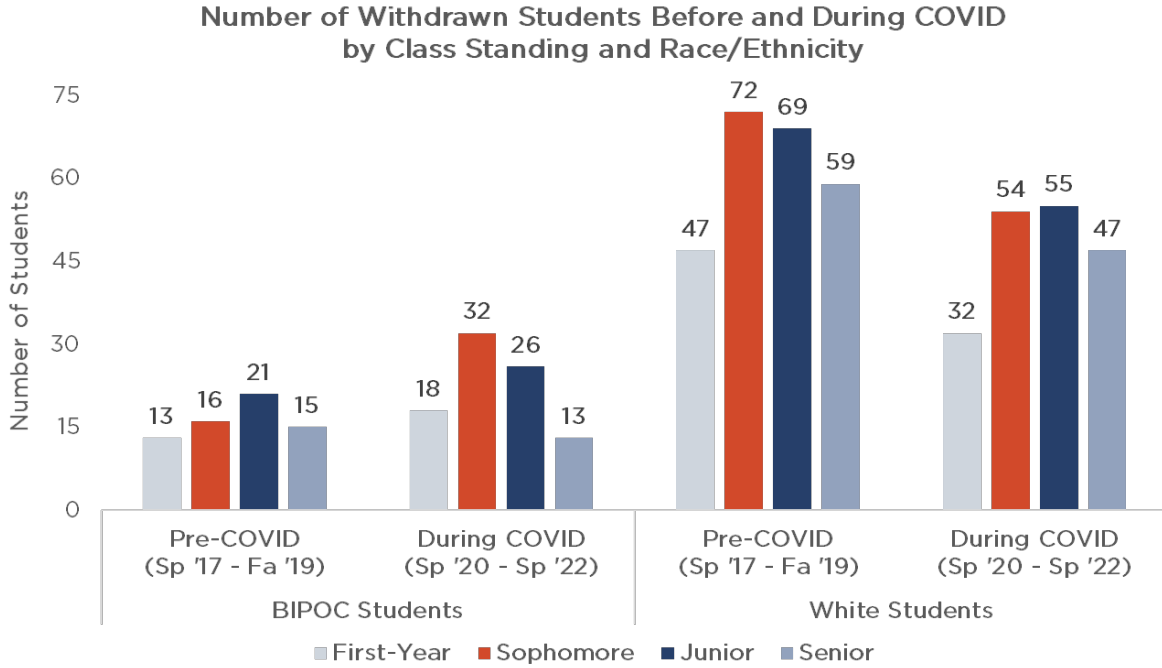


Figure 3. Number of Withdrawn Students Pre- and During COVID by Class Standing and Race/Ethnicity

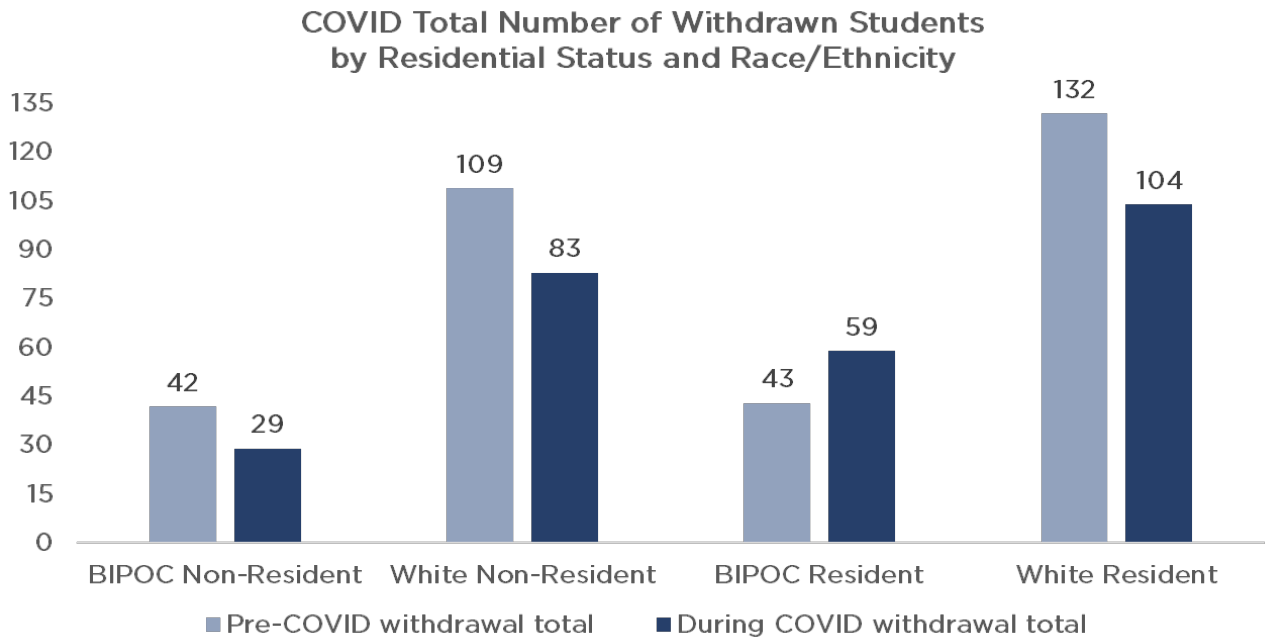


Figure 4. Number of Withdrawn Students Pre- and During COVID by Residential Status and Race/Ethnicity

III. Literature Review

Sense of Belonging

In recent literature, of the reasons specific to BIPOC students for withdrawing, discussion frequently includes sense of belonging. Sense of belonging originated from Maslow's hierarchy of needs, which discusses how people prioritize five different needs of increasing importance. It is usually shown in a pyramid style with our basic needs of food, shelter, etc. at the bottom of the pyramid [3]. Love and belonging are the "need" right in the middle of the pyramid and STEM education research has expanded this specific component as its own framework. Sense of belonging is defined as "students' perceived social support on campus, a feeling or sensation of connectedness, and the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the campus community or others on campus such as faculty, staff, and peers" [4, pp.4]. Some reasons BIPOC students feel they don't belong include negative faculty and peer interactions and identity clashes between BIPOC students and the culture of engineering [5,6]. The campus racial climate can also contribute to a lack of belonging, as some studies cite the lack of diversity and historical legacies of exclusion as potential factors that can cause students to feel out of place [2]. Literature demonstrates the importance of sense of belonging on the student experience, especially for BIPOC students within environments where they are underrepresented.

Sense of belonging impacts other underrepresented student groups as well, not just BIPOC. Specific to engineering, female students tend to experience belonging at significantly lower levels than their male peers [7,8]. These feelings arise from a multitude of environments, such as in relation to how female students interact with their male peers and with instructors. Some examples highlighted include female students being type-casted for certain roles, such as notetakers, by male peers [9] and feelings of exclusion and ostracization [10]. Because of intersectionality, female students who are also BIPOC have multiple identities that tend to feel isolated and left out of engineering.

It is worth noting how sense of belonging can differentially impact students across spaces of an institution. "Academic" and "Social" are two major contexts for belonging at an institution. In one study that measured sense of belonging on a cohort of First-year students, social belonging played a larger role on future persistence than academic belonging [11]. The study demonstrates the value of understanding belonging as it is experienced in different spaces across an institution instead of treating it as uniform experience. Additionally, it implies how knowing those differences in how students experience belonging across different institutional spaces can help educators be strategic in meeting retention challenges. For SPUR, the literature proves the importance in understanding how students experience belonging at our institution in order to uncover factors with more granularity.

Mental Health

In light of COVID, mental health has become a significant recent factor that impacts student retention. For example, literature describes students' challenges with establishing spaces to study or their concerns with personal or familial mental and physical health during COVID

[12]. COVID also exacerbated different mental health factors like anxiety and depression which further impacted student's ability to stay successful in school [12]. Even prior to COVID, mental health had become a growing concern for educators as a 2017 survey from the Chronicle of Higher Education documented mental health as the main concern for student affairs leadership [13]. The concern grows from the negative impact mental health has on student outcomes, such as GPA and retention. A 2005 longitudinal study focused on mental health for a sample of over 5,000 undergraduates and graduates at an academically competitive university. The study found that of students with a GPA below 3.0, 25% of those who reported mental health symptoms dropped out while only 10% dropped out of those who did not report mental health symptoms [14]. Overall, mental health challenges complicate the student experience for many and highlight the importance of mental health when understanding retention.

Culturally, studies also describe differences in how mental health is handled across different racial and ethnic communities. For instance, research shows that Asian populations tend to focus on acutely physical symptoms over emotional symptoms when dealing with mental health while within the Black community, many tend to handle problems and distress more personally and rely on spirituality [15]. There are also differences reported in how mental health is experienced professionally. One survey [16] describes issues like access, quality of care and satisfaction as differing in experience across racial groups, such as Black and Latiné patients expressing how they've been treated badly in a clinical setting. Transitioning to an educational setting, understanding how different cultures may experience mental health and mental healthcare could be helpful for educators who see retention challenges related to mental health at their institutions.

Additionally, because we are a STEM institution with a relatively low proportion of BIPOC students, mental health has an added layer of complexity. Engineering culture, which is reflective of the institution as a whole, typically promotes heavy course loads, course difficulty and "all-nighters" as markers of success [17], which can cause students to take pride in suffering and hardship, further compounding the cultural challenges BIPOC students may face with addressing mental health. Prior to COVID, one study found that engineering students had high rates of stress and mental health conditions [18]. As we understand how mental health impacts students at our institution, we also have to consider the inherent culture that exists in engineering, where mental health symptoms may not be seen as problematic but rather signs of success. Because of this phenomenon, the SPUR survey allows students to describe symptoms related to mental health that might be aligned with the culture of engineering and also enables them to report actual clinical conditions, if students choose. This strategy provides BIPOC students with an outlet to disclose experiences where they may have felt previously a self-diagnosis was a form of outing.

IV. Institutional Data

The Office of Student Life has all students fill out withdraw forms when they inform leadership of their intent to leave our institution. Figure 5 highlights a selection of aggregate data from these forms where students rate their level of agreement on a Likert scale to

different items. When asked about their sense of community outside of the classroom, there were nearly matching percentages of students who felt they had community outside of the classroom as there were students who felt they did not. Black students specifically had the largest disparity with the total number of students who disagreed that they felt a strong sense of community outside the classroom tripling the number of students who agreed. The survey also asks about student self-reported involvement in multiple organizations at our institution, to which the majority of the student respondents indicated they were not involved (Figure 5), including BIPOC students. These data were collected from the permanent withdraw and leave of absence forms submitted by students between spring 2019 and fall 2022 for a total of 994 students. Student Life collects the responses, and the analysis was completed by the Intuition Research and Strategic Analytics team in December 2022. Data are presented in aggregate form for all demographic groups to protect confidentiality since we have a relatively small number of BIPOC students.

When students lack engagement outside of the classroom, it negatively affects student outcomes, such as retention [19]. Literature historically places emphasis on students engaging and assimilating into institutions [20]. However, creating an environment where assimilation is expected can hurt BIPOC populations by neglecting the cultural contributions these students can add to enhance the institutional culture. While creating an environment where students want to engage is encouraged, it must be desired and natural. When BIPOC students already feel disconnected from the culture of their institution [2,5,6], engagement is not likely to be a desired option. Additionally, it could result in BIPOC students feeling forced to fit in instead of that engagement happening naturally. More recently, research has highlighted the importance of student engagement as an institutional responsibility as opposed to falling solely on the student [21].

The data demonstrate how the students who are withdrawing are not connected outside the classroom or do not feel the connections available are adequate, which signals an intervention from an institutional standpoint. Connection and community are direct reflections of sense of belonging; therefore, our institutional data confirms belonging as a significant factor impacting the experiences for withdrawn students, and research highlights the role institutions can play in strengthening that engagement.

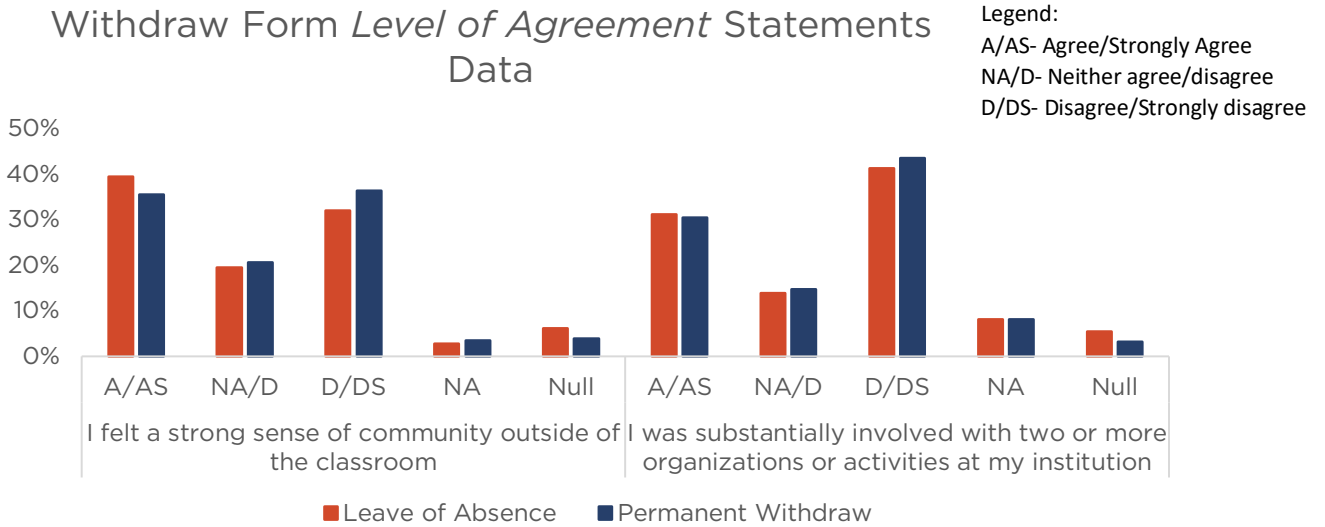


Figure 5. Withdraw Form *Level of Agreement* Statements Data Collected Spring 2019 to Fall 2022, n=994

Institutional data also depicts mental health as a significant reason impacting why students have withdrawn. Figure 6 illustrates the same pool of students over the same time period in terms of their response to the contributing factors in their decision to withdraw. The figure only includes the factors that were a strong contributing factor for at least 50% or more of the student population. Of those listed, the majority of students responded that their mental health was a strong contributing factor to their decision to withdraw. For most BIPOC students, mental health was also the strongest contributing factor to their decision to withdraw, but for Black students, personal and family priorities were the strongest contributing factor. Due to this finding, our survey made sure to include prompts about how students outside life affected their decision to withdraw. In comparison to the other contributing factors depicted, mental health exceeds the others in terms of total percentage for student agreeance.

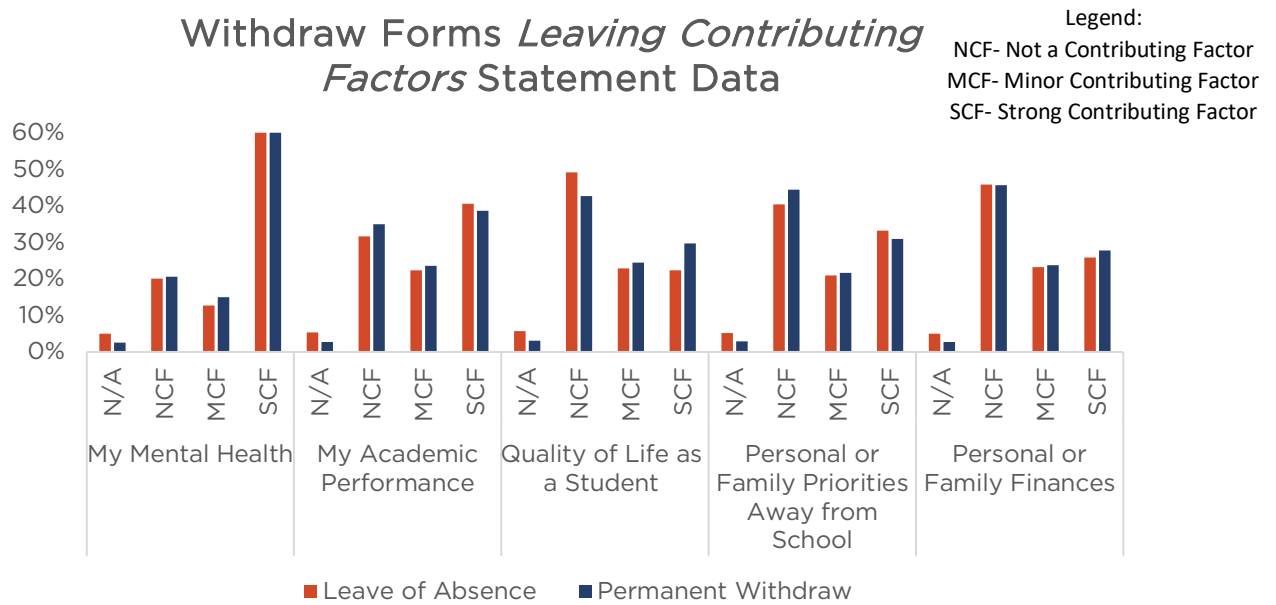


Figure 6. Withdraw Form Leaving Statements Data Collected Spring 2019 to Fall 2022, n=994

V. Recommendations and Conclusions

As research suggests, universities play a significant role in creating a supportive and inclusive environment that can foster academic and personal growth, thus increasing retention. To do this, student engagement is key, but more significantly, creating an environment where students from all types of backgrounds will want and have adequate opportunities to be engaged is vital. Universities must apply strategies that promote belonging, particularly for BIPOC and other underrepresented students, so that they feel engagement is both desired and organic. This gives universities the obligation of learning about the student populations that exist in their space and the ways to make them feel supported, comfortable, and valuable. It also highlights the need to create and promote community and belonging strategically with BIPOC students and other underrepresented populations who may not immediately connect with institutional culture at predominantly white institutions.

Literature also highlights the importance of shifting the conversation on retention from a deficit to an assets-based approach. This allows institutions to focus on the strengths that underrepresented students bring to their institutions instead of focusing on disadvantages they believe these populations possess [22,23]. This provides the space to introduce frameworks such as Funds of Knowledge and Community Cultural Wealth, both of which focus on how BIPOC students have knowledge and wealth within their very cultures, life experiences and family traditions that can support and promote their retention within engineering.

The role of mental health in institutional learning is another factor that universities need to bring into the conversation but infused within all institutional structures. Oftentimes, mental

health has a stigma that causes students (notably BIPOC students) to face mental health challenges on their own without leaning on support structures, if available, within their universities. University personnel should also be aware of cultural differences that can exist for how BIPOC students experience mental health challenges and offer a variety of structures that can support different responses to mental health concerns. This speaks to the importance of promoting an environment where discussion around mental health is accepted and respected and to take intentional steps to address stigma around mental health for BIPOC populations. And it also demonstrates the need for different personnel, from staff to instructors, to leadership, to all be educated and informed on mental health resources and tools coupled with cultural competency.

VI. Next Steps

SPUR used the insight of these institutional data discussed here, counseling center, the Multicultural Engineering Program, the Diversity, Inclusion & Access team and survey design experts to create a survey instrument that gives BIPOC and white students space to share their stories through open-ended questions, and through survey items relating to sense of belonging and mental health. Through identifying different or similar patterns between populations, we will pinpoint what structures within the institution would be most effective for implementing retention strategies, and how those may differ between BIPOC and white student populations.

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