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RESEARCH ARTICLE

Mental health in undergraduate engineering students: Identifying facilitators and barriers to seeking help

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Abstract

Background: Engineering students encounter high levels of stress, which may negatively impact their mental health. Nevertheless, engineering students who experience mental health distress are less likely than their peers to seek professional help, even when controlling for gender and race/ethnicity.

Purpose: We examined beliefs that undergraduate engineering students have about barriers and facilitators to seeking professional help for their mental health. We also sought to identify cultural and systemic factors within and beyond engineering that might affect help-seeking. Together, these beliefs influence students' sense of personal agency around seeking mental health care.

Method: We implemented a pragmatic qualitative design that incorporated the integrated behavioral model to investigate engineering students' ($N = 33$) professional mental health help-seeking beliefs. We used thematic analysis to analyze help-seeking beliefs and perceived barriers and facilitators that students described during interviews.

Results: We identified four themes: Navigating the system impacts personal agency; sacrifices associated with help-seeking act as a barrier; engineering culture acts as a barrier to help-seeking; and student confidence in help-seeking varies significantly. These themes portray the effect of perceived barriers and facilitators on students' personal agency for accessing mental health care. Our findings have implications for engineering departments and university counseling centers that want to minimize barriers to help-seeking.

Conclusions: Engineering stakeholders must improve access to professional help for engineering students. Implementing changes to normalize help-seeking behaviors, enhance personal agency, and facilitate engagement with mental health resources will create better conditions for engineers. Further research is necessary to understand how other beliefs (e.g., attitudes, perceived norms) inform the relationships between student mental health, professional help seeking, and engineering culture.

KEYWORDS
engineering culture, help-seeking, mental health, undergraduate

1 | INTRODUCTION

Pursuing a college education involves significant life transformations such as changes in independence, environment, routine, and social support; introduction to new substances; and increases in academic pressures and competition. These changes can induce stress and contribute to mental health concerns (Kruisselbrink Flatt, 2013; Taub & Thompson, 2013). Reports of mental health distress such as depression, anxiety, and suicidal ideation in college students have increased significantly (Duffy et al., 2019; Lipson et al., 2018), with a study in the United States revealing an increase in suicidal ideation from 6.4% to 15.2% of students between 2007 and 2017 (Duffy et al., 2019). In addition, suicide was the third leading cause of death for the college-aged population in 2020 (Injury Center, 2020), highlighting a critical need to understand and support mental health within this population.

A mental health treatment gap reflects the number of people who need mental health care but remain untreated despite the existence of effective treatments (Jansen et al., 2015). Although counseling centers across the United States have seen increases in student demand for services (Lipson et al., 2018), there is still a significant treatment gap for students that can differentially impact specific student populations. For instance, female-identified college students are more likely to seek mental health care than men, and White students are more likely to seek help than Latinx, Black, and Asian students (Eisenberg et al., 2012). Further, only 52% of students self-reporting suicidal ideation had received professional help within the past year, and only 32% were actively engaged in treatment (Downs & Eisenberg, 2012). Because mental health symptoms can impact academic performance, satisfaction with the college experience, and retention (Bruffaerts et al., 2018; Deberard et al., 2004; Eisenberg et al., 2012; Hartley, 2011), failure to seek help can result in negative academic outcomes. Additionally, mental health treatment can offer students diagnoses, medication, coping strategies, accommodations, and treatment plans to manage their mental health while fostering their success in college (Regehr et al., 2013; Vidourek et al., 2014). This can result in positive outcomes such as lower stress levels, increased problem-solving, and better overall mental health (Vidourek et al., 2014).

Numerous factors affect whether students will in fact seek help including aspects of their identity such as culture, race/ethnicity, and gender (Montano & Kasprzyk, 2015). Thus, to effectively develop interventions to improve help-seeking, it is imperative that researchers investigate factors that influence help-seeking within specific populations of interest. Within engineering, the high-stress learning environment that prioritizes academic excellence (Beddoes & Danowitz, 2022; Jensen et al., 2023), as well as cultural norms that favor logic, lack of emotion, and other traditional hegemonic norms (De Pillis & De Pillis, 2008; Frehill, 2004; Godfrey & Parker, 2010), have the potential to influence not only students' mental health but also help-seeking. Therefore, this article will focus on understanding the factors that influence help-seeking among undergraduate engineering students. Specifically, we aim to answer the following research questions: "What are the perceived barriers and facilitators that impact undergraduate engineering students' sense of personal agency around seeking mental health care?" and "How confident are undergraduate engineering students in their ability to seek help?"

2 | ENGINEERING STUDENT'S MENTAL HEALTH

The engineering learning environment has been described as "suffering and shared hardship" (Godfrey & Parker, 2010, p. 12), a "meritocracy of difficulty" (Stevens et al., 2007, p. 2), and an overall "culture of stress" (Cross & Jensen, 2018, p. 1; Jensen & Cross, 2021, p. 372). Students can experience stress related to an unsupportive and challenging learning environment, challenges in time management, and academic performance expectations (Ban et al., 2022). This culture of stress, which is often normalized in engineering (Beddoes & Danowitz, 2022), can negatively impact students' mental health. Several studies have aimed to quantify the prevalence of mental health distress among engineering students, and results have varied by population. Of significant concern, higher rates of mental health distress have been found in female and first-generation (Jensen & Cross, 2021), as well as gender-expansive engineering students (Hargis et al., 2021). In addition, engineering students who viewed their classrooms as competitive were more likely to suffer from anxiety and depression (Posselt & Lipson, 2016). These adverse effects were more pronounced for students with

marginalized identities, specifically female-identified and Black engineering students. This signals the importance of studying mental health in engineering, especially in marginalized student populations.

After controlling for demographic factors such as gender and race/ethnicity, engineering students who self-report symptoms associated with mental health distress are less likely to have received mental health care when compared to their non-engineering peers (Lipson et al., 2016). More specifically, only 25.1% of undergraduate engineering students self-reporting symptoms of mental health distress had received treatment in the past year, compared to an average of 39.4% of students for the overall college student population (Lipson et all., 2016). Further, although 28.4% of engineering students reported symptoms associated with a diagnosable mental health condition, only 16.4% had a diagnosis (Danowitz & Beddoes, 2020). This highlights a significant mental health treatment gap in engineering students, where engineering students are unlikely to seek help for their mental health and therefore they do not access the professional support necessary to receive a diagnosis.

Some qualitative studies in engineering have begun to identify potential causes for this treatment gap. In one study, an engineering student identified a decreased willingness to seek mental health care due to fear that a mental health diagnosis would impact their ability to get a job in a field that required security clearance (Beddoes & Danowitz, 2022). Although some engineering roles require security clearances, this varies across engineering major and career trajectory. Therefore, there are likely other factors influencing help-seeking behavior within the engineering student population. Another study characterized three types of barriers that influenced help-seeking in engineering students: (i) physical (e.g., time, location), (ii) cultural (e.g., normalization of stress, stigma), and (iii) informational (e.g., lack of knowledge) (Jensen et al., 2023). Although these studies are helpful in providing context for understanding help-seeking behavior in engineering students, the findings were part of larger qualitative studies focused around mental health and engineering culture, indicating the need for further studies specifically aimed at understanding help-seeking behavior in engineers.

The literature around engineering culture, which includes the normative set of beliefs, tasks, rituals, and values that dictate what it means to "be" an engineer (Cech, 2013; Jensen & Cross, 2021), can also shed light on how engineering students might view mental health and help-seeking. For example, engineering students are expected to have "grit" based on defining characteristics of engineering, which include rigor, stress, and suffering (Godfrey & Parker, 2010; Jensen & Cross, 2021; Kirn & Benson, 2018). Further, engineering has been characterized as a traditionally masculine discipline (De Pillis & De Pillis, 2008; Frehill, 2004), where engineers are expected to be "hard" or unemotional and to trust logic, analysis, and reason (Godfrey & Parker, 2010). This reflects how traditional hegemonic masculine norms shape engineering culture (Sagar-Ouriaghli et al., 2020). In the help-seeking literature, endorsement of masculine social norms such as self-reliance, emotional control, and valuing work over personal relationships has been associated with reduced willingness to seek psychological help (Juvrud & Rennels, 2017; Levant & Richmond, 2016; Mahalik & Di Bianca, 2021; McDermott et al., 2018). Therefore, it is important to understand how traditional hegemonic masculine norms in the engineering learning context relate to students' personal agency beliefs and help-seeking decisions. Engineering students also report higher stress levels and academic rigor in their studies relative to students pursuing other majors (Stevens et al., 2007). These high academic expectations are similar to those in other academically rigorous professional degree programs such as law, medicine, dentistry, and nursing, where students are also less likely to seek professional help for their mental health (Chew-Graham et al., 2003; Dyrbye et al., 2015; Ey et al., 2000; Organ et al., 2016). These studies identified that perceived stigma, fear of disclosure, and perceived detriment to academic and/or career success influenced help-seeking within these student populations. Together, existing research studies start to shed light on potential factors influencing help-seeking, but there is an important need for a comprehensive, theory-driven approach to better understand mental health related help-seeking in undergraduate engineering students.

3 | THEORETICAL FRAMEWORK: INTEGRATED BEHAVIORAL MODEL

The integrated behavioral model (IBM; also known as the integrative model of behavioral prediction) is an empirically supported social scientific framework that can be applied to identify beliefs that influence behavior within a population (Fishbein, 2000; Montano & Kasprzyk, 2015). The foundation of this model is robust research indicating that intention is one of the best predictors of behavior (Hammer et al., 2018; Kasprzyk et al., 2018). In the mental healthcare context, the IBM states that the most important driver of help-seeking behavior is intention to seek help (Figure 1).

Intention is shaped by three direct mediators (attitude, perceived norm, and personal agency) that are influenced by indirect beliefs. Attitude is a person's overall evaluation (bad vs. good) of help-seeking given their indirect outcome beliefs (anticipated negative or positive outcomes of seeking help) and experiential beliefs (negative or positive

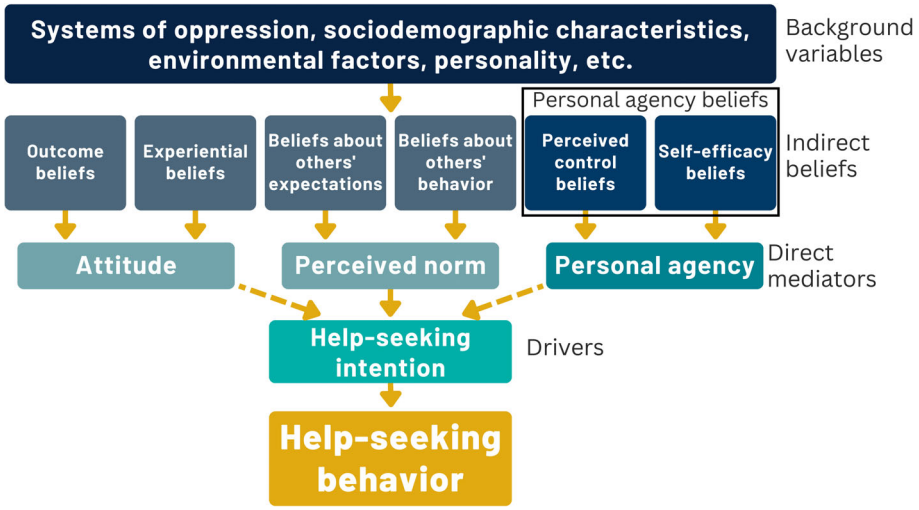

FIGURE 1 Background variables, indirect beliefs, and direct mediators influencing help-seeking intention and behavior per the integrated behavioral model. Through this article, we will focus on the personal agency beliefs that influence help-seeking.

emotional responses to the idea of seeking help). Perceived norm refers to societal pressure an individual feels to seek help based on their indirect beliefs about others' expectations for their behavior (i.e., do they believe that their friends or family expect them to seek help?) as well as their beliefs about others' behavior (i.e., do they believe that their friends or family would seek help for themselves?). Finally, personal agency refers to one's evaluation of whether they will be able to seek help, given their indirect beliefs about perceived control over seeking help (i.e., their perceived autonomy around help-seeking) and their self-efficacy beliefs (i.e., confidence or certainty in their ability to seek help in the context of perceived barriers and facilitators). Indirect beliefs can be influenced by background variables such as systems of oppression, sociodemographic characteristics, environmental factors, and personality. For example, the cultural norms of the engineering community could impact students' indirect beliefs about help-seeking, which can have a direct impact on the mediators that shape help-seeking intention and behavior.

For the context of this article, we focus on the ways in which personal agency beliefs (i.e., perceived control and self-efficacy) might influence students' help-seeking behavior. Perceived control can be influenced by environmental factors that make it easier or harder to seek mental health treatment. For instance, not having a car to access in-person mental health care would likely lower a person's perceived control. Self-efficacy can be influenced by four main factors: (i) personal experiences of success or failure, (ii) experiences of others, (iii) social persuasion, and (iv) emotional and physiological reactions (Bandura et al., 1999). In the context of the IBM, perceived control and self-efficacy are probed through questions such as, "What would make it easier/harder for you to seek help?" and "If you felt your mental health was negatively impacting your daily life, how certain are you that you could seek help from a mental health professional?" Personal agency reflects the beliefs that influence a person's evaluation of whether they could complete the behavior. Further, we defined perceived barriers and facilitators as those factors that increase or decrease one's sense of personal agency around help-seeking. In this way, perceived barriers and facilitators could impact a person's perception about the ease or difficulty of seeking help or about their capability to seek help given their particular circumstances. Taken together, our study focused on identifying how perceived barriers and facilitators influence personal agency around mental health help-seeking.

4 | METHODS

Engineering students experience a significant mental health treatment gap, motivating the need for a theory-driven study to identify how perceived barriers and facilitators influence personal agency around help-seeking. Qualitative methods can be useful for identifying a comprehensive list of barriers and facilitators perceived by engineering students. Therefore, the present study sought to identify perceived barriers and facilitators that impact undergraduate engineering students' sense of personal agency (i.e., perceived control and self-efficacy) around seeking mental health care.

4.1 | Design and development

Data reported in this article are derived from a larger mixed-methods project that used the IBM to explore undergraduate engineering students' beliefs about seeking help for their mental health. This project was guided by a pragmatic research paradigm. Pragmatism as a methodological approach to problem-solving requires recognition of a social issue and sufficient action to address the problem (Kaushik & Walsh, 2019). We chose this methodological approach to better understand undergraduate engineering students' experiences and to investigate the gap in mental health treatment. We used thematic analysis (Braun & Clarke, 2012) to examine the data. Thematic analysis complemented our pragmatic research design by allowing us to focus on identifying meaningful patterns that were relevant to answering our distinct research questions.

4.2 | Researcher positionalities

The six authors of this study included two doctoral students in counseling psychology, one master's student in social work, one tenured educational psychology professor, one tenured counseling psychology professor, and one tenure-track chemical and materials engineering professor. The authors include one Black woman, one White man, and four White women. As a collective research team, we bring experience in providing therapy and mental health support to young adults (including engineering students), developing and delivering higher education programming related to mental health, and supporting undergraduate students of diverse backgrounds. As a result, our personal experiences and identities informed the research topic, the study format, the questions asked in the interviews, and our interpretations of the data as they relate to college student culture, engineering culture, and mental health. For example, we collectively value the prioritization of mental health and believe in the effectiveness of professional help-seeking. Further, we seek to resist the narrative that one should disconnect from one's emotions, embrace high levels of stress as normative and acceptable, and practice stoicism or compartmentalization in order to matriculate into a field of study. We perceive that institutions and the programs offered through them, such as engineering, can socialize their constituents into prioritizing or de-prioritizing mental health. As a result, we believe that academic units have an obligation to prioritize students' mental health and think about the interpersonal and structural elements that influence help-seeking. We resist the urge to victim-blame by putting the onus of action on the people often most marginalized in a system. Instead, we aim to look at the structures in which people operate and use that to understand how the system needs to change to fulfill the ethical obligation of honoring the whole person (including mental health).

4.3 | Institutional context

We recruited participants from a large, Southern, research-oriented, predominantly White (76%) public university. At the time of data collection, the engineering program at this institution had 10 engineering majors, approximately 3000 undergraduate students, and over 200 faculty. First-year students enter the college of engineering into a general first-year engineering program and can participate in an engineering-focused on-campus residence program. After their first year, they enroll in discipline-specific courses.

4.4 | Recruitment and participants

After gaining institutional review board approval from the university, the research team recruited students during the Fall of 2020 and the Spring of 2021. To be eligible for participation, students had to be enrolled as an undergraduate student in engineering and at least 18 years of age. Participants were recruited in two stages. First, we asked course instructors to share information about the study on their respective course learning management systems. Second, to recruit students with marginalized identities, we asked administrators of identity-based engineering student groups on campus (e.g., National Society of Black Engineers, STEMgiQueers, Society of Hispanic Professional Engineers) to advertise the study to their group members. The recruitment materials included a video and letter detailing the purpose and voluntary nature of the study.

Students who were interested in participating completed an online survey, which collected information about their demographics, program of study, mental health help-seeking, mental health distress (Kessler et al., 2002), and help-seeking intention (Ajzen, 2019). Participants were described as being in moderate mental distress if they had a Kessler

K6 score between 5 and 13 and as being in serious mental distress if their score was greater than 13 (Prochaska et al., 2012). Help-seeking intention was measured on a Likert scale of 1–7. Those students who self-reported a score of 1–3 were labeled as unlikely to seek help and 5–7 were labeled as likely to seek help. Those who self-reported a score of 4 were labeled as neutral. A total of 250 students voluntarily responded to the screening measure.

We employed purposeful stratified sampling to develop a diverse set of interviewees across majors, years of study, gender, race/ethnicity, generational status, history of help-seeking, and mental health distress status. We successfully recruited 33 students to participate in an interview. As an incentive, we offered a $50 Amazon gift card to all participants who completed the interview. Interview participants were undergraduate students of all class years across all engineering majors (see Table 1 for other demographic information).

4.5 | Data collection

We developed a semi-structured interview protocol to guide the qualitative portion of the larger mixed-method project. The objective of the interview protocol was to promote in-depth reflection by participants on the stressors they experience as engineering students and their thoughts about mental health help-seeking, including the key belief categories of the IBM, and the influence of the engineering community and culture on these beliefs. To promote safety during the COVID-19 pandemic, interviews were conducted virtually via a HIPAA-compliant Zoom account. At the beginning of each interview, the first author (who was the sole interviewer) reviewed informed consent with participants. All interviews lasted between 45 and 70 min and were recorded. The audio files were transcribed.

Key interview questions about perceived barriers and facilitators included the following:

- "What sorts of things might influence whether you would seek help from a mental health professional?"
- "What would make it easier/harder to seek help?"
- "If you felt your mental health was negatively impacting your daily life, how confident are you that you could seek help from a mental health professional?"

4.6 | Data analysis

We focused on identifying semantic codes within the interview transcripts that fit the criterion of perceived barriers and facilitators that influence undergraduate engineering students' personal agency beliefs. We did not code help-seeking beliefs for other IBM mediators (e.g., attitudes, outcome beliefs), as that was beyond the scope of the present work.

We undertook an iterative process of generating and refining semantic codes that represented our data (Braun & Clarke, 2012). First, each interview transcript was read, and perceived facilitators or barriers were used to create initial semantic codes. Three researchers including one professor, one doctoral student, and one master's student generated initial codes. Once the final codebook was established, the two graduate students were responsible for coding all interviews. We used a process of negotiated agreement (Campbell et al., 2013) in which discrepancies were discussed to understand and resolve disagreements. This process resulted in a final list of 19 codes. Table 2 depicts the code definitions and criteria used to assess application of codes to participant data.

In addition to coding for perceived facilitators and barriers, we screened transcripts for participant responses about confidence in seeking help. Confidence about seeking help was coded according to whether the student indicated that they were certain they could or could not seek help, certain they would or would not seek help, or uncertain if they could/would or could/would not seek help. We developed themes by combining codes into larger, more meaningful patterns (Braun & Clarke, 2012). We used an inductive approach to developing themes, allowing them to emerge from the data. To facilitate review of the themes and codes, we identified representative quotations that reflected the patterns of meaning that we aimed to demonstrate.

We based sample size for data collection on the informational power model wherein sufficient informational power is determined by five influential dimensions of the study, namely study aim, sample specificity, use of established theory, quality of dialogue, and analysis strategy (Malterud et al., 2016). Our study was exploratory, grounded in theory, and incorporated inductive data analysis across multiple cases. We used specific inclusion criteria for recruitment and focused dialogue between interviewer and participants. Owing to the cross-case design, broad aim, and interviewer's level of experience, we sought a larger sample size (30+). Preliminary analysis of the data indicated that we could sufficiently describe what facilitates and inhibits undergraduate engineering students' mental health help-seeking behaviors.

TABLE 1 Description of the interview participants.

ID	Personal information	Major	Year	Prior help-seeking	Mental distress	Help-seeking intent
A	White, man	Mining	1	No	Moderate	Unlikely
B	Latina, woman, first generation	Chemical	3	No	Moderate	Neutral
C	White, transgender man/nonbinary, first generation	Computer	1	Yes	Serious	Likely
D	Black, woman, first generation	Computer science	3	Yes	Serious	Likely
E	Gender fluid, first generation	Electrical	2	N/A	Serious	Unlikely
F	White, woman	Mining	2	Yes	Serious	Likely
G	Asian, man, first generation	Materials	2	Yes	Moderate	Likely
H	White, man, first generation	Mechanical	4	No	Moderate	Unlikely
I	White, woman	Biosystems	1	Yes	Moderate	Likely
J	Multiracial, woman	Materials	<1	No	Moderate	Neutral
K	Multiracial, man	Biomedical	1	Yes	Moderate	Likely
L	Asian, American Indian, woman, first generation	Materials	1	Yes	Serious	Likely
M	White, woman, first generation	Materials	2	No	Moderate	Neutral
N	White, woman	Biosystems	1	No	Moderate	Neutral
O	White, man	Civil	1	No	Moderate	Unlikely
P	Asian, woman, first generation	Computer Science	<1	No	Moderate	Unlikely
Q	Asian, man	Chemical	3	Yes	Moderate	Likely
R	White, man	Mechanical	4	No	Serious	Unlikely
S	Multiracial, woman	Mechanical	3	No	N/A	Unlikely
T	Prefer not to disclose race/ethnicity, agender	Chemical	2	No	Moderate	Unlikely
U	White, man	Mechanical	4	No	Moderate	Unlikely
V	Asian, agender	Mechanical	<1	Yes	Serious	Neutral
W	White, woman	Mechanical	3	No	Moderate	Unlikely
X	White, genderqueer	Chemical	3	No	Serious	Unlikely
Y	Latina, woman	Chemical	3	No	Moderate	Likely
Z	Asian, man	Chemical	3	No	Serious	Likely
AA	White, woman	Chemical	4	No	Moderate	Unlikely
BB	Multiracial, Black, man	Computer Science	<1	No	Moderate	Unlikely
CC	Asian woman	Mechanical	3	No	Serious	Neutral
DD	White, man, first generation	Civil	<1	Yes	Moderate	Likely
EE	Asian, man	Electrical	2	No	Moderate	Likely
FF	Asian, man	Electrical	1	No	Moderate	Unlikely
GG	Multiracial, man	Chemical	4	No	Serious	Unlikely

Note: Year indicates the number of years that the students had completed in the engineering program.

5 | FINDINGS

As participants reflected on their academic and social experiences as engineering students, they described the ways they felt the university and engineering environment contributed to their knowledge and personal agency around help-seeking. The patterns in students' responses could be well characterized by four themes that reflect the dynamic interplay between factors that promote and prevent seeking-help for mental health concerns: (i) Navigating the system impacts personal agency; (2) Sacrifices associated with help-seeking act as a barrier; (iii) Engineering culture acts as a

TABLE 2 List of codes, definitions, and qualifications or exclusions for applying the codes.

Code	Definition	Qualifications or exclusions
Making appointment	Perceptions of ease or difficulty of making an appointment	Discussion of feelings about or process for making appointment
Cost of services	Perceptions of how much it costs to access mental health resources	Mention of financial resources, finances, or free services related to help-seeking
Lack of immediate support	Perception of how quickly a student could access mental health providers	Discussion of timeliness of support or accessibility of mental health providers
Discretion	The ability or lack thereof to receive help in a private space	References to privacy, confidentiality, or discretion related to help-seeking
Appointment availability	Perceptions of limited appointment availability	References to appointments being limited based on own or others' experiences
Competing time demands	Lack of time or schedule conflicts	References to academics, extracurriculars, or other activities that occupy one's time and are prioritized over mental health care
Faculty inflexible	Perception that professors will not be flexible if a student is dealing with a mental health concern	Mention of observed or anticipated faculty responses to requests related to mental health concerns
Help-seeking in person	Preferences for or against receiving mental health help in person	Discussion of format for working with provider: in brick-and-mortar facilities
Help-seeking via telehealth	Preferences for or against receiving mental health help via telehealth	Discussion of format for working with provider: virtually/online
Help-seeking on-campus	Preferences for or against receiving mental health help on-campus	Discussion of location of services: on-campus rather than in community
Help-seeking off-campus	Preferences for or against receiving mental health help off-campus	Discussion of location of services: in community as opposed to on-campus
Mental health resources	The advertisement of and discussion of mental health resources by others	Mention of influence of professors, peers, and significant others on help-seeking intentions
Mental health symptoms	Symptoms associated with having a mental health concern	Discussion of how one's mental health symptoms interferes with the process of securing an appointment with a provider
Navigating system	Perceptions of ease or difficulty of navigating the healthcare system	Discussion of the steps involved in accessing appointments or resources
No academic penalties	Perceptions of academic penalties or losses	Mention of consequences associated with prioritizing mental health over academics
Trying to find the right fit	The perceived quality of the relationship with the provider	References to quality of relationship with provider or fears associated with developing a relationship with someone new
Distance or location	The distance and or location of mental health resources	References to transportation and physical accessibility of mental health services

barrier to help-seeking; (iv) Student confidence in help-seeking varies significantly. Below, we present illustrative quotes to describe each theme.

5.1 | Navigating the system impacts personal agency

Most engineering students we interviewed perceived navigating the mental healthcare system as a barrier to their seeking help. Their descriptions revealed three distinct processes represented as the following subthemes: challenges

associated with accessing treatment; ambivalence about working with mental health providers; and challenges associated with finding accessible resources.

5.1.1 | Challenges associated with accessing treatment

Although several participants were aware of how to make an appointment with the university counseling center, some felt overwhelmed by the number of steps required to receive mental health care.

> You don't want to have to sit in a bunch of lines or go through a lengthy process to just ... speak with a mental health professional, especially the first time ... That's just a physical barrier. Nobody wants to spend a lot of time doing something they're already kind of anxious and on the edge about doing.
>
> [Participant A]

As a result of the compulsory, multi-step process for making an appointment, some students avoided navigating the mental healthcare system altogether. Additionally, the number of steps required to make an appointment was a challenge or perceived barrier among students who were struggling to manage their mental health concerns. For example, Participant C explained, "when you're like feeling very down and depressed, like just doing things is very difficult, so it's just another thing on a list of things to do." These concerns could interfere with their ability to complete the associated tasks. Participant D echoed this sentiment:

> I think if I have been dealing with a mental health issue for a month and ... in your head, being like "it's not even going to help," even though you know it will help. So, you're just frustrated, and you're like, "I don't even want to go." It's like ... this tired feeling. Like not even wanting to do anything.
>
> [Participant D]

In this way, having a mental health concern could function as a barrier to engaging in the number of steps required to schedule an appointment.

Beyond the process of scheduling, several participants were also concerned about a lack of readily available appointments. Some participants had direct experience with being on the waitlist, whereas others had heard about a long waitlist, which kept them from attempting to make an appointment. For those who felt that taking this first step was hard enough on its own, being told that they could not be seen right away was reported as a deflating experience.

> There's a lot of waitlists ... so sometimes I just know in my head that, "well, it might be a week or two, so why even bother?" And so, a lot of times I throw a roadblock up and stop myself there without even actually ... thinking, "well, let me just call and try."
>
> [Participant C]

Consequently, long waitlists acted as a perceived barrier by conveying to students that there was a lack of immediate support available.

5.1.2 | Ambivalence about working with mental health providers

Finding a "good fit" and building a relationship with a mental health professional was another concern. Many students worried about the quality of help they would receive and how well a professional trained outside of engineering could understand their experiences. For example, Participant G said, "Sometimes I don't feel like I can always seek help from a mental health professional because they're not engineers, and they don't understand what I'm going through." Engineering students perceived that their experiences as college students might be unique compared to other students. As a result, believing that their problems could not be solved or understood by a mental health professional was a significant barrier to seeking help.

Furthermore, several participants worried about the potential relationship they might have with a therapist. They were particularly concerned about wasting a therapist's time if their symptoms happened to improve before an

appointment became available. Participant B used this to justify managing her own mental health alone rather than seeking help:

> ... in the back of my mind I would always just try to say something like, "well, maybe in a month or in three weeks, I could be feeling better, and I don't wanna waste the counselor's time by making an appointment now."

Time is a valuable resource for engineering students, and this frame of reference led some to presume that time is also valuable for mental health providers and therefore should not be "wasted." Participants' ambivalence about working with mental health providers appeared to stem from both a lack of knowledge about providers' training and how it might be useful to engineers who are experiencing a wide spectrum of mental health distress. Overall, to effectively navigate the mental healthcare system, students must engage in the combination of steps required to set up an appointment, potentially endure long waitlists, and mitigate their concerns about the future relationship with a therapist. The combination of these factors often results in students' further resistance to seeking help.

5.1.3 | Challenges associated with finding accessible resources

Another difficulty many participants discussed was navigating the format or location of therapy sessions and the financial cost of obtaining mental health care. For example, some participants did not want to attend appointments in person, preferring a telehealth option. Participant C identified the perceived benefit of talking to someone with greater ease by seeking help online: "I also wanted to add how it can be easier to talk to someone through telehealth, just to ... come out with things that are harder to say in person."

For participants who were interested in face-to-face counseling services, the location of the counseling center was a primary concern. The university counseling center was perceived as an easier resource to navigate than local resources within the community. Further, on-campus resources could alleviate some challenges associated with navigating the broader healthcare system. For example, Participant C stated, "Obviously, I also think that our current healthcare system makes it way more difficult than it ever should be, and the university helps with that a pretty decent amount, especially with the counseling center specifically."

Many participants also cared about the location of mental health services because of concerns about privacy. They associated other people noticing their help-seeking with feelings of discomfort and shame. For example:

> I guess if it's in a spot ... like a designated mental health center or something like that, and ... everyone could see [you] going in there ... I feel like that would be kind of awkward or make you feel a little ashamed.
>
> [Participant H]

Discrete treatment settings could prevent others from finding out about their mental health concerns. Some participants also worried about what others might infer if they were seen going to locations labeled as mental health centers or hospitals. The thought process looked like this for Participant A:

> If you have to go to a hospital or something ... that would kind of carry the connotation that something is wrong with you ... Whereas if it was in a lot more of a neutral space then it might be like you're going and it's not necessarily something wrong ..., but it's just a beneficial thing that you can do. You know, it's like going to a yoga class or whatever.

Another structural barrier to help-seeking was the potential cost of mental health services. Fortunately, many participants felt that free mental health care available on campus made it easier to access treatment. In contrast, those who might want or need services offered off-campus discussed the associated financial burden. Insurance also acted as a barrier when participants considered having to make co-payments or talk to parents about utilizing insurance to address their mental health.

Generally, the structural challenges of navigating the system contributed to most participants' unwillingness to seek help. Several participants felt intimidated by the process of initiating care because of the number of steps involved in

making an appointment, the lack of appointment availability, managing adverse mental health symptoms, matching with a therapist who was a good fit, the modality or location of mental health services, and the financial cost of mental health care. When participants evaluated whether they could or would seek help, they considered not only the myriad factors described here but also sacrifices they would need to make to get help.

5.2 | Sacrifices associated with help-seeking act as a barrier

When deciding whether to pursue help, many participants considered the sacrifices they would need to make to prioritize their mental health. There were two subthemes that reflect underlying processes embedded in several students' responses: student priorities reflect academic values, and students apply highest yield thinking to mental health concerns. The subthemes highlight how personal factors, such as values, affected engineering students' decision-making when considering whether to seek mental health care.

5.2.1 | Student priorities reflect academic values

One reason that some participants cited for avoiding help-seeking was the unwillingness to sacrifice the time needed to make and attend an appointment. Most participants were concerned that help-seeking would require them to sacrifice time typically used to study. For example, Participant L shared:

> I still didn't think to just go back to [the mental health professional] and talk to them because I was like, 'I don't have time for this. I have to get my work done ... I don't have time when I have to work on everything else.' Which is not good.

While students recognized the downside of their thinking that led them to deprioritize help-seeking, they still were unable to rationalize the decision to seek help during times of academic stress. Furthermore, some participants recognized that the time sacrificed to pursue mental health help was a long-term commitment. With so many time commitments, ranging from managing their academic workload, to household chores, to spending quality time with loved ones, some worried that therapy might not provide an immediate or time-efficient solution for their concerns. Participant G shared, "the disadvantage is that ... we talk for so long and we don't get anywhere. It's like, I'm an engineer, I need to be efficient ... I can't waste time on a therapy that's not working out." This statement portrays one example of how engineering students might rationalize their decision not to seek help based on their engineering values. Some do not perceive therapy as valuable because it may not be an efficient process; and efficiency was a value that many students attributed to being an engineer.

For other participants, the thought of investing time in the help-seeking process only served to increase their stress levels. Sacrificing the time needed to complete coursework for counseling was a significant barrier to pursuing help. Students specifically associated less time spent studying with an additional indirect cost: negative academic performance. Participant M noted that her academics might feel less manageable if she had even less time in her schedule dedicated to work:

> Maybe that time would actually be more productively spent going to a mental health professional ... But yeah, I definitely think that I would see it as a drawback that you're losing time and ... not that it's not worth the time, but that there's so much to do and it would stress me out more.

Across the data, participants were dedicated to prioritizing schoolwork, resulting in limited time to seek help for their mental health.

5.2.2 | Students apply highest yield thinking to mental health concerns

Many students felt the need to complete and succeed in their academics "by any means necessary," meaning that they prioritized their academics even if this meant delaying or avoiding seeking help for mental health concerns. Participant N acknowledged this potential effect when saying:

> It's kind of like we don't have the time. It's like, keep your head down. We gotta get through our work, and [mental health], that's almost put to the side. The priority is our work, and if we don't feel like there's time, then there's really no reason to go. Keep busy and then you don't have to worry about it, I guess.

In this way, staying busy becomes an avoidance-coping strategy that allows engineering students to distract themselves from other concerns that might be impacting their lives. When trying to manage both academic and mental health concerns, Participant C described the process of prioritizing:

> I think you focus on the thing that's more easily fixable ... When I look at, "oh, I have really bad grades," I see a thing that I can do that will cause a solution, and it's like a math problem. If I do these things then I will get this grade, whereas fixing your mind is a lot less of that. And so, I think engineering brain takes over and says "I'm solving this problem, you know, with the highest yield steps. First highest yield is I'm going to finish this project." But obviously when I do that, as hard as I try to actually finish those things academically, it's not going to happen nearly as much and nearly as well as it could be if I'm already going through a mental health crisis.

This participant was able to recognize not only how they rationalize their decision to prioritize academics over mental health but also the consequence of doing so: potential lower quality or incomplete work. Because academic concerns can feel easier to tackle, students may justify focusing on those tasks instead of addressing mental health concerns.

Many participants did not feel that they could prioritize their mental health, leading them to deny feelings of distress altogether:

> I feel like the last semester we didn't have a lot of time to do hardly anything. And, you know, having the freak outs about test grades or studying or something like that ... I even felt like "I don't even have time to be freaking out about this. I don't have time to actually feel like this." So, you know, there's kind of like a "stop it, suck it up, you have other things to do" and then just pushing it to the side ... And so, if I don't have time to actually react like that, when do I have time to actually see how to fix that?
>
> [Participant J]

Furthermore, several participants perceived their rigorous education as temporary—something they just have to get through, and after college they will be okay. Participant J described how she anticipated the pressure changing in later stages of her career:

> The pressure with that kind of ... career path ... you have to prioritize the education and the work that goes towards it instead of ... yourself ... I think a lot of people think that it's just four years ... or however many years that they have to go to school, and then after that it's fine. You know, they don't need to really worry about it. They need to get through the school and then it'll be fine.

According to Participant J, it is a common perception when choosing an engineering career path that engineering education comes with the pressure to prioritize the work over oneself. The presumption is if they can do this, then, in the end, they will be fine.

Overall, many participants perceived a cost associated with seeking mental health care and struggled with making personal and academic sacrifices that would allow them to pursue treatment. These findings suggest that engineering students' over-prioritization of work may be an avoidance-coping strategy that leads them to ignore or minimize mental health concerns. Students' values were often shaped by their experiences and expectations as engineering students. Students described the expectations within engineering as "suck it up" and "prioritize the education," and they also noted how such phrases seemed to typify the broader culture within engineering.

5.3 | Engineering culture acts as a barrier to help-seeking

This theme provides insight into cultural aspects of the engineering learning environment and how participants saw this culture influencing their personal agency around seeking help for a mental health concern. In nearly all interviews

(as reflected in the previous theme), participants discussed how the rigorous nature of engineering learning and high standards for academic achievement affected their time management and unwillingness to pursue mental health services. Most interviewees believed that producing high-quality work and earning good grades in preparation for their future career was top priority. Two subthemes—perceiving and internalizing pressure to perform, and desire for normalized mental health discussions—characterize the perceived impact of engineering culture on personal agency around seeking help.

5.3.1 | Perceiving and internalizing pressure to perform

Interview responses suggested that some students perceive professors' messaging as reflective of the discipline's overarching values: stoicism, grit, and productivity. Participant M provided an example of how engineering professors might negatively influence mental health culture:

> I have definitely had professors in the past who are like "Nope, like you had time to do this ..." and kind of like they don't care what's going on in your personal life, to put it bluntly, and they want to make sure that everything ... get[s] done, on their terms ... And I think that, that is not very good for mental health. So ... they aren't obviously openly saying like "don't go to these mental health resources" or anything like that, it's more of a just kind of like a culture that they're creating within their classroom that is more so mentally unhealthy than in other classrooms that I've been in.

Here, the professor is perceived to expect students to remain productive regardless of what might be impacting them outside of their courses. Similarly, Participant I described how some professors were rigid when it came to addressing students' mental health. From her perspective, professors may not view mental health concerns as a valid reason to miss classes:

> I think if it was someone that missed class for that reason and just had a general note or something, they—not every instructor, but some instructors—might not view that as a valid reason to miss. If you're not on your deathbed, it's not a valid reason to miss.

To fit into this culture established within the engineering community, students adhere to the norms they have identified from interacting with peers and professors in their environment.

Most participants felt that professors valued student productivity over all else. Consequently, students were reluctant to ask for extensions or indicate that they could not meet expectations, for fear of disappointing their professors. Participant O named academic excellence, a cultural norm in engineering, as a source of pressure for all engineers: "I guess the big picture is that in general, engineers are pressured by workload and the fear of failure. I feel like that just comes from sheer workload, academic excellence, the stigmas surrounding all of that for engineers." Moreover, Participant F shared that she would be a lot less likely to seek help if she was busy with school: "Obviously for me, school always comes first, no matter how bad I'm feeling, no matter how sick I am. So, if I was really busy with school, like finals week was coming up, maybe I wouldn't reach out."

As discussed in the previous theme, many students felt that time was an important factor affecting their ability to keep up with academic demands. Thus, if help-seeking would interfere with the participants' ability to meet deadlines, study for exams, or otherwise demonstrate excellence and competence, then they were much less likely to engage with the help-seeking process. Participant G indicated that this pattern of choosing work over mental health extended beyond help-seeking to include limiting time spent socializing with friends:

> They [engineering students] might feel judged. They might feel like they don't have enough time to do it because engineering is such a hard major. They just want to spend all their time studying and not taking care of other parts like mental health or even socializing with other engineering majors.

Of note, Participant G's remarks do not solely capture his personal experiences as he generalized the pattern to engineering students as a whole. Some participants believed that by selecting engineering as a major, they had informally

agreed to prioritize their work over their personal needs. This belief might operate as a cultural norm in the context of engineering education. Participant J's comments are relevant in this regard:

> I think [engineering students are] prioritizing work over themselves as well and having priorities that are with what they're working on or their classes and stuff like that, and I guess ... that just kind of dehumanizes us .... I'm very guilty of thinking, "this comes first, I will deal with my feelings later, or I'll just tuck them away and just not think about it."

Participant J compartmentalized or suppressed her feelings to focus on completing the course work. Although this student might recognize this as an unhealthy coping mechanism, she also generalized this expectation as a norm within the engineering community.

5.3.2 | Desire for normalized mental health discussions

Not all participants were committed to acculturating to existing norms or using avoidance-coping strategies instead of seeking mental health services. Several participants expressed interest in mental health resources, and many wanted to hear more from professors about these opportunities. When reflecting on her exposure to the counseling center's resources, Participant L felt intrigued, saying:

> There was this thing where we sat in this little auditorium and learned about the counseling center and all of the things that they had to offer. You could just sit down, talk to people ... [do] relaxation exercises, and that made me want to go there.

Although some students seemed open to accessing these resources, they felt that the positive messages that they received around mental health resources were not shared by all faculty members in engineering. Further, students distinguished between a professor's professional obligation to make students aware of resources and their actual level of personal interest in participants' mental well-being. Participant O shared:

> I feel like ... every single one of them [professors] would say that ... they are in support of it. They would say "go get help." But I also feel like only a few, [I'm] estimating roughly 30%, would have a sort of human, character driven, response in saying those words. A lot of it is just policy and memorization.

Our participants' reflections suggest that it may be important for them to feel a genuine sense of concern or care from engineering professors to promote and normalize mental health help-seeking.

We nevertheless found some exceptions to the perspective that most professors are uninterested in students' mental health. Some participants noticed and appreciated when professors conveyed genuine care when discussing options for support on campus. In fact, Participant O went on to say:

> I've had some [professors], one in particular, that has always been very, very human about seeking help and makes us feel like even if we're doing poorly in the class and it feels like something['s] slipping away, we're still OK. We can still get help.

Overwhelmingly, many participants felt that the general engineering population could benefit from being more connected to mental health resources. However, as previous themes have exemplified, providing information to cultivate awareness of mental health resources is just the start of the help-seeking process. Participant C felt that students also had a responsibility to use their knowledge of resources to seek out services:

> I see a lot of spitting resources at people, so like, "Here's a list of all these resources, go click all these links." So, I know a lot of that is just making people aware of what's available to them, and then it's up to the individual whether or not they actually decide to click those links or decide to call those numbers.

Participant N felt that normalizing the process of seeking counseling for a range of concerns would help her feel more comfortable with pursuing services. She emphasized the importance of other people talking about their experiences as a method for normalizing help-seeking:

> I guess if people do it, they don't talk about it. So, if more people I was around were talking about it or people spoke more about casually going to get help—I feel like all the experiences I hear is someone who is feeling something a lot more extreme than I am. So, then I feel like I'm not included in a group that should go to get mental help—but if it was more normalized, I guess that would make me more inclined to go.

Not only did this student note the lack of conversation around mental health in engineering but she also highlighted that her only experiences with conversations around help-seeking were related to others who were in significant distress. Comparing her own concerns to others' prevented this participant from seeking help because she associated help-seeking with what she perceived to be "more extreme" distress. Participant N and several others commented on the lack of conversation about mental health concerns within the engineering community. Professors have a unique opportunity as powerful role models in participants' lives to shape help-seeking culture within engineering. However, participants felt that most of their professors were not explicitly supportive of mental health.

Throughout this theme, participants' reflections and personal experiences demonstrated the significance of cultivating an environment where they felt their mental health needs were important and respected. Without this environment, engineering students may feel that their mental health is not relevant, leading them to minimize their mental health concerns. As a result, their avoidance may prevent them from seeking mental health help.

5.4 | Student confidence in help-seeking varies significantly

We were interested in participants' assessment of their help-seeking self-efficacy, which was targeted in the interview question, "If you felt your mental health was negatively impacting your daily life, how certain are you that you could seek help from a mental health professional?" In response, participants provided answers that addressed their self-efficacy (e.g., I could seek help, I could not seek help). Responses to these questions helped us assess students' confidence in their ability to seek help, which addresses our second research question.

Of the 33 respondents, half said they were certain they could seek help from a mental health professional. Two participants were uncertain about whether they could seek help. Notably, 14 participants described feeling that although they could seek help, they would not actually follow through with it. This highlights the complexity of beliefs that contribute to a student's decision to seek help for their mental health beyond having the knowledge that lends itself to self-efficacy.

For those who felt that they could seek help, facilitators included their own or a loved one's past help-seeking, the severity of symptoms, and access to treatment on campus. Participant O attributed some of his confidence to the progressive campus environment:

> [My] gut reaction number is 80% OK. I'm very confident that I would be able to seek help. I could imagine that I would hang up for just a second on those sort of deeply ingrained stereotypes of weakness. But seeing now, and especially being at this university for two plus years now, I feel like I could break through that because this place is a lot more progressive than where I came from, that's for sure.

Although this student was able to see the positive impact the university had on his feelings around help-seeking, he still recognized the stereotypes he held on to when thinking about mental health.

Additionally, several participants cited factors that would undermine their confidence such as not recognizing mental health symptoms that warranted help seeking, not wanting to admit to having a problem, and not having enough time. For Participant P, past success with coping on her own made her feel less confident that she would seek help:

> I don't know, 'cause I've been there before and I got through it by myself, so I don't think I'll be likely to seek professional help in the future if I got into the same situation. But it might just be my personal opinion.

This lack of clarity around whether or not they would actually seek help was echoed by multiple students through the study. Although Participant B had an awareness of resources that might promote her self-efficacy, she was undecided about whether she would seek help of her own accord:

> I would say it's pretty 50/50. I might seek help. I might not. I feel like I would definitely be relying on the people around me to say something ... because ... in the back of my mind, I would always be trying to convince myself that it's not a big deal. It's something I might get over, like in a week ... [and] the people around me are probably going through the same thing and they seem fine. So yeah, just feeling like it's not that serious when it might actually be.

Here, the normalization of stress acts as an additional barrier to seeking professional help. Because this student perceived that her peers were going through the same experiences without facing any challenges, she felt that she should be able to do the same. Further, she highlighted the importance of other people helping her to recognize when she might cross a line and need to seek professional help. Similarly, Participant N lacked confidence in her ability to recognize symptoms that warrant help-seeking, which would ultimately impact her decision to seek help:

> I know I can. I do know a lot of resources. They are passed around and I know [name of institution] would provide them to me ... but I don't know that I would recognize myself as needing it or recognize when that point is. I guess there's no clear descriptor of, "Oh, this is time to ... seek help." I guess it's just a personal feeling and I don't see myself as ever thinking, "today's the day," you know, "this is too much for me to handle." I've never experienced anything to know if I would. It would take a lot for me to finally seek professional help.

Although most participants recognized that they could seek help, whether they actually would involved a more complex decision-making process. The final decision to seek help was informed by a combination of attitudes, perceived norms, stigma, and personal agency beliefs, indicating that access to resources is not enough to guarantee participants' confidence in their ability to seek help.

6 | DISCUSSION

This study revealed factors that influence engineering students' personal agency including specific perceived facilitators and barriers to professional help-seeking for a mental health concern. Although engineering students seek help less often than their counterparts outside of engineering, we expected and confirmed that engineering students face many of the same barriers as students from other disciplines. These findings are consistent with the help-seeking literature for the college student and general population. In addition to these more widespread barriers, our findings indicated that engineering students perceived cultural norms of the engineering learning environment that influenced their personal agency regarding help-seeking. We identified four themes that offered insight into engineering students' help-seeking self-efficacy and decision-making process, as well as how the engineering learning environment was perceived to influence their mental health related help-seeking.

Our finding that engineering students view navigating the mental healthcare system as a barrier to seeking help aligns with previous work on other populations of college students (Eisenberg et al., 2007; Gulliver et al., 2010). For instance, location (Andrade et al., 2014), cost (Andrade et al., 2014; Eisenberg et al., 2011), transportation (Andrade et al., 2014; Marsh & Wilcoxon, 2015), and lack of time (Eisenberg et al., 2011; Marsh & Wilcoxon, 2015) are commonly identified as barriers to help-seeking. Additionally, it was clear that preferences for treatment format were individualized, necessitating flexible treatment options to meet individual needs. For instance, some participants talked about the accessibility and discretion afforded by telehealth care, whereas others preferred in-person treatment options. This is consistent with research on mental health care in college students (Dunbar et al., 2018; Hadler et al., 2021). Similarly, other studies have found significant variance in preferred treatment format and attributes such as method of making appointment, formality of treatment, appointment length, delay in appointment availability, and counseling center hours (Sagar-Ouriaghli et al., 2020; Walsh et al., 2022), highlighting the need for flexible mental health care treatment options.

Another salient concern for engineering students was the external and internal factors that contributed to a delay in treatment. These include insufficient on-campus treatment options to meet the high demand for services, as well as experiencing debilitating mental health symptoms that further limit access to timely mental health treatment. In particular, participants discussed how being put on a long waitlist to get an appointment in the counseling center was a deflating experience and interpreted as a barrier to help-seeking. Prior studies have shown that wait time can negatively impact students scheduling their intake appointment (Krendl & Lorenzo-Luaces, 2021) and that shorter wait times are valued across a wide variety of students (e.g., undergraduate, graduate, social class, etc.) (Walsh et al., 2022). Additionally, for students experiencing debilitating distress, immediacy of treatment access can be a critical factor in whether they pursue treatment (Pretorius et al., 2019). Personal distress levels can also impact help-seeking because symptoms of mental health distress must be overcome to initiate treatment. For example, symptoms of depression result in lower help-seeking motivation (Eigenhuis et al., 2021; Polacsek et al., 2019), and suicidal ideation can result in reduced help-seeking intention (Rickwood et al., 2005). Together, these external and internal factors can either delay or prevent students from accessing mental health supports altogether.

Beyond structural factors, students highlighted that their perceptions of help-seeking were influenced by engineering cultural norms. We found that students are aware of and internalize engineering socialization practices that emphasize academic excellence and grit and understate the significance of mental health. Further, engineering students are trained to solve problems "efficiently and effectively" (Godfrey & Parker, 2010, p. 14). Therefore, some students view therapy as inefficient and inconsistent with engineering values. Furthermore, participants specifically highlighted the lack of genuine, character-driven discussion of mental health both inside and outside the classroom. As a result, participants often perceived sharing of resources by faculty as an obligation, rather than something faculty viewed as important for their students' well-being. Prior research on engineering cultural norms suggests the relevance of traditional hegemonic masculinity norms such as stoicism, strength, self-reliance, grit, and avoidance of vulnerability (Addis & Mahalik, 2003; Godfrey & Parker, 2010; Lewis et al., 1998), which have been associated with lower rates of help-seeking among those who endorse such norms (Mahalik & Di Bianca, 2021). Direct and indirect messages from professors and peers influenced students' perception of help-seeking as a behavior that violates existing engineering cultural norms related to "hardness" and grit (Godfrey & Parker, 2010) and associated with traditional hegemonic masculinities (Akpanudo et al., 2017).

These cultural norms are further reflected in students' responses to stressful time periods. Rather than attending to their feelings and/or mental health concerns, participants described feeling the need to "suck it up" and "prioritize the education." Although the ability to regulate emotions can result in improved mental health, emotional suppression can have negative consequences for mental health (Hu et al., 2014). In a study of medical students, the use of approach-based coping strategies over avoidance-coping strategies was associated with positive mental health outcomes (Thompson et al., 2016). Therefore, the development of coping strategies that allow students to acknowledge, appraise, and regulate emotions can result in improved well-being. Further, because engineering students feel the need to prioritize academic success over their mental health, it is important for students to recognize the impact that poor mental health can have on academic abilities (De Luca et al., 2016; Eisenberg et al., 2009; Wyatt et al., 2017). In this way, promoting mental health as a way to support and potentially improve academic performance could be motivating for engineering students.

Additionally, engineering students have been found to perceive their discipline as more rigorous and competitive than students studying other subjects (Stevens et al., 2007). Because of their ability to endure this rigor, engineering students expect to gain rewards and comforts in their future careers that would make withstanding the challenges worth it (Stevens et al., 2007). In our study, engineering students believed that prioritizing their work in the present was highly important despite any distress. Because participants often linked their distress to the engineering learning environment, they regarded their distress as temporary. Kirn and Benson (2018) found that engineering students evaluated the value of present behaviors and tasks by considering how well they fit with their future identities as professional engineers. Among tasks perceived as consistent with their future selves, engineering students were more likely to display higher levels of persistence and motivation (Kirn & Benson, 2018). This is consistent with our findings that students were more willing and motivated to prioritize their academics (a task aligned with their futures as engineers) compared to their mental health (a task that did not fit with their view of engineering norms).

Although many students saw perceived benefits associated with seeking help, they evaluated whether those benefits would outweigh the perceived sacrifice of dedicating less time to academics (and therefore violating a cultural norm within the discipline). Lack of time is also frequently cited in the literature as a barrier to help-seeking in studies on other academic programs with high levels of perceived stress such as medical, dental, veterinary, and law programs (Ey

et al., 2000; Givens & Tjia, 2002; Knipe et al., 2018; Organ et al., 2016; Tjia et al., 2005). Prior research has demonstrated that a cost–benefit analysis is associated with the decision to seek help, where individuals weigh the perceived sacrifices against perceived benefits in their decision-making process (Andrade et al., 2014; Pescosolido, 1992). Because academic excellence is so highly valued within engineering, it may be difficult for students to rationalize sacrificing their academics to pursue professional mental health treatment.

Furthermore, participants worried that they might be wasting an appointment if their mental health concerns were not severe enough to warrant treatment. This suggests that an additional perceived barrier is uncertainty about when distress levels warrant professional help. The normalization of stress within the engineering learning environment might lead students to further increase their threshold for distress (Biddle et al., 2007), and thereby create a higher standard for when to seek help. Literature shows that distress exists on a continuum and varying thresholds for distress play an important part in the decision to seek help, with individuals often re-evaluating their definition of "normal" stress as they navigate mental health symptoms (Biddle et al., 2007). Young adult men typically have a higher threshold for distress, which inhibits help-seeking when compared to young adult women (Biddle et al., 2004), which has consistently been explained as a result of the influence of traditional hegemonic masculine norms (Cole & Ingram, 2020; Mahalik & Di Bianca, 2021). Together, both the normalization of stress and the adherence to traditional hegemonic masculine norms within engineering may result in students setting higher thresholds for professional mental health treatment that might exceed those of students from non-engineering majors.

Finally, students' help-seeking confidence was influenced by commonly identified facilitators and barriers but also other beliefs such as attitudes and perceived norms. Half of the participants were confident in their ability to seek professional help if they needed it. However, others expressed uncertainty about whether they could seek help or decidedly would not seek help despite awareness and accessibility of resources. This indicates that confidence in one's ability to seek help is perhaps necessary, but not sufficient, further necessitating the need for comprehensive studies on the factors that influence help-seeking within the engineering student population.

7 | IMPLICATIONS

Ample research has explored and identified perceived facilitators and barriers to mental health help-seeking across diverse populations. However, this is the first study to investigate an undergraduate engineering student population to better understand the role of perceived barriers and facilitators in shaping personal agency around seeking mental health care. There are several ways that higher education administrators, engineering educators, mental health professionals, and students can work together to improve rates of help-seeking and access to professional help. We use the findings from this study to offer insights on ways to reduce perceived barriers to help-seeking, amplify facilitators to help-seeking, and develop a positive mental health culture within engineering programs.

Several interventions could be useful for reducing the number of barriers that engineering students perceive to seeking help. University stakeholders and mental health professionals can advocate for funding to implement structural changes that simplify the appointment process. Additionally, brick and mortar campus resources might include access to telehealth, as well as peer support services, self-help mental health resources, and mindfulness and wellness apps. These additional resources can help address the mental health care need and augment or supplant traditional treatments for students with minor mental health concerns. Lastly, stakeholders and professionals can advocate for mental health services that are embedded in general wellness clinics to reduce stigma associated with treatment and promote opportunities for collaboration across health and wellness professionals.

Within engineering, administrators, educators, and student leaders can collaborate with mental health professionals to offer information sessions. These sessions should address knowledge gaps or areas of misinformation such as (i) costs associated with treatment and how students can get financial support, (ii) the appointment process and availability, (iii) clinician–client pairing, and (iv) ways one can self-identify mental health concerns suitable for treatment. This is also an opportunity to reduce fear by addressing misconceptions about mental health professionals' training background and its relevance for engineering students; the option of medication, which may be recommended to complement treatment (but is not required); and the behavioral healthcare process for addressing mental health concerns via talk therapy. Providing this information, along with compelling testimonials by engineers with positive treatment experiences, can help address the perceived barriers associated with navigating the mental healthcare system.

Although university counseling centers provide community outreach and develop resources to promote mental health on campus (Golightly et al., 2017), these efforts are often limited in reach (Glass, 2020) or unpersuasive for

marginalized students who may hold different worldviews regarding mental health (Boone et al., 2011; Cheng et al., 2013). Engineering administrators, staff, and faculty can play a crucial role in making sure students are aware of and take advantage of opportunities to prioritize their mental health. There are several ways that college of engineering stakeholders can do this including outreach, programming, academic policies, and funding efforts.

Engineering stakeholders could establish a mental health liaison to not only distribute information about mental health resources and connect students to the counseling center but also cultivate a positive mental health culture. Mental health professionals who act as liaisons within the college can specialize in working with the engineering population. This might allow students to feel safer in approaching these professionals and reassured that the mental health professionals are familiar with the demands and norms of the engineering learning environment. Relatedly, mental health providers could also be embedded within specific colleges to promote accessibility and minimize stigma associated with other locations. Further outreach efforts within engineering can include peer support groups and mental health campaigns to promote the benefits of professional help-seeking for personal and academic well-being. Stakeholders should be willing to advocate for funds to actualize these recommendations.

Engineering stakeholders are also encouraged to dialogue with students about perceived barriers to seeking mental health care and collaboratively brainstorm potential solutions to these barriers. Likewise, students can be encouraged to organize and advocate for change, such as through existing student organizations or novel advocacy groups. In this way, they can help communicate to stakeholders the importance and urgency of structural and cultural change around mental health within engineering. Stakeholders can also commit to practicing accountability around working toward healthier cultural norms around mental health.

Regarding the mental health culture of the engineering learning environment, administrators, staff, and faculty should work together at micro and macro levels to shift values away from productivity and achievement at the expense of one's health. Engineering professors are regarded as authority figures and role models whom students reference to make decisions. In this study, students discussed prioritizing academics, sometimes at the expense of their mental health. Overfocusing on the academic workload might amplify or distract from important signs of mental distress; however, if professors provide more holistic definitions of "success" and "worth," students will feel more license to prioritize mental health. Therefore, engineering professionals must move beyond making students aware of mental health resources to explicitly and implicitly demonstrating that mental health should be prioritized, even if that takes time away from academic productivity. They can do this by being intentional about communicating a genuine interest, care, and the value of mental health and holistic wellness.

Furthermore, engineering professionals can highlight the evidence-based connection between strong mental health and academic success (which students already value). In doing so, they can help students recognize that prioritizing one's mental health does not come at the cost of academics but rather strengthens it. Integrating discussions of mental health into the cultural fabric of the engineering community could help normalize help-seeking behaviors, enhance engineering students' sense of personal agency, and facilitate their desire to engage with mental health resources. These changes will create better conditions for future engineers and lead to a more productive and sustainable engineering workforce.

8 | ADDRESSING LIMITATIONS THROUGH FUTURE RESEARCH

This study has several limitations that should be acknowledged. First, we focused on perceived barriers and facilitators to help-seeking that contribute to personal agency beliefs. According to the IBM, other important mediators for help-seeking intention include attitudes and perceived norms. Future research should incorporate analyses of these mediators when examining intentions. Second, our qualitative design allowed us to provide themes with detailed descriptions of participants' experiences, but we were unable to quantify the degree to which perceived barriers and facilitators influenced personal agency. Thus, quantitative research examining the correlations between endorsement of specific personal agency beliefs and intention to seek help is a recommended next step. Third, our sample only included undergraduate engineering students at a single institution and disproportionately over-represented engineering students with marginalized sociocultural identities. This limits our understanding of how these findings may or may not apply to graduate students or students whose identities were under-represented in the sample. Although this study provides a rich context for factors that influence help-seeking that may be transferable to similar populations, additional research is needed to examine the further generalizability of these findings. Future research should further investigate the cultural influence of help-seeking barriers that are unique to

engineers. Because engineering culture is influenced by faculty, staff, and administrators, in addition to college students, researchers should also investigate how engineering professionals perceive students' mental health and their role in providing students with information about resources.

9 | CONCLUSION

Engineering students experiencing mental health concerns are less likely to have sought professional help when compared to students from outside engineering. Dismantling systemic barriers to accessing mental health treatment could improve help-seeking. Additionally, establishing mental health as a core value among existing cultural norms in the engineering learning environment could help normalize help-seeking and create improved learning conditions for future generations of engineers. Engineering stakeholders must take an active and unified role in communicating that mental health is a priority. They should advocate for increased funding to implement changes, such as mental health related programming within engineering departments, to shift engineering cultural norms. Additional research on the relationships between engineering culture, student mental health, and professional help-seeking is needed.

10 | ENDNOTE

Quotations were edited to improve readability while maintaining the original message of the participant. These edits include removal of filler words, repeated words or phrases, and encouragement from the interviewer.

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DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are not publicly available due to privacy concerns that could compromise the identity of the participants.

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