

Relationship Between Mental Health Distress and Help-Seeking Behaviors Among Engineering Students

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Understanding the Relationship Between Mental Health Concerns and Help-Seeking Attitudes and Behaviors Among Engineering Students

Background

College can be a stressful time in a person's life. For many students, their college years involve intense identity exploration and a period of planning for the transition to a career and adulthood [1]. When coupled with the demands of rigorous academic coursework and requirements, this period of development can present significant psychological challenges. Indeed, mental health concerns have been increasing on college campuses, as students report more symptoms of stress, depression, and anxiety [2], [3]. This is concerning given the evidence of the link between mental health during college and students' academic achievement, retention, work-ethic, and social well-being [1], [4]. Perhaps more alarming is the fact that suicide is the second-leading cause of death on college campuses [1], [5].

Seeking help from mental health professionals is one way that students can cope with the challenges of college. However, some evidence suggests that engineering students are less likely to seek help for mental health distress than students in other disciplines [2]. This study aims to describe the level of mental health concerns reported by engineering students and to examine the relationship between mental health distress and students' attitudes and behaviors related to seeking help. Furthermore, given previous research showing that men and women report different levels of mental health concerns and help-seeking attitudes and behaviors, the study will also investigate possible gender differences.

Mental Health in College

In 2015, the National Alliance on Mental Illness found that approximately 25% of college students had a diagnosed mental health concern or had received treatment for one [4]. Researchers who gathered data from several universities found that 35% of undergraduate students had screened positive for one or more mental health concerns [6]. In addition to identifying the number of college students experiencing some sort of mental health concern, it is important to also examine how students view these concerns. One in four college students who were experiencing a mental health concern reported being unhappy with their experiences in college. Furthermore, researchers found that a majority of untreated students who had screened positive for a mental health concern doubted the severity of their problems and regarded them as "normal" experiences during college [7]. Although considering one's mental health concerns as normal may provide some temporary sense of relief, students who experience more severe forms of mental health distress may be less likely to seek out professional help when they need it.

College Students' Help-Seeking Behaviors

The increasing prevalence of mental health distress among college students has led to a similar increase of students in search of help. Since 2003, college counseling centers have reported an increase in the demand for mental health related services [8], [5]. With this increasing demand, universities are finding their counseling centers stretched, understaffed, and low on necessary

resources [9]. It is important for schools to ensure that their students have the resources needed for their mental health and academic success [1].

Unfortunately, researchers have found that a majority of college students who are experiencing a mental health concern did not receive needed treatment [10]. Several studies examining the help-seeking behaviors of college students reported a disparity between the number of students with a mental health disorder and the number of students who sought help. Eisenberg et al. [11] confirmed that only 36% of undergraduate and graduate students attending a large, public university who screened positive for a mental health concern sought out therapy or medication. What is keeping students from seeking help? Some evidence suggests that students are concerned about the stigma surrounding mental health help-seeking, and others doubt the seriousness of their own distress [12], [7]. Other factors related to whether students would seek help from a mental health professional include knowledge about available resources, beliefs about whether treatment from a professional would be beneficial, and other perceived barriers (e.g., cost). The social norms of help-seeking within a student's peer group in college may also be related to help-seeking behaviors or intentions. This paper seeks to further investigate the attitudes, intentions, and behaviors students report surrounding seeking out help for a mental health concern.

Mental Health and Help-Seeking in Engineering

This study focuses on the mental health experiences and help-seeking attitudes of college students pursuing an engineering degree. Students in many engineering majors experience intense academic pressure due to challenging curricula, rigorous learning requirements that may lack relevance to current engineering practice, and competitive grading structures [13], [14], [15]. These challenges specific to the engineering discipline can lead to elevated stress levels among students [16]. For example, a large-scale study of engineering students attending 70 universities revealed that students who perceived their classrooms to be highly competitive were 6.7% more likely to suffer from anxiety and 7.6% more likely to suffer from depression [4]. These effects were three times stronger for women in engineering than for their counterparts in other disciplines.

Despite these trends, national research comparing engineering students to students in other disciplines has shown several unexpected patterns. First, fewer engineering students are diagnosed with a mental health concern compared to their peers [17]. Second, engineering students are less likely to seek out help for mental health concerns. For example, engineering students at one university utilized their counseling center resources 20% less often than the general student population [18]. These findings may go hand in hand. If engineering students are less willing to seek out help than their peers, they may also be more likely to be experiencing undiagnosed mental health concerns. This raises the question as to whether experiences like heightened stress or anxiety have become normalized in engineering disciplines such that students are less likely to seek help from a mental health professional.

The 2018-2019 Healthy Minds Study (HMS), from which the present study is based, involved a survey of 60,000 U.S. college students from diverse backgrounds and majors. Comparative analyses across undergraduate majors revealed that only 32% of undergraduate engineers with

significant anxiety or depression symptoms had sought professional help in the last year, compared to 45% of their non-engineering peers [2]. Among students pursuing non-engineering degrees, 38% said they would be willing to talk to a mental health professional if they were experiencing serious emotional distress, whereas only 29% of engineering students said so. These disparities were also evident among subgroups of students who are traditionally less likely to seek help (e.g., men, students of color, first-generation college students), further pointing to factors within the engineering discipline that may affect students' mental health perceptions and behaviors.

Gender Differences

Understanding mental health help-seeking is critical for supporting all engineering students. However, the potential normalization of distress in engineering disciplines may be even more problematic in historically underrepresented groups in engineering, such as female and gender minority students. These groups may be even more likely to suffer from mental health concerns like anxiety and depression [4]. Women on average report experiencing mental health concerns such as depression, anxiety, and distress more than men do [19]. Among engineering majors specifically, women were shown to have an overall lower mental health status than men based on self-reported survey responses [20]. Despite this pattern, women with a mental health-related concern are more likely to be receptive of help than are men [21], [22]. Liddon et al. [23] reported that men found it more difficult to seek out help and to speak with a professional than women. Although any person may experience mental health distress, these findings suggest that male, female, and non-binary students may experience and respond to their distress in different ways.

Research Questions and Hypotheses

The research evidence above describes comparative differences between engineering students and non-engineering students' mental health reporting and help-seeking behaviors. The present study takes a sole focus on exploring the mental health distress of undergraduate engineering students. We further sought to compare the attitudes, perceptions, and help-seeking behaviors of distressed versus non-distressed engineering students. Three main research questions (RQ), along with two sub-questions, guided this investigation. First, what is the level of mental health concerns (i.e., anxiety, depression, suicidality) reported by undergraduate engineering students (RQ1)? Do women and men report similar levels of mental health concerns? Second, how do undergraduate engineering students report their help-seeking attitudes and behaviors (RQ2)? Do women and men report similar help-seeking attitudes and behaviors? Finally, what is the relationship between mental health distress and students' help-seeking attitudes and behaviors?

Our first two primary questions involve descriptive analyses for which no hypotheses are needed. However, we hypothesize that female engineering students will report higher levels of mental health concerns (anxiety, depression, suicidality) than male students. For our third research question, we hypothesize that students who report mental health distress will report less favorable help-seeking attitudes and intentions compared to non-distressed students.

Method

The sample for this study was drawn from the Healthy Minds Study, a national investigation of undergraduate students' mental health attitudes and behaviors. The Healthy Minds Study (HMS) was approved by the Health Sciences and Behavioral Sciences Institutional Review Board at the University of Michigan [2]. Data were collected through a web-based survey sent to students' email addresses [2]. Participants had to be at least 18 years of age and consent to take part in the study. The survey was created using the Qualtrics platform, and the overall participation rate was 16% [2]. The online survey consisted of three standard modules that all participants were given. From there, institutions could choose from among fourteen different elective modules to also be included in the survey for their students.

We began this study by focusing on the 6,567 HMS participants randomly selected from engineering programs [2]. Demographic information can be found in Table 1. Due to their low number relative to men and women, transgender, gender queer, or gender self-identified participants were regrouped into a "gender minority" category for subsequent analyses. Given that the focus of the present study was on the mental health concerns of engineering students, we selected for further analysis only students who had completed measures of depression, anxiety, and suicidality. This resulted in a final sample of 4,137 participants (i.e., 63% of all engineering students who took part in the HMS). Demographic information for this subsample largely mirrored that reported in Table 1. Among these students, 65.8% identified as male, 32.6% identified as female, 1.1% were categorized as gender minority, and 0.5% did not report their gender.

Mental Health Measures

The three mental health concerns of interest for this study were depression, anxiety, and suicidality. We used cutoff scores from each measure to classify students as distressed or not distressed, as described below.

Depression was screened using the Patient Health Questionnaire-9 [24]. The measure consisted of nine items inquiring about whether participants had experienced any symptoms of depression within the previous two weeks. The response categories consisted of a 4-point scale ranging from 1 (*not at all*) to 4 (*nearly every day*) [24]. Sum scores were calculated for each student and used to classify students' depression severity as minimal (1-4), mild (5-9), moderate (10-14), moderately severe (15-19), or severe (20-27).

Anxiety was screened using the Generalized Anxiety Disorder 7-item scale (GAD-7) [25]. Students were asked to rate whether they had experienced seven distinct symptoms of anxiety within the previous two weeks. Response categories to the seven items were the same as those for the depression measure. Sum scores were calculated for each student and used to classify the level of anxiety severity as minimal (0-4), mild (5-9), moderate (10-14), or severe (15-21).

Suicidality was measured using one item asking students about their thoughts of attempting suicide within the past year (i.e., "In the past year, did you ever seriously think about attempting suicide?") [2]. Response categories were 1 (*yes*) and 0 (*no*).

Table 1

Demographic Information for Engineering Students Participating in the Healthy Minds Study (N = 6,567)

Demographic Group	%		%
Gender Identity		Religious Identity	
Male	65.0	Christian	32.7
Female	33.3	Catholic	23.3
Trans male/Trans man	0.1	Agnostic	13.0
Trans female/Trans woman	0.2	Atheist	9.6
Genderqueer/Gender non-conforming	0.5	Jewish	3.2
Self-identified	0.8	Muslim	2.3
Race/Ethnicity		Buddhist	2.7
White	64.7	Hindu	1.9
Asian American/Asian	25.1	No preference	13.6
Hispanic/Latino/Chicano	6.1	Other	4.8
African/Black	4.6	Year in Degree Program	
Middle Eastern/Arab/Arab American	3.7	1st year	29.5
American Indian or Alaskan Native	1.3	2nd year	25.0
Native Hawaiian/Pacific Islander	0.2	3rd year	19.8
Sexual Identity		4th year	16.1
Heterosexual	82.3	5th year	2.6
Bisexual	9.3	6th year	0.7
Gay	2.2	7th + year	0.5
Lesbian	1.7	Financial Situation	
Queer	2.6	Always stressful	12.4
Questioning	2.7	Often stressful	22.4
Self-identified	2.4	Sometimes stressful	35.6
		Rarely stressful	21.0
		Never stressful	6.9

A determination of students' mental health distress within the past year (1 = *distressed*; 0 = *not distressed*) was based on students' combined responses from the depression, anxiety, and suicidality items. Students were categorized as "distressed" if they reported any of the following: (a) moderate to severe symptoms of depression, (b) moderate to severe symptoms of anxiety, or (c) having seriously thought of attempting suicide in the past year.

Help-Seeking Measures

Students were asked about their help-seeking attitudes, intentions, and behavior using several items developed by Eisenberg et al. [2]

Attitudes About Mental Health and Professional Treatment

Mental health stigma was measured using two items—one for externally-perceived stigma (i.e., “Most people think less of a person who has received mental health treatment.”) and one for personally-held stigma (i.e., “I would think less of a person who has received mental health treatment.”). Students rated their agreement on the same six-point Likert scale ranging from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). Two items were used to assess the degree to which students found therapeutic treatment to be helpful. Students were asked, “How helpful on average do you think [medication (Item 1)/therapy or counseling (Item 2)] is, when provided competently, for people your age who are clinically depressed?” Response categories ranged from 1 (*Not Helpful*) to 4 (*Very Helpful*).

Help-Seeking Knowledge and Resources

Students were asked to rate their *knowledge about where to seek mental health support on campus* with one item, “If I needed to seek professional help for my mental or emotional health, I would know where to go on my campus,” to which students rated their level of agreement on a six-point Likert scale ranging from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). Students were also asked to identify to whom, if anyone, they would go for mental health help (e.g., “If you were experiencing serious emotional distress, whom would you talk to about this?”). Response options included 1 (*Professional Clinician*), 2 (*Roommate*), 3 (*Friend*), 4 (*Significant Other*), 5 (*Family Member*), 6 (*Religious Counselor or Other Religious Contact*), 7 (*Support Group*), 8 (*Other*), or 9 (*No One*).

Perceived Need and Help-Seeking Behavior

Students were asked to rate the extent to which they *perceived a need* for mental health help during the past year (i.e., “In the past 12 months, I needed help for emotional or mental health problems such as feeling sad, blue, anxious or nervous.”). Response options ranged from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*).

Students were also asked to identify any *barriers to seeking help* that they had experienced in the past year [i.e., “In the past 12 months, which of the following factors have caused you to receive fewer services (counseling, therapy, or medications) for your mental or emotional health than you would have otherwise received?"]. Response options were 1 (*No need for service*), 2 (*Financial reasons*), 3 (*Not enough time*), 4 (*Not sure where to go*), 5 (*Difficulty finding an available appointment*), 6 (*Prefer to deal with issues on my own or with support from family/friends*), 7 (*Other*), and 8 (*No barriers*).

Service utilization during college was measured using one question regarding the student’s previous use of counseling services (i.e., “Have you ever received counseling or therapy for mental health concerns?”). The response categories included four options indicating whether and when students had ever received services (1, *No, never*; 2, *Yes, prior to starting college*; 3, *Yes, since starting college*; 4, *Yes, both of the above*). A binary variable was calculated to reflect whether the student had ever received therapy during college (1 = *Yes*, 0 = *No*).

Analysis of Data

Descriptive statistics were used to examine students' self-reported mental health concerns, help-seeking attitudes, and help-seeking behaviors. One-way between-subjects analyses of variance were conducted to compare the effect of gender on continuous outcomes. Chi square tests of independence with post hoc analyses were conducted to examine relationships between gender and categorical outcome variables (e.g., suicidal ideation, mental health distress). Bivariate correlations were used to investigate the relationship among the study variables. Correlations and mean differences were also calculated separately for students who reported recent mental distress and those who did not.

Results

RQ1

To answer our first research question, we investigated the degree to which engineering students were experiencing depression or anxiety or had recently thought of suicide. Means, standard deviations, and frequencies for mental health measures are reported in Table 2 for the full sample and by gender.

Results indicated that, within two weeks prior to taking the survey, 29.7% of engineering students had experienced moderate to severe depression and 24.4% had experienced moderate to severe anxiety. Of the participating students, 11.2% reported having had suicidal thoughts within the past year.

Patterns in students' mental health reports differed by gender. Women consistently reported more depression and more anxiety than did men and students identifying as transgender or gender non-binary reported the greatest amount of mental health distress. ANOVAs revealed significant differences for depression scores, $F(2,4,113) = 41.34, p < .001, \eta^2 = .020$, and for anxiety scores $F(2,4,113) = 79.12, p < .001, \eta^2 = .037$. Post hoc analyses revealed significant differences by all pairwise gender comparisons, with Cohen's d effect sizes ranging from 0.26 for the difference in depression scores between men and women to 0.81 for the difference in anxiety scores between men and gender minority students.

Chi square tests of independence showed a significant relationship between gender and depression severity, $X^2(8, N = 4,116) = 82.88, p < .001$, and anxiety severity, $X^2(6, N = 4,116) = 136.84, p < .001$. Post hoc test results are reported in Table 2. Most notably, women were disproportionately more likely than men to report severe depression and anxiety, and men were more likely to report minimal depression and anxiety. Gender minority individuals reported experiencing severe depression and anxiety disproportionately more than did men and women.

Table 2*Engineering Students' Recent Mental Health Ratings for the Full Sample and By Gender*

	Full Sample (<i>N</i> = 4,137)	Men (<i>n</i> = 2,722)	Women (<i>n</i> = 1,347)	Other Gender (<i>n</i> = 47)
<i>Mean (SD): Depression Total Score</i>	7.58 (5.94)	7.03 ^a (5.71)	8.57 ^b (6.17)	11.49 ^c (7.17)
<i>Mean (SD): Anxiety Total Score</i>	6.16 (5.33)	5.44 ^a (7.49)	7.49 ^b (5.61)	9.53 ^c (5.82)
% Suicidal in Past Year	11.2	10.4 ^a	12.3 ^a	27.7 ^b
Depression Severity				
% Minimal	36.8	40.1 ^a	30.5 ^b	19.1 ^b
% Mild	33.5	33.6 ^a	33.6 ^a	27.7 ^a
% Moderate	16.1	14.9 ^a	18.6 ^b	19.1 ^{a,b}
% Moderately severe	8.3	7.2 ^a	10.3 ^b	12.8 ^{a,b}
% Severe	5.3	4.2 ^a	7.1 ^b	21.3 ^c
Anxiety Severity				
% Minimal	48.1	53.5 ^a	37.9 ^b	25.5 ^b
% Mild	27.6	26.9 ^a	28.7 ^a	27.7 ^a
% Moderate	15.3	12.8 ^a	20.0 ^b	25.5 ^b
% Severe	9.1	6.8 ^a	13.4 ^b	21.3 ^b
% in Mental Health Distress	38.6	33.9 ^a	46.9 ^b	68.1 ^c

Note. Depression and anxiety scores were based on symptoms experienced within the “past two weeks”; suicidality ideology was based on feelings within the “past year.” In each row, means and proportions for each gender group with different superscripts were statistically different from one another.

A chi square test of independence similarly showed a significant association between gender and suicidal ideation, $\chi^2(2, N = 4,116) = 16.44, p < .001$. Pairwise comparisons revealed that gender minority students reported significantly higher suicidal ideation than did men or women. Men and women did not differ in relative frequency of suicidal ideation.

We classified as “distressed” any student who reported experiencing moderate to severe depression or anxiety within the past two weeks and/or suicidal ideation within the past year. Of the 4,137 participants, 38.6% were classified as experiencing mental health distress. A chi square test of independence showed a significant association between gender and distressed status, $\chi^2(2, N = 4,116) = 81.47, p < .001$. Pairwise comparisons revealed significant differences in distress for all groups: more women (46.9%) were distressed than were men (33.9%), and, of the 47 students in the gender minority group, over two thirds (68.1%) were considered to have recently experienced mental health distress.

RQ2

Our second research question involved an examination of students' attitudes and behaviors related to help-seeking. Descriptive statistics for all help-seeking variables are reported in Table 3.

We first examined students' responses to four items related to their attitudes about mental health and professional treatment. Students rated public and personal stigma around help-seeking for a mental health concern. On average, students reported greater agreement with perceptions of external stigma (i.e., that "most people" would think less of a person who has received mental health treatment) than with their own personal beliefs about stigma (personally thinking less of a person who has received mental health treatment). Engineering students held neutral to positive attitudes about the helpfulness of medication-based and talk-based therapy, respectively. Men rated therapeutic treatments as less helpful than did either women or gender minority students, $F(2,3922) = 20.14, p < .001, \eta^2 = .014$.

We next examined students' knowledge about mental health services on their college campuses and the resources they would hypothetically use if they were seeking mental health support. Students' knowledge about mental health services on campus varied by gender, $F(2,3963) = 8.18, p < .001, \eta^2 = .004$. Post hoc analyses revealed that, on average, men reported significantly less knowledge about campus mental health resources than did women ($d = 1.44$).

In terms of the sources from whom engineering students would seek mental health support, only 29.5% said they would seek out a professional clinician if experiencing some sort of distress. A chi square test of independence similarly showed a significant association between gender and intentions to seek help from a professional clinician, $X^2(2, N = 4,116) = 36.64, p < .001$. Pairwise comparisons revealed significant differences for all gender groups. Over half of the participating students from gender minority groups (53.2%) said they would seek help from a clinician, compared to 34.1% of women and 26.7% of men.

Of all engineering students, 10.9% reported that they would not talk to anyone at all. A second chi square test showed a significant association between gender and intentions to seek help from "no one," $X^2(2, N = 4,116) = 28.35, p < .001$. Again, pairwise comparisons revealed significant differences for all gender groups. Male students (12.8%) were most likely to say that they would not seek help, compared with 7.3% of women and 6.4% of gender minority students. Frequencies by help-seeking source and gender group are reported in Table 3.

The third group of help-seeking variables we examined related to students' recent mental health experiences. Of the full sample of engineering students, 19.6% reported that they had received counseling or therapy for mental health concerns during college. A chi square test of independence showed a significant association between gender and students' professional mental health service during college, $X^2(2, N = 4,001) = 110.46, p < .001$. Pairwise comparisons revealed significant differences for all groups. Over half of gender minority students (56.5%) had received services during college, compared to over one quarter of women (26.7%) and just 15.4% of men.

Table 3

Means (Standard Deviations) and Frequencies of Help-Seeking Attitudes and Behaviors for the Full Sample and By Gender

	Full Sample (<i>N</i> = 3,966)	Men (<i>n</i> = 2,627)	Women (<i>n</i> = 1,293)	Other Gender (<i>n</i> = 46)
Attitudes About Mental Health and Professional Treatment				
Personal Perceived Stigma (1-6)	1.81 (1.10)	1.93 (1.15)	1.59 (0.95)	1.43 (0.86)
External Perceived Stigma (1-6)	3.24 (1.34)	3.25 (1.33)	3.18 (1.35)	3.54 (1.19)
Helpfulness of Medication as Treatment (1-4)	2.57 (0.86)	2.50 (0.86)	2.71 (0.83)	2.87 (0.96)
Helpfulness of Therapy as Treatment (1-4)	3.07 (0.81)	3.01 (0.82)	3.21 (0.76)	3.26 (0.80)
Help-Seeking Knowledge and Resources				
Knowledge of Resources (1-6)	4.28 (1.45)	4.22 (1.45)	4.40 (1.43)	4.65 (1.46)
Likely Sources of Help				
Professional Clinician	29.5	26.7	34.1	53.2
Roommate	24.4	24.0	25.3	27.7
Friend	55.2	53.3	58.8	68.1
Significant Other	34.2	31.7	39.1	38.3
Family Member	50.4	49.8	52.4	29.8
Religious Contact	6.9	7.5	5.8	4.3
Support Group	2.7	2.8	2.4	10.6
No One	10.9	12.8	7.3	6.4
Perceived Need and Help-Seeking Behavior				
% Having Received Mental Health Services in College	19.6	15.4	26.7	56.5
Perceived Need for Help in Past Year (1-6)	3.33 (1.81)	3.01 (1.76)	3.92 (1.76)	5.00 (1.26)
Barriers to Help-Seeking				
No Need for Service	49.5	53.5	42.3	22.2
Financial Reasons	10.0	8.3	13.0	20.0
Insufficient Time	19.7	15.4	27.6	37.8
Not Sure Where To Go	10.2	8.9	12.5	20.0
Difficulty Finding Appointment	6.4	4.5	9.7	20.0
Prefer to Cope in Different Way	27.6	25.9	30.7	35.6
Other	5.6	4.3	7.9	15.6
No Barriers	14.5	16.8	9.8	15.6

Students were asked to rate the degree to which they felt they needed help for emotional or mental health problems during the past 12 months (regardless of whether they had actually received mental health services). ANOVA results showed significant gender differences in students' perceived need for support, $F(2,4017) = 139.33, p < .001, \eta^2 = .065$). All groups were significantly different, with men perceiving the least need for support and gender minority students reporting the greatest need ($d = 1.13$). However, the largest difference in perceived need of services was between men and women. Female engineering students reported greater need for support than did male students ($d = 1.76$).

Participants were asked to identify the barriers they faced to seeking mental health support in the past 12 months. However, the most frequently selected response was by students who said they did not believe they were in need for mental health services (49.5%). Many students (27.6%) also reported that they preferred to cope with emotional distress in a different way, or they had an insufficient amount of time to seek help (19.7%). Women and gender minority students reported being more likely to experience any of the given barriers than their male peers. Chi square tests of independence revealed that many of the perceptions of barriers differed by gender. We refer readers to Table 3 to view differences in frequency by gender group.

RQ3

The final aim of this research study was to investigate the relationship between mental health concerns and help-seeking attitudes and behaviors among engineering students. We first examined the correlations among the study's continuous variables, which are reported for the full sample in Table 4.

Engineering students who reported greater depression and anxiety symptoms within the previous two weeks expressed significantly higher perceptions of external stigma. That is, as students' mental health symptoms increased, so did their agreement with the statement that people think less of those who received mental health treatment. Although depression and anxiety scores were positively related to students' perceived need for mental health help, they were also associated with less knowledge about mental health resources on campus. Students with higher depression scores rated therapy as less helpful, whereas those with higher anxiety rated therapy as more helpful.

We next examined these relationships for students who experienced mental health distress (i.e., moderate to severe anxiety or depression and/or suicidal ideation) and those who did not. Correlations appear below the diagonal for distressed students and above the diagonal for non-distressed students in Table 5. Although the correlations for distressed and non-distressed students generally follow the same patterns, the magnitude of the correlations differed somewhat, particularly for relationships involving beliefs about personally and externally held stigma about help-seeking. For example, distressed students with greater anxiety reported less internal stigma about help-seeking, but this relationship was not found among non-distressed students. Distressed students who experienced greater need for mental health resources over the previous year reported lower levels of personal stigma associated with help-seeking and higher perceptions about the efficacy of therapeutic treatments. The magnitude of these relationships was weaker, though still statistically significant, among non-distressed students.

Table 4

Means, Standard Deviations, and Correlations Between Engineering Students' Mental Health Scores and Help-Seeking Beliefs

Variables	Scale	1	2	3	4	5	6	7
1. Depression Score	0-27							
2. Anxiety Score	0-21	.76**						
3. Perceived External Stigma	1-6	.17**	.14*					
4. Perceived Internal Stigma	1-6	-.01	-.04*	.38**				
5. Helpfulness of Medication	1-4	-.03	-.02	-.02	-.13**			
6. Helpfulness of Therapy	1-4	-.09**	.04*	-.06**	-.23**	.38**		
7. Knowledge of Resources	1-6	-.13**	-.11**	-.08**	-.10**	.15**	.17**	
8. Perceived Need of Therapy Past 12 Months	1-6	.55**	.54**	.14*	-.09**	.07**	.07**	.01

* $p < .05$. ** $p < .01$.

We next examined differences in students' help-seeking attitudes and behaviors by distress status. Table 5 presents t tests of mean differences between groups on the continuous variables. On average, distressed students reported higher depression and anxiety, and a greater perceived need for treatment compared to non-distressed students. Distressed students were also more likely than their non-distressed peers to agree that most people would think less of someone for receiving a mental health treatment. Distressed students were less likely to agree that therapy would be helpful and rated themselves as less certain about where to go when experiencing distress compared to non-distressed students.

Chi square tests of independence indicated a significant relationship between students' level of distress and their help-seeking attitudes and behaviors (see Table 6). Distressed students (34%) were more likely than non-distressed students (26.5%) to report that they would likely seek help from a professional clinician, whereas a greater proportion of non-distressed students reported that they would likely seek help from a friend or family member. On the other hand, 14.7% of distressed students reported that they would seek help from "No one" for their mental health problems, compared to only 8.7% of their non-distressed counterparts.

The proportion of distressed students who had already sought mental health support during college (31.8%) was nearly three times that of non-distressed students (11.8%). However, distressed students were significantly more likely than non-distressed students to identify numerous barriers to seeking help, including financial challenges, insufficient time, and uncertainty about where to go for help. For example, only 5.5% of non-distressed students reported that not knowing where to go for help was a barrier compared to 17.5% of distressed students.

Table 5

Means Differences, Standard Deviations, and Correlations Between Mental Health Scores and Help-Seeking Beliefs for Distressed and Non-Distressed Undergraduate Engineering Students

Variables	Scale	<i>t</i>	Distressed (<i>n</i> = 1,596)					Non-Distressed (<i>n</i> = 2,541)						
			<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	<i>M</i>	<i>SD</i>
1. Depression Score	0-27	-63.72**	13.22	5.36		.55**	.09**	.04	-.01	-.06*	-.07**	.38**	4.04	2.63
2. Anxiety Score	0-21	-58.72**	11.02	5.00	.45**		.07**	< -.01	-.02	< -.01	-.05	.40**	3.11	2.53
3. Perceived External Stigma	1-6	-8.13**	3.46	1.39	.14**	.07		.42**	< .01	-.03	-.06*	.08**	3.10	1.28
4. Perceived Personal Stigma	1-6	-0.40	1.81	1.13	-.04	-.08*	.34**		-.09**	-.21**	-.10**	-.06*	1.82	1.08
5. Helpfulness of Medication	1-4	2.35	2.53	0.89	< .01	.04	-.03	-.18**		.39**	.15**	.06*	2.60	0.84
6. Helpfulness of Therapy	1-4	4.23**	3.00	0.86	-.07	.03	-.08*	-.26**	.37**		.16**	.11**	3.11	0.77
7. Knowledge of Resources	1-6	6.34**	4.09	1.56	-.08*	-.07*	-.08*	-.09**	.14**	.15**		.05	4.40	1.36
8. Perceived Need of Therapy Past 12 Months	1-6	-37.06**	4.48	1.55	.29**	.25**	.08*	-.16**	.16**	.14**	.11		2.61	1.58

Note. Correlations for distressed engineering students appear below the diagonal; correlations for non-distressed engineering students appear above the diagonal. Bonferroni adjustment for familywise error rate $.05/8 = \alpha = .00625$.

* $p < .00625$. ** $p < .001$.

Table 6

Frequencies for Likely Sources of and Barriers to Help-Seeking By Mental Health Distress Status

	χ^2	% Distressed (<i>n</i> = 2,541)	% Non-Distressed (<i>n</i> = 1,596)
Likely Sources of Help-Seeing			
Professional Clinician	28.29	34.3	26.5
Roommate	45.07	18.7	27.9
Friend	7.11	52.6	56.9
Significant Other	0.08	34.5	34.0
Family Member	109.21	40.1	56.8
Religious Contact	22.87	4.6	8.5
Support Group	0.81	2.4	2.9
No One	36.17	14.7	8.7
Perceived Barriers to Help-Seeking			
No Need for Service	454.57	28.2	62.9
Financial Reasons	166.42	17.7	5.1
Insufficient Time	341.90	34.2	10.3
Not Sure Where To Go	147.22	17.5	5.5
Difficulty Finding Appointment	128.71	11.9	2.9
Prefer to Cope in Different Way	148.75	38.5	20.8
Other	64.25	9.4	3.4
No Barriers	24.66	11.0	16.7

Note. All proportions were statistically significantly different ($p < .05$) between distressed and non-distressed students except for students' willingness to seek help from a "significant other" or a "support group."

As expected, a greater proportion of distressed students (31.8%) than of non-distressed students (11.8%) reported having received counseling or therapy during college, $\chi^2 (2, N = 4,020) = 243.15, p < .001$.

Discussion

Overall, more than one third of engineering students reported experiencing distress in some form within the year prior to taking the Healthy Minds Study survey. Women and gender minority students were more likely to report experiencing distress than their male peers, specifically in terms of anxiety and depression. These findings are consistent with previous research suggesting that underrepresented populations in engineering (e.g., female, genderqueer) experience more distress than their peers [4]. Other evidence has shown that women in engineering often report experiencing more negative mental health symptoms than their male counterparts [20]. Although women and gender minority students may experience more mental health distress such as anxiety

or depression generally, the results of this study suggest that this discrepancy is more acute in the engineering discipline, where men outnumber women and gender minority students.

Although men have been reported to hold more suicidal ideation and are more likely to consider death by suicide [26], gender minority students in this study were much more likely to have serious thoughts of suicide than were male or female students in engineering. This finding aligns with previous literature stating that a significantly higher level of symptoms relating to mental health concerns (e.g., depression, anxiety, eating disorders, suicidality) were found among gender minority students than their cisgender peers [27]. Gender minority groups have been studied much less often than students identifying as male or female [27]. While the number of gender minority students in this sample is small, the high severity levels of the mental health concerns among them cannot be ignored by engineering colleges or universities as a whole. The high severity levels of mental health distress in gender minority students also suggests that this student group should be the focus of research in the future.

Unfortunately, a negative stigma surrounding mental health and receipt of professional treatment is evident among many engineering undergraduates. Many students reported believing that their peers would think less of them for receiving needed treatment. In contrast, previous research has shown no evidence of a negative public stigma surrounding mental health or help-seeking attitudes and behaviors of students in general [28]. For instance, one study found that among untreated students with a mental health concern, very little negative stigma was reported surrounding treatment, suggesting other explanations as to why students may not seek out help for a mental health concern [7]. Our findings indicate that stigma may still be one important barrier to mental health help-seeking among students in engineering disciplines.

Indeed, less than one third of the engineering students in this study expressed that they would seek out the help of a professional clinician if experiencing serious emotional distress. Even more concerning, many students admitted that they would not talk to anyone at all if they were under mental or emotional duress, and students who had been “distressed” during the recent past were twice as likely as their non-distressed counterparts to say that they would not seek help. These results are consistent with research suggesting that students would prefer to seek help from family or friends, rather than a professional, for fear of judgment from others or from their universities [12]. While in college, students are working toward a career and creating an identity as an adult [1]. If students believe that seeking treatment for a mental health concern could jeopardize this future, they likely will be unwilling to seek out help. Universities should promote positive attitudes surrounding the care of students’ mental health.

Distressed students—those who reported either moderate to severe anxiety or depression or who had had suicidal thoughts in the recent past—likely need tailored intervention around help-seeking. Although distressed students were more likely to admit needing help, they were less likely to know where to find professional mental health treatment or to even believe that the treatment received would be an effective solution. These same students were more likely to believe in the negative stigma surrounding mental health treatment than were their non-distressed peers. Distressed students were unsure of where to go to seek help, what people might think of them afterwards, and whether the treatment would even work. These insights offer reasons as to

why a majority of college students experiencing a mental health concern are not seeking any sort of treatment and areas in which universities can apply interventions [10].

Distressed students reported far more barriers to seeking help than did non-distressed students. Many reported either a lack of available time or that they would prefer to cope with their distress in other ways. These reported barriers could coincide with the high levels of pressure and competition surrounding engineering disciplines, resulting in a lack of time and energy [13], [14], [15]. These characteristics of engineering education, as well as other high intensity fields, have also been known to cause higher levels of stress, anxiety, and depression than other fields of college education [4], [16]. This may also explain why almost 39% of all students in this study reported experiencing some type of distress. While these consequences of high intensity disciplines are surely not intended, universities should strive to attend to the unique and specific needs of students in high intensity disciplines, such as engineering.

Conclusion

Previous research has shown that engineering students are less likely to be diagnosed with a mental health concern than their peers, but is there an alternative explanation? Many students in engineering report that they would not seek out help when experiencing distress, despite having positive beliefs about the efficacy of counseling or therapy. There appears to be a negative stigma still lingering surrounding the idea of seeking help, mainly among the most vulnerable students. These students may be more concerned than their non-distressed peers about what the people around them might think about seeking help from a professional. Distressed students in engineering may already feel stigmatized for experiencing mental health concerns in the first place, and therefore may be more likely to associate seeking help with a negative stigma, and more unwilling to seek out treatment. Timely intervention could help disrupt this negative cycle.

Addressing these beliefs and the negative stigma surrounding the idea of seeking help may facilitate student success now and their longevity in the discipline. Universities, professors, and mental health professionals should consider strongly promoting positive mental health practices and beliefs in high intensity disciplines. This may involve offering unique services to fit the particular needs of engineering students. Undergraduate students, no matter their discipline, should also strive to support their fellow peers and advocate for more positive attitudes and beliefs toward mental health and professional help-seeking.

Limitations and Future Directions

This investigation of students' mental health characteristics focused solely on anxiety, depression, and suicidality. Only students who completed items from all three measures were included in the study and may not therefore be representative of all engineering students. Furthermore, although these are common mental health concerns among college students, researchers should continue to look to other negative or positive aspects of mental health in engineering students.

Our study focused on a full sample analysis and possible differences by gender. The study sample primarily self-identified as White and male. Further investigation of the mental health

concerns of other underrepresented populations in engineering should be examined as well. People are intersectional beings. Taking a more intersectional approach to examining student mental health concerns and help-seeking may reveal different patterns.

Our study was limited to self-reported symptoms and beliefs. All variables in the study were based on the students' judgments of their own lives and experiences. Although such measures are certainly important in the examination of mental health, coupling them with externally assessed behaviors would provide additional validity evidence for these findings. Finally, while this study provides useful information about universities' engineering students' mental health and help-seeking, it does not examine how to continue in changing the culture around mental health. Further research should investigate how to bridge the gap between students with mental health concerns and the extent to which the broader social and academic cultures in which they learn may or may not facilitate their willingness to seek help.

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