

Association of Religiosity and Help-Seeking among International Students in Undergraduate Engineering Education

Background: The increasing prevalence of mental health issues among college students, particularly international engineering students, has become a growing concern. While previous studies have explored factors contributing to mental health issues among college students, there is a notable gap in the literature regarding international undergraduates in engineering. International students, with their different beliefs, values, and expectations related to mental health, may have different coping strategies, help-seeking preferences, and service utilization patterns. Among various factors, religiosity may influence their approach to coping, seeking assistance, and utilizing services. With this in mind, this study investigates the impact of religiosity on the mental health, help-seeking behavior, and service utilization of international undergraduate engineering students in the United States.

Purpose/Hypothesis: This study explores the relationship between religiosity and service utilization among college students, with a particular focus on international undergraduate engineering students in the US. It seeks to answer several research questions: 1) What is the prevalence of mental health conditions and help-seeking among international engineering undergraduates? 2) Are there gender differences in help-seeking among international engineering undergraduates? 3) How do help-seeking (formal and informal) tendencies vary among engineering undergraduates with different levels of religiosity?

Design/Method: The study uses a logistic regression model to analyze data from engineering undergraduate students participating in the Healthy Minds Study (HMS) for 2021-2022 to address research questions. The study considers help-seeking and service utilization as dependent variables and examines how they relate to religiosity while controlling for certain demographic characteristics.

Findings: We found that only 15.61 % of the international students in our sample were diagnosed with a mental health condition. Of them, women were twice as likely to screen positive for mental health concerns than their counterparts. Logistic regression models found that students with high religiosity are less likely to seek formal and informal help. Controlling for gender reveals that women with high religiosity are more likely to utilize informal and professional mental health services compared to men.

Conclusions/Implications: The findings of this study suggest potential avenues for supporting international students' mental health. One key implication is the exploration of incorporating spiritual and religious practices, as this approach may provide valuable support to international students who may draw strength from their religious beliefs. Moreover, there is potential for collaboration between higher education institutions and local religious organizations to enhance the support and resources available to international students.

Keywords: religiosity; help- seeking; mental health; International; undergraduate ; logistic regression

Introduction

Higher education faces a mental health crisis. To college students, time during college is considered a time of psychological distress [1]. A recent study using data from hundreds of US college campuses denoted that between 2013 and 2021, there has been a 50% increase in mental health conditions. In addition, their trends also show that 60% of college students nationwide fit the diagnostic criteria for having at least one mental health disorder [2]. Research notes that depressive symptoms cause academic impediments and increase the likelihood of dropping out of college[3]. If left unattended, symptoms can worsen and result in serious mental health concerns or resistance to treatment. The concern around this topic is significant in contemporary higher education, and US college presidents ranked mental health and wellbeing issues among college students as one of the challenges of current times [4].

While college is stressful for students, engineering culture, known for its high-stress environment [5], compounds these challenges. Literature on mental health and wellbeing indicates that engineering students are less likely than others to seek help [6]. Additionally, it is also found that students who are distressed (moderate to severe depression or anxiety and suicidality) prefer not to seek help from anyone [7]. Several researchers in engineering education have started to explore the area of help-seeking among engineering college students (e.g., [8]–[10]), denoting the enablers and barriers to help-seeking. Findings from a systematic literature review on undergraduate mental health and wellbeing (MHW) suggest targeted interventions as a way to support the MHW of undergraduate students in engineering targeted interventions [11]. Although the body of research in this area is expanding, results specific to subgroups are still limited, and there has been a call to account for the impact of identity aspects [7]. Additionally, there is a notable gap in the literature regarding the mental health and wellbeing of international undergraduates in engineering and ways to support them.

Among international students, the United States is deemed a desirable destination to pursue further studies. Over one million international undergraduate and graduate students were enrolled in US universities during the 2018-19 academic year, with over 500,000 in science, technology, engineering, or math (STEM) fields [12]. Studies have indicated that international students are presumably more prone to mental health concerns because they frequently experience additional stressors and challenges beyond those commonly experienced by their domestic counterparts, such as language barriers, immigration and visa regulations, cultural adjustment, and discrimination [13], [14]. However, the number of university offices assisting international students is comparably limited, so usually, their responsibilities are restricted to handling logistics or compliance issues [15]. Research notes that college students' attitudes toward help-seeking can be positively impacted by their familiarity or experience with counseling services available at the university [16]. However, international students, with their different

beliefs, values, and expectations related to mental health, as well as stressors, may have different coping strategies, help-seeking preferences, and service utilization patterns. Among various factors that may influence a student's approach to coping, seeking assistance, and utilizing services, religiosity can act both as a protective factor and, to some extent, as a barrier to seeking help for mental health concerns [17]. In this study, religiosity refers to the extent to which religion is important for an individual.

This study explores the association of religiosity with help-seeking and service utilization among international undergraduate engineering students in the United States. With this exploratory study, we wish to contribute to the growing literature on mental health and wellbeing in engineering by focusing on a specific subgroup: international engineering undergraduate students.

Literature Review

Engineering as a discipline has a (dis)reputation for its hard and demanding nature. Recent works on engineering culture have noted that students view stress as a normal aspect of the culture [18]. Several academic stressors, such as high course load, hostile environments, lack of sense of belonging, as well as lack of faculty support, are noted as key reasons for students' worsening mental health [19] and eventually dropping out of engineering programs [20]. There is no significant evidence that engineering students are more prone to mental health concerns; however, they are less likely to seek help and possibly face barriers and hesitations regarding mental health concerns [21], indicating a treatment gap. For example, by controlling for gender, Whitwer et al. [7] found that women undergraduates in engineering are more likely than their non-engineering counterparts to report symptoms of depression and anxiety. Additionally, engineers were found to be less likely to use professional help than their non-engineering counterparts; however, women were more likely to seek professional help than men.

Several reasons have been attributed to this perceived lack of seeking help, such as stigma concerns that help-seeking could be perceived as a sign of weakness, as well as a lack of normalization of mental health concerns in academic settings by key stakeholders (e.g., faculty) [19]. Women and underrepresented minorities face unique and additional barriers regarding mental health concerns since masculinity is deemed as embodied demographic norms of engineers whose features include individuality or self-reliance and emotional detachment [22]. Wright et al. [8] also note engineering students' tendency to suck it up or prioritize academics over mental health unless they reach a point of crisis. We posit that preventive, rather than reactive, interventions are required to foster the culture of wellness in engineering, given the current treatment gap and students' greater thresholds for stress and challenges when seeking professional help regarding mental health.

Students' mental health is impacted by multiple aspects of their identity as well as the surrounding context. While several studies have started to look into students' sociodemographic identities (e.g., gender, race/ethnicity) as well as their intersections to interpreting the results

related to mental health and wellbeing, there is an “absence of studies that included and reported Mental health and Wellbeing outcomes for undergraduate engineering students with other diverse, intersectional identities” [11, p. 18]. International status, often in conjunction with other minoritized identities, can lead to additional barriers such as discrimination or neo-racism (a type of discrimination based on an individual’s cultural or national origin rather than biological racial characteristics) [23], in addition to the challenges that international students face throughout their educational journey. For example, in Kali et al., a Latina international undergraduate student discusses how being an international student from a South American country has impacted her mental health, bringing up topics such as financial instability, feelings of homelessness, navigating ambiguous and uncertain systems (legal, academic, employment), unequal access to opportunities and difficulties in communicating about mental health concerns [24]. Additionally, discrimination is a strong risk factor for mental health symptoms, according to a report from the Center for Collegiate Mental Health (CCMH) [25]. This is especially true for students who have experienced discrimination for multiple identities or any one of the six identities (disability, gender, nationality/country of origin, race/ethnicity/culture, religion, sexual orientation). Also, International students are found to be less likely to seek help (formal and informal) than domestic students [13]. Even though it is speculated that international students might experience more psychological distress and mental health concerns than domestic students, international students might react and respond to various stressors and challenges based on their identities as well as their ability to make meaning about the environment they are situated in. We posit that to develop preventive interventions and enhance the mental health of international students before they reach the phase of distress, we should explore the factors that impact mental health and the decision to seek help.

One of the many variables impacting help-seeking is religiosity, a multi-faceted construct. Three primary characteristics make up religiosity: belief, activities, and religious affiliation [26]. Similarly, Charters et al. [27] list three types of religiosity: subjective, organizational, and non-organizational. Public or external behaviors such as attending and/or participating in religious congregations are referred to as organizational religiosity. On the other hand, non-organizational religiosity describes intrinsic or private expressions like praying, engaging in religious lectures, and so on. The importance of religion to particular individuals is referred to as their subjective religiosity.

Studies have observed complex relationships regarding the impact of religiosity on the act of seeking help (formal and informal). The sense of purpose and belonging in life, as well as general happiness, are all predicted by one's religious affiliation. Furthermore, there may be a considerable correlation between religiosity and ethnicity. African Americans, for instance, might rely more on religion as a coping mechanism in difficult times [28]. High levels of religiosity are linked to good mental health [29] and are thought to serve as a protective factor against a number of mental health issues, including substance abuse, depression, and suicide [26]. Furthermore, it has been discovered that religiosity is linked to a lower use of professional

mental health services [28]. It is also plausible that those who practice high levels of religiosity are more prone to use an informal approach to obtaining assistance. Taken together, we hypothesize that international students with greater religiosity would be associated with lower mental health service utilization (formal help-seeking) and higher informal help-seeking.

Purpose/Hypothesis

This study explores the relationship between religiosity and service utilization among college students, with a particular focus on international undergraduate engineering students in the US. It seeks to answer the following research questions:

- 1) What is the prevalence of mental health conditions and help-seeking among international engineering undergraduates? Are there gender differences in help-seeking among international engineering undergraduates?
- 2) How do help-seeking (formal and informal) tendencies vary among engineering undergraduates with different levels of religiosity?

Method

Data

The Healthy Minds Study (HMS) is an annual online survey carried out at universities throughout the United States [30]. It investigates mental well-being, utilization of services, and associated factors among both undergraduate and graduate students. Educational institutions choose to participate in the HMS survey. The data used in the current study is from the academic year 2021-2022, which involved 95,860 students from over 140 academic institutions.

Participants

In this study, we specifically focus on international engineering undergraduate students enrolled in institutions across the United States. Therefore, international engineering undergraduates were defined as individuals who exclusively selected “bachelors” as their degree level, “engineering” as their field of study, and “international” as their citizenship status. Those selecting more than one degree or field of study were excluded. The final sample comprises 436 responses.

Measures

Help-Seeking (Dependent Variable)

The HMS dataset differentiates between formal and informal help-seeking. Formal help-seeking is characterized by service utilization, i.e., seeking professional counseling or obtaining mental health medication. Informal help-seeking is assessed by the following question: *In the past 12 months, have you received support for your mental or emotional health from any of the following sources?* The raw responses in the HMS are categorized from 1 to 10 as follows (1=Roommate, 2=Friend (who is not a roommate), 3= Significant others, 4= Family members, 5= Religious

counselors or another religious contact, 6= Support group, 7= Other non-clinical source (please specify), 8= No, none of these [mutually exclusive], 9= Faculty member/professor, 10= Staff member.) The HMS data also included a binarized variable that would capture whether participants sought any of these informal help. This binary help-seeking variable (1=yes, 0=no) provided by the HMS dataset was the one used for our analysis.

Service Utilization (Dependent Variable)

Service utilization or formal help-seeking refers to seeking help for mental health conditions from the professional services available either on or off campus. In the HMS dataset it is measured through participants' utilization of counseling or obtaining psychotropic medications in the last 12 months. Service utilization is a binary variable with a (1=yes, 0=no) response.

Religiosity (Independent Variable)

The HMS study measures religiosity through a single item (*how important is religion in your life?*) on a 5-point Likert scale with responses ranging from very important to very unimportant. The purpose of the study is to explore how religious orientation impacts help-seeking. As it is beyond the scope of the study to explore the impact of the extent of religiosity on help-seeking, we re-coded religiosity to a 3-category variable. The three-category variable represents being religious (combined (1) very important and (2) important), being non-religious (combined (4) unimportant and (5) very unimportant), and (3) being religion-neutral.

Socio-economic Status

In this study, we use the financial condition while growing up as a proxy of socioeconomic status as a control variable. The financial condition was measured through a single item (*How would you describe your financial situation while growing up?*) with responses ranging on a 5-point Likert scale from always stressful to never stressful. Keeping in mind the scope of the investigation, which focuses on whether there was financial stress or not, we re-coded socioeconomic status into a binary variable by coding stressful categories (1= Always stressful, 2= Often Stressful, 3= Stressful) to 1= stressful and non-stressful categories (4=rarely stressful, 5= never stressful) as 0.

Gender

We use gender as a control variable in this study. Gender identity is assessed through a single item (*What is your gender identity?*) with multiple response choices. In this study, we confine ourselves to male and female gender identities for the sake of analysis and use a binary gender variable. We recognize that this is a limitation of our analytical approach, which excludes gender minorities. We expect to navigate such limitations in future work and aim to understand the relationship between religiosity and marginalized gender identities.

Age

The HMS study gathers information about age by directly asking participants their age. All participants are at least eighteen years of age. Age is a continuous variable.

Mental Health Diagnosis

To assess whether the participants were diagnosed with mental health conditions, HMS uses scales for anxiety, depression, eating disorders, and suicidality. It also provides a binarized variable assessing whether an individual was positive on any of the scales or not (1= Yes, 0=No). In this study, we used the binarized mental health diagnosis variable to see the prevalence of mental health problems among international engineering undergraduates.

Descriptive Statistics

Table 1: Descriptive Statistics

Variables	Mean	Median	Min	Max
Help-Seeking	0.64	1.00	0.0	1.00
Religiosity	1.13	1.00	0.0	2.00
Socioeconomic status	0.00	0.00	0.0	1.00
Gender	0.00	0.00	0.0	1.00
Age	20.51	20.00	18.0	39.00
Service utilization	0.00	0.00	0.0	1.00

Data Analysis

The data analysis was conducted using the R statistical package. We applied weights provided by the HMS data to account for the sampling imbalance and make the analysis representative of the total population. We estimated two models using logistic regression since our outcome variables, i.e., help-seeking and service utilization, were binary in nature. The selection of independent variables was based on the theoretical relevance as discussed in the literature, a recommended approach in predictive modeling [31]. Also, we conducted all the assumption testing before estimating the models, such as linearity, independence, and multicollinearity; no deviations of the assumptions were identified, deeming our models reliable.

In *model 1*, help-seeking served as a dependent variable categorized as a binary variable where 1 indicated seeking help from friends, family, religious counselors, etc., and 0 indicated not seeking help. Our model selected not seeking help as the baseline category when conducting regression. Log-odds (b coefficients) and corresponding p values are presented in Table 3.

Model 1

$$Helpseeking_i = \alpha_i + \beta_1 NonReligious_i + \beta_2 Religious_i + \beta_3 SES_i + \beta_4 Gender_i + \beta_5 Age_i + \epsilon_i$$

In *model 2*, service utilization, referring to seeking help from professionals, was used as a dependent variable where 1 represented yes and 0 as no. We selected the non-utilizing service group as the reference group.

Model 2

$$Service\ Uti._i = \alpha_i + \beta_1 NonReligious_i + \beta_2 Religious_i + \beta_3 SES_i + \beta_4 Gender_i + \beta_5 Age_i + \epsilon_i$$

In both models, independent variables remain the same. While religiosity served as the explanatory variable, we controlled the socioeconomic status, gender, and age of the students. Religiosity is a 3-level categorical variable where we code being neutral about religion as 0 and used as a reference category. Religion is not important was coded as 1, while religion is important was coded as 2. For the sake of interpretation, we refer to 0 as neutral, 1 as non-religious and 2 as religious. The socioeconomic status variable is also binary in nature, with 1 indicating financial difficulty while growing up and 0 (reference category) indicating no financial difficulty while growing up. The variable gender was coded as 1 for females and 0 for males (reference category). The variable age is a continuous variable.

Results

Table 2 presents the distribution of diagnosed mental health conditions across gender and religiosity. It is interesting to see that a higher percentage of women among international engineering students are diagnosed with mental health conditions (22.63%) compared to men (10.04%). Overall, only 15.61 % of the international students in our sample were diagnosed with a mental health condition.

In terms of religiosity, it is interesting to see that those who considered religion to be important had the lowest percentage of diagnoses for mental health conditions (10.13%). In comparison, those who did not consider religion to be important showed a higher prevalence of diagnosed mental health conditions (22.35). Among the neutral respondents, mental health diagnosis remains at 15.38%.

Model 1 (Table 3) shows that not being religious is positively associated with log odds of seeking help from informal sources, $b = 0.86$ ($SE = 0.92$), ($p < 0.01$). However, a negative relationship exists between considering religion to be important with the log odds of seeking help, $b = -0.64$ ($SE = 0.29$), ($p < 0.05$). The model also shows that gender (female) positively predicts the log odds of seeking help, $b = 0.94$, ($SE = 0.27$), ($p < 0.01$), suggesting that women are more likely to seek help from informal sources compared to men. The relationship of SES and age were found to be statistically insignificant.

Table 2: Distribution of Mental Health Diagnosis (MHC) across Gender and Religiosity

Variables	Total	%	With MHC	%	WithoutMHC	%
Gender						
Male	239	55.71	24	10.04	215	89.95
Female	190	44.28	43	22.63	147	77.36
Total	429	100	67	15.61	362	84.38
Religiosity						
Neutral	91	21.21	14	15.38	55	60.43
Non-religious	170	39.62	38	22.35	103	60.58
Religious	148	34.49	15	10.13	104	70.27
NA	20	4.66				
Total	429	100	67	15.61	239	61.07

Model 2 results shown in Table 3 showcase the association of religiosity with service utilization, controlling for socioeconomic status, gender, and age. Not being religious is significantly positively associated with log odds of utilizing professional help sources for mental health conditions, $b = 0.71$ ($SE = 0.31$), ($p < 0.05$). However, an insignificant relationship was found between considering religion to be important/ being religious and service utilization. Gender (female) was also found to positively predict the log odds of utilizing professional services, $b = 0.83$, ($SE = 0.24$), ($p < 0.01$), which suggests that women are more likely to utilize professional mental health services compared to men. Similar to model 1, the relationship of SES and age were found to be statistically insignificant.

Discussion

We are presenting a first exploration of the current challenges related to the prevalence of mental health conditions and help-seeking attitudes of engineering undergraduates at the unique intersection of international status and religiosity. Our analysis allowed for an exploration of such prevalence among groups that have been documented to have a higher prevalence of mental health conditions, such as women and students from low socioeconomic backgrounds. Among 429 international undergraduate engineering students in our sample, 15.61 percent were

diagnosed with mental health conditions, which is slightly below the general prevalence of mental health conditions in the general US population [32]. Our findings align with previous findings indicating that individuals with high religiosity are less likely to screen positive for

Table 3: The results of two models. Model 1 shows the association of help-seeking with religiosity, controlling for socioeconomic status, gender, and age. Meanwhile, model 2 shows the relationship between service utilization and religiosity while controlling for other variables.

Variables	Model 1- Help-Seeking			Model 2- Service Utilization		
	Coefficient	Std. error	P-value	Coefficient	Std. error	P-value
Intercept	0.53	0.92	0.56	0.26	1.23	0.83
Non-Religious	0.86	0.31	0.00**	0.71	0.31	0.02*
Religious	-0.64	0.29	0.03*	-0.20	0.33	0.53
SES	0.13	0.24	0.57	0.27	0.24	0.26
Gender	0.94	0.27	0.00**	0.83	0.24	0.00**
Age	-0.02	0.04	0.62	-0.08	0.05	0.15

** represents p-value <0.01, * represents p-value < 0.05

mental health conditions [33],[34]. Religion also tends to provide individuals with a sense of purpose and worldview that shapes how they make meaning of the world [35]. Additionally, religion also provides religious coping strategies, belonging to a community, and social networks, which can be utilized in stressful life events [36]. However, we acknowledge that different religions have different perspectives on handling mental health, and therefore, it is possible that many might not get diagnosed or report mental health conditions.

In our sample, international students identifying as women were nearly two times more likely to screen positive for mental health conditions than their male peers. This finding aligns with existing research on engineering education, which shows that women are more likely to experience issues related to their mental health [37], [38]. Research with large sample sizes has also shown that international students are less likely than domestic students to report serious

mental health conditions such as depression and anxiety yet are more likely to report feeling overwhelmingly depressed or having engaged in suicide attempts [39]. Future aspects of this exploration will require more nuance about the type of mental health conditions faced by international students in engineering at the intersection with gender.

We hypothesized a relationship between religiosity and help-seeking (formal and informal) among international engineering undergraduates. Research has found evidence that the relationship between religiosity and mental health is strongly mediated by perceived social support [40], which made us hypothesize about the influence of religiosity on different types of help-seeking forms.

Using two logistic regression models and controlling for gender, age, and socio-economic status, we found a relationship between religiosity with help-seeking (informal) and service utilization (formal help-seeking), respectively. Both models show a significant positive association between help-seeking (formal and informal) with low religiosity and a negative association with high religiosity (insignificant in the second model). The negative relationship aligns with previous literature that notes that individuals with high religiosity might have different perceptions and reactions to stressors and coping strategies [40]. Additionally, controlling for gender identity shows that women are more likely to seek help from informal as well as formal sources compared to men. Given the positive association between religiosity and both good mental health and a lower likelihood of seeking treatment, more research should be done to determine if religious beliefs serve as protective factors for people or if they prevent people in distress from seeking help.

Implications

Based on the findings of this study, we suggest potential avenues for supporting international undergraduates' mental health. One key implication, given that we found that religious students were less likely to seek formal help, is the expanding the incorporation of spiritual and/or religious practices in institutions of higher education, as this approach may provide valuable support to international students who may draw strength from their religious beliefs. One way to tap into the advantages of religion could even be to help interested students find out how to get in touch with religious communities. Moreover, there is potential for collaboration between higher education institutions and local religious organizations to enhance the support and resources available to international students.

Additionally, adopting more culturally sensitive mental health care might improve the utilization of the students as it would assure them that their unique concerns will be addressed. These partnerships could be instrumental in addressing the unique mental health needs of international undergraduate engineering students in the US. Finally, to enhance informal help-seeking, training, such as gatekeeper training, might be helpful for students to recognize the signs of distress and potential next steps (e.g., refer).

Conclusions and Future Work

Our study identifies a prevalence of mental health conditions lower than the general US population, yet we found a higher prevalence among female international students. Our exploration of the relationship between religiosity and students' help-seeking attitudes showed that non-religious international students were more likely to seek informal help, and religious international students were less likely to seek any form of help. However, such effect was not always significant. Through the use of the Healthy Minds Study dataset, we contribute to a more comprehensive understanding of the landscape related to mental health concerns and service utilization among international college students.

Even though the data used is cross-sectional, the survey is administered annually, thereby opening up the opportunity to conduct a longitudinal study, which will be addressed in a future study. We acknowledge that domestic students also have multiple religious beliefs impacting mental health outcomes and consequent help-seeking or different religions have different perspectives on handling mental health; however, for the scope of the study, we focus on international students and find baseline information in undergraduate engineering education.

Future work might also account for the within-group similarities and differences. For example, it will also consider ethnicity as a mediating factor in the relationship between religiousness and help-seeking and service utilization attitudes of international students, as the mediating effect of ethnicity between religiousness and mental health has been previously documented [41]. Religiosity is a multi-dimensional construct, and we only examined the importance of religion or subjective religiosity without examining other dimensions, such as organizational and non-organizational religiosity. We expect to be able to model a lot more factors that might moderate the relationship between religiosity and help-seeking in future expansions of this study.

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