



# Stress, Anxiety, and Depression Among Undergraduate Students during the COVID-19 Pandemic and their Use of Mental Health Services

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## Abstract

The coronavirus 2019 (COVID-19) has brought significant changes to college students, but there is a lack of empirical studies regarding how the pandemic has affected student mental health among college students in the U.S. To fill the gap in the literature, this study describes stress, anxiety, and depression symptoms for students in a public research university in Kentucky during an early phase of COVID-19 and their usage of mental health services. Results show that about 88% of students experienced moderate to severe stress, with 44% of students showing moderate to severe anxiety and 36% of students having moderate to severe depression. In particular, female, rural, low-income, and academically underperforming students were more vulnerable to these mental health issues. However, a majority of students with moderate or severe mental health symptoms never used mental health services. Our results call for proactively reaching out to students, identifying students at risk of mental health issues, and providing accessible care.

**Keywords** COVID-19 · Student mental health · Mental health services · College students

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The coronavirus 2019 (COVID-19) has brought significant and sudden changes to college students. To protect and prevent students, faculty, and staff members from the disease, higher education institutions closed their campus in the spring of 2020 and made a quick transition to online classes. Students were asked to evacuate on a short notice, adjust to new online learning environments, and lose their paid jobs in the middle of the semester. The pandemic has also raised concerns among college students about the health of their family and friends (Brown & Kafka, 2020). Because all these changes were unprecedented and intensive, they caused psychological distress among students, especially during the first few months of the pandemic. There is abundant anecdotal evidence describing students' stress and emotional difficulties as impacted by COVID-19, but there are only a few empirical studies available that directly measure college student mental health since the outbreak (e.g., Huckins et al., 2020; Kecojevic et al., 2020; Son et al., 2020). Most existing studies focus on mental health for general populations (e.g., Gao et al., 2020) or health care workers (e.g., Chen et al., 2020), whose results may not be applicable to college students. Given that college students are particularly vulnerable to mental health issues (e.g., Kitzrow, 2003), it is important to explore their mental health during this unprecedented crisis.

In this study, we describe the prevalence of stress, anxiety, and depression for undergraduate students in a public research university during the six weeks after the COVID-19 outbreak alongside their usage of mental health services. Using a self-administered online survey, we measured stress, anxiety, and depression levels with well-established clinical tools and asked the extent to which college students used on-campus and off-campus mental health services for the academic year. Our results revealed that more than eight out of ten students surveyed experienced modest or severe stress, and approximately 36–44% of respondents showed moderate or severe anxiety and depression. However, more than 60% of students with moderate or severe stress, anxiety, or depression had never utilized mental health services on- or off-campus. Although focusing on a single institution, this paper is one of the few studies that empirically examine mental health of college students in the U.S. during the early phase of the pandemic. Findings from this paper reassure the seriousness of student mental health during the pandemic and call for a proactive mental health assessment and increased support for college students.

## Literature Review

### COVID-19 and Student Mental Health

Empirical studies reported a high prevalence of college mental health issues during the early phase of COVID-19 around the world (Cao et al., 2020; Chang et al., 2020; Liu et al., 2020; Rajkumar, 2020; Saddik et al., 2020). In the U.S. a few, but a growing number of empirical surveys and studies were conducted to assess college students' mental health during the pandemic. Three nationwide surveys conducted across the U.S. conclude that college student mental health became worse during the pandemic. According to an online survey administered by Active Minds in mid-April of 2020, 80% of college students across the country reported that COVID-19 negatively affected their mental health, with 20% reporting that their mental health had

significantly worsened (Horn, 2020). It is also concerning that 56% of students did not know where to go if they had immediate needs for professional mental health services (Horn, 2020). Another nationwide survey conducted from late-May to early-June also revealed that 85% of college students felt increased anxiety and stress during the pandemic, but only 21% of respondents sought a licensed counselor or a professional (Timely MD, n.d.). According to the Healthy Minds Network's survey (2020), which collected data from 14 college campuses across the country between March and May of 2020, the percentage of students with depression increased by 5.2% compared to the year before. However, 58.2% of respondents never tried mental health care and about 60% of students felt that it became more difficult to access to mental health care since the pandemic. These survey results clearly illustrate that an overwhelming majority of college students in the U.S. have experienced mental health problems during the early phase of COVID-19, but far fewer students utilized professional help. Despite the timely and valuable information, only Healthy Minds Network (2020) used clinical tools to measure student mental health, and none of them explored whether student characteristics were associated with mental health symptoms.

To date, only a few scholarly research studies focus on college student mental health in the U.S. since the COVID-19 outbreak. Huckins et al. (2020) have longitudinally tracked 178 undergraduate students at Dartmouth University for the 2020 winter term (from early-January to late-March of 2020) and found elevated anxiety and depression scores during mid-March when students were asked to leave the campus due to the pandemic. The evacuation decision coincided with the final week, which could have intensified student anxiety and depression. The anxiety and depression scores gradually decreased once the academic term was over, but they were still significantly higher than those measured during academic breaks in previous years. Conducting semi-structured interviews with 195 students at a large public university in Texas, Son et al. (2020) found that 71% of students surveyed reported increased stress and anxiety due to the pandemic, but only 5% of them used counseling services. The rest of the students explained that they did not use counseling services because they assumed that others would have similar levels of stress and anxiety, they did not feel comfortable talking with unfamiliar people or over the phone, or they did not trust counseling services in general. Common stressors included concerns about their own health or their loved ones', sleep disruption, reduced social interactions, and difficulty in concentration. Based on a survey from 162 undergraduate students in New Jersey, Kecojevic et al. (2020) found that female students had a significantly higher level of stress than male students and that upper-class undergraduate students showed a higher level of anxiety than first-year students. Having difficulties in focusing on academic work led to increased levels of stress, anxiety, and depression (Kecojevic et al., 2020).

## College Student Mental Health and Usage of Mental Health Services Before COVID-19

College student mental health has long been studied in education, psychology, and medicine even before the pandemic. The general consensus of the literature is that college student mental health is in crisis, worsening in number and severity over time. Before the

pandemic in the academic year of 2020, more than one-third of college students across the country were diagnosed by mental health professionals for having at least one mental health symptom (American College Health Association, 2020). Anxiety (27.7%) and depression (22.5%) were most frequently diagnosed. The proportion of students with mental health problems is on the rise as well. Between 2009 and 2015, the proportion of students with anxiety or depression increased by 5.9% and 3.2%, respectively (Oswalt et al., 2020). Similarly, between 2012 and 2020, scores for depression, general anxiety, and social anxiety have constantly increased among those who visited counseling centers on college campuses (Center for College Mental Health [CCMH], 2021).

Some groups are more vulnerable to mental health problems than others. For example, female and LGBTQ students tend to report a higher prevalence of mental health issues than male students (Eisenberg et al., 2007b; Evans et al., 2018; Wyatt et al., 2017). However, there is less conclusive evidence on the difference across race or ethnicity. It is well-supported that Asian students and international students report fewer mental health problems than White students and domestic students, but there are mixed results regarding the difference between underrepresented racial minority students (i.e., African-American, Hispanic, and other races) and White students (Hyun et al., 2006; Hyun et al., 2007). Many researchers find either insignificant differences (e.g., Eisenberg et al., 2007b) or fewer mental health issues reported for underrepresented minority students compared to White students (e.g., Wyatt et al., 2017). This may not necessarily mean that racial minority students tend to have fewer mental health problems, but it may reflect their cultural tendency against disclosing one's mental health issues to others (Hyun et al., 2007; Wyatt & Oswalt, 2013). In terms of age, some studies (e.g., Eisenberg et al., 2007b) reveal that students who are 25 years or older tend to have fewer mental health issues than younger students, while others find it getting worse throughout college (Wyatt et al., 2017). Lastly, financial stress significantly increases depression, anxiety, and suicidal thoughts among college students (Eisenberg et al., 2007b).

Despite the high prevalence of mental health issues, college students tend to underutilize mental health services (Cage et al., 2018; Hunt & Eisenberg, 2010; Lipson et al., 2019; Oswalt et al., 2020). The Healthy Minds Study 2018–2019, which collected data from 62,171 college students across the country, reports that 57% of students with positive anxiety or depression screens have not used counseling or therapy, and 64% of them have not taken any psychotropic medications within the past 12 months (Healthy Minds, 2019). Even when students had visited a counseling center, about one-fourth of them did not return for a scheduled appointment, and another 14.1% of students declined further services (CCMH, 2021). When asked the barriers that prevented them from seeking mental health services, students reported a lack of perceived needs for help (41%), preference to deal with mental health issues on their own or with families and friends (27%), a lack of time (23%), financial difficulty (15%), and a lack of information about where to go (10%). Students who never used mental health services were not sure if their insurance covered mental health treatment or were more skeptical about the effectiveness of treatment (Eisenberg et al., 2007a). Stigma, students' view about getting psychological help for themselves, is another significant barrier in seeking help and utilizing mental health services (Cage et al., 2018).

## Current Study

While previous studies have advanced our understanding of student mental health and their usage of mental health services, we find a lack of empirical studies on these matters, particularly in the context of COVID-19. The goal of this study is to fill the gap with specific investigations into the prevalence and pattern of U.S. college student mental health with regard to counseling service use during the early phase of COVID-19. First, very few studies focus on college students and their mental health during the pandemic, and most nationwide surveys conducted in the U.S. did not use clinically validated tools to measure student mental health. In this study, we have employed the three clinical measures to assess stress, anxiety, and depression, which are the most prevalent mental health problems among college student populations (Leviness et al., 2017). Secondly, it should be noted that while empirical research conducted in U.S. institutions clearly demonstrate that college students were under serious mental distress during the pandemic (Huckins et al., 2020; Son et al., 2020; Kecojevic et al., 2020), such studies have relatively small sample sizes and rarely examined whether particular groups were more vulnerable than others during the pandemic. To overcome such limitations, the present study has recruited a relatively large number of students from all degree-seeking students enrolled at the study institution. Further, given the high prevalence of mental health issues, we have identified vulnerable student groups and provided suggestions regarding necessary support for these students in an effort to reduce mental health disparity. Lastly, previous studies (e.g., Healthy Minds, 2019) show that college students, even those with mental health issues, tended to underutilize counseling services before the pandemic. Yet, there is limited evidence regarding whether this continued to be the case during COVID-19. Our study provides empirical evidence regarding the utilization of mental health services during the early phase of the pandemic and identifies its predictors. Based on the preceding discussions, we address the following research questions in this study:

First, how prevalent were stress, anxiety, and depression among college students during the early phase of the pandemic?

Second, to what extent have students utilized mental health services on- and off-campus?

Third, what are the predictors of mental health symptoms and the usage of mental health services?

## Methods

### Data

We collected data via a self-administered online survey. This survey was designed to measure student mental health, the usage of mental health services, and demographics. The survey was sent to all degree-seeking students enrolled in a public research university in Kentucky for the spring of 2020. An invitation email was

first sent on March 23, which was two days after the university announced campus closure, and two more reminder emails were sent in mid-April and late-April. The survey was available until May 8th, which was the last day of the semester.

A total of 2691 students (out of 24,146 qualified undergraduate and graduate degree-seeking students enrolled for the semester) responded to the survey. The response rate was 11.14%, but this is acceptable as it is within the range of Internet survey response rates, which is anywhere from 1 to 30% (Wimmer & Dominick, 2006). We deleted responses from 632 students who did not answer any mental health questions, which left 2059 valid students for the analysis. In this study, we focused on undergraduate students because they are significantly different from graduate students in terms of demographics (e.g., racial composition, age, and income) and major stressors (Wyatt & Oswalt, 2013). As a result, 1412 undergraduate students are included in our sample. 90% of these students had complete data. The rest of students skipped a couple of questions (usually related to their residency) but answered most of the question. Thus, we conducted multiple imputation, created ten imputed data sets, and ran regression models using these imputed data (Allison, 2002). Our regression results using imputed data are qualitatively similar to the estimates using original data; however, for comparison, we also provided the regression estimates using original data in Appendix Tables 6 and 7. Please note that we still used original data for descriptive research questions (presented in Tables 1, 2, and 4) to accurately describe the prevalence of mental health symptoms and use of counseling services.

Table 1 provides descriptive statistics for students in our data. Female (73%), White (86%), and students who are below 25 years old (95%) are the vast majority of our sample. About one in four students are rural students and/or students from Appalachian areas (27%) and first-generation students (23%). Wealthier students (whose family income was \$100,000 or more) make up about 44% of the sample (44%). Compared to the undergraduate student population at the study site, female students (56.3% at the study site) are overrepresented in our study. The proportion of White students is slightly higher in our sample (86%) than the study population (84%), and that of first-generation students is slightly lower in our sample (23%) than that in the study population (26%).

## Variables

There are five key outcome variables for this study. The first three outcome variables are stress, anxiety, and depression, and the other two variables are the extent to which students used on-campus and off-campus mental health services for the academic year, respectively. Our mental health measures are well-established and widely used in a clinical setting. For stress, we used the Perceived Stress Scale (PSS) that includes ten items asking students' feelings and perceived stress measured on a 5-point Likert scale from 0 (strongly disagree) to 4 (strongly agree) (Cohen et al., 1983). Using the sum of scores from the ten items, the cut-off score for low, moderate, and high stress is 13, 26, and 40, respectively. PSS scale was

**Table 1** Descriptive statistics of sample characteristics

	Number	Percentage
Gender		
Male	368	26.06%
Female	1027	72.73%
LGBTQ	17	1.20%
Race	1131	
White	972	85.94%
African-American	50	4.42%
Hispanic	47	4.16%
Asian	62	5.48%
International students	27	1.91%
Rural students	378	26.77%
First-generation students	327	23.16%
Age		
Below 25 years old	1345	95.32%
25–29 years old	35	2.48%
30–39 years old	20	1.42%
40 years old or above	11	0.78%
Class level		
Freshman	355	25.41%
Sophomore	342	24.22%
Junior	345	24.43%
Senior	370	26.20%
GPA		
Below 2.0	23	1.65%
2.0–3.0	209	15.03%
3.01–3.5	375	26.96%
3.51–4.0	784	56.36%
Family Income		
Below \$22,000	123	8.85%
\$22,000–\$39,999	132	9.50%
\$40,000–\$64,999	169	12.16%
\$65,000–\$83,999	198	14.24%
\$84,000–\$99,999	165	11.87%
\$100,000–\$149,999	310	22.30%
\$150,000 or above	293	22.08%
Total	1412	100%

used in hundreds of studies and validated in many languages (Samaha & Hawi, 2016). PSS also has a high internal consistency reliability. Of the recent studies that used the instrument to measure mental health of U.S. college students, Cronbach's alpha was around 0.83 to 0.87, which exceeded the commonly used cut-off of 0.70 (Adams et al., 2016; Burke et al., 2016; Samaha & Hawi, 2016).

**Table 2** Descriptive statistics for stress, anxiety, and depression prevalence

		Number	Percentage
Stress	Low	174	12.34%
	Moderate	889	63.05%
	Severe	347	24.61%
	Total	1410	100%
Anxiety	Minimal	325	23.05%
	Mild	455	32.27%
	Moderate	337	23.90%
	Severe	293	20.78%
	Total	1410	100%
Depression	None to slight	601	42.62%
	Mild	298	21.13%
	Moderate	421	29.86%
	Severe	90	6.38%
	Total	1410	100%

We used the General Anxiety Disorder 7-item (GAD-7) scale to measure anxiety. This is a brief self-report scale to identify probable cases of anxiety disorders (Spitzer et al., 2006). The GAD scores of 5, 10, and 15 are taken as the cut-off points for mild, moderate, and severe anxiety, respectively. In a clinical setting, anyone with a score of 10 or above are recommended for further evaluation. GAD is moderately good at screening three other common anxiety disorders - panic disorder (sensitivity 74%, specificity 81%), social anxiety disorder (sensitivity 72%, specificity 80%), and post-traumatic stress disorder (sensitivity 66%, specificity 81%) (Spitzer et al., 2006). In their recent study, Johnson, et al. (2019) validated that “the GAD-7 has excellent internal consistency, and the one-factor structure in a heterogeneous clinical population was supported” (p. 1).

Lastly, depression was assessed with the eight-item Patient-Reported Outcomes Measurement Information System (PROMIS) Depression Short Form (Pilkonis et al., 2014). A score less than 17 is considered as none to slight depression, a score between 17 and 21 is considered as mild depression, a score between 22 and 32 is considered as moderate depression, and a score of 33 or above is considered as severe depression. PROMIS depression scale is a universal, rather than a disease-specific, measure that was developed using item response theory to promote greater precision and reduce respondent burden (Shensa et al., 2018). The scale has been correlated and validated with other commonly used depression instruments, including the Center for Epidemiological Studies Depression Scale (CES-D), the Beck Depression Inventory (BDI-II), and the Patient Health Questionnaire (PHQ-9) (Lin et al., 2016).

When it comes to the usage of psychological and counseling services, we asked students to indicate the extent to which they used free on-campus resources (e.g., counseling center) and off-campus paid health professional services (e.g., psychiatrists) anytime during the academic year on a scale of 1 (never) to 5 (very often), respectively. These questions do not specifically ask if students utilized these



services after the COVID-19 outbreak, but responses for these questions indicate whether and how often students had used any of these services for the academic year until they responded to our survey.

We also collected data about student demographics and characteristics including student gender, race or ethnicity, age, class levels (freshman, sophomore, junior, and senior), first generation student status (1 = neither parent has a bachelor's degree, 0 = at least one parent with a bachelor's degree), family income, residency (rural and/or Appalachian students, international students), GPAs, and perceived stigma about seeking counseling or therapy (i.e., "I am afraid of what my family and friends will say or think of me if I seek counseling/therapy") measured on a 5-point Likert scale. We used these variables to see if they were associated with a high level of stress, anxiety, and depression and the usage of mental health services.

## Analyses

We used descriptive statistics, ordinal logistic regression, and logistic regression models in this study. To address the first and second research questions, we used descriptive statistics and presented the prevalence of stress, anxiety, and depression as well as the frequency of using mental health services. For the third research question, we adopted ordinal logistic regression and logistic regression models depending on outcome variables. We used ordinal logistic regression models to identify correlates of different levels of stress, anxiety, and depression, which were measured in ordinal variables (e.g., mild, moderate, and severe). For the usage of mental health service outcomes, we employed logistic regression models. Because more than two-thirds of students in the sample never utilized either type of mental health services, we re-coded the usage variables into binary variables (1 = used services, 0 = never used services) and ran logistic regression models.

## Limitations

Our study is not without limitations. First, we do not claim a causal relationship in this study, but we describe the state of mental health for students soon after the COVID-19 outbreak. We acknowledge that many students may have suffered from mental health problems before the pandemic, with some experiencing escalation after the outbreak (e.g., Horn, 2020). Even if our study does not provide a causal relationship, we believe that it is important to measure and document student mental health during the pandemic so that practitioners can be aware of the seriousness of this issue and consider ways to better serve students. Secondly, our study results may not be applicable to students in other institutions or states. We collected data from a public research university in Kentucky where the number of confirmed cases and deaths were relatively lower than other states such as New York. The study site mainly serves traditional college students who attend college right after high school, who live on campus, and who do not have dependents. Therefore, mental health for students at other types of institutions or in other states could be different from what is presented in our study.

## Findings

### Prevalence of Stress, Anxiety, and Depression

Table 2 shows the prevalence of stress, anxiety, and depression. Overall, a majority of students experienced psychological distress during the early phase of the pandemic. When it comes to stress, about 63% of students had a moderate level of stress, and another 24.61% of students fell into a severe stress category. Only 12% of students had a low level of stress. In other words, more than eight in ten students in the survey experienced moderate to severe stress during the pandemic. This result is comparable to the Active Minds' survey results that report 91% of college students reported experiencing feelings of stress and anxiety since the pandemic (Horn, 2020).

In terms of anxiety, approximately 24% and 21% of students in our study had moderate and severe anxiety disorders, respectively. Given that those who scored 10 or above on the GAD-7 scale (moderate to severe category) are recommended to meet with professionals (Spitzer et al., 2006), this finding implies that nearly half of students in this study needed to get professional help. This proportion of students with moderate to severe anxiety is almost double that for university students in China (e.g., Chang et al., 2020) or the United Arab Emirates soon after the COVID-19 outbreak (Saddik et al., 2020). Lastly, approximately 30% and 6% of students suffered from moderate and severe depression, respectively. These proportions are far higher than college students in China measured during the pandemic (Chang et al., 2020) but slightly higher than a nationwide sample of U.S. college students assessed before the pandemic (Healthy Minds, 2019). Given that our study measured these mental health symptoms for the first six weeks of the pandemic, we speculate that the proportion of students with moderate or severe depression would increase over time.

In order to explore predictors of a higher level of stress, anxiety, and depression, we ran ordinal logistic regression models as presented in Table 3. Overall, it is clear and consistent that the odds of experiencing a higher level of stress, anxiety, and depression (e.g., severe than moderate, moderate than mild, etc.) were significantly greater for female students by a factor of 1.489, 1.723, and 1.246 than the odds for male students when other things were held constant. This gender difference in mental health symptoms is quite consistent with other studies before and during the pandemic (Eisenberg et al., 2007a; Kecojecic et al., 2020). When it comes to race or ethnicity, the odds of experiencing a higher level of stress, anxiety, and depression for African-American students were almost as half as the odds for White students. However, there was no significant difference in the odds for Hispanic and Asian students compared to White students. Student class level was significantly related to stress and anxiety levels: The odds were greater for upper-class students than lower class students. This result is consistent with Kecojecic et al. (2020), which reported significantly higher levels of anxiety among upper-class students compared to freshman students. It may reflect that one of major stressors for college students during the pandemic is the uncertain future of their education and job prospects, which would be a bigger concern for upper-class students (Timely MD, n.d.).

**Table 3** Ordinal logistic regression models for severity of mental health symptoms (imputed data)

	Stress	Anxiety	Depression
Female	1.489** (0.189)	1.723*** (0.193)	1.246+ (0.144)
African American	0.592+ (0.175)	0.512* (0.140)	0.520* (0.138)
Hispanic	1.439 (0.430)	1.351 (0.360)	1.226 (0.326)
Asian	0.879 (0.260)	1.043 (0.263)	1.250 (0.319)
Class level	1.122* (0.055)	1.083+ (0.047)	1.046 (0.046)
Age	0.644** (0.010)	0.974 (0.136)	0.860 (0.119)
International students	1.139* (0.503)	0.999 (0.384)	1.428 (0.548)
Rural students	1.125 (0.141)	1.325* (0.147)	1.270* (0.145)
First-generation students	0.905 (0.128)	1.003 (0.125)	0.992 (0.127)
Family income	0.900*** (0.029)	0.899*** (0.025)	0.885*** (0.026)
GPA	0.704*** (0.050)	0.798*** (0.049)	0.740*** (0.047)
N	1393	1393	1393

Odds ratio are reported, and numbers in parentheses are standard error

+  $p < 0.1$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

One's rurality, family income, and GPA were significantly associated with the severity of mental health symptoms. The odds of experiencing a severe level of anxiety and depression were 1.325 and 1.270 times higher among rural students than urban and suburban students. With every one unit increase in family income or students' GPAs, the odds of experiencing a more severe stress, anxiety, and depression significantly decreased. This result suggests that students from disadvantaged backgrounds were even more vulnerable to psychological distress during the early phase of the pandemic. The negative association between GPAs and mental distress levels was consistent with previous studies that showed that college students were very concerned about their academic performances and had difficulty in concentration during the early phase of the pandemic (Kecojevic et al., 2020; Son et al., 2020).

### Usage of Mental Health Services

In Table 4, we first describe the extent to which students with moderate to severe symptoms of stress, anxiety, or depression used mental health services on- and off-campus during the academic year. The university in this study has provided free counseling services for students, and the counseling services have continued to be available for students in the state via phone or Internet even after the university was closed

after the outbreak. Table 4 presents the frequency of students using on-campus mental health services (Panel A) and off-campus paid mental health services (Panel B) on a five-point scale. For this table, we limited the sample to students with moderate to severe symptoms of stress, anxiety, or depression to focus on students who were in need of these services. Surprisingly, a majority of these students never used mental health services on- and off-campus even when their stress, anxiety, or depression scores indicated that they needed professional help. More than 60% of students with moderate to severe symptoms never used on-campus services, and more than two-thirds of students never used off-campus mental health services. This underutilization of mental health resources is concerning but not surprising given that college students tended not to use counseling services before and during the pandemic as presented in previous studies (e.g., CCMH, 2021; Healthy minds, 2019; Son et al., 2020).

In order to explore predictors of the usage of mental health services, we ran logistic regression models as shown in Table 5. We included all students in these regression models to see whether a severity of mental health symptoms was related to the usage of mental health services. Table 5 presents the results for the usage of any mental health services, on-campus mental health services, and off-campus mental health services, respectively. Overall, stress, anxiety, and depression levels were positively associated with using mental health services on- and off-campus: With every one unit increase in each of these mental health symptoms, the odds of using on- and off-campus mental health services significantly increased. This result is relieving as it suggests that students who were in great need of these services actually used them. Other than mental health symptoms, there were different predictors for utilizing on-campus and off-campus services. African-American and Hispanic students were significantly more likely to use on-campus services than White students. The odds of using on-campus mental health services were 3.916 times higher for African-American students and 2.032 times higher for Hispanic students than White students. This result is interesting given that the odds of having severe mental distress were significantly lower for African-American students than White students, according to Table 3. It may suggest

**Table 4** Usage of mental health services among students with moderate or severe symptoms

	Never	Rarely	Sometimes	Often	Very Often
<b>Panel A (On-Campus Services)</b>					
Stress (N = 1236)	822 (66.50%)	176 (14.24%)	136 (11.20%)	66 (5.34%)	36 (2.91%)
Anxiety (N = 630)	380 (60.32%)	100 (15.87%)	83 (13.17%)	45 (7.14%)	22 (3.49%)
Depression (N = 511)	309 (60.47%)	80 (15.66%)	62 (12.13%)	41 (8.02%)	19 (3.72%)
<b>Panel B (Off-Campus Services)</b>					
Stress (N = 1236)	920 (74.43%)	73 (5.91%)	115 (9.30%)	75 (6.70%)	53 (4.29%)
Anxiety (N = 630)	423 (67.14%)	38 (6.03%)	71 (11.27%)	57 (9.05%)	41 (6.51%)
Depression (N = 511)	349 (68.30%)	36 (7.05%)	56 (10.96%)	40 (7.83%)	30 (5.87%)

**Table 5** Logistic regression models predicting the usage of mental health services (imputed data)

	Any service	On-campus free service	Off-campus paid service
Female	1.487** (0.199)	1.142 (0.160)	1.656** (0.273)
African American	3.001** (0.952)	3.916*** (1.202)	0.735 (0.292)
Hispanic	1.336 (0.417)	2.032* (0.627)	0.757 (0.288)
Asian	0.709 (0.218)	0.750 (0.248)	0.867 (0.313)
Class level	1.088 (0.056)	0.960 (0.052)	1.178** (0.071)
Age	1.133 (0.178)	0.688+ (0.136)	1.624** (0.264)
International students	1.418 (0.634)	2.269+ (1.040)	0.715 (0.394)
Rural students	0.937 (0.123)	1.034 (0.142)	0.781 (0.121)
First-generation students	0.793 (0.117)	0.934 (0.144)	0.924 (0.159)
Family income	0.991 (0.038)	0.985 (0.034)	1.057 (0.041)
GPA	0.981 (0.073)	0.953 (0.074)	0.927 (0.079)
Stigma	0.881** (0.040)	1.006 (0.048)	0.807*** (0.044)
Stress	1.433** (0.188)	1.325* (0.182)	1.382* (0.211)
Anxiety	1.286** (0.097)	1.173* (0.093)	1.447*** (0.127)
Depression	1.293*** (0.104)	1.205* (0.102)	1.169+ (0.108)
N	1392	1392	1392

Odds ratio are reported, and numbers in parentheses are standard error

+  $p < 0.1$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

that African-American students reported relatively lower levels of mental health symptoms as they had been using on-campus mental health services at higher rates. The odds of using on-campus mental health services were 2.269 times higher for international students than domestic students, but there was no significant difference in the odds of using off-campus services between the two groups. Students' age was significantly associated with the usage of on-campus and off-campus mental health services: The odds of using on-campus services were significantly lower for older students, while the odds of utilizing off-campus services were significantly higher for older students compared to younger students. When it comes to using off-campus mental health services, the odds were significantly higher for female students, older students, and upper-class students than male students, younger students, and lower classman students. Students

who were concerned with stigma associated with getting counseling and therapy were less likely to utilize off-campus mental health services.

## Discussions

Our paper describes the prevalence of stress, anxiety, and depression among a sample of undergraduate students in a public research university during an early phase of the COVID-19 outbreak. Using well-established clinical tools, we find that stress, anxiety, and depression were the pervasive problems for college student population during the pandemic. In particular, female, rural, low-income, and academically low-performing students were more vulnerable to psychological distress. Despite its prevalence, about two-thirds of students with moderate to severe symptoms had not utilized mental health services on- and off-campus. These key findings are very concerning considering that mental health is strongly associated with student well-being, academic outcomes, and retention (Bruffaerts et al., 2018; Wyatt et al., 2017).

Above all, we reiterate that college student mental health is in crisis during the pandemic and call for increased attention and interventions on this issue. More than eight in ten students in our study had moderate to severe stress, and more than one thirds of students experienced moderate to severe anxiety and/or depression. This is much worse than American college students before the COVID-19 (e.g., American College Health Association, 2020) and postsecondary students in other countries during the pandemic (e.g., Chang et al., 2020; Saddik et al., 2020). In particular, rural students, low-income students, and students with low GPAs were more vulnerable to psychological distress. These students have already faced multiple barriers in pursuing higher education (e.g., Adelman, 2006; Byun et al., 2012), and additional mental health issues would put them at a high risk of dropping out of college. Lastly, although they were dropped from the main analysis due to the small sample size ( $n = 17$ ), it is still noteworthy that a significantly higher proportion of LGBTQ students in our sample experienced severe stress, anxiety, and depression, which calls for significant attention and care for these students.

Despite the high prevalence of mental health problems, a majority of students with moderate to severe symptoms never used mental health services during the academic year, even though the university provided free counseling services. This result could be partially explained by the fact that the university's counseling center switched to virtual counseling since the COVID-19 outbreak, which was available only for students who stayed within the state due to the license restriction across state borders. This transition could limit access to necessary care for out-of-state students, international students, or students in remote areas where telecommunications or the internet connection is not very stable. Even worse, these students may also have limited access to off-campus health professionals due to the geographic restrictions (rural students), limited insurance coverage (international students), or a lack of financial means. Our results support that international students relied significantly more on on-campus resources than domestic students. We urge practitioners and policy makers to provide additional mental health resources that are accessible, affordable, and available for students regardless of their locations, insurance, and financial means, such as informal peer conversation groups or regular check-ins via phone calls or texts.

It is also important to point out that the overall usage of both on-campus and off-campus mental health services was generally low even before the COVID-19 outbreak. Previous studies consistently report that college students underutilize mental health services not only because of a lack of information, financial means, or available seats but also because of a paucity of perceived needs or stigma related to revealing one's mental health issues to others (Cage et al., 2018; Eisenberg et al., 2007a; Son et al., 2020). Our results support this finding by demonstrating that stigma one associated with getting counseling or therapy negatively influenced their utilization of off-campus mental health services. Considering these barriers, practitioners should deliver a clear message publicly that mental health problems are very common among college students and that it is natural and desirable to seek professional help if students feel stressed out, anxious, or depressed. In order to identify students with mental health needs and raise awareness among students, it can be also considered to administer a short and validated assessment in classes that enroll a large number of students (e.g., in a freshman seminar course), inform the entire class of how to interpret their scores on their own, and provide a list of available resources for those who may be interested. This would give students a chance to self-check their mental health without revealing their identities and seek help, if necessary.

We recommend that future researchers longitudinally track students and see whether the prevalence of mental health problems changes over time. Longitudinal studies are generally scarce in student mental health literature, but the timing of assessment can influence mental health symptoms reported (Huckins et al., 2020). The survey for our study was sent out right after the university of this study was closed due to the pandemic. It is possible that students may adjust to the outbreak over time and feel better, or that their stress may add up as the disease progresses. Tracking students over time can illustrate whether and how their mental health changes, especially depending on the way the pandemic unfolds combined with the cycle of an academic year. Secondly, there should be more studies that evaluate the effect of an intervention program on student mental health. Hunt and Eisenberg (2010) point out that little has been known about the efficacy of intervention programs while almost every higher education institution offers multiple mental health resources and counseling programs. During this pandemic, it can be a unique opportunity to implement virtual mental health interventions and evaluate their efficacy. Future research on virtual counseling and mental health interventions would guide practices to accommodate mental health needs for students who exclusively take online courses or part-time students who spend most of their time off campus. Lastly, we recommend future research investigate the extent of mental health service utilization among students with mental health needs. Existing surveys and studies on this topic usually rely on responses from those who visit a counseling center or students who respond to their surveys. Neither of these groups accurately represents those who are in need of professional help because there may be a number of students who are not aware of their mental health issues or do not want to reveal it. An effective treatment should first start with identifying those in need.

Our study highlights that college students are stressed, anxious, and depressed in the wake of COVID-19. Although college students have constantly reported mental health issues (e.g., American College Health Association, 2020), it is remarkable to note that the broad spectrum of COVID-19-related challenges may mitigate the overall quality of their psychological wellbeing. This is particularly the case for at-risk

students (rural, international, low-income, and low-achieving students) who have already faced multiple challenges. We also present that a majority of students with mental health needs have never utilized on- and off-campus services possibly due to the limited access or potential stigma associated with mental health care. Systematic efforts with policy makers and practitioners are requested in this research to overcome the potential barriers. All these findings, based on the clinical assessment of student mental health during the early phase of the pandemic, will benefit scholars and practitioners alike. As many colleges and universities across the country have re-opened their campus for the 2020–2021 academic year, students, especially those who take in-person classes, would be concerned about the disease and continuing their study in this unprecedented time. On top of protecting students from the disease by promoting wearing masks and social distancing, it is imperative to pay attention to their mental health and make sure that they feel safe and healthy. To this end, higher education institutions should proactively reach out to all student populations, identify students at risk of mental health issues, and provide accessible and affordable care.

## Appendix 1

**Table 6** Ordinal logistic regression models for severity of mental health symptoms (original data)

	Stress	Anxiety	Depression
Female	1.526** (0.197)	1.747*** (0.198)	1.288* (0.151)
African American	0.611+ (0.182)	0.529* (0.145)	0.535* (0.142)
Hispanic	1.525 (0.463)	1.473 (0.396)	1.318 (0.353)
Asian	0.970 (0.289)	1.094 (0.278)	1.358 (0.349)
Class level	1.120* (0.056)	1.088+ (0.048)	1.048 (0.047)
Age	0.631** (0.101)	0.948 (0.136)	0.850 (0.122)
International students	1.149 (0.516)	0.909 (0.352)	1.542 (0.595)
Rural students	1.148 (0.145)	1.358** (0.152)	1.299* (0.149)
First-generation students	0.837 (0.120)	0.969 (0.122)	0.958 (0.124)
Family income	0.898** (0.029)	0.900*** (0.025)	0.886*** (0.026)
GPA	0.706*** (0.051)	0.808** (0.050)	0.750*** (0.049)
N	1368	1368	1368

Odds ratio are reported, and numbers in parentheses are standard error

+  $p < 0.1$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



## Appendix 2

**Table 7** Logistic regression models predicting the usage of mental health services (original data)

	Any service	On-campus free service	Off-campus paid service
Female	1.473** (0.198)	1.130 (0.159)	1.653** (0.275)
African American	2.954** (0.937)	3.913*** (1.200)	0.751 (0.298)
Hispanic	1.374 (0.433)	2.116* (0.658)	0.789 (0.301)
Asian	0.733 (0.226)	0.782 (0.259)	0.903 (0.324)
Class level	1.081 (0.056)	0.952 (0.052)	1.177** (0.071)
Age	1.078 (0.173)	0.689+ (0.138)	1.555** (0.259)
International students	1.529 (0.695)	2.412+ (1.119)	0.777 (0.427)
Rural students	0.950 (0.126)	1.054 (0.145)	0.805 (0.126)
First-generation students	0.783 (0.117)	0.901 (0.141)	0.893 (0.157)
Family income	0.987 (0.033)	0.983 (0.034)	1.055 (0.041)
GPA	0.976 (0.073)	0.952 (0.074)	0.933 (0.080)
Stigma	0.880** (0.041)	1.006 (0.048)	0.802*** (0.044)
Stress	1.412** (0.186)	1.298+ (0.180)	1.356* (0.209)
Anxiety	1.284** (0.097)	1.166+ (0.093)	1.433*** (0.127)
Depression	1.284** (0.104)	1.195* (0.101)	1.116 (0.108)
N	1367	1367	1367

Odds ratio are reported, and numbers in parentheses are standard error

+  $p < 0.1$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

**Author's Contribution** The order of the authors in the title page reflects the share of each author's contribution to the manuscript.

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## Declarations

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