



Gender and Racial/Ethnic Disparities in Undergraduate and Graduate Students' Mental Health and Treatment Use Amid the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic has negatively impacted numerous people's mental health and created new barriers to services. To address the unknown effects of the pandemic on accessibility and equality issues in mental health care, this study aimed to investigate gender and racial/ethnic disparities in mental health and treatment use in undergraduate and graduate students amid the COVID-19 pandemic. The study was conducted based on a largescale online survey ($N = 1,415$) administered during the weeks following a pandemic-related university-wide campus closure in March 2020. We focused on the gender and racial disparities in current internalizing symptomatology and treatment use. Our results showed that in the initial period of the pandemic, students identified as cis women ($p < .001$), non-binary/genderqueer ($p < .001$), or Hispanic/Latinx ($p = .002$) reported higher internalizing problem severity (aggregated from depression, generalized anxiety, intolerance of uncertainty, and COVID-19-related stress symptoms) compared to their privileged counterparts. Additionally, Asian ($p < .001$) and multiracial students ($p = .002$) reported less treatment use than White students while controlling for internalizing problem severity. Further, internalizing problem severity was associated with increased treatment use only in cisgender, non-Hispanic/Latinx White students ($p_{\text{cis man}} = 0.040$, $p_{\text{cis woman}} < 0.001$). However, this relationship was negative in cis-gender Asian students ($p_{\text{cis man}} = 0.025$, $p_{\text{cis woman}} = 0.016$) and nonsignificant in other marginalized demographic groups. The findings revealed unique mental health challenges faced by different demographic groups and served as a call that specific actions to enhance mental health equity, such as continued mental health support for students with marginalized gender identities, additional COVID-related mental and practical support for Hispanic/Latinx students and promotion of mental health awareness, access, and trust in non-White, especially Asian, students are desperately needed.

Keywords Mental health equity · Gender · Race/ethnicity · COVID-19 · Internalizing problems

As of May 2021, the disease COVID-19 (caused by the virus SARS-Co-V02) has been declared a pandemic by the World Health Organization for more than one year (World Health Organization., 2020) and claimed over two million lives worldwide (Worldometer, 2021). To mitigate spread, institutions of higher education have undergone many unprecedented changes, such as purchasing remote learning systems, rolling out online asynchronous courses, redesigning campus spaces and activities, and optimizing regulatory

policies in response to rapid changes in regional COVID situations (El Masri & Sabzalieva, 2020). The outbreak and countermeasures to limit transmission have resulted in substantial education challenges and social disturbance. Besides the imminent health hazard and long-term physical effects of COVID-19, a global sense of uncertainty, financial stress, losses of loved ones, new learning modalities, and social isolation have led to predictions of a widespread mental health crisis on campus—including increased rates of mental illness and decreased access to treatment (Sahu, 2020; Son et al., 2020; Zhai & Du, 2020).

The full scope and intensity of this anticipated crisis have yet to be determined. However, we have already observed an evident surge in mental health issues among postsecondary students (including undergraduate and graduate students):

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a population whose well-being and functioning is critical to a country's economic growth and success (Astakhova et al., 2016; Eisenberg et al., 2009; Kruss et al., 2015). Multiple studies conducted during the pandemic in mid-2020 showed that 70% of postsecondary students experienced overall increases in stress levels and reported 1.5–2 times higher prevalence rates of depression and anxiety disorders than 2019 (Chirikov et al., 2020; Son et al., 2020; Wang et al., 2020). Tragic deaths due to COVID-19 and unceasing media coverage of resulting economic, health-related, and political turmoil, have also heightened the risk of post-traumatic stress disorder (PTSD; Su et al., 2021).

Simultaneously, new social distancing measures have rendered common modes and settings for mental health treatment for postsecondary students inaccessible (e.g., in-patient and outpatient psychotherapy; campus-based support). Some providers have successfully converted to telehealth-only services, which may facilitate access for some students (e.g., by eliminating transportation-based barriers)—but the pandemic's net impact on students' access to and willingness for mental health treatment in higher education remains unknown.

A mental health crisis may affect students regardless of their background, but postsecondary students with marginalized gender or racial/ethnic identities may be disproportionately impacted by crisis and emergency. Both within and beyond university settings, disparities in access, use, and quality of mental health care between individuals with privileged and marginalized identities were already a serious problem before the COVID-19 outbreak (Burgess et al., 2008; Cook et al., 2016; Dunbar et al., 2017; Hunt et al., 2015; Miranda et al., 2008). Although studies have shown how the COVID-19 outbreak amplified gender and racial/ethnic disparities in health care (Kim et al., 2020; Macias Gil et al., 2020; Ryan & El Ayadi, 2020), few studies have examined the impacts of COVID-19 on gender and racial/ethnic disparities in postsecondary students' mental health and treatment use. Such information is critical to identifying disparities and may directly inform targeted efforts toward mental healthcare equity.

Current Study

Through a large-scale online survey, the current study aimed to understand gender and racial/ethnic disparities in mental health and treatment use amid the COVID-19 pandemic in higher education. The survey was administered to undergraduate and graduate students at Stony Brook University on Long Island, NY, an early world epicenter of the pandemic during the weeks following a university-wide pandemic-related campus closure in March 2020. We

compared the severity of internalizing symptomatology, including depression, generalized anxiety, intolerance of uncertainty, and COVID-19-related stress symptoms, and a general indicator of internalizing problem severity aggregated from the aforementioned internalizing domains, during the pandemic between individuals with privileged (i.e., man, White, non-Hispanic/Latinx White) and marginalized gender (i.e., woman, non-binary/genderqueer identities), racial (i.e., Asian, Black, multiracial), and ethnic (i.e., Hispanic/Latinx) identities. We also examined current mental health treatment use rates in different demographic groups accounting for their current internalizing symptomatology. By understanding unique mental health challenges for postsecondary students with marginalized gender and racial/ethnic identities during the pandemic, we hoped to provide researchers and policymakers in the higher education and mental health care systems with concrete leverage points to enhance mental health equity.

Method

Participants

From March through April 2020, a total of 1,903 undergraduate and graduate students were recruited via emails sent to the entire school population of about 25,000 students at Stony Brook University for an online survey focusing on the psychosocial and academic impacts of the COVID-19 pandemic. Informed consent was obtained upon the beginning of the survey. The study protocol was reviewed and assigned formal exemption status by the Institutional Review Board at Stony Brook University. A total of 1,415 (74.36%) individuals completed the survey and met the following inclusion criteria: (1) age ≥ 18 , (2) no contradictory responses to questions regarding mental health treatment history (e.g., checking “yes” for wanting and not wanting support at the same time), (3) answering at least one question in each symptomatology measure. We also omitted participants with missing demographic variables and excluded subgroups with a sample size of fewer than 20 individuals from the following analysis.

Of the final analytic sample, participants' ages ranged from 18 to 63 years ($M=22.54$; $SD=4.89$), among which 68.48% identified as cis women, 29.54% cis men, and 1.98% non-binary/genderqueer. The racial/ethnic composition was 55.41% White, 4.03% Black, 35.34% Asian, 5.23% multiracial, and 9.54% Hispanic/Latinx. Regarding mental health care utilization, including pharmacological and psychological treatments: 15.12% reported current mental health treatment use; 33.43% reported past treatment use; 22.90% endorsed presently unmet treatment needs, and

35.76% reported no current or past treatment needs. Note that current treatment use was *not* mutually exclusive from past treatment use (but was mutually exclusive from the other two options).

Assessment

Perceived pre-pandemic overall mental health This question has been included in the Coronavirus Health Impact Survey V0.3 from the National Institutes of Mental Health. Participants rated their “mental or emotional health” before the COVID-19 pandemic (here, defined as beginning in March 2020) on a 5-point Likert-type scale, ranging from 1 (*poor*) to 5 (*excellent*).

Mental health treatment history Mental health treatment was defined as “any support for emotional, behavioral, mental health, or substance use problems,” and support was described as “professional therapy, seeing a counselor (at school or outside of school), attending a support group, or seeing a doctor for any of these problems.” Participants could select from the following statuses: (A) Yes, I am getting support now, (B) Yes, I have gotten support in the past, (C) No, but I have wanted this type of support before, or (D) No, and I have not wanted this type of support before.

Current internalizing symptomatology Current internalizing symptomatology was assessed across four domains, including depression, generalized anxiety, intolerance of uncertainty, and COVID-19-related stress. The first three domains were assessed with self-report Likert-type scales, namely the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001), Generalized Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006), and Intolerance of Uncertainty Scale-Short Form (IUS-12; Khawaja & Yu, 2010). These measures showed excellent internal reliability (Cronbach’s α of 0.89, 0.92, 0.92, respectively), good comparability to clinical interviews, and strong associations with functional impairment (Khawaja & Yu, 2010; Kroenke et al., 2001; Spitzer et al., 2006). COVID-19-related stress was assessed with a symptom checklist consisting of four symptoms representing each PTSD symptom category (American Psychiatric Association, 2013). Lastly, we derived an overall indicator of internalizing problem severity from averaging the z-scores of the four aforementioned self-report measures. The correlations of internalizing problem severity with each of the four measures were large in magnitude

(0.84, 0.91, .74, and 0.74, respectively), supporting our use of a composite.

Statistical Analysis

Disparities in mental health symptomatology We calculated the means and standard deviations of perceived overall pre-pandemic mental health and current internalizing symptomatology and problem severity during the COVID-19 pandemic by demographic subgroups. We then conducted t-tests to compare the mean scores of privileged identities (e.g., cis man, White, non-Hispanic/Latinx White) to corresponding marginalized gender (e.g., woman, non-binary/genderqueer), racial (e.g., Asian, Black, multiracial), and ethnic (e.g., Hispanic/Latinx) identities. Significance levels were adjusted with Bonferroni correction based on a total of six comparisons.

Disparities in mental health treatment use We estimated a series of logistic regression models on mental health treatment use during the COVID-19 pandemic. The first model (M1) examined the effects of demographics (i.e., gender, race, ethnicity) on current treatment use. The second model (M2) investigated the potentially independent effect of each internalizing domain (i.e., depressive symptoms, generalized anxiety symptoms, intolerance of uncertainty, and COVID-19-related stress) on current treatment use. The third model (M3) replaced the four internalizing domains with a single variable indicating the overall internalizing problem severity. Subsequently, we added demographic variables into M2 and M3 to examine the demographic differences in treatment use while controlling for separate internalizing domains (M4) or the overall internalizing problem severity (M5). Lastly, to investigate the role of internalizing symptomatology in predicting treatment use in each demographic group, we added interaction terms between demographic variables and internalizing domains (M6) or internalizing problem severity (M7) to the models.

The model estimation and comparison processes were conducted in *Python scikit-learn 1.0.2* (Pedregosa et al., 2011) using the logistic regression model and 100-time stratified 10-fold cross-validation method. The cross-validation method allowed us to resample different portions of the data creating multiple training and testing sets to evaluate predictive model performance on different iterations. Additionally, the stratified algorithm allowed us to maintain the proportion of classes of a categorical dependent variable (in this case, currently in treatment vs. not currently in treatment) in the resampling sets as in the original data.

Table 1 T-tests Comparisons Between Privileged and Marginalized Demographic Groups

<i>M</i> (<i>SD</i>)	Gender			Race				Ethnicity	
	Cis Men	Cis Women	Non-Binary/Genderqueer	White	Black	Asian	Multiracial	Non-H/L White	Hispanic/Latinx
Perceived pre-pandemic overall mental health	3.34 (1.18)	2.83 (1.08)***	2.46 (1.00)***	2.97 (1.12)	2.93 (1.31)	3.00 (1.13)	2.81 (1.24)	3.00 (1.11)	2.81 (1.22)
Depression	1.86 (0.69)	2.13 (0.71)***	2.34 (0.66)**	2.07 (0.7)	2.12 (0.72)	1.99 (0.71)	2.29 (0.72)	2.03 (0.7)	2.3 (0.74)**
Generalized Anxiety	1.85 (0.76)	2.21 (0.81)***	2.29 (0.69)*	2.18 (0.81)	2.14 (0.8)	1.96 (0.78)***	2.24 (0.87)	2.15 (0.81)	2.35 (0.82)
Intolerance of Uncertainty	2.42 (0.81)	2.67 (0.87)***	3.2 (0.9)***	2.6 (0.87)	2.59 (0.82)	2.61 (0.87)	2.66 (0.8)	2.58 (0.87)	2.74 (0.9)
COVID-19-related Stress	0.28 (0.34)	0.43 (0.36)***	0.46 (0.32)*	0.44 (0.36)	0.36 (0.36)	0.3 (0.34)***	0.38 (0.32)	0.43 (0.36)	0.5 (0.36)
Internalizing Problem Severity	-0.27 (0.76)	0.11 (0.79)***	0.38 (0.7)***	0.07 (0.81)	0.01 (0.77)	-0.13 (0.79)***	0.14 (0.75)	0.03 (0.8)	0.28 (0.82)*

Note. Non-H/L White = non-Hispanic/Latinx White; Male, White, and non-Hispanic/Latinx White are the reference group of each category. Significance levels were adjusted by the six comparisons between individuals with privileged and marginalized identities with Bonferroni corrections. * = $p < .05$; ** = $p < .01$; *** = $p < .001$.

The preprocessing procedure included standardizing numeric variables. Additionally, we applied the state-of-the-art method—Synthetic Minority Over-Sampling Technique (SMOTE)—which generates synthetic samples for minority class (Chawla et al., 2002) to address the class imbalance issue (i.e., most survey respondents were not currently in treatment). The *SMOTE-NC* function in *scikit-learn* was incorporated in the training procedure to accommodate both numerical and categorical independent variables (Lemaître et al., 2017). The model performance was measured based on the mean balanced accuracy score (i.e., the prediction accuracy averaged across outcome classes) averaged across 1000 cross-validation folds (Brodersen et al., 2010; Kelleher et al., 2020). Lastly, for the statistical evaluation of model coefficients (e.g., contrasts, significance), we used the *glm* function in the binomial family (Konis, 2007) with *lsmeans* (Lenth, 2016) in *R*.

Results

Disparities in Mental Health Symptomatology

The descriptive statistics and t-tests results by gender, race, and ethnicity are presented in Table 1. Compared to cis men, students identified as cis women (w) and non-binary/genderqueer (nb) reported *worse* perceived, pre-pandemic overall mental health ($p_w < 0.001$, Cohen's $d_w = -0.46$, 95% CI [-0.58, -0.35]; $p_{nb} < 0.001$, $d_{nb} = -0.75$, 95% CI [-1.14, -0.36]) and *higher* levels of current depression ($p_w < 0.001$, $d_w = 0.39$, 95% CI [0.27, 0.50]; $p_{nb} = 0.001$, $d_{nb} = 0.70$, 95% CI [0.32, 1.09]), generalized anxiety ($p_w < 0.001$, $d_w = 0.45$, 95% CI [0.33, 0.56]; $p_{nb} = 0.003$, $d_{nb} = 0.57$, 95% CI [0.19,

0.96]), intolerance of uncertainty ($p_w < 0.001$, $d_w = 0.30$, 95% CI [0.18, 0.41]; $p_{nb} < 0.001$, $d_{nb} = 0.95$, 95% CI [0.56, 1.34]), COVID-19-related stress ($p_w < 0.001$, $d_w = 0.41$, 95% CI [0.29, 0.52]; $p_{nb} = 0.008$, $d_{nb} = 0.53$, 95% CI [0.14, 0.91]), and internalizing problem severity ($p_w < 0.001$, $d_w = 0.48$, 95% CI [0.37, 0.60]; $p_{nb} < 0.001$, $d_{nb} = 0.86$, 95% CI [0.47, 1.25]) during the pandemic. Compared to White students, Asian students showed *lower* levels of current generalized anxiety ($p < .001$, $d = -0.28$, 95% CI [-0.39, -0.16]), COVID-19-related stress ($p < .001$, $d = -0.41$, 95% CI [-0.52, -0.29]), and internalizing problem severity ($p < .001$, $d = 0.24$, 95% CI [-0.35, -0.13]). Hispanic students did not differ in their perceived pre-pandemic overall mental health from non-Hispanic/Latinx White students ($p = .894$, $d = -0.17$, 95% CI [-0.36, 0.01]) but showed *higher* levels of current depression ($p < .001$, $d = 0.38$, 95% CI [0.19, 0.56]) and internalizing problem severity ($p = .002$, $d = 0.31$, 95% CI [0.12, 0.49]).

Disparities in Mental Health Treatment Use

We estimated a series of logistic regression models predicting current treatment use with demographic and internalizing symptomatology. The model performance results are shown in Table 2. Compared to the baseline chance prediction rate of 50%, the model with demographic variables (M1) increased the prediction accuracy by 9.93% ($t(999) = 55.50$, $p < .001$). The second (M2) and third (M3) models examined the prediction performance of separate internalizing domains versus aggregated internalizing problem severity in predicting current treatment use. M3 with a single variable indicating the overall internalizing problem severity outperformed M2 with four separate internalizing

Table 2 Logistic Regression Models Predicting Current Treatment Use with Demographic and Internalizing Symptomatology Variables

Model	Independent Variable	Balanced Accuracy <i>M (SD)</i>
M1	Demographic variables (i.e., gender, race, ethnicity)	59.93% (5.65%)
M2	Internalizing domains (i.e., depression, generalized anxiety, intolerance of uncertainty, COVID-19-related trauma symptoms)	52.47% (5.78%)
M3	Internalizing problem severity	55.17% (5.79%)
M4	Demographic variables + Internalizing domains	59.87% (5.57%)
M5	Demographic variables + Internalizing problem severity	60.01% (5.42%)
M6	Demographic variables* Internalizing domains	58.77% (5.60%)
M7	Demographic variables * Internalizing problem severity	58.42% (5.51%)

Note. The chance rate of balanced accuracy is 50%

Table 3 Model Coefficients in M5

Variable	Log Odds	SE	Z	p
Intercept	0.01	0.14	0.07	0.941
Internalizing Problem Severity	0.16	0.06	2.74	0.006**
Cis woman	0.46	0.15	3.13	0.002**
Other gender identities	0.33	0.36	0.93	0.352
Black	-0.51	0.27	-1.86	0.064
Asian	-1.52	0.15	-9.85	< 0.001***
Multiracial	-0.77	0.24	-3.16	0.002**
Hispanic/Latinx	-0.24	0.18	-1.36	0.173

Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$

domains (i.e., depression, generalized anxiety, intolerance of uncertainty, and COVID-19-related trauma symptoms) by 2.5% ($t(999) = -10.44, p < .001$). This result indicated no unique treatment-seeking pattern associated with different internalizing domains.

Although M4 and M5 with additional demographic variables significantly improved prediction accuracy compared to their counterparts with only internalizing symptomatology variables ($t_{M2vs.M4}(999) = -29.17, p_{M2vs.M4} < 0.001$; $t_{M3vs.M5}(999) = -19.27, p_{M3vs.M5} < 0.001$), such improvement was not significant compared to the model with only demographic variables ($t_{M1vs.M4}(999) = 0.21, p_{M1vs.M4} = 0.829$; $t_{M1vs.M5}(999) = -0.33, p_{M1vs.M5} = 0.740$). These results indicated that the association between internalizing symptomatology variables and current treatment use could be mostly explained by demographic differences. Further, the models with additional interaction terms between demographics and internalizing symptomatology variables (M6 and M7) decreased model performance compared to their counterparts with only main effects ($t_{M4vs.M6}(999) = 4.40,$

$p_{4vs.M6} = 0.001$; $t_{M5vs.M7}(999) = -6.48, p_{M5vs.M7} < 0.001$), suggesting that most interaction effects were small and/or unstable.

Because the models with four separate internalizing domains did not outperform the ones with a single internalizing problem severity variable, the following analysis on model coefficients focused on models incorporating internalizing problem severity (i.e., M5 and M7). The model coefficients of M5 are shown in Table 3. The overall internalizing severity was associated with *greater* current treatment use (log odds = 0.16, $SE = 0.06, p = .006$) when controlling for demographics. Additionally, individuals identified as cis women showed *greater* current treatment use compared to cis men (log odds = 0.46, $SE = 0.15, p = .002$) while controlling for internalizing problem severity. In contrast, individuals identified as Asian (log odds = -1.52, $SE = 0.15, p < .001$) or multiracial (log odds = -0.77, $SE = 0.24, p = .002$) reported *less* current treatment use compared to their White counterparts given the same level of internalizing problem severity. We did not observe a significant difference in current treatment use in individuals identified as non-binary/genderqueer, Black, or Hispanic/Latinx compared to their privileged counterparts (i.e., man, White, non-Hispanic/Latinx).

To further understand why adding internalizing problem severity did not increase model performance, we examined the association between internalizing problem severity and current treatment use in each demographic group by applying contrast analysis on M7. The association between internalizing problem severity and current treatment use in each demographic group is shown in Table 4. The results suggested that for individuals identified as cis-gender non-Hispanic/Latinx White, internalizing problem severity was associated with a significant *increase* in current treatment use ($p_{cis\ man} = 0.040$; $p_{cis\ woman} < 0.001$), indicating a matching trend between mental health needs and service use. However, the link between internalizing severity and treatment use was mostly nonsignificant for the other demographic groups. Further, for individuals identified as cis-gender Asian, internalizing problem severity was associated with a significant *decrease* in current treatment use ($p_{cis\ man} = 0.025$; $p_{cis\ woman} = 0.016$).

Discussion

Using survey data of 1,423 students engaged in postsecondary education at the same university, we examined gender and racial/ethnic disparities in mental health symptomatology and treatment use in higher education during the COVID-19 pandemic. Our results suggest that students from different demographic groups experienced unique mental health challenges during the pandemic. We observed

Table 4 The Association between Internalizing Problem Severity and Current Treatment Use in Each Demographic Group

Demographic Group	Race/Ethnicity	Internalizing Problem Severity			
		Log Odds	SE	Z	p
Cis man	White (Non-Hispanic/Latinx)	0.29	0.14	2.05	0.040*
	Black	-0.18	0.32	-0.55	0.583
	Asian	-0.45	0.20	-2.25	0.025*
	Multiracial	0.02	0.33	0.06	0.952
	Hispanic/Latinx	-0.32	0.21	-1.50	0.135
Cis woman	White (Non-Hispanic/Latinx)	0.33	0.08	4.20	<0.001***
	Black	-0.14	0.29	-0.47	0.636
	Asian	-0.41	0.17	-2.40	0.016*
	Multiracial	0.06	0.31	0.19	0.851
	Hispanic/Latinx	-0.28	0.18	-1.51	0.132
Other gender identities	White (Non-Hispanic/Latinx)	-0.06	0.42	-0.14	0.892
	Black	-0.52	0.51	-1.02	0.310
	Asian	-0.80	0.45	-1.77	0.077
	Multiracial	-0.33	0.53	-0.62	0.533
	Hispanic/Latinx	-0.66	0.46	-1.43	0.152

Note. As we had very few individuals identified as non-White Hispanic/Latinx, we only separated the ethnicity effect in White but not the other racial groups for a more straightforward result presentation.

elevated risk in internalizing symptomatology in individuals identified as cis women, non-binary/genderqueer, or Hispanic/Latinx during the pandemic than their privileged counterparts (i.e., men, non-Hispanic/Latinx White). In contrast, students identified as Asian reported *lower* levels of internalizing symptomatology than those identified as White. Additionally, students identified as Asian, Hispanic/Latinx, or multiracial reported *lower* levels of current treatment use compared to their privileged counterparts when controlling for internalizing problem severity. Further, our results indicate a mismatch between mental health needs (quantified as internalizing problem severity aggregated from depression, generalized anxiety, intolerance of uncertainty, and COVID-19-related stress) and mental service use in students with marginalized racial/ethnic identities.

Our findings on the elevated risk of internalizing symptomatology in students with marginalized gender identities during the pandemic were generally consistent with the literature. A longitudinal epidemiological study showed that women experienced approximately four times higher odds of psychological distress compared to men across the pandemic period from March to August 2020 (Riehm et al., 2021). Although few COVID studies focused on non-binary/genderqueer populations, pre-COVID literature showed that people with marginalized gender identities were more likely to experience internalizing symptoms (Dyar et al., 2020; Eaton et al., 2012), and pre-pandemic psychological distress was shown to be a primary predictor of elevated psychological problems during the pandemic (Breslau et al., 2021). Most studies attributed the elevated internalizing symptomatology in women to the increased responsibilities in childcare and disproportionate loss of employment due

to the pandemic (Breslau et al., 2021; Collins et al., 2021). However, the current studied population was students in post-secondary education, which suggests that in addition to the above two explanations, there are likely other stressors at home for students identified as cis women or non-binary/genderqueer.

The racial/ethnic differences in internalizing symptomatology during the pandemic were also consistent with the literature. In the current study, students identified as Asian reported lower levels of generalized anxiety, COVID-19-related stress, and internalizing problem severity to their White counterparts. The results are consistent with other COVID (Centers for Disease Control and Prevention, 2020; Goldmann et al., 2021) and pre-COVID studies (Asnaani et al., 2010; Eaton et al., 2013) that Asians and Asian Americans tend to report lower levels of internalizing problems such as depression and anxiety. It is beyond the scope of the current study to identify the reasons for lower internalizing symptomatology in Asian students. The reasons could be a mix of social expectancy, stigmas of mental illness, cultural values, and buffering effects of social supports (Cheng et al., 2018; Leong & Lau, 2001). However, despite lower levels of reported internalizing symptomatology, we should keep in mind that Asian students have experienced increased racial discrimination during the pandemic (Lee & Waters, 2021). Further discussion and support on these discrimination issues are critical for campus inclusion, diversity, and equity.

Additionally, although Hispanic/Latinx students reported similar levels of pre-pandemic mental distress compared to their non-Hispanic/Latinx counterparts, they reported heightened internalizing symptomatology, including depression

and internalizing problem severity, during the pandemic. These findings are compatible with recent COVID-19 reports on Hispanic/Latinx populations. One study showed that the pandemic affected Hispanic/Latinx families' financial security to a greater extent than other racial/ethnic groups (Gonzalez et al., 2020). Additionally, the Hispanic population had around two-fold higher COVID-19-related hospitalization and death rates than non-Hispanic/Latinx White populations due to immigration status, language barriers, poor access to quality health care, and financial burden (Macias Gil et al., 2020). Although the current study focused on postsecondary students and the factors above may have a less direct impact on them than individuals in the general population, the pandemic may still impose tremendous family and community stress on Hispanic/Latinx students. Further, most students needed to return home after university lockdowns (Son et al., 2020). Returning to stressful family environments may impose additional risk on their mental health and impact their academic performance, which can act as an additional stressor. It is critical to understand the unique COVID-19-related stressor for Hispanic populations and empower those in higher education with proper mental health support and information on social resources for their families and community members.

Our results also revealed disparities in treatment use during the pandemic in higher education. Both Asian and multiracial students reported lower levels of treatment use than White students when controlling for their internalizing problem severity. Additionally, we observed a mismatch between treatment usage rate and mental health needs, such that the internalizing problem severity was only associated with increased treatment use in cis-gender non-Hispanic/Latinx White students. In contrast, we observed a negative relationship between internalizing problem severity and treatment use in Asian students, whereas such a relationship was nonsignificant in the other student populations with marginalized racial/ethnic identities. Because the nonsignificant racial/ethnic effects in the non-binary/genderqueer groups were likely due to insufficient power of small sample sizes, the following discussion would only focus on racial/ethnic factors.

The lower rates of reported treatment use and the negative relationship between internalizing problem severity and treatment use in Asian students may result from a variety of factors. Previous studies showed that Asian individuals perceived people with mental illness as more dangerous and wanted more segregation than did White individuals (Eylem et al., 2020; Rao et al., 2007). Asian individuals are also more likely to believe that mental problems are a matter of willpower (Leong & Lau, 2001). In addition to cultural factors, institutional racism, including culturally insensitive diagnostic criteria and treatment approaches (Baima &

Sude, 2020; Halvorsrud et al., 2019; Rathod et al., 2018), erroneous assumptions regarding race and history (Burr, 2002; Williams & Williams-Morris, 2000), minimal diversity and cultural competence training in the mental health workplace (Wood & Patel, 2017), and potential language barrier (the school has a significant number of international students), may serve as a barrier to mental health care for Asian students.

The lower rate of treatment use in students identified as multiracial compared to their White counterparts when controlling for internalizing problem severity was challenging to explain due to a lack of research on this heterogeneous group. Exploratory work has acknowledged the harmful impact of *multiracial identity invalidation* on trust with mental healthcare providers (Siddiqui et al., 2018). Further research is required to understand critical public health questions regarding multiracial individuals—in this case, their unique barriers to mental health treatment.

The nonsignificant relationship between internalizing problem severity and treatment use in the other groups with marginalized racial/ethnic identities could be explained by a myriad of factors. Previous studies showed that the degree of acculturation, social-economic status, and access to care could all affect individuals' attitudes and use rates of mental health care (Anglin et al., 2008; Cheng et al., 2018; Ojeda & Bergstresser, 2008; Rao et al., 2007). The heterogeneity of the above factors within each demographic group could mask the association between internalizing problem severity and current treatment use. Further, studies have shown that non-White populations have been disproportionately exposed to COVID-related stressors (Goldmann et al., 2021), which may affect students' abilities to prioritize mental health care at the time of the current study (i.e., the beginning of pandemic). The transition to telehealth could also affect students' access to campus mental health care for those without stable internet or adequate private space. Students could also be seeking mental health care for other conditions, such as ADHD, substance use, and other externalizing problems. However, given the similar or even higher internalizing problem severity in Black, multiracial, and Hispanic/Latinx groups compared to White, non-Hispanic students, a nonsignificant relationship between internalizing problem severity and treatment use is still an alarming phenomenon.

Although identifying the exact causes of racial/ethnic disparities in treatment use during the pandemic is beyond the scope of the current study, these disparity results still have implications beyond the current pandemic. Our findings indicate that the current mental health care system in higher education, despite the equal provision of mental health care insurance and care access, more actions to enhance mental health awareness, information dissemination, logistic

support, and healthcare trust in individuals with marginalized racial/ethnic identities—especially Asian students—are desperately needed.

Limitations

Although the current sample was large, we still encountered difficulties recruiting enough Native Americans and Native Hawaiians/Pacific Islanders for statistical analysis. Considering the composition of the US population, oversampling should be applied in future studies. Although we have included Black students in the current analysis ($N=57$), the sample size was relatively small. We might not have sufficient power to detect a significant racial effect on treatment use for this population. Despite being nonsignificant ($p=.064$), a lower odds of treatment use (log odds = -0.051) was found in Black students compared to their White counterparts. Similarly, we had a small sample size of non-binary/genderqueer ($N=28$). We should interpret the nonsignificant results in Black or non-binary/genderqueer students with caution, considering the small sample size of these subgroups in the current analysis.

Additionally, we were unable to decompose multiracial identities in the current data. Fine-grained racial/ethnic information may facilitate a better understanding of the unique challenges faced by multiracial individuals. Also, we did not comprehensively measure gender and only had three gender categories (i.e., man, woman, and non-binary/genderqueer). Further, given the small sample size of a few subgroups, we could not conduct further analysis of intersecting marginalized identities. The current study aimed to provide timely results for researchers/policymakers and thus need to balance efficiency and details. Future studies for long-term follow-ups on the impact of COVID-19 on mental health are suggested to focus more on detailed demographic background and intersectionality.

There were also limitations regarding our assessment measures. First, the pre-pandemic overall mental health was assessed by a single item question. Although it was adopted from an NIMH survey, we had little information regarding its reliability or validity. Note that it was not the primary goal of the current study to compare participants' pre- and post-pandemic mental health status. We simply included this item in the descriptive statistics to provide readers a general sense of each subgroup's *perceived* pre-pandemic mental health status. Second, similar to other early COVID-19 studies, our questionnaire did not include specific descriptions to differentiate “general” versus “post-traumatic” stress caused by the COVID-19 pandemic. Although the COVID-19-related stress symptoms were assessed based on post-traumatic stress symptom criteria listed in the

DSM-5, later studies showed that not all COVID-19-related events qualified as the *DSM-5*-defined trauma (see North et al., 2021). Thus, we decided to endorse the term “COVID-19-related stress” instead of “post-traumatic stress” in the current study. Future studies should aim to better differentiate the two types of stress and explore their nosology as well as corresponding treatments.

The current study had a narrower focus on postsecondary students, which is unlikely to generalize to the US population. However, considering that we were focusing on an already more privileged group (e.g., in our student sample, all students have broad insurance coverage and access to mental health services) compared to their demographic counterparts, the currently observed disparities in mental health symptomatology and treatment use during the COVID-19 pandemic would likely only be more severe in the general population. Additionally, although we made speculations on reasons for lower treatment use in Asian and multiracial students, self-reported reasons would help to further pinpoint COVID-specific and non-COVID-specific targets to improve mental health equity.

By studying gender and racial/ethnic disparities in students' mental health and treatment use amid the COVID-19 pandemic, we hoped to enhance the understanding of COVID-19 related impacts on mental health equity in higher education. However, we did not have comprehensive measures on pre-pandemic mental health and treatment history. Respondents' mental states at the time of the survey may also bias their perceptions of past experiences. Ideally, longitudinal studies with waves collected before the pandemic may best address changes in mental health and treatment use due to the COVID-19 pandemic. Although our findings may not best answer the exact changes due to the impact of COVID-19, we were able to identify mental health disparities in the context of COVID-19 and suggest potential leverage points to improve mental health equity.

Conclusion

The current study investigated the unique mental health challenges faced by post-secondary students with marginalized identities during the COVID-19 pandemic. Students with marginalized gender identities, including cis women and non-binary/genderqueer, continued to experience more elevated internalizing symptomatology compared to cis men during the pandemic. Hispanic/Latinx students' mental health has been disproportionately impacted by the pandemic, likely due to COVID-imposed financial and health stress on their family and community members. In terms of mental health treatment use, Asian and multiracial students reported less treatment use than White students while

controlling for internalizing problem severity. Further, although internalizing problem severity was associated with increased treatment use in cis-gender non-Hispanic/Latinx White, we observed a negative relationship between such mental health needs and service usage in Asian students, and a nonsignificant relationship in other demographic groups with marginalized racial/ethnic identities, likely due to a combination of cultural factors and institutional racism.

The current findings suggest policymakers in mental health care and higher education continue quality mental health support for students with marginalized gender identities, provide additional COVID-related mental and practical support for Hispanic/Latinx students, and take further action to enhance mental health awareness, information dissemination, care access and healthcare trust in individuals with marginalized gender, racial, ethnic identities, especially for Asian students. We also encourage future research to disentangle the mental health challenges associated with multiracial/ethnic identities and groups representing the spectrum of gender diversity. It is worth noting that all demographic groups—marginalized or not—need mental health support with these unprecedented changes during the pandemic, and it is crucial for us to ensure inclusion and equity when distributing our resources.

Appendix

The current study was based on a large-scale online survey administered during the weeks following a pandemic-related university-wide campus closure in March 2020. The survey data was shared among the department with centralized monitoring of overlaps between proposed research projects. There have been no other studies submitted for publication at the time of this submission.

Author Contribution All authors contributed to the study conception and design. Material preparation and data collection were performed by Jessica L. Schleider, Brady D. Nelson, and Lauren L. Richmond. Statistical analysis was performed by Sin-Ying Lin and discussed with Nicholas R. Eaton. The first draft of the manuscript was written by Sin-Ying Lin and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Data Availability Not publicly available.

Materials Availability <https://osf.io/x8uch/>.

Declarations

Informed Consent Informed consent regarding study participation was obtained upon the beginning of the survey.

Conflicts of Interest There is no conflict of interests to report for the present work.

Ethics Approval The study protocol was reviewed and assigned formal exemption status by the Institutional Review Board at Stony Brook University.

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