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

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Declaration

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Abstract

Objective: To investigate gender and racial/ethnic disparities in mental health and treatment use in undergraduate and graduate students amid the COVID-19 pandemic.

Method: Based on a large-scale online survey ($N = 1,415$) administered during the weeks following a pandemic-related university-wide campus closure in March 2020, we examined gender and racial disparities in current internalizing severity and treatment use with t -tests and logistic regression models.

Results: Specifically, we found that students with marginalized gender (e.g., woman [$p < .001$], non-binary gender [$p < .001$]) or Hispanic/Latinx identity ($p = .002$) reported higher levels of internalizing problem severity compared to their privileged counterparts (e.g., man, non-Hispanic/Latinx White). Regarding treatment use, Asian ($p < .001$) and multiracial students ($p = .002$) reported lower treatment use after controlling for internalizing problem severity.

Internalizing severity was generally associated with higher treatment use (logit = 0.53, $p = .001$), indicating a match of objective needs with service use. However, this relationship was offset by a negative interaction between internalizing problem severity and Asian (logit = -0.49, $p < .001$) or Black identity (logit = -0.57, $p = .03$) in predicting treatment use.

Conclusion: 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 and trust in Asian/Black students, are desperately needed.

Keywords: mental health equity; minority; marginalized identity; COVID-19; treatment use; internalizing symptoms

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

As of February 2021, the coronavirus disease 2019 (COVID-19) has been declared a pandemic by the World Health Organization for nearly one year (World Health Organization., 2020) and claimed over two million lives worldwide (Worldometer, 2021). To mitigate spread, one country after another entered varying degrees of lockdowns (Iacobucci, 2020; Looi, 2020; Pulla, 2020). The outbreak and countermeasures to limit transmission have resulted in substantial economic losses 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, and social isolation have led to predictions of a widespread mental health crisis—including increased rates of mental illness and decreased access to treatment (Dong & Bouey, 2020; Torales et al., 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 graduate and graduate students): a population whose well-being and functioning is critical to a country's economic growth and success (Astakhova et al., 2016; 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 in 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

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 using a large-scale online survey. 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 symptoms, including depression, generalized anxiety, intolerance of uncertainty, and COVID-19-related traumatic stress during the pandemic between individuals with privileged (i.e., man, White, non-Hispanic/Latinx White) and marginalized gender (i.e., woman, non-binary gender identities), racial (i.e., Asian, Black, multiracial), and ethnic (i.e., Hispanic/Latinx) identities. We also examined rates of current mental health treatment use in different demographic groups accounting for current internalizing symptomatology, perceived pre-pandemic overall mental health, and past mental health treatment history. By understanding unique mental health challenges for individuals with marginalized gender and racial/ethnic identities in higher education 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 from the deans of multiple colleges at Stony Brook University for an online survey focusing on the psychosocial and academic impacts of the COVID-19 pandemic. 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, and (4) no missing values for gender, race/ethnicity, and perceived

pre-pandemic overall mental health variables, and (5) the sample size of each gender, racial, and ethnic group was larger than 20.

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 woman, 29.54% man, and 1.98% non-binary gender identities. 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 treatment use, needs, and access: 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. Because current treatment use was *not* mutually exclusive from past treatment use (but was mutually exclusive from the other two options), we controlled for past treatment use in regression models on current treatment use.

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*).

Current internalizing symptomatology and problem severity. Current internalizing symptomatology was assessed across four different domains, including depression, generalized anxiety, intolerance of uncertainty, and COVID-19-related trauma symptoms. 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 .89, .92, .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 traumatic stress was assessed with a symptom checklist consisting of four symptoms representing each PTSD symptom category (American Psychiatric Association, 2013). Lastly, we derived 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 (.84, .91, .74, and .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., man, White, non-Hispanic/Latinx White) to corresponding marginalized gender (e.g., woman, non-binary gender identities), racial (e.g., Asian, Black, multiracial), and ethnic (e.g., Hispanic/Latinx) identities. Significance levels were adjusted by 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 baseline model (M0) regressed current treatment use on gender, race, and ethnicity, controlling for perceived overall pre-pandemic mental health and past treatment use. The subsequent models added internalizing symptomatology variables to the baseline model. To assess potentially independent effects of each internalizing domain (i.e., depressive symptoms, generalized anxiety symptoms,

intolerance of uncertainty, and COVID-19-related traumatic stress), we added the four internalizing measures to the first model (M1) simultaneously. The second model (M2) replaced the four measures with the internalizing problem severity composite score. The third (M3) and fourth models (M4) further examined possible interactions of demographic variables with unique internalizing domains and internalizing problem severity, respectively, on current treatment use.

We estimated and compared model performance with 100-time-repeated five-fold cross-validation and addressed class imbalance with the Synthetic Minority Over-Sampling Technique (Chawla et al., 2002) (see S1 in Supplementary Materials for details). The model estimation and comparison processes were conducted using the *glm* function in the binomial family (Konis, 2007) with *caret* 6.0 (Kuhn et al., 2020) and *DMwR* 0.4.1 (Torgo, 2015) packages in R 3.6.3 (R Core Team, 2020). The final model was selected based on the highest averaged prediction accuracy and Cohen's Kappa (i.e., prediction accuracy over expected accuracy by chance) (Cohen, 1960; Landis & Koch, 1977) on a validation dataset. Note that parsimony law holds less weight in machine learning model selection, where overfitting problems could be examined through external data validation, especially when all the incorporated variables contained clinically meaningful information (Raschka, 2018). Model stability was measured with the standard deviation of accuracy rates. To improve the robustness of local effects towards random seeds, we reported the averaged logistic coefficients of the final model across 500 random seeds and calculated local significance levels based on resampling distributions.

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 men, women (w) and individuals with non-binary (nb) gender identities

reported *worse* perceived, pre-pandemic overall mental health ($p_w < .001$, Cohen's $d_w = -0.46$, 95% CI [-0.58, -0.35]; $p_{nb} < .001$, $d_{nb} = -0.75$, 95% CI [-1.14, -0.36]) and *higher* levels of current depressive symptoms ($p_w < .001$, $d_w = 0.39$, 95% CI [0.27, 0.50]; $p_{nb} = .001$, $d_{nb} = 0.70$, 95% CI [0.32, 1.09]), generalized anxiety symptoms ($p_w < .001$, $d_w = 0.45$, 95% CI [0.33, 0.56]; $p_{nb} = .003$, $d_{nb} = 0.57$, 95% CI [0.19, 0.96]), intolerance of uncertainty ($p_w < .001$, $d_w = .30$, 95% CI [0.18, 0.41]; $p_{nb} < .001$, $d_{nb} = 0.95$, 95% CI [0.56, 1.34]), COVID-19-related traumatic stress ($p_w < .001$, $d_w = 0.41$, 95% CI [0.29, 0.52]; $p_{nb} = .008$, $d_{nb} = 0.53$, 95% CI [0.14, 0.91]), and internalizing problem severity ($p_w < .001$, $d_w = 0.48$, 95% CI [0.37, 0.60]; $p_{nb} < .001$, $d_{nb} = 0.86$, 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 traumatic 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 depressive symptoms ($p < .001$, $d = 0.38$, 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 five logistic regression models of current treatment use on demographic variables and internalizing symptomatology while controlling for perceived pre-pandemic overall mental health and past treatment use. M0 with demographic variables achieved an average prediction accuracy of 69.11% ($SD = .03$) and Kappa of .21 ($SD = 0.05$) on validation samples (chance rate approximated to 50%). M1, with the additional four internalizing measures, had an averaged accuracy of 70.37% ($SD = .03$) and Kappa of .22 ($SD = .05$). M2 replaced the

four measures in M1 with internalizing problem severity and achieved a similar averaged accuracy of 70.69% ($SD = .03$) and Kappa of .22 ($SD = .05$). M3 incorporated additional interaction terms between the four internalizing measures and demographic variables, but its averaged accuracy rate and Kappa dropped to 69.75% ($SD = .03$) and .19 ($SD = .05$).

Alternatively, M4 incorporated interaction terms between internalizing problem severity and demographic variables and achieved the highest averaged accuracy of 71.02% ($SD = .03$) and Kappa of .22 ($SD = .05$). Note that Kappa between .21 and .40 indicates a fair agreement between model prediction and the observed class after adjusting for class imbalance (Landis & Koch, 1977).

Based on accuracy and Kappa, we selected M4, which incorporated the main and interaction effects of internalizing problem severity and demographic variables, as the final explanatory model. The averaged logistic regression coefficients and their significance levels across 500 random seeds were shown in Table 2. The distributions of regression coefficients are presented in Fig. S1 in the Supplementary Materials. In short, all distributions were bell-shaped (Kurtosis ranged from 2.79 to 4.16 with a mean of 3.13) with larger standard deviations for subgroups of smaller sample sizes. Women and students with non-binary gender identities had *greater* treatment use compared to men. Asian and multiracial students had *less* treatment use compared to White students. *Better* perceived, overall pre-pandemic mental health was associated with *less* treatment use during the pandemic, but past treatment use had a *nonsignificant* relationship with current treatment use. Internalizing problem severity was associated with *greater* current treatment use overall. However, this relationship was offset in Asian and Black students, where we observed significant negative interactions between internalizing problem severity and Asian/Black identities.

Discussion

Using survey data of 1,423 students engaged in postsecondary education at the same university, we examined gender and racial 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. Individuals with marginalized gender identities (i.e., woman and non-binary gender identities) reported worse perceived pre-pandemic overall mental health and more severe internalizing symptoms during the pandemic but had greater treatment use than men.

Hispanic/Latinx students showed nonsignificant differences in perceived pre-pandemic overall mental health but reported more elevated depression and internalizing problem severity during the pandemic than non-Hispanic/Latinx White students. Asian students reported lower levels of anxiety, intolerance of uncertainty, and internalizing severity during the pandemic and had less treatment use than White students. Although internalizing problem severity was associated with greater treatment use overall, this relationship was offset in Asian and Black students, where their treatment use did not match needs indicated by internalizing problem severity.

The results regarding disparities in mental health symptomatology during the COVID-19 pandemic were generally consistent with previous literature and provided unique insights into the impact of COVID-19 on different demographic groups' mental health. Previous studies showed that individuals who did not identify as men were more likely to experience internalizing symptoms (Dyar et al., 2020; Eaton et al., 2012). During the pandemic, both women and individuals with non-binary gender identities continuously reported higher levels of depression, generalized anxiety, intolerance of uncertainty, COVID-19-related traumatic stress, and internalizing severity compared to men.

Previous studies have reported lower prevalence rates but higher severity and chronicity of internalizing disorders in individuals with marginalized racial/ethnic identities than White individuals (Anderson & Mayes, 2010; Asnaani et al., 2010; Breslau et al., 2006; Williams et al., 2007). With dimensional measures, we observed nonsignificant differences in internalizing symptomatology and problem severity among racial groups except that Asian students showed significantly lower levels of generalized anxiety, COVID-19-related traumatic stress, and internalizing severity. The findings regarding Asian students were consistent with previous studies showing that Asian individuals were the least likely to meet generalized anxiety and PTSD diagnoses than other racial groups (Asnaani et al., 2010; Eaton et al., 2013).

Hispanic/Latinx students showed nonsignificant differences in pre-pandemic mental health than non-Hispanic/Latinx White students but reported more elevated internalizing symptoms across multiple domains during the pandemic. This finding is 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 group (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 healthcare, 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 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 racial disparities in treatment use during the pandemic in higher education. Both Asian and multiracial students reported less treatment use than White students. Although lower treatment use in Asian students may be partially due to their lower levels of reported anxiety, lower treatment use in multiracial students could not be explained in the same way. Exploratory work has acknowledged the harmful impact of *multiracial identity invalidation* on trust with mental healthcare providers (Siddiqui et al., 2018). However, multiracial individuals have been relatively neglected in previous research. Further research is required to understand critical public health questions regarding multiracial individuals—in this case, their unique barriers to mental health treatment.

Although internalizing problem severity is positively associated with treatment use in most racial/ethnic groups, this relationship was offset in Asian and Black students. Although previous studies have demonstrated that individuals with marginalized racial/ethnic identities tend to underutilize mental health treatment, these studies rarely examined the interaction between racial/ethnic groups and symptom severity. Additionally, previous studies often centered on issues regarding health insurance and access to mental health care (Cook et al., 2017; Miranda et al., 2008). The current respondents were from a higher education community where mental health insurance and treatment access were guaranteed by means of their university enrollment, which may explain the mostly nonsignificant racial/ethnic main effects on treatment use in the current study.

The negative interaction effects between internalizing severity and Asian or Black identity in predicting treatment use may be explained by cultural factors and institutional racism. Previous studies showed that Asian and Black 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 and Black individuals are also more likely to believe that mental problems are a matter of willpower (Leong & Lau, 2001) or would improve on their own (Anglin et al., 2008) compared to White individuals. 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), may serve as a barrier to mental health treatment use in Asian and Blacks students. Although there could be more factors contributing to the negative interaction between internalizing problem severity and Asian or Black identity, it does not change the alarming level of a mismatch between treatment use and needs indicated by internalizing problem severity in Asian and Black students. These results serve as a call that more actions to enhance mental health awareness, information dissemination, and healthcare trust in individuals with marginalized racial identities—especially Asians and Blacks, 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. 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. Additionally, we did not comprehensively measure gender and only had three gender categories (i.e., man, woman, and non-binary gender identities). 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.

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 of lower treatment use in Asian and Black, 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 on 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 what are 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 postsecondary students with marginalized identities during the COVID-19 pandemic. Students with marginalized gender identities (i.e., woman and non-binary gender identities) continued to experience more internalizing symptoms compared to 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 lower treatment use than White students. Further, although internalizing problem severity was generally associated with higher treatment use (i.e., a match between objective needs and services), this relationship was offset in students with Asian or Black identity, 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, and healthcare trust in individuals with marginalized racial identities, especially Asian and Black students. We also encourage future research to disentangle the mental health challenges associated with multiracial/ethnic identities and of groups representing the spectrum of gender diversity.

References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Author. <https://doi.org/10.1176/appi.books.9780890425596>
- Anderson, E. R., & Mayes, L. C. (2010). Race/ethnicity and internalizing disorders in youth: A review. *Clinical Psychology Review, 30*(3), 338–348.
<https://doi.org/10.1016/j.cpr.2009.12.008>
- Anglin, D. M., Alberti, P. M., Link, B. G., & Phelan, J. C. (2008). Racial differences in beliefs about the effectiveness and necessity of mental health treatment. *American Journal of Community Psychology, 42*(1–2), 17–24. <https://doi.org/10.1007/s10464-008-9189-5>
- Asnaani, A., Richey, J. A., Dimaite, R., Hinton, D. E., & Hofmann, S. G. (2010). A cross-ethnic comparison of lifetime prevalence rates of anxiety disorders. *The Journal of Nervous and Mental Disease, 198*(8), 551–555. <https://doi.org/10.1097/NMD.0b013e3181ea169f>
- Astakhova, K. V., Korobeev, A. I., Prokhorova, V. V., Kolupaev, A. A., Vorotnoy, M. V., & Kucheryavaya, E. R. (2016). The role of education in economic and social development of the country. *International Review of Management and Marketing, 6*(1), 53–58.
- Baima, T., & Sude, M. E. (2020). What White mental health professionals need to understand about whiteness: A Delphi study. *Journal of Marital and Family Therapy, 46*(1), 62–80.
<https://doi.org/10.1111/jmft.12385>
- Breslau, J., Aguilar-Gaxiola, S., Kendler, K. S., Su, M., Williams, D., & Kessler, R. C. (2006). Specifying race-ethnic differences in risk for psychiatric disorder in a USA national sample. *Psychological Medicine, 36*(1), 57–68. <https://doi.org/10.1017/S0033291705006161>
- Burgess, D., Lee, R., Tran, A., & Van Ryn, M. (2008). Effects of perceived discrimination on mental health and mental health services utilization among gay, lesbian, bisexual and

- transgender persons. *Journal of LGBT Health Research*, 3(4), 1–14.
<https://doi.org/10.1080/15574090802226626>
- Burr, J. (2002). Cultural stereotypes of women from South Asian communities: Mental health care professionals' explanations for patterns of suicide and depression. *Social Science and Medicine*, 55(5), 835–845. [https://doi.org/10.1016/S0277-9536\(01\)00220-9](https://doi.org/10.1016/S0277-9536(01)00220-9)
- Chawla, N. V., Bowyer, K. W., Hall, L. O., & Kegelmeyer, W. P. (2002). SMOTE: Synthetic Minority Over-sampling Technique. *Journal of Artificial Intelligence Research*, 16, 321–357. <https://doi.org/https://doi.org/10.1613/jair.953>
- Chirikov, I., Soria, K. M., Horgos, B., & Jones-white, D. (2020). Undergraduate and graduate students' mental health during the COVID-19 pandemic. *SERU Consortium Reports*.
<https://cshe.berkeley.edu/seru-covid-survey-reports>
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20, 37–46.
- Cook, B. L., Trinh, N.-H., Li, Z., Hou, S. S.-Y., & Progovac, A. M. (2016). Trends in Racial-Ethnic Disparities in Access to Mental Health Care, 2004–2012. *Psychiatric Services*, 68(1), 9–16. <https://doi.org/10.1176/appi.ps.201500453>
- Cook, B. L., Trinh, N.-H., Li, Z., Hou, S. S.-Y., & Progovac, A. M. (2017). Trends in racial-ethnic disparities in access to mental health care, 2004–2012. *Psychiatric Services*, 68(1), 9–16. <https://doi.org/10.1176/appi.ps.201500453>
- Dong, L., & Bouey, J. (2020). Public mental health crisis during COVID-19 pandemic, China. *Emerging Infectious Diseases*, 26(7), 1616–1618. <https://doi.org/10.3201/eid2607.200407>
- Dunbar, M. S., Sontag-Padilla, L., Ramchand, R., Seelam, R., & Stein, B. D. (2017). Mental health service utilization among lesbian, gay, bisexual, and questioning or queer college

students. *Journal of Adolescent Health*, 61(3), 294–301.

<https://doi.org/10.1016/j.jadohealth.2017.03.008>

Dyar, C., Sarno, E., Newcomb, M., & Whitton, S. (2020). Longitudinal associations between minority stress, internalizing symptoms, and substance use among sexual and gender minority individuals assigned female at birth. *Journal of Consulting and Clinical Psychology*, 88. <https://doi.org/10.1037/ccp0000487>

Eaton, N. R., Keyes, K. M., Krueger, R. F., Balsis, S., Skodol, A. E., Markon, K. E., Grant, B. F., & Hasin, D. S. (2012). An invariant dimensional liability model of gender differences in mental disorder prevalence: evidence from a national sample. *Journal of Abnormal Psychology*, 121(1), 282–288. <https://doi.org/10.1037/a0024780>

Eaton, N. R., Keyes, K. M., Krueger, R. F., Noordhof, A., Skodol, A. E., Markon, K. E., Grant, B. F., & Hasin, D. S. (2013). Ethnicity and psychiatric comorbidity in a national sample: Evidence for latent comorbidity factor invariance and connections with disorder prevalence. *Social Psychiatry and Psychiatric Epidemiology*, 48(5), 701–710. <https://doi.org/10.1007/s00127-012-0595-5>

Eylem, O., de Wit, L., van Straten, A., Steubl, L., Melissourgaki, Z., Danişman, G. T., de Vries, R., Kerkhof, A. J. F. M., Bhui, K., & Cuijpers, P. (2020). Stigma for common mental disorders in racial minorities and majorities a systematic review and meta-analysis. *BMC Public Health*, 20(1), 879. <https://doi.org/10.1186/s12889-020-08964-3>

Gonzalez, D., Karpman, M., Kenney, G. M., & Zuckerman, S. (2020). *Hispanic adults in families with noncitizens disproportionately feel the economic fallout from COVID-19*. https://www.urban.org/sites/default/files/publication/102170/hispanic-adults-in-families-with-noncitizens-disproportionately-feel-the-economic-fallout-from-covid-19_1.pdf

- Halvorsrud, K., Nazroo, J., Otis, M., Brown Hajdukova, E., & Bhui, K. (2019). Ethnic inequalities in the incidence of diagnosis of severe mental illness in England: a systematic review and new meta-analyses for non-affective and affective psychoses. *Social Psychiatry and Psychiatric Epidemiology*, 54(11), 1311–1323. <https://doi.org/10.1007/s00127-019-01758-y>
- Hunt, J. B., Eisenberg, D., Lu, L., & Gathright, M. (2015). Racial/ethnic disparities in mental health care utilization among U.S. college students: Applying the institution of medicine definition of health care disparities. *Academic Psychiatry*, 39(5), 520–526. <https://doi.org/10.1007/s40596-014-0148-1>
- Iacobucci, G. (2020). Covid-19: UK lockdown is “crucial” to saving lives, say doctors and scientists. *BMJ*, 368, m1204. <https://doi.org/10.1136/bmj.m1204>
- Khawaja, N. G., & Yu, L. N. H. (2010). A comparison of the 27-item and 12-item intolerance of uncertainty scales. *Clinical Psychologist*, 14(3), 97–106. <https://doi.org/10.1080/13284207.2010.502542>
- Kim, E. J., Marrast, L., & Conigliaro, J. (2020). COVID-19: Magnifying the effect of health disparities. *Journal of General Internal Medicine*, 35(8), 2441–2442. <https://doi.org/10.1007/s11606-020-05881-4>
- Konis, K. (2007). *Linear programming algorithms for detecting separated data in binary logistic regression models*. Worcester College, University of Oxyford.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9. *Journal of General Internal Medicine*, 16(9), 606–613. <https://doi.org/https://doi.org/10.1046/j.1525-1497.2001.016009606.x>
- Kruss, G., McGrath, S., Petersen, I. haam, & Gastrow, M. (2015). Higher education and

economic development: The importance of building technological capabilities.

International Journal of Educational Development, 43, 22–31.

<https://doi.org/10.1016/j.ijedudev.2015.04.011>

Kuhn, M., Wing, J., Weston, S., Williams, A., Keefer, C., Engelhardt, A., Cooper, T., Mayer, Z., Kenkel, B., R Core Team, Benesty, M., Lescarbeau, R., Ziem, A., Scrucça, L., Tang, Y., Candan, C., & Hunt, T. (2020). *Package ‘caret’* (6.0-86).

Landis, J. R., & Koch, G. G. (1977). The Measurement of observer agreement for categorical data. *Biometrics*, 33(1), 159–174. <https://doi.org/10.2307/2529310>

Leong, F. T. L., & Lau, A. S. L. (2001). Barriers to Providing Effective Mental Health Services to Asian Americans. *Mental Health Services Research*, 3(4), 201–214. <https://doi.org/10.1023/A:1013177014788>

Looi, M.-K. (2020). Covid-19: Is a second wave hitting Europe? *BMJ*, 371, m4113. <https://doi.org/10.1136/bmj.m4113>

Macias Gil, R., Marcelin, J. R., Zuniga-Blanco, B., Marquez, C., Mathew, T., & Piggott, D. A. (2020). COVID-19 pandemic: Disparate health impact on the Hispanic/Latinx population in the United States. *The Journal of Infectious Diseases*, 222(10), 1592–1595. <https://doi.org/10.1093/infdis/jiaa474>

Miranda, J., McGuire, T. G., Williams, D. R., & Wang, P. (2008). Mental health in the context of health disparities. *American Journal of Psychiatry*, 165(9), 1102–1108. <https://doi.org/10.1176/appi.ajp.2008.08030333>

Pulla, P. (2020). Covid-19: India imposes lockdown for 21 days and cases rise. *BMJ*, 368, m1251. <https://doi.org/10.1136/bmj.m1251>

R Core Team. (2020). *R: A language and environment for statistical*. R Foundation for Statistical

Computing. <https://www.r-project.org/>

Rao, D., Feinglass, J., & Corrigan, P. (2007). Racial and ethnic disparities in mental illness stigma. *Journal of Nervous and Mental Disease*, 195(12), 1020–1023.

<https://doi.org/10.1097/NMD.0b013e31815c046e>

Raschka, S. (2018). Model evaluation, model selection, and algorithm selection in machine learning. *ArXiv*.

Rathod, S., Gega, L., Degnan, A., Pikard, J., Khan, T., Husain, N., Munshi, T., & Naeem, F.

(2018). The current status of culturally adapted mental health interventions: A practice-focused review of meta-analyses. *Neuropsychiatric Disease and Treatment*, 14, 165–178.

<https://doi.org/10.2147/NDT.S138430>

Ryan, N. E., & El Ayadi, A. M. (2020). A call for a gender-responsive, intersectional approach to address COVID-19. *Global Public Health*, July, 1–9.

<https://doi.org/10.1080/17441692.2020.1791214>

Siddiqui, S., Benning, T. B., & Chinnapen, Y. (2018). An Exploratory Study of the Experiences of Adult Multiracial Community Mental Health Clients in a Metro Vancouver City.

Diversity & Equality in Health and Care, 15(1), 30–38. <https://doi.org/10.21767/2049-5471.1000153>

Son, C., Hegde, S., Smith, A., Wang, X., & Sasangohar, F. (2020). Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *Journal of*

Medical Internet Research, 22(9), 1–14. <https://doi.org/10.2196/21279>

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*,

166(10), 1092–1097. <https://doi.org/10.1001/archinte.166.10.1092>

- Su, Z., McDonnell, D., Wen, J., Kozak, M., Abbas, J., Šegalo, S., Li, X., Ahmad, J., Cheshmehzangi, A., Cai, Y., Yang, L., & Xiang, Y. T. (2021). Mental health consequences of COVID-19 media coverage: the need for effective crisis communication practices. *Globalization and Health*, 17(1), 1–8. <https://doi.org/10.1186/s12992-020-00654-4>
- Torales, J., O’Higgins, M., Castaldelli-Maia, J. M., & Ventriglio, A. (2020). The outbreak of COVID-19 coronavirus and its impact on global mental health. *International Journal of Social Psychiatry*, 66(4), 317–320. <https://doi.org/10.1177/0020764020915212>
- Torgo, L. (2015). *Package ‘DMwR’* (0.4.1).
- Wang, X., Hegde, S., Son, C., Keller, B., Smith, A., & Sasangohar, F. (2020). Investigating mental health of US college students during the COVID-19 pandemic: Cross-sectional survey study. *Journal of Medical Internet Research*, 22(9). <https://doi.org/10.2196/22817>
- Williams, D. R., González, H. M., Neighbors, H., Nesse, R., Abelson, J. M., Sweetman, J., & Jackson, J. S. (2007). Prevalence and distribution of major depressive disorder in African Americans, Caribbean blacks, and non-Hispanic whites: Results from the National Survey of American Life. *Archives of General Psychiatry*, 64(3), 305–315. <https://doi.org/10.1001/archpsyc.64.3.305>
- Williams, D. R., & Williams-Morris, R. (2000). Racism and mental health: The African American experience. *Ethnicity and Health*, 5(3–4), 243–268. <https://doi.org/10.1080/713667453>
- Wood, N., & Patel, N. (2017). On addressing ‘Whiteness’ during clinical psychology training. *South African Journal of Psychology*, 47(3), 280–291. <https://doi.org/10.1177/0081246317722099>
- World Health Organization. (2020). *WHO Director-General’s opening remarks at the media*

briefing on COVID-19 - 11 March 2020.

Worldometer. (2021). *COVID-19 Coronavirus pandemic.*

<https://www.worldometers.info/coronavirus/>

Table 1

T-tests Comparisons Between Privileged and Marginalized Demographic Groups

<i>M (SD)</i>	Gender			Race				Ethnicity	
	Men	Women	Non-Binary	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 (1.13)	2.81 (1.24)	3 (1.11)	2.81 (1.22)
Depressive Symptoms	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 Symptoms	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-related post-traumatic 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, Caucasian, 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 . * = $p < .05$; ** = $p < .01$; *** = $p < .001$ after Bonferroni corrections.

Table2

Final Logistic Regression Model of Mental Health Care Use During the COVID-19 Pandemic

Variable	Estimates	SE	Z	p
Intercept	-0.38	0.14	-4.38	< .001
Internalizing problem severity	0.53	0.19	3.29	0.001
Woman	0.46	0.15	4.79	< .001
Non-binary gender identities	0.88	0.44	2.39	0.017
Black	-0.25	0.28	-1.23	0.220
Asian	-1.61	0.15	-19.84	< .001
Multiracial	-0.61	0.28	-3.11	0.002
Hispanic/Latinx	-0.19	0.21	-1.29	0.198
Pre-pandemic mental health	-0.51	0.07	-9.77	< .001
Past treatment use	0.13	0.12	1.52	0.129
INT*Woman	-0.10	0.20	-0.60	0.549
INT*Non-binary gender	-0.65	0.62	-1.17	0.242
INT*Black	-0.57	0.38	-2.18	0.030
INT*Asian	-0.49	0.20	-3.78	< .001
INT*Multiracial	-0.21	0.38	-0.73	0.468
INT*Hispanic/Latinx	-0.31	0.24	-1.64	0.100

Note. INT = internalizing problem severity; * indicates an interaction effect between the two variables.