

Factors Associated with Graduate and Professional Students' Mental Health during the COVID-

19 Pandemic

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### Abstract

The purpose of this study was to examine the relationships between graduate and professional students' individual, interpersonal, institutional, health and safety, and academic/financial stressors and students' odds of experiencing clinically significant symptoms of major depressive disorder (MDD) and generalized anxiety disorder (GAD) during the COVID-19 pandemic. We drew our sample from ten large, public research universities ( $n = 15,247$ ). The results of logistic regressions suggest there are several demographic variables associated with students' odds of MDD or GAD. Additionally, supportive campus environments are associated with reduced odds of MDD or GAD while food/housing insecurity, lack of safety in home environment, obstacles to degree progress, and financial hardships were associated with increased odds of MDD or GAD.

An outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease (COVID-19), was first reported in China in December 2019. In March 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic, forcing many higher education institutions to take measures to promote students' safety such as abruptly closing campus facilities and requiring in-person classes to be converted to remote learning formats. Due to those sudden changes, graduate and professional students encountered significant disruptions in their research, teaching, and other employment obligations (Soria et al., 2021). Graduate and professional students also experienced obstacles in the transition to online instruction, such as distracting home environments, challenges caring for others, and lack of interactions or communications with classmates (Soria, 2020a; Soria, Chirikov et al., 2020). Furthermore, graduate and professional students experienced financial hardships during the pandemic, including unexpected increases in living expenses and spending for technology, loss or reduction of income from other family members, food insecurity, and loss of wages or employment positions (Lederer et al., 2021; Mialki et al., 2021; Soria, 2020b; Soria, Horgos et al., 2020).

The fallout from the COVID-19 pandemic—including the speed at which the campus closures unfolded, the loss of loved ones due to COVID-19, the social isolation associated with social distancing, and the uncertainty of the virus's threat—constitute, for many, collective traumatic events similar to the events typically experienced during natural disasters (Copeland et al., 2021). In most cases, those challenges were exacerbated for students from underrepresented and marginalized backgrounds, including students from lower social class backgrounds, first-generation students, students with disabilities, students of color, caregivers, transgender, non-binary, genderqueer, gay, lesbian, bisexual, pansexual, queer, and asexual students (Gonzales et

al., 2020; Molock & Parchem, 2021; Soria & Horgos, 2020; Soria & Horgos, 2021a, 2021b; Soria, Horgos, Chirikov et al., 2020a, 2020b; Soria, McAndrew et al., 2020; Soria, Roberts et al., 2020).

Over a year after campuses restructured their operations due to the COVID-19 pandemic, scholars have begun to take stock of the effects of the pandemic upon students. One clear and consistent observation is that the events surrounding the pandemic have negatively affected students' mental health, leading to increases in the prevalence of major depressive disorder (MDD) and generalized anxiety disorder (GAD) among students (Healthy Minds Network, 2020; Liu et al., 2020; Soria & Horgos, 2021). Recent statistics are both distressing and alarming: the rates of MDD range between 32% to 48% and the rates of GAD range between 31% to 39% for undergraduate, graduate, and professional students during the pandemic (Chirikov et al., 2020; Healthy Minds Network, 2020; Soria & Horgos, 2021a; Wang et al., 2020). While scholars continue to explore the ways in which students' mental health has been impacted during the pandemic, the majority of researchers have published studies about undergraduates' mental health and have not focused on graduate or professional students' mental health (American Council on Education, 2020; Browning et al., 2020; Charles et al., 2021; Copeland et al., 2020; Czeisler et al., 2020; Gonzales et al., 2020; Son et al., 2020; Wang et al., 2020). Although students' mental health has been a longstanding paramount concern to higher education leaders (Lederman, 2020), there is a paucity of scholarship related to graduate and professional students' mental health that limits leaders' ability to effectively respond to the mental health experiences and needs of graduate and professional students (Jones-White et al., 2020).

The lack of research about graduate and professional students' mental health is concerning given that there is a rise of mental health disorders among graduate students that has

reached “crisis” levels even before the COVID-19 pandemic (Evans et al., 2018). As faculty, student affairs practitioners, administrators, and mental health providers brace for the impact of increasing numbers of graduate and professional students who experience mental health disorders in upcoming semesters, they may benefit from an enhanced understanding of the students who are likely to experience mental health disorders or the roles that other stressors or supports can play in students' mental health. The unique context surrounding the pandemic may create conditions that alter previous research findings related to graduate and professional students' mental health; therefore, we designed this study to examine the associations between individual, interpersonal, institutional, health, and stress-related factors and graduate and professional students' risk for clinically significant MDD and GAD.

### **Mental Health Disorders Among Graduate and Professional Students During the COVID-19 Pandemic**

Even before the pandemic, the frequency of graduate and professional students' mental health disorders was increasing at an alarming rate. Recent estimates prior to the pandemic suggest that 41% of doctoral students had moderate to severe anxiety while 39% had moderate to severe depression (Evans et al., 2018). Some of the variables associated with graduate and professional students' mental health can be grouped into five broad categories: 1) individual characteristics (e.g., gender and sexual orientation), 2) interpersonal factors (e.g., social engagement and sense of belonging), 3) institutional factors (e.g., campus climate), 4) health-related factors (e.g., nutrition and sleep), and, 5) stressors (e.g., financial or academic) (Dyrbye et al., 2006; El-Ghoroury et al., 2012; Fink, 2014; Haynes et al., 2012; Hyun et al., 2006; Jones-White et al., 2020; Oswald & Wyatt, 2011; Toews et al., 1993).

The unique conditions surrounding the COVID-19 pandemic might exacerbate the effects of some of those aforementioned factors on graduate and professional students' risk for having clinically significant MDD and GAD symptoms. Although most of the literature published about students' experiences during the pandemic have focused on undergraduate students, there may be some common themes that reach across both undergraduates and graduate and professional students. For instance, social distancing has led many students to feel increasingly isolated and lonely: up to 90% of students reported that they were moderately to severely lonely during the pandemic (Labrague et al., 2020). The feelings of isolation and loneliness during the pandemic can be detrimental for students' mental health (Domagala-Krecioch & Majerek, 2013; Liu et al., 2020).

Students experienced an abrupt shift to remote learning during the pandemic, which could elevate their academic-related stress; for instance, the switch to remote classes introduced stressors for students who lacked the technology necessary for online learning, did not have motivation to engage in online classes, and did not have access to quiet, non-distracting study spaces (Soria & Horgos, 2021b). Many students also had to take on additional caregiver responsibilities, which negatively impacted their academic engagement during the pandemic as well (Lederer et al., 2021; Soria, McAndrew et al. 2020). Those types of academic and financial obstacles meant that fewer than half of undergraduate students indicated they were able to cope adequately with the stressors driven by the pandemic (Wang et al., 2020). Students also expressed higher rates of worrying about the health of friends and family (Son et al., 2020). As the personal losses increase, students may continue to experience significant levels of trauma, bereavement, and complicated grief associated with the loss of loved ones during the pandemic (Gesi et al., 2020).

Other health-related factors caused by the pandemic have negatively compromised students' mental health; for instance, many students experienced food insecurity during the pandemic (Owens et al., 2020; Soldavini et al., 2020; Soria, Horgos et al., 2020). Some students reported disruptions in their eating patterns, such as eating more out of boredom or eating less due to anxiety (Son et al., 2020). Some students were also unable to explore outdoor spaces or engage in physical exercise; consequently, they spent more time in front of screens (e.g., for classes) and reading the news via social media outlets. For many students, the lack of physical engagement and focus on reading the news increased the negative psychological impacts of the pandemic (Browning et al., 2021). Students also experienced disruptions in their sleep (Marelli et al., 2020) and overall had reduced levels of wellness (Copeland et al., 2021). Students' substance and alcohol use also increased during the pandemic (Charles et al., 2021), with some researchers estimating that 25% of students initiated or increased substance use to cope with the stressful toll of the pandemic (Cziesler et al., 2020).

While emerging studies on college students' mental health during the COVID-19 pandemic provide useful information to practitioners, the majority of those studies are also limited due to smaller sample sizes, single institution samples, or a limited number of independent variables (Huckins et al., 2020; Liu et al., 2020). In this study, we examine a wide variety of individual, interpersonal, institutional, health, and stress-related factors associated with college students' rates of MDD and GAD. Our variables are specific to graduate and professional students' experiences during the pandemic, our sample is drawn from ten large, public research universities, and our sample size allowed us to examine the effects among demographic groups typically excluded in studies due to their small numbers.

### **Conceptual Framework**

We developed our conceptual framework from Glover et al.'s (2020) conceptual framework for mitigating the equity harms of the COVID-19 pandemic and Fink's (2014) integrated model of college students' mental health. Glover et al.'s model stipulates that inequitable COVID-19 policy options may generate both interactive and multiplicative harms upon individuals who were already marginalized, oppressed, and disenfranchised prior to the pandemic. Glover and colleagues cited several demographic factors that are associated with equity harms due to COVID-19 policies, including occupation, race/ethnicity, gender, family education, disability, social capital, place of residence, and socioeconomic status. We used many of those demographic variables (or proxies) in our analyses to examine whether the conceptual framework of global inequities due to COVID-19 policies can be applied to college students in the United States context.

Fink's model of student mental health combines Astin's (1993) input-environment-outcome model, the VicHealth framework (Keleher & Armstrong, 2005), and Keyes's (2002) mental health continuum. Fink examined the effects of students' *individual* characteristics, *interpersonal* factors (e.g., sense of belonging), and *institutional* factors (e.g., supportive college climates) on students' mental health. We extend Fink's framework by adding in additional stressors that we theorized would affect students' mental health, including *health and safety factors* (food/housing insecurity and safety) and *academic or financial stressors* given the significant disruptions to graduate and professional students' experiences during the pandemic.

### **Methodology**

#### **Instrument and Sample**

We used the Student Experience in the Research University (SERU) COVID-19 survey,



which was developed by members of the SERU Consortium. Ten large, public research universities located in various regions of the U.S. (e.g., Midwest, South) administered the census survey from June to July 2020. The response rates ranged 14% to 41% ( $n = 15,247$ ) and 90% of students answered all items in the survey. We did not impute missing data and detailed information about the sample and independent variables is available in Table 1.

Table 1

*Descriptive Statistics*

<i>Categorical Variables in the Analysis</i>	<i>n</i>	<i>%</i>
Non-binary gender	111	0.7
Transgender	117	0.8
Cisgender woman	9129	59.2
Cisgender man	5786	37.5
Prefer not to answer or prefer to self-describe gender	284	1.8
Straight (heterosexual)	12208	79.1
Gay or lesbian	629	4.1
Bisexual	945	6.1
Queer	360	2.3
Questioning	108	0.7
Asexual	100	0.6
Pansexual	173	1.1
Prefer not to answer or prefer to self-describe sexual orientation	904	5.9
American Indian or Alaskan Native	42	0.3
Asian	2254	14.6
Black or African American	603	3.9
Native Hawaiian or Pacific Islander	9	0.1
Hispanic or Latinx	416	2.7
White	8557	55.5
Multiracial	1101	7.1
Race/ethnicity not provided or unknown	2445	15.8
International	3876	25.1
Domestic	11551	74.9
Cared for children during the pandemic	1369	8.9
Cared for adults during the pandemic	1790	11.6
Cared for both children and adults during the pandemic	723	4.7
Not a caregiver during the pandemic	11545	74.8

Physical disability	1.7	456
Learning disability	2.5	687
Neurodevelopmental/cognitive disability	4.4	1,202
No disabilities	10998	71.3
First-generation	3873	25.1
Continuing-generation	11547	74.9
Low-income	1236	8.0
Working-class	3278	21.2
Middle-class	6540	42.4
Upper-middle class	4128	26.8
Wealthy	245	1.6
STEM	5119	33.2
Arts, humanities, communication, and design	1833	11.9
Business	1002	6.5
Health sciences	2689	17.4
Industry, manufacturing, and construction	703	4.6
Education	909	5.9
Law, security, and public administration	1277	8.3
Social and behavioral sciences	1466	9.5
Master's research	4461	28.9
Master's professional	1344	8.7
Doctorate research	7541	48.9
Doctorate professional	2081	13.5
Inability to schedule qualifying events	1858	12.2
Inability to conduct research	6586	43.1
Inability to fulfill required clinical rotation, residency, or internship hours	2028	13.3
Inadequate access to quality advising	2298	15.0
Inadequate access to faculty	3316	21.7
Lack of access to administrative services	1560	10.2
Increased teaching workload associated with transitioning to online classes	2526	16.5
Increased research workload	1135	7.4
Increased hours worked or obtained another job	1774	11.6
Inability to attend professional conferences	5482	35.9
Lack of access to an appropriate study space or distracting home environment	8060	52.8
Need to provide additional care for yourself or a family member	3892	25.5
No obstacles to degree progress	1793	11.7
Unexpected increases in spending for technology	3765	25.1
Loss of wages from on-campus employment	1066	7.1
Loss of wages from off-campus employment	2073	13.8
Loss or reduction of a scholarship	464	3.1

Loss or reduction of grant aid	268	1.8
Loss or reduction of student loan aid	144	1.0
Loss or reduction of insurance coverage	335	2.2
Loss or cancellation of an expected job or internship offer	2542	16.9
Unexpected increases in living expenses	4035	26.9
Loss or reduction of income of other family members	3278	21.8
No financial hardships	5510	36.7
Housing insecurity	5464	35.4
Food insecurity	2919	18.9
I had a place to live that was free from physical/emotional violence or abuse (never/sometimes true)	1189	7.6
I had a place to live that was free from drug and/or alcohol abuse (never/sometimes true)	1110	7.1
I had a place to live where my identity was respected (never/sometimes true)	1042	6.7
I had a place to live where I felt safe and protected (never/sometimes true)	1611	10.4
<i>Quantitative Variables in the Analysis</i>	<i>m</i>	<i>sd</i>
I feel valued as an individual at my university	4.28	1.31
I feel that I belong at my university	4.50	1.22
I feel that my university supported me during the COVID-19 pandemic	4.25	1.30
Support you received from instructors to successfully learn online	3.17	0.69
Satisfaction with institution's overall response to the pandemic	2.92	0.73

## Measures

### *Individual Variables*

Our individual variables included a variety of demographic characteristics (all reported in Table 1). We used effect coding (Mayhew & Simonoff, 2015) for all of the individual variables. We included students' self-identified gender (cisgender men, cisgender women, nonbinary, transgender, prefer not to answer or prefer to self-describe gender) and sexual orientation (asexual, bisexual, gay or lesbian, pansexual, prefer not to answer or prefer to self-describe sexual orientation, queer, questioning, and straight/heterosexual). We also included students' race/ethnicity (American Indian or Alaska Native, Asian, Black, Hispanic or Latinx, multiracial, Native Hawaiian or Pacific Islander, race or ethnicity not provided or unknown, and White) and

international status (domestic or international). Both race/ethnicity and international status were reported by institutions.

Additionally, students reported whether they were responsible for caring for children or adults (age 18 or over) during the COVID-19 pandemic. Some students cared for both children and adults, so we had four caregiver categories: not a caregiver, caregiver for children, caregiver for adults, and caregiver for both children and adults. We asked students to share their parents' or guardians' highest educational attainment and developed a variable to reflect first-generation status (neither parents/guardians have earned a bachelor's degree) and continuing-generation status (parents/guardians earned a bachelor's degree or higher).

We also included students' self-identified social class (low-income or poor, working-class, middle-class, upper professional or upper middle-class, and wealthy). Students also reported their disability in one of four categories: physical disability (yes/no), learning disability (yes/no), and neurodevelopmental or cognitive disability (yes/no). Institutions provided data about students' academic level (master's research, master's professional, doctorate research, and doctorate professional) and two-digit CIP codes for students' academic majors, which we organized into academic areas (e.g., STEM, business).

### ***Interpersonal Variables***

We included two items for students' interpersonal factors of social well-being and support (e.g., I feel that I belong at my university), scaled 1 = strongly disagree to 6 = strongly agree. We report the means and standard deviations in Table 1.

### ***Institutional Variables***

Student reported their agreement (1 = strongly disagree to 6 = strongly agree) on whether they believed that their university supported them during the COVID-19 pandemic. Students also

reported their satisfaction with their institution's overall response to the pandemic and the support they received from instructors to successfully learn online (1 = very dissatisfied to 4 = very satisfied). We report the means and standard deviations in Table 1.

### ***Academic and Financial Stressors***

In the survey, students responded to a question, "Which of the following factors, if any, have been an obstacle to your progress towards your graduate/professional degree during the COVID-19 pandemic?" and they could select all that applied from a list of 13 options (e.g., increased research workload). In our sample, students were most likely to have selected that a lack of access to an adequate study space was an obstacle to their degree progress (52.8%) (Table 1).

Additionally, students responded to a question, "Which of the following financial hardships, if any, have you experienced during the COVID-19 pandemic?" and they could select all options that applied from a list of 11 options (e.g., unexpected increases in spending for technology). In our sample, students were most likely to have selected that they experienced "no financial hardships (32.7%) (Table 1).

### ***Health and Safety***

For the health and safety factors, we used a two-item food insecurity screen to identify students' food insecurity (Hager et al., 2010). We asked students how often they worried whether their food would run out before they got money to buy more and how often the food they bought did not last (and they did not have money to purchase more food). A response of "often true" or "sometimes true" to either statement indicates a positive screen for food insecurity. These items have good reliability (Cronbach's  $\alpha = .828$ ). In our sample, 18.9% of graduate and professional students experienced food insecurity (Table 1).

We also created two items to measure students' housing insecurity that were similar to the food insecurity items. We asked students how often they were worried that they would not have enough money to cover the cost of their housing and how often they were unable to pay all of the costs of their housing on time. We considered a response of "often true" or "sometimes true" to either statement to indicate a positive screen for housing insecurity. These items also have acceptable reliability (Cronbach's  $\alpha = .714$ ). In our sample, 35.4% of graduate and professional students experienced food insecurity (Table 1).

We also included measures of students' safety. Students responded to four questions in which they indicated whether it was "often true," "sometimes true," or "never true" that they 1) had a place to live that was free from physical/emotional violence or abuse; 2) had a place to live that was free from drug and/or alcohol abuse; 3) had a place to live where their identity was respected (e.g., gender identity, sexual orientation, race/ethnicity); and, 4) had a place to live where they felt safe and protected. We collapsed the "sometimes true" and "never true" options into one option "sometimes or never true" for ease of interpretation. In our sample, the largest percentage (10.4%) of students indicated that it was "sometimes or never true" that they had a place to live where I felt safe and protected (Table 1).

### ***Dependent Variables***

Our dependent measures include the Patient Health Questionnaire-2 (PHQ-2) two-item scale to screen for MDD symptoms (Kroenke et al., 2003) and the Generalized Anxiety Disorder-2 (GAD-2) two-item scale to screen students for GAD symptoms (Kroenke et al., 2007). The PHQ-2 includes two questions about the frequency of depressed mood and anhedonia over the past two weeks while the GAD-2 includes two questions about the frequency of anxiety over the past two weeks (scaled from 0 = not at all to 3 = nearly every day). We summed the

scores and used the recommend cut-off point of PHQ-2  $\geq 3$  and GAD-2  $\geq 3$ . In our sample, 32% of students met the criteria for clinically significant symptoms of MDD while 39% of graduate students met the criteria for clinically significant symptoms for GAD.

### **Data Analysis**

We computed the intraclass correlation coefficients and discovered the coefficients were less than .001, suggesting there is greater variability within institutions than between institutions; therefore, we did not utilize hierarchical linear modeling. Instead, we utilized binomial logistic regression to examine the relationships between graduate and professional students' individual, interpersonal, institutional, health, and stress-related factors and students' risk for clinically significant MDD and GAD symptoms.

## **Results**

### **Results for Clinically Significant Major Depressive Disorder (MDD) Symptoms**

#### ***Individual Variables***

The results of the regression for students' MDD suggest straight/heterosexual students, domestic (non-international) students, students who were caregivers for children, and students without disabilities had significantly reduced odds of experiencing clinical symptoms of MDD. Gay or lesbian students, asexual students, international students, caregivers for adults or both children and adults, non-caregivers, students with neurodevelopment/cognitive disabilities, and low-income students all had significantly greater odds of experiencing clinical symptoms of MDD compared to their peers (Table 2).

Additionally, students in STEM programs and arts, humanities, communication, and design programs had significantly greater odds of experiencing clinical symptoms of MDD compared to their peers while students in health sciences had significantly reduced odds. Finally,

doctorate professional students had significantly reduced odds of experiencing clinical symptoms of MDD while master's research and doctorate research students had significantly greater odds of experiencing clinical symptoms of MDD compared to their peers.

### ***Interpersonal Variables***

Students who were more likely to agree that they felt valued and like they belonged at their university had decreased odds of experiencing clinical symptoms of MDD.

### ***Institutional Variables***

Students who were more satisfied with the support they received from instructors and that their university supported them during the pandemic had decreased odds of experiencing clinical symptoms of MDD.

### ***Academic and Financial Variables***

Students who reported the following obstacles to their degree progress had significantly greater odds of experiencing clinical symptoms of MDD compared to students who did not experience those obstacles to their degree progress: inability to conduct research, inadequate access to quality advising, inadequate access to faculty, increased teaching workload, increased research workload, lack of access to an appropriate study space, and needing to provide additional care for themselves or a family member.

Students who reported the following financial hardships had significantly greater odds of experiencing clinical symptoms of MDD compared to their peers who did not experience the financial hardships: unexpected increases in spending for technology, loss of wages from off-campus employment, and loss or reduction of a scholarship.

### ***Health and Safety Variables***

Students experiencing housing and food insecurity had significantly greater odds of



experiencing clinical symptoms of MDD compared to their peers. Additionally, students who lived in places that were only “sometimes or never” free from drug or alcohol abuse and where they only “sometimes or never” felt safe and protected had significantly greater odds of experiencing clinical symptoms of MDD compared to their peers who “often” lived in those safe spaces.

### **Results for Clinically Significant Generalized Anxiety Disorder (GAD) Symptoms**

#### ***Individual Variables***

The results of the regression for students' GAD suggest students who prefer not to answer or prefer to self-describe their gender and sexual orientation, straight or heterosexual students, students who were caregivers for children, students without disabilities, and continuing-generation students had significantly reduced odds of experiencing clinical symptoms of GAD symptoms. Cisgender women, gay or lesbian students, bisexual students, queer students, caregivers for adults or both children and adults, non-caregivers, students with neurodevelopment/cognitive disabilities, first-generation students, and low-income students all had significantly greater odds of experiencing clinical symptoms of GAD compared to their peers.

Additionally, students in STEM programs and arts, humanities, communication, and design programs had significantly greater odds of experiencing clinical symptoms of GAD symptoms while students in business and health sciences had significantly reduced odds of experiencing clinical symptoms of GAD.

#### ***Interpersonal Variables***

Students who were more likely to agree that they felt valued and like they belonged at their university had decreased odds of experiencing clinical symptoms of GAD.

***Institutional Variables***

Students who were more likely to agree their university supported them during the pandemic had significantly decreased odds of experiencing clinical symptoms of GAD.

***Academic and Financial Variables***

Students who reported the following obstacles to their degree progress had significantly greater odds of experiencing clinical symptoms of GAD compared to students who did not experience those degree progress obstacles: inability to schedule qualifying events; inability to conduct research; inability to fulfill required clinical rotation, residency, or internship hours; inadequate access to quality advising; inadequate access to faculty; increased teaching workload; increased research workload; lack of access to an appropriate study space; and needing to provide additional care for themselves or a family member.

Students who reported the following financial hardships had significantly greater odds of experiencing clinical symptoms of GAD compared to their peers who did not experience the financial hardships: unexpected increases in spending for technology, loss of wages from off-campus employment, loss or reduction in student loan aid, and loss or reduction of a scholarship.

***Health and Safety Variables***

Students experiencing housing and food insecurity had significantly greater odds of experiencing clinical symptoms of GAD compared to their peers. Additionally, students who lived in places where they only “sometimes or never” felt safe and protected had significantly greater odds of experiencing clinical symptoms of GAD compared to their peers who “often” lived in those safe spaces.

Table 2

*Logistic Regression Analyses for Graduate and Professional Students' Major Depressive Disorder (MDD) and Generalized Anxiety Disorder (GAD)*

	MDD ( $\alpha = .86$ )			GAD ( $\alpha = .88$ )		
	$\beta$	$e^{\beta}$	$p$	$\beta$	$e^{\beta}$	$p$
Non-binary gender	-0.075	0.928		0.020	1.020	
Transgender	-0.055	0.946		-0.089	0.915	
Cisgender woman	0.066	1.069		0.222	1.249	***
Cisgender man	0.025	1.026		-0.179	0.836	
Prefer not to answer or prefer to self-describe gender	-0.055	0.947		-0.239	0.787	***
Straight (heterosexual)	-0.362	0.696	***	-0.296	0.744	***
Gay or lesbian	0.263	1.300	***	0.153	1.165	**
Bisexual	0.061	1.062		0.205	1.228	***
Queer	0.106	1.112		0.241	1.273	*
Questioning	0.109	1.115		-0.040	0.960	
Asexual	0.434	1.543	*	-0.026	0.974	
Pansexual	-0.233	0.792		0.033	1.034	
Prefer not to answer or prefer to self-describe sexual orientation	-0.138	0.871		-0.290	0.749	***
American Indian or Alaskan Native	-0.399	0.671		0.158	1.171	
Asian	-0.034	0.966		0.006	1.006	
Black or African American	-0.103	0.902		-0.278	0.758	
Native Hawaiian or Pacific Islander	0.639	1.894		0.728	2.070	
Hispanic or Latinx	0.079	1.082		0.036	1.037	
White	-0.088	0.916		-0.080	0.923	
Multiracial	-0.023	0.977		-0.037	0.963	
Race/ethnicity not provided or unknown	-0.097	0.908		-0.226	0.798	
International	0.139	1.149	**	-0.116	0.890	
Domestic	-0.139	.870	**	0.116	1.123	
Cared for children during the pandemic	-0.311	0.733	***	-0.334	0.716	***
Cared for adults during the pandemic	0.258	1.295	***	0.257	1.293	***
Cared for both children and adults during the pandemic	0.277	1.320	***	0.300	1.350	***

Not a caregiver during the pandemic	0.265	1.304	***	0.244	1.276	***
Physical disability	0.056	1.058		0.081	1.085	
Learning disability	0.122	1.130		0.019	1.019	
Neurodevelopmental/cognitive disability	0.532	1.702	***	0.483	1.622	***
No disabilities	-0.863	0.422	***	-1.016	0.362	***
First-generation	-0.039	0.962		-0.129	0.879	***
Continuing-generation	0.038	1.039		0.129	1.138	***
Low-income	0.134	1.144	**	0.121	1.129	*
Working-class	-0.017	0.983		-0.061	0.941	
Middle-class	-0.032	0.969		-0.018	0.982	
Upper-middle class	0.024	1.024		0.003	1.003	
Wealthy	-0.110	0.896		-0.091	0.913	
STEM	0.256	1.292	***	0.115	1.122	***
Arts, humanities, communication, and design	0.176	1.192	***	0.124	1.132	*
Business	-0.115	0.892		-0.138	0.871	*
Health sciences	-0.286	0.751	***	-0.272	0.762	***
Industry, manufacturing, and construction	0.069	1.071		0.084	1.087	
Education	-0.040	0.961		0.010	1.010	
Law, security, and public administration	-0.039	0.962		0.022	1.022	
Social and behavioral sciences	0.033	1.033		-0.022	0.978	
Master's research	0.088	1.092	*	-0.011	0.989	
Master's professional	0.065	1.067		0.041	1.041	
Doctorate research	0.174	1.190	***	0.066	1.069	
Doctorate professional	-0.202	0.817	***	-0.101	0.904	
I feel valued as an individual at my university	-0.114	0.892	***	-0.130	0.878	***
I feel that I belong at my university	-0.132	0.876	***	-0.079	0.924	***
Support you received from instructors to successfully learn online	-0.142	0.868	***	-0.047	0.954	
Satisfaction with institution's overall response to the pandemic	0.001	1.001		-0.034	0.967	
I feel that my university supported me during the COVID-19 pandemic	-0.064	0.938	***	-0.065	0.937	***

Inability to schedule qualifying events	0.040	1.041		0.125	1.133	***
Inability to conduct research	0.172	1.188	***	0.147	1.158	***
Inability to fulfill required clinical rotation, residency, or internship hours	0.010	1.010		0.104	1.110	**
Inadequate access to quality advising	0.286	1.331	***	0.210	1.234	***
Inadequate access to faculty	0.130	1.139	***	0.117	1.124	***
Lack of access to administrative services	0.030	1.031		0.094	1.099	
Increased teaching workload associated with transitioning to online classes	0.134	1.143	**	0.149	1.161	**
Increased research workload	0.236	1.266	***	0.341	1.406	***
Increased hours worked or obtained another job	0.101	0.904		0.145	1.156	**
Inability to attend professional conferences	0.014	1.014		0.020	1.020	
Lack of access to an appropriate study space or distracting home environment	0.496	1.642	***	0.379	1.460	***
Need to provide additional care for yourself or a family member	0.359	1.431	***	0.467	1.595	***
No obstacles to degree progress	-0.148	0.862		-0.133	0.875	
Unexpected increases in spending for technology	0.127	1.136	***	0.126	1.134	***
Loss of wages from on-campus employment	-0.004	0.996		-0.091	0.913	
Loss of wages from off-campus employment	0.125	1.132	***	0.129	1.141	***
Loss or reduction of a scholarship	0.095	1.099	*	-0.009	0.991	
Loss or reduction of grant aid	-0.182	0.834		-0.146	0.864	
Loss or reduction of student loan aid	0.274	1.315		0.419	1.520	*
Loss or reduction of insurance coverage	0.099	1.104		0.095	1.100	
Loss or cancellation of an expected job or internship offer	0.040	1.041		0.093	1.098	

Unexpected increases in living expenses	-0.016	0.984		0.031	1.031	
Loss or reduction of income of other family members	0.064	1.066		0.092	1.097	*
No financial hardships	0.027	1.027		-0.005	0.995	
Housing insecurity	0.348	1.417	***	0.297	1.345	***
Food insecurity	0.308	1.361	***	0.288	1.333	***
I had a place to live that was free from physical/emotional violence or abuse (never/sometimes true)	0.149	1.161		0.128	1.136	
I had a place to live that was free from drug and/or alcohol abuse (never/sometimes true)	0.229	1.258	**	0.084	1.088	
I had a place to live where my identity was respected (never/sometimes true)	-0.131	0.878		-0.113	0.893	
I had a place to live where I felt safe and protected (never/sometimes true)	0.316	1.371	***	0.365	1.441	***
Constant	4.510	90.877	***	5.393	219.867	***

Note. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ . Cox & Snell  $R^2$  for MDD = .146, GAD = .150. Nagelkerke  $R^2$  for MDD = .206, GAD = .204. The MDD model properly classified 83% of the cases while the GAD model properly classified 79% of the cases.

### Limitations

The sample, which was drawn from large, public research universities, provides limited generalizability to other types of institutions (e.g., regional institutions). The survey was also administered in the summer 2020 semester during the beginning of the pandemic, which may have contributed to lower than desirable response rates at some institutions. Additionally, our study was limited in the types of academic and degree attainment obstacles, financial hardships, and health and safety factors we assessed. The effects of the pandemic may have meant significant changes in students' experiences with those degree obstacles, hardships, or health and safety factors over time—in other words, those conditions may have been exacerbated at the start

of the pandemic, limiting generalizability to other timeframes within the ongoing pandemic or potential post-pandemic applications.

### **Discussion**

The results of our study suggest that a variety of individual, interpersonal, health and safety, and financial and academic stressors are associated with graduate and professional students' risk for experiencing clinically significant MDD and GAD symptoms during the COVID-19 pandemic. There are differences in students' MDD and GAD rates based upon their demographic characteristics, a finding corroborated in prior studies (Evans et al., 2018; Jones-White et al., 2020; Oswald & Wyatt, 2011); however, our study advances understanding of other demographic indicators also associated with increased rates of MDD and GAD, including disability and caretaking status, and suggest that some marginalized students may experience higher rates of mental health disorder symptoms.

The results also suggest supportive campus environments (i.e., the interpersonal and institutional variables) may reduce graduate and professional students' risk for MDD and GAD. As the pandemic continues, institutions should continue to prioritize mental health resources, such as increasing staffing in mental health resource centers, offering additional trainings for faculty and staff, and advocating for additional funding. Campuses can continue to offer virtual mental health services such as telecounseling, particularly for students that do not feel comfortable meeting in-person. Furthermore, colleges and universities can invest in online mental health wellness websites and apps, such as Therapy Assistance Online (TAO; Benton et al., 2016), Nod (Bruehlman-Senecal et al., 2020), and YOU@College (Grit Digital Health, 2021). Finally, campuses can proactively address student mental health by ensuring that faculty and staff are trained in basic mental health support, such as crisis management and resources for

referring students. Regardless of an individual's position on-campus, all faculty and staff should prioritize taking a trauma-informed approach when working with students.

Furthermore, health-related factors (such as food/housing insecurity) are also associated with students' MDD and GAD symptoms. When considering proactively supporting students' mental health, institutions should view resources through a holistic lens. For instance, campuses can provide access to safe housing, healthy food, and childcare for students, thus potentially easing financial burdens. Additionally, campuses could increase the availability of physical fitness activities, access to virtual workout classes, or transportation to nearby parks. Campuses can also offer crisis support services such as emergency housing, alternative or short-term housing, and free transportation to local support services.

Finally, the results suggest that financial and academic stressors associated with the pandemic may increase students' risk for experiencing symptoms of mental health disorders. Institutions can ease financial and academic burdens on students by prioritizing funding students from marginalized backgrounds. Furthermore, faculty should approach grading in an equitable manner, such as providing flexible deadlines or reducing coursework for students who are struggling with mental health concerns. Faculty can also ease financial burdens for students by offering free or low-cost course materials, such as PDFs of textbooks. Finally, campuses can continue to be flexible with students' schedules, as they may be juggling work and/or caregiving on top of school.

While our study is limited in terms of the response rates and generalizability to other institutional types, we believe the results have applicability to higher education leaders, faculty, student affairs practitioners, and mental health providers in many contexts. The effects of the pandemic clearly have negative ramifications on college students' mental health; therefore, we



urge institutional leaders to expand mental health services to students, including telecounseling or app-based services that might be available to students 24/7. We also recommend that practitioners create supportive campus environments for students, reduce students' food/housing insecurity, increase students' safety (or help them locate safer housing alternatives), mitigate students' financial hardships, and reduce students' academic obstacles to online learning. Given the unique MDD and GAD rates among demographic groups, we encourage—leaders to understand that mental health services should not be designed in a “one-size-fits-all” fashion and that specialized services may be more beneficial for students based upon their unique identities.

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