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Impacts of the COVID-19 Pandemic on Mental Health of Undergraduate Students

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Abstract

Previous studies conducted in the United States during the COVID-19 pandemic have found that undergraduate students experienced considerable levels of anxiety, depression, stress, difficulties transitioning to online learning, worries about academic performance, and difficulties concentrating (Fruehwirth et al., 2021; Hathaway et al., 2021; Lee et al., 2021; Son et al., 2020; X. Wang et al., 2020). However, these studies were primarily conducted during the first wave of the pandemic. To assess ongoing impacts of the COVID-19 pandemic on undergraduate students, students at a state university in the southeastern United States were surveyed to examine associations between mental health symptoms (anxiety, depression, and stress) and class modality (classes online versus at least one in-person class), along with various demographic and academic variables (perceived distractibility and perceived decrease in quality of coursework). The results showed that class modality was not a significant predictor of anxiety, depression, and stress. Perceived distractibility and perceived decrease in quality of coursework were significant predictors of all three outcomes and female gender was a positive predictor of anxiety and stress. Students within this study reported clinically significant levels of anxiety, depression, and stress, indicating the need for further research on the availability of mental health services for students.

Keywords: COVID-19, undergraduate students, mental health, online learning

Introduction

The COVID-19 pandemic caused a major shift in American undergraduate education, with most major universities moving to online learning during early 2020. By the fall semester of 2021, most major universities — particularly those in the southeastern U.S. — began to emphasize a return to in-person or hybrid classes. The purpose of this study is to examine how changes in the structure of university-level education during the ongoing COVID-19 pandemic

impacted the mental health of undergraduate students approximately one year after the first wave of the pandemic.

Even before the pandemic, university students were considered a vulnerable population due to increased risk of anxiety, depression, suicide, and distress (Balon et al., 2015; Garlow et al., 2008). Consistent with international research (e.g. Qanash et al., 2020; C. Wang et al., 2020), several studies conducted in the U.S. in 2020 indicated that university students experienced considerable levels of anxiety, depression, and stress due to the COVID-19 pandemic (Fruehwirth et al., 2021; Hathaway et al., 2021; Lee et al., 2021; Son et al., 2020; X. Wang et al., 2020); however, there are few studies investigating the impact of COVID-19 on symptoms of anxiety, depression, and stress after the first wave of the pandemic. Towards the beginning of the pandemic, many students were experiencing changes in the structure of education, decreased opportunity for social interactions, financial struggles, and worries about the COVID-19 pandemic that may have contributed to increased overall distress (Aristovnik et al., 2020). Many of these stressors are still applicable to students after the first wave of the pandemic, suggesting students may still be experiencing distress related to them.

The increase in distress reported in previous literature may be explained by the following stressors: general concerns regarding the health of themselves and others, academic success, and difficulties with social interactions (Son et al., 2020; X. Wang et al., 2020). Social isolation is another risk factor for depression and anxiety in university students (Fruehwirth et al., 2021). Due to campus closures and lockdowns during the pandemic, students had less access to interactions with others both in academic and social situations, such as not being able to live with others in dorms or meet up with friends or study groups (Aristovnik et al., 2020). Students who were able to return home to be with family may have experienced lower risk of increased anxiety and depression (Fruehwirth et al., 2021). Other factors associated with increased distress in undergraduate students during the pandemic include female gender (Sundarasen et al., 2020) and being earlier in one's college career (X. Wang et al., 2020). Area of study may also impact experiences of distress. For example, a recent study conducted by Black Thomas (2022) comparing nursing undergraduate students with non-nursing undergraduate students found that nursing students reported higher levels of life stress but lower levels of depression when compared to their non-nursing counterparts, and Aristovnik and colleagues (2020) found that students in applied science courses experienced less life satisfaction and satisfaction with

academic work. Continued stressors related to the pandemic and a failure or inability to access mental health services may perpetuate these experiences of distress, as the majority of students who were experiencing moderate to severe symptoms had not utilized mental health services (Lee et al., 2021).

The transition to online learning during the COVID-19 pandemic may also have adverse effects on academic performance. One study found that major academic concerns reported by participants during the pandemic included difficulty concentrating, worry about performance and progress, and adjusting to distance learning (X. Wang et al., 2020). Students in STEM majors may be particularly vulnerable to these changes. A study by Barber and colleagues (2021) found that compared to students with non-STEM majors, STEM students were less satisfied with the transition to online learning, reporting increased workload and decreased ability to participate in remote learning. Additionally, in a study investigating a population of undergraduate STEM majors, 26% of participants worried about quality of instruction upon returning to campus and 24% were concerned about the lack of hands-on learning and interactions with faculty during online learning (Palmer et al., 2021). These findings suggest that this adjustment was likely a source of stress for many undergraduate students. Though, it is important to note that in other contexts, online learning does not always negatively impact academic success (Shea & Bidjerano, 2014). Additionally, psychological distress created by the pandemic, including anxiety, depression, and stress, can negatively affect academic success through its adverse impact on motivation, concentration, and social interactions (Son et al., 2020).

The primary contribution of this study is the observation of both the impact of class modality (classes online versus in-person) and the associations between symptoms of anxiety, depression, and stress and demographic and academic variables one year after the first wave of the COVID-19 pandemic in the U.S. Due to the everchanging nature of the pandemic, evaluating data collected during 2021 will help to shed light on how these factors might differ from existing literature as the pandemic evolves. This is particularly applicable to this study due to the reemergence of in-person learning opportunities during the time these data were collected.

Aims and Hypotheses

The first aim of this study examines the impact of the transition to online learning on student mental health. It is hypothesized that students taking online classes will report higher levels of

anxiety, depression, and stress compared to their peers taking at least one class in person. The second aim of this study is to investigate the associations between symptoms of anxiety, depression, and stress and various demographic and academic variables. It is hypothesized that those who identify as female, underclassman (i.e., 1st and 2nd years), and those in STEM majors will report higher levels of anxiety, depression, and stress. It is also hypothesized that difficulty paying attention in class and adverse perceptions of academic performance will be positively associated with anxiety, depression, and stress.

Method

Participants

Data for this study were collected through an online survey conducted via Qualtrics™. Participants were recruited through advertisements in UF Listservs and email blasts. All study procedures were approved by the University of Florida Institutional Review Board (IRB202100638). To be eligible for this study, participants had to be an undergraduate student currently enrolled at a state university in Florida for at least one full semester. Data were collected from late May 2021 to late October 2021. At the beginning and end of data collection, there were approximately 2,000 confirmed cases of COVID-19 per week in Florida; however, around the middle of data collection in August 2021, there was a large spike in cases that peaked at approximately 21,000 confirmed cases per week due to the Delta variant (USA Facts, 2022). A screening question regarding enrollment for at least one full semester was added to the survey in early July 2021. Participants were not compensated for their participation in the study. A total of 357 participants responded to the survey. Participants were excluded from the analyses due to inactive enrollment at a state university in Florida (n=8), not being enrolled for at least one full semester (n=36), or failed validity checks (n=136). The total number of participants included in final analyses was 177.

The average age of participants was 20.06 (SD=2.07). Many more respondents identified as female (76.3%) than male (22%) or non-binary (1.7%). The sample was mostly White/Caucasian (78%). Most participants indicated involvement in a STEM major (80.2%) rather than a non-STEM major (19.8%). The majority of participants were in their second (37.3%), third (22.6%), or fourth (29.4%) year of undergraduate study. Detailed demographic information can be found in Table 1.

Table 1. Demographics for Total Sample and In-Person and Online Only Groups

Factor	% Total Sample	% Online Only	% In-Person
n	177	44	133
Mean Age (Standard Deviation)	20.06 (2.07)	20.16 (1.88)	20.03 (2.13)
Gender			
Male	22.0	27.3	20.3
Female	76.3	70.5	78.2
Non-Binary	1.7	2.3	1.5
Racial/Ethnicity			
White/Caucasian	78.0	79.5	77.4
Black or African American	4.0	0.0	5.3
Asian	13.0	11.4	13.5
Native American or Alaska Native	0.6	0.0	0.8
Native Hawaiian or Other Pacific Islander	0.6	0.0	0.8
Hispanic or Latino	22.0	36.4	17.3
Other	2.3	2.3	2.3
Undergraduate Major			
STEM	80.2		
Non-STEM	19.8		
Year in Undergraduate Study			
First Year	8.5	11.4	7.5
Second Year	37.3	50.0	33.1
Third Year	22.6	11.4	26.3
Fourth Year	29.4	22.7	31.6
Five or More Years	2.3	4.6	1.5

Measures

The first set of questions presented to participants was based on whether participants indicated full or partial enrollment in online classes. Using branching logic, participants answered a set of questions concerning their feelings about either online or in-person education using 5-point Likert scale questions. One question assessed participants' change in self-reported coursework quality ("The quality of the coursework I have produced has decreased since the start of the COVID-19 pandemic") and another assessed for change in distractibility ("I am frequently distracted when trying to do my schoolwork or attend lectures"). Participants were also asked to indicate their distress related to the COVID-19 pandemic using Likert scale questions. The Generalized Anxiety Disorder 7-item (GAD-7) scale was used to assess symptoms of anxiety within the past two weeks (Spitzer et al., 2006), the 10-item Perceived Stress Scale was used to

assess the degree of perceived stress in various situations over the last month (Cohen et al., 1983), and the PROMIS Depression 8b Short Form v1.0 was used to assess emotional distress and depression within the past 7 days (Clover et al., 2018). Participants were also asked a variety of demographic questions regarding age, gender, race/ethnicity, undergraduate major/minor, and year in their degree program. Majors were divided into STEM or non-STEM majors based on classification as science, technology, engineering, math, or health-related (ACT, n.d.).

Analyses

Statistical Analyses were conducted via IBM's Statistical Product and Service Solutions (SPSS) software, version 27. A multivariate analysis of variance (MANOVA) was conducted to assess Aim 1, whether receiving only online instruction versus attending at least one class in person predicted levels of depression, stress, and anxiety. Aim 2, whether demographic variables and academic difficulties were related to levels of depression, stress, and anxiety, was assessed using three multiple linear regressions with depression, stress, and anxiety acting as the three dependent variables.

Results

Table 2 presents Pearson correlations and descriptive statistics for the dependent and academic variables. On average participants reported moderate levels of anxiety, depression, and stress. Additionally, on average, participants were neutral or somewhat agreed that the quality of their coursework had decreased since the beginning of the pandemic and somewhat agreed that they were frequently distracted when trying to do schoolwork or attend lectures. Anxiety, depression, and stress were all highly positively correlated with each other, and quality of work and distractibility were moderately and positively correlated with the anxiety, depression, and stress variables and each other. The omnibus effect of class modality on the anxiety, depression, and stress variables was small and non-significant [$F(3, 173)=1.040$, $p=.376$, partial $\eta^2=.018$]. Group comparisons for depression, anxiety, and stress are summarized in Table 3.

Table 2. Zero Order Pearson Correlations Between and Descriptive Statistics of Main Variables of Interest

	M (*SD*)	1	2	3	4	5
1. GAD7	10.51 (5.46)	-	.729***	.763***	.287***	.369***
2. PROMIS	21.06 (8.40)		-	.758***	.378***	.298***

3. PSS	21.76 (7.77)	-	.315***	.387***
4. Quality	3.59 (1.31)		-	.281***
5. Distractibility	4.09 (1.10)			-

Note. GAD7 ranges from 0 to 21, PROMIS ranges from 8 to 40, PSS ranges from 0 to 40, quality ranges from 1 to 5, and distractibility ranges from 1 to 5.
****p<.001*

Table 3. Pairwise Comparisons

Variable	Online only (N=44)		Some in-person instruction (N=133)		F	partial η^2
	M	SD	M	SD		
Anxiety	10.955	5.326	10.361	5.512	0.390	.002
Depression	21.659	8.066	20.857	8.528	0.300	.002
Stress	23.250	21.763	21.271	7.822	2.160	.012

Note. N = 177.

Table 4 summarizes the results of the hierarchical regression predicting anxiety. Demographic variables explained 10.2% of the variance in anxiety. Including academic variables explained an additional 13.2% of the variance. In the final model, female gender, perceived decrease in quality of coursework, and perceived distractibility were all significant predictors of anxiety with small to moderate effect sizes. Table 5 summarizes the results of the hierarchical regression predicting depression. Demographic variables explained 3.2% of the variance in depression. Including academic variables explained an additional 16.4% of the variance. In the final model, perceived decrease in quality of coursework and perceived distractibility were significant predictors of depression with small to moderate effect sizes. Female gender was a significant predictor in the first model with a small effect size; however, it was no longer a significant predictor of depression once academic variables were included. Table 6 summarizes the results of the hierarchical regression predicting stress. Demographic variables explained 11% of the variance in stress. Including academic variables explained an additional 14.9% of the variance. In the final model, female gender, perceived decrease in quality of coursework, and perceived distractibility were all significant predictors of stress with small to moderate effect sizes.

Table 4. Hierarchical Regression Predicting Anxiety

Step	Predictor	b	SE	β	t	p	R^2	R^2 change	F	p
1							.102	.102	6.522	.000
	Female	3.883	.925	.304	4.199	.000				
	STEM	.255	.986	.019	.259	.796				
	Year in Undergraduate Degree	.575	.377	.110	1.526	.129				
2							.233	.132	14.692	.000
	Female	2.962	.876	.232	3.381	.001				
	STEM	.399	.922	.029	.433	.666				
	Year in Undergraduate Degree	.512	.351	.098	1.459	.146				
	Quality	.748	.292	.180	2.562	.011				
	Distractibility	1.369	.351	.277	3.906	.000				

Note. N = 177.

Table 5. Hierarchical Regression Predicting Depression

Step	Predictor	b	SE	β	t	p	R^2	R^2 change	F	p
1							.032	.032	1.904	.131
	Female	3.095	1.477	.157	2.095	.038				
	STEM	1.022	1.576	.049	.648	.518				
	Year in Undergraduate Degree	.584	.602	.073	.970	.333				
2							.196	.164	17.408	.000
	Female	1.669	1.381	.085	1.208	.229				
	STEM	.975	1.453	.046	.671	.503				
	Year in Undergraduate Degree	.496	.553	.062	.897	.371				
	Quality	1.980	.460	.309	4.303	.000				
	Distractibility	1.504	.553	.198	2.722	.007				

Note. N = 177.

Table 6. Hierarchical Regression Predicting Stress

Step	Predictor	b	SE	β	t	p	R^2	R^2 change	F	p
1							.110	.110	7.095	.000
	Female	5.964	1.310	.328	4.551	.000				
	STEM	-.408	1.398	-.021	-.292	.711				
	Year in Undergraduate Degree	.538	.534	.072	1.008	.315				

2							.259	.149	17.184	.000
	Female	4.579	1.227	.251	3.733	.000				
	STEM	-.224	1.290	-.011	-.173	.863				
	Year in Undergraduate Degree	.444	.491	.060	.904	.367				
	Quality	1.220	.409	.206	2.986	.003				
	Distractibility	1.987	.491	.282	4.049	.000				

Note. N = 177.

Discussion

The first aim of this study assessed the impact of the transition to online learning on the mental health of undergraduate students by analyzing anxiety, depression, and stress scores between students taking classes entirely online and students taking at least one class in person. This differs from other findings reported during the pandemic that indicated adjustment to online learning environments as a major concern for students (X. Wang et al., 2020). Interestingly, the findings seem more consistent with pre-pandemic data (Shea & Bidjerano, 2014), which could be due to the timing of data collection, which began after students had time to adjust to online learning and continued as courses began to transition back to an in-person format.

The second aim of this study assessed the associations between gender, year in university, area of study, perceived distractibility, and perceptions of academic performance with anxiety, depression, and stress scores. Partially consistent with the hypothesis and prior studies (Fruehwirth et al., 2021; X. Wang et al., 2020), female gender was a significant predictor of anxiety and stress; however, it did not remain a significant predictor of depression when academic variables were added in the analysis. Therefore, in this sample, female gender was a consistent risk factor for anxiety and stress, but quality of work and distractibility were the greatest predictors of depression. Consistent with the hypothesis, perceived decrease in quality of coursework and increased distractibility were both significant predictors of anxiety, depression, and stress for the entire sample. This is consistent with findings indicating these academic variables as major concerns for students (X. Wang et al., 2020). Contrary to the hypothesis, neither year in university nor area of study (STEM versus non-STEM) were significant predictors of anxiety, depression, or stress. This differs from findings indicating that younger

students had higher levels of anxiety and depression (X. Wang et al., 2020) and that students in different majors experiences different levels of life satisfaction (Aristovnik et al., 2020), depression, and stress (Black Thomas, 2022) but again this may be explained by the changes in attitudes as the pandemic progresses on.

A primary strength of this study is that it expands on existing literature to examine the impact of the pandemic after the first wave to allow for better understanding of the current stressors facing students. Few studies investigating undergraduate student mental health have been conducted assessing data gathered after the first wave. This study provides useful insight on more recent impacts on undergraduate mental health since this pandemic is ongoing and will likely continue to affect the structure of university-level education for the foreseeable future. The time in which these data were collected spans over parts of both the Summer and Fall semesters during 2021. This allows a unique perspective related to the changes occurring to university-level education in Florida at a time when in-person classes were becoming much more prevalent.

However, this study does have several limitations, most notably, the small sample size, recruitment from only one institution, and lack of racial, ethnic, and gender diversity within the participants, all of which impact the generalizability of the findings. One of the main reasons for the small sample size was the exclusion of 136 participants due to a failure to pass several validity checks throughout the online survey. While this was ultimately a limiting factor in this study, it is important to utilize these checks and exclude participants who do not answer correctly to ensure that all data collected is honest and accurate. Another limitation of this study was the use of three separate measures to assess anxiety, depression, and stress in participants. Considering that anxiety, depression, and stress were all highly positively correlated in this study, a measure of overall distress, such as the Depression Anxiety Stress Scale-21 (DASS-21), may have been more appropriate for assessing the psychological impact of the independent variables of interest (Osman et al., 2012).

Overall, this study provides insight into the mental health of undergraduate students at a state university in the southeastern United States during the second year of the COVID-19 pandemic. This study failed to find a significant difference in student mental health related to receiving online instruction only versus at least one in-person class. While this study was limited by its sample size, it suggests that stress, anxiety, and depression are not related to the type of instruction one receives. The results also suggest undergraduate students experience clinically

significant levels of anxiety, depression, and stress, and those that reported greater distractibility and poorer academic performance experienced significantly more mental health symptoms. Thus, it may be beneficial for university counseling centers to assess distress for students with poor academic behaviors or decreases in academic performance. Due to the vulnerability of university students (Balon et al., 2015; Garlow et al., 2008), researchers should investigate the availability and adequacy of student mental health services (Lee et al., 2021).

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