



College student mental health risks during the COVID-19 pandemic: Implications of campus relocation

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ABSTRACT

Purpose: During the COVID-19 pandemic, many universities evacuated their campuses, requiring students to vacate on campus residences. The psychological outcomes of students who relocated during the pandemic remains unknown. We examined mandated relocation experiences related to self-reported worry, grief, loneliness, and depressive, generalized anxiety, and post-traumatic stress disorder (PTSD) symptoms among college students during the COVID-19 pandemic.

Methods: We analyzed cross-sectional survey data obtained from April 9 to August 4, 2020 on 791 young adults (ages 18–30 years) who were enrolled at a U.S. university. The CARES 2020 Project (COVID-19 Adult Resilience Experiences Study) is an online survey of young adults’ mental health during the COVID-19 pandemic. Recruitment relied on snowball sampling. Participants were asked if they were required to relocate from campus and among those who did, their experiences in moving. COVID-19-related worry and grief, loneliness, and depressive, anxiety, and PTSD symptoms were assessed.

Results: Approximately one-third of students reported being mandated to relocate. Students mandated to relocate reported more COVID-19-related grief, loneliness, and generalized anxiety symptoms compared to those who did not even after controlling for the severity level of local COVID-19 outbreaks. Students who had to leave behind valuable personal belongings reported more COVID-19-related worries, grief, and depressive, generalized anxiety, and PTSD symptoms.

Conclusions: Students who were mandated to relocate reported worse psychological outcomes compared to students who were not mandated to relocate. Our findings have implications for addressing the psychological impact of evacuating college campuses during public health emergencies and other disasters.

1. Introduction

As the COVID-19 pandemic spread through the United States in March of 2020, many universities evacuated their campuses to mitigate viral transmission (Sahu, 2020). College students were asked to leave campus with mere days of notice, generating uncertainty among students who were simultaneously rushing to pack, planning transportation, and worrying about academic deadlines (Hartocollis, 2020). Of the colleges and universities tracked by US News and World Reports, 96% reported that they either cancelled in-person classes or shifted to

online-only instruction during the spring of 2020 (Marsicano, 2020). Approximately 26 million U.S. college students were impacted by institutional changes implemented in response to the pandemic (Entangled Solutions, 2020).

Robust literature documents the stress of relocation (Heller, 1982; Kasl, 1972; Niebanck, 1966; Weaver et al., 2020). College students cite relocation as a stressful life event, and relocation has been associated with depressive symptoms (Reyes-Rodríguez et al., 2013). Populations mandated to relocate following a disaster have increased rates of depression and anxiety as sudden relocation can threaten identity, sense

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Table 1

Descriptive data from Wave I of CARES 2020 (N = 791) from April 9 to August 4, 2020, by relocation status, proportions indicated unless otherwise noted.

Factors	Total	Did Not Relocate (n = 527)	Relocated (n = 264)	Statistical Test
Relocation				
No	66.6%	–	–	
Yes	32.4%	–	–	
Age (years)	M = 23.07, SD = 3.18, Range = 18.02–30.99	M = 24.25, SD = 3.18, Range = 18.17–30.99	M = 20.72, SD = 1.40, Range = 18.02–30.28	t (791) = 17.23, p < .001
Gender				χ^2 (2, N = 791) = 6.62, p = .037
Men	14.3%	15.9%	11.0%	
Women	82.2%	81.4%	83.7%	
Nonbinary gender identity	3.5%	2.7%	5.3%	
Race				χ^2 (5, N = 791) = 3.42, p = .636
Asian	21.0%	21.8%	19.3%	
Black	4.8%	5.3%	3.8%	
Hispanic or Latinx	5.8%	5.1%	7.2%	
White	59.7%	59.4%	60.2%	
Mixed	7.0%	6.5%	8.0%	
Another race	1.8%	1.9%	1.5%	
Student Status				χ^2 (1, N = 791) = 197.36, p < .001
Undergraduate	61.9%	44.8%	96.2%	
Graduate	38.1%	55.2%	3.8%	
Year in School				
Undergraduate				χ^2 (4, N = 490) = 34.89, p < .001
1st year	11.6%	11.0%	12.2%	
2nd year	20.6%	12.3%	28.3%	
3rd year	32.7%	30.5%	34.6%	
4th year	27.6%	34.3%	21.3%	
≥5th year or other	7.6%	11.9%	3.5%	
Graduate				χ^2 (5, N = 301) = 18.66, p = .002
1st year	29.2%	27.1%	90.0%	
2nd year	29.9%	30.6%	10.0%	
3rd year	17.3%	17.9%	0%	
4th year	10.6%	11.0%	0%	
5th year	8.3%	8.6%	0%	
≥6th year or other	4.7%	4.8%	0%	
International Student				χ^2 (1, N = 791) = 5.58, p = .018
No	92.3%	90.7%	95.5%	
Yes	7.7%	9.3%	4.5%	
Received Financial Aid				χ^2 (1, N = 791) = 12.74, p < .001
No	43.7%	48.2%	34.8%	
Yes	56.3%	51.8%	65.2%	
Emotional health				
Pre-existing psychiatric diagnosis				χ^2 (1, N = 791) = .107, p = .744
No	57.5%	57.1%	58.3%	
Yes	42.5%	42.9%	41.7%	
Psychological resilience	M = 25.86, SD = 6.13, Range = 4.00–40.00	M = 25.92, SD = 6.15, Range = 4.00–40.00	M = 25.75, SD = 6.09, Range = 8.00–40.00	t (789) = .364, p = .716
Distress tolerance	M = 3.27, SD = 0.85, Range = 1.00–5.00	M = 3.31, SD = 0.85, Range = 1.00–5.00	M = 3.18, SD = 0.84, Range = 1.00–4.87	t (789) = 2.041, p = .042
COVID-19 characteristics				
Number of days from pandemic start to survey start	M = 62.87, SD = 33.33, Range = 27.00–143.00	M = 59.76, SD = 33.41, Range = 27.00–143.00	M = 69.09, SD = 32.35, Range = 27.00–143.00	t (789) = -.375, p < .001
COVID-19 transmission rate at the time of relocation	M = 1.20, SD = 0.09, Range = 1.00–1.36	M = 1.19, SD = 0.09, Range = 1.00–1.36	M = 1.21, SD = 0.10, Range = 0.99–1.31	t (789) = -2.33, p = .02
Outcomes				
COVID-19-related worry	M = 15.90, SD = 5.42, Range = 6.00–30.00	M = 15.98, SD = 5.39, Range = 6.00–30.00	M = 15.72, SD = 5.47, Range = 6.00–30.00	t (789) = .658, p = .511
COVID-19-related grief	M = 20.06, SD = 4.65, Range = 6.00–30.00	M = 19.29, SD = 4.50, Range = 6.00–30.00	M = 21.58, SD = 4.57, Range = 8.00–30.00	t (789) = -6.70, p < .001
Loneliness	M = 6.28, SD = 1.89, Range = 3.00–9.00	M = 6.05, SD = 1.87, Range = 3.00–9.00	M = 6.73, SD = 1.84, Range = 3.00–9.00	t (789) = -4.83, p < .001
Depression	M = 9.28, SD = 5.65, Range = 0–24.00	M = 9.12, SD = 5.71, Range = 0–24.00	M = 9.62, SD = 5.50, Range = 0–24.00	t (789) = -1.18, p = .239
Generalized anxiety	M = 9.47, SD = 5.63, Range = 0–21.00	M = 9.11, SD = 5.62, Range = 0–21.00	M = 10.18, SD = 5.58, Range = 0–21.00	t (789) = -2.52, p = .012
PTSD	M = 39.29, SD = 14.25, Range = 17.00–79.00	M = 38.05, SD = 33.96, Range = 17.00–79.00	M = 41.75, SD = 14.51, Range = 17.00–77.00	t (789) = -3.47, p = .001

of control, social support, and relationships (Acierno et al., 2006; Carr and Lewin, 1997; Dirkzwager et al., 2006; Najarian et al., 2001; Uscher-Pines, 2009; Yzermans et al., 2005). Sudden relocation following a potentially traumatic experience can create psychological stress and limit access to resources needed for effective coping and recovery (Uscher-Pines, 2009). Young adults who have recently relocated may experience disruption in routine, spend less time on leisure activities, and feel less enjoyment from socializing than those who have not relocated (Hendriks et al., 2016). One study of physical activity and stressful life events among U.S. college students which began prior to the pandemic found that 40% of college students were forced to relocate during the pandemic, with campus closure a significant stressful life event for these students (Maher et al., 2020).

While news media chronicled the stress of college students during campus closures and mandated relocations, there is no empirical data examining the mental health of U.S. college students who were mandated to relocate during the COVID-19 pandemic. College students in Spain reported depression and anxiety following closure of their university due to the pandemic (Odrizola-González et al., 2020). College students in France and China living with their parents during the pandemic experienced less anxiety and depression than students who were living alone (Cao et al., 2020; Husky et al., 2020). However, many factors distinguish the college student population in the U.S. from those other countries, including social norms, personal expectations about living independently, and the nature of financial stress. The psychological outcomes associated with U.S. campus closures during the pandemic remains unknown.

This study aimed to understand self-reported experiences among U.S. college students mandated to relocate during the spring of 2020 due to the COVID-19 pandemic. The CARES 2020 Project (COVID-19 Adult Resilience Experiences Study) is a survey of young adults, ages of 18–30 years, which used standardized measures to examine psychological symptoms and relocation experiences of college students during the first months of the COVID-19 pandemic.

2. Methods

2.1. Procedure

Young adults aged 18–30 years currently living in the U.S. or obtaining education from a U.S. institution were eligible for participation. The analysis included online survey data collected from Wave 1 of the CARES 2020 Project from April 9, 2020 to August 4, 2020. The cross-sectional analysis focused on self-reported psychological symptoms among college students who were and were not mandated to relocate due to campus closure and/or transition to remote during the pandemic. Survey respondents were recruited using social media, email list serves, and word of mouth through snowball sampling. Embedded attention checks and human verification were used to ensure the data quality of the online survey. Participants had the option to join a raffle, and one out of every 10 who joined the raffle received a \$25 gift card. The Boston University Institutional Review Board approved all procedures.

2.2. Participants

This analysis included a total of 791 students, ranging from 18 to 30 years old. Table 1 displays the breakdown of participants based on socio-demographic characteristics in total and by relocation status. The dates during which students had to relocate ranged from March 2 to March 30, 2020.

2.3. Measures

2.3.1. Descriptives

Relocation circumstances. To understand the general circumstances of relocation, participants indicated time permitted to relocate,

where they moved after leaving campus, their current place of residence, if their residence required payment and whether they left behind valuable belongings.

2.3.2. Predictors

Relocation status. Respondents were asked to indicate “yes” or “no” to the question, “Were you mandated to vacate from your residence by your university due to the COVID-19 outbreak and thus required to find new living arrangements?”. This response served as a binary predictor.

Days to relocate. Those who responded “yes” to the question above were asked, “How many days did you have to move out of your residence following your university’s campus closing announcement?”. The number of days they indicated served as a continuous predictor.

Leaving behind belongings. Those who responded “yes” to the relocation status were also asked to indicate “yes” or “no” to the question “After being told to relocate, did you have to leave behind any valuable personal belongings?”. This response served as a binary predictor.

2.3.3. Outcomes

COVID-19-related worry. COVID-19-related worry is a newly developed 6-item measure to assess the intensity of current anxieties specific to the COVID-19 pandemic (Liu et al., 2020b). Respondents indicated their level of worry about obtaining groceries, accessing healthcare, contacting loved ones, and maintaining employment during the pandemic on a scale from 1, indicating “not at all” to 5, indicating “very worried”, with total scores ranging from 6 to 30. Reliability was verified by Cronbach’s α for measure items and was .70.

COVID-19-related grief. COVID-19-related grief is a newly developed 6-item measure to assess the intensity of current feelings about losses specific to the COVID-19 pandemic (Liu et al., 2020b). Many items on this measure were adapted from the Inventory of Complicated Grief (Prigerson et al., 1995). Respondents indicated the extent to which they agreed or disagreed with six statements about the loss of personally significant life experiences, vital resources like housing, food and healthcare, and feelings associated with grief, including feeling stunned, dazed or bitter. Respondents were asked to rate each statement on a scale from 1, indicating “strongly disagree” to 5, indicating “strongly agree”, with summed scores ranging from 6 to 30. Reliability was verified by Cronbach’s α for measure items and was 0.76.

Loneliness. An adapted 3-item version of the UCLA Loneliness Scale Short Form was used to assess loneliness (Hughes et al., 2004). Items on the scale address lack of companionship and feeling socially isolated during the prior two weeks. Respondents were asked to rate each statement on a scale of 1, indicating “hardly ever” to 3, indicating “often”. The sum score was used for analyses.

Depression. The 8-item version of the Patient Health Questionnaire (PHQ-8) was used to assess depression (Kroenke et al., 2009). Respondents indicated the frequency that they had experienced depressive symptoms during the past two weeks on a scale from 0, indicating “not at all”, to 3, indicating “nearly every day”. This resulted in a total possible score that ranged from 0 to 24. Results were recoded dichotomously based on a cutoff score of 10 (Wu et al., 2019).

Anxiety. The Generalized Anxiety Disorder Scale (GAD-7) was used to assess anxiety (Spitzer et al., 2006). Survey respondents reported the frequency that they had experienced anxiety symptoms during the past two weeks on a scale from 0, indicating “not at all”, to 3, indicating “nearly every day”. This resulted in a total possible score that ranged from 0 to 21. Results were recoded dichotomously based on a cutoff score of 10 (Plummer et al., 2016).

PTSD. The PTSD Checklist—Civilian Version (PCL-C) was used to assess for Post-Traumatic Stress Disorder (PTSD) (Weathers et al., 1993). Survey respondents reported the degree of impact from the stressful life event during the past month on a scale from 1, indicating “not at all”, to 5, indicating “extremely”. This resulted in a total score that ranged from 17 to 85. Results were recoded dichotomously based on a cutoff score of

45 (Blanchard et al., 1996).

2.3.4. Covariates

Sociodemographic Characteristics. Respondents reported demographic characteristics including their age, self-identified gender (man, women, or other), race (Asian, Black, Hispanic or Latinx, White, mixed, or another race), student type (undergraduate or graduate student), for undergraduates, year in school (1–5 years or more), for graduate students, year in school (1–6 years or more), international student (yes or no), and whether the student received financial aid (yes or no). Date of birth and the survey administration date was used to calculate the respondents' age.

Pre-existing psychiatric diagnosis. Pre-existing psychiatric diagnoses were assessed given recent evidence for elevated COVID related distress among this population (Liu et al., 2020a). This survey included a list of nine psychiatric diagnoses: Attention Deficit Hyperactivity Disorder (ADHD); generalized anxiety disorder; depression; insomnia; obsessive compulsive disorder (OCD); panic disorder; post-traumatic stress disorder (PTSD); substance abuse or addiction (alcohol or other drugs); or another psychiatric disorder. For each psychiatric diagnosis, survey respondents were asked to select one of the following: “No”; “Suspected, but not diagnosed”; “Yes, diagnosed but not treated”; or “Yes, diagnosed and treated.” Responses to this item were collapsed into a single variable, and this variable was treated as binary. The responses “Yes, diagnosed but not treated,” and “Yes, diagnosed and treated” were categorized as “Pre-existing psychiatric diagnosis”, while the responses “Suspected, but not diagnosed” and “No” were categorized as “No pre-existing psychiatric diagnosis.”

Psychological resilience. The 10-item Connor-Davidson Resilience Scale (CD-RISC-10) was used to assess psychological resilience (Connor and Davidson, 2003). In response to statements about their ability to cope with adverse experiences, survey respondents reported how they felt during the past month on a scale from 0, indicating “not true at all”, to 4, indicating “true nearly all the time” (Andrews and Slade, 2001; Kessler and Mroczek, 1992).

Distress tolerance. The 15-item Distress Tolerance Scale was used to assess ability to withstand with emotional distress (Simons and Gaher, 2005). In response to statements about personal attitudes toward emotional distress, survey respondents reported their degree of agreement on a scale from 1, indicating “strongly agree”, to 5, indicating “strongly disagree”. Higher scores indicate greater distress tolerance.

Duration of pandemic. The number of days between the date where COVID-19 was declared as a pandemic (March 13, 2020) to when each respondent started the survey was calculated in “days.” This was included as a covariate given the possible correlation between the date of the survey completion and the outcome measures.

COVID-19 transmission rate. Rt represents the average number of people who become infected by an infectious person and is a measure of whether viral spread is contained at a given time. This was obtained by linking the Rt with the location of the state where the specific school was located with the date in which the university closed and/or transitioned to remote learning. Rt was obtained via Rt live (Systrom et al., 2021). Test-adjusted positives represent the number of positive cases in the state on that day after correcting for testing volume.

2.3.5. Data analytic plan

Using SPSS 26.0, t-tests and chi-square analyses were conducted to determine differences in either means or proportions among all analytic variables based on relocation status. To determine whether there were differences in outcome by relocation status, a series of linear regression models were performed to sequentially examine the effects of socio-demographic characteristics (Block 1), emotional health, which included pre-existing psychiatric diagnosis, psychological resilience, and distress tolerance (Block 2), COVID-19 characteristics which included the number of days since the start of the pandemic until the survey start and COVID-19 transmission rate at the time of campus

closure and/or transition to remote learning (Block 3), and finally, relocation status, specifically, whether students had to move off campus (Block 4). To determine any within group differences, a series of linear regression models were similarly performed in a sequential manner but for only those who had to relocate from campus. The same variables were used for Blocks 1–3, with Block 4 containing the following relocation experiences as predictors: number of days available to move from campus and whether students had to leave behind any valuable belongings. Missing data was minimal (1%) and therefore were treated using listwise deletion.

3. Results

Table 1 presents the distributions of demographic characteristics of the participants and includes descriptive data on our study variables. Those who relocated were more likely to be younger ($M = 20.72$, $SD = 1.40$) compared to those who did not relocate ($M = 24.25$, $SD = 3.18$). Based on chi-square analyses, students with the following characteristics were statistically more likely to relocate: gender identified as other (compared to gender identified as man or woman), undergraduate students (versus graduate students), undergraduates in their first three years (compared to those in later years), graduate students in their first year (compared to later years), non-international students, and those who received financial aid. Table 1 presents results from simple t-tests showing statistically significant differences in other variables with those who relocated reporting lower levels of distress tolerance and greater levels of COVID-19 related grief, loneliness, and generalized anxiety and PTSD symptoms. Students who relocated were more likely to be in a location with a higher COVID-19 transmission rate when their schools closed and/or transitioned to remote learning; they responded to the survey an average of ten days later than those who did not relocate.

Table 2 displays data pertaining to the relocation experiences. On average, students had one week to move off campus ($M = 7.07$, $SD = 7.55$), and approximately 80% of students had one week or less to move. Less than half (43.6%) had to leave valuable personal belongings behind when they relocated. Among the students who relocated, 86.4% reported currently living with a parent or guardian. Following their relocation from campus, 11.4% needed to move again at least once and

Table 2

Relocation experiences among students who relocated from campus, proportions indicated unless otherwise noted.

Factors	Relocated Students
How many days did you have to move out of your residence following your university's campus closing announcement?	Mean = 7.06, SD = 7.55, Range = 0–70.00
0-3	27.8%
4-7	50.2%
8-14	15.6%
15+	6.4%
After being told to relocate, did you have to leave behind any valuable personal belongings?	
Yes	43.6%
No	56.4%
How many other moves were made after relocating from campus	
0	88.6%
1	9.1%
2+	2.3%
Where do you live right now?	
Parent/guardian's home	86.4%
Friend's home	2.7%
Relative's home	4.2%
Rental or sublet	3.4%
University temporary housing	1.1%
Off-campus housing	1.5%
Other	0.8%
Was payment required for you to stay in this current location?	
No	91.2%
Yes	8.8%

Table 3

Multiple regression predicting COVID-19-related worry and grief, and loneliness based on sociodemographic variables, emotional health, COVID-19 characteristics (time and transmission rates), and **relocation status** (no/yes) from April 9 to August 4, 2020.

Blocks of variables entered in three steps	COVID-19 worries				COVID-19 grief				Loneliness			
	B	SE	β	R^2	B	SE	β	R^2	B	SE	β	R^2
1. Sociodemographic characteristics				.042***				.065***				.060***
Age (years)	.137	.069	.081*		-.068	.056	-.047		-.066	.023	-.112**	
Gender (Ref = Men)												
Women	.456	.539	.032		.134	.440	.011		.158	.179	.032	
Nonbinary gender identity	1.737	1.128	.059		1.207	.920	.048		.120	.375	.012	
Race (Ref = White)												
Asian	.504	.523	.038		-.928	.427	-.081*		-.492	.174	-.106**	
Black	.138	.876	.005		-3.099	.715	-.143***		-.420	.292	-.048	
Hispanic or Latinx	.869	.802	.038		-.466	.654	-.023		-.314	.267	-.039	
Mixed	-.070	.739	-.003		-.684	.603	-.037		-.297	.246	-.040	
Another race	.626	1.403	.015		-.031	1.145	-.001		-.272	.467	-.019	
International Student (Ref = No)	2.490	.778	.123**		.668	.635	.038		.013	.259	.002	
Received Financial Aid (Ref = No)	1.561	.381	.143***		.345	.311	.037		.107	.127	.028	
2. Emotional Health				.098***				.181***				.191***
Pre-existing psychiatric diagnosis (Ref = No)	.176	.398	.016		.351	.325	.037		.197	.133	.052	
Psychological resilience	-.032	.036	-.037		-.051	.029	-.068 [†]		-.032	.012	-.104**	
Distress tolerance	-1.394	.260	-.218***		-1.620	.212	-.295***		-.639	.087	-.287***	
3. COVID-19 characteristics				.118***				.181				.191
Number of days from pandemic start to survey start	-.023	.006	-.141***		-.003	.005	-.024		-.001	.002	-.013	
COVID-19 transmission rate at the time of relocation	-3.093	1.970	-.054		.368	1.607	.008		.287	.655	.014	
4. Campus Relocation				.188				.204***				.196*
Were you mandated to vacate from your residence by your university due to the COVID-19 outbreak and thus required to find new living arrangements? (Ref = No)	.151	.461	.013		1.757	.376	.178***		.331	.153	.083*	

¹ N's = 791, [†]p < 0.1, *p < .05, **p < .01, ***p < .001.

²Model does not include student type (undergraduate/graduate) due to multicollinearity.

³Beta coefficients from the final model are presented. Unstandardized beta values represent the change in the outcome score by one unit of increase within the predictor. For example, one unit increase of the number of days from pandemic start to survey would be one day; campus relocation would be relocation (vs. relocation). Standardized beta values represent the change in the outcome based on one standard deviation of the predictor.

⁴Significance based on p-values with R^2 represent significance in the change of R^2 from previous block of predictors.

another 8.8% were required to pay for their new living accommodations.

Tables 3 and 4 shows the results of linear regression analyses to examine the effect of various predictors (Block 1–3) and campus relocation (Block 4) on COVID-19 worries, COVID-19 grief, loneliness, and depressive, generalized anxiety, and PTSD symptoms. Unstandardized beta values, which are displayed in the first column of the tables represent the change in the outcome with every one unit increase of the predictor. We briefly comment on notable patterns of statistically significant associations ($p < .05$) and refer the reader to the tables for specific statistical values.

International students and those who received financial aid were more likely to report COVID-19 worries. Those who reported nonbinary gender identity were more likely to report depressive, generalized anxiety, and PTSD symptoms relative to men. Individuals with higher distress tolerance were less likely to report symptoms across all six outcomes, whereas individuals with higher psychological resilience were less likely to report loneliness, depressive and generalized anxiety symptoms. A pre-existing psychiatric diagnosis was significant associated with depressive, generalized anxiety, and PTSD symptoms. The interval of time between the start of the pandemic and date that the survey was completed was negatively associated with COVID-19 worries and generalized anxiety symptoms. COVID-19 transmission rates were not associated with any of the six outcomes. Finally, campus relocation was associated with increased COVID-19 grief, loneliness, and generalized anxiety symptoms. Student who relocated from campus (versus those who did not relocate) showed the following average increases in outcomes based on unstandardized beta values: COVID-19 grief scores by 1.76, loneliness scores by .331, and generalized anxiety scores by .802.

Tables 5 and 6 displays the results of linear regression analyses to examine the effect of various predictors (Block 1–3) and days to move and leaving behind belongings (Block 4) on COVID-19 worries, COVID-19 grief, loneliness, and depressive, generalized anxiety, and PTSD symptoms for only those who indicated “yes” to having relocated from campus. We refer the reader to the tables to see the specific associations between the predictors from Blocks 1–3 and the six outcomes. The number of days to relocate from campus was not associated with any of the six outcomes. However, those who indicated having to leave behind valuable personal belongings were more likely to report COVID-19 worries, COVID-19 grief, and depressive, generalized anxiety, and PTSD symptoms. Here we see that based on unstandardized beta values, those who had left valuable belongings behind (versus those who did not) showed the following average increases in outcomes: COVID-19 worries scores increased by 1.526, COVID-19 grief scores by 1.336, depression scores by 1.552, generalized anxiety scores by 1.358, and PTSD scores by 5.351, while holding the other predictors constant.

4. Discussion

Based on survey data obtained within the first five months of the COVID-19 pandemic within the U.S., our findings demonstrate the impact of various factors on the mental health of college students. Consistent with previous literature, a pre-existing psychiatric diagnosis was associated with increased depressive, anxiety, and PTSD symptoms. Psychological resilience appeared to protect against loneliness, depressive and generalized anxiety symptoms, while distress tolerance appeared as a protective factor for all six of our outcomes.

This work revealed the potential psychological effects of campus evacuation on U.S. college students during the pandemic. Notably, one-

Table 4

Multiple regression predicting depressive, generalized anxiety, and PTSD symptoms based on sociodemographic variables, emotional health, COVID-19 characteristics (time and transmission rates), and **relocation status** (no/yes) from April 9 to August 4, 2020.

Blocks of variables entered in three steps	Depression				Generalized Anxiety				PTSD			
	B	SE	β	R^2	B	SE	β	R^2	B	SE	β	R^2
1. Sociodemographic characteristics				.049***				.076***				.066***
Age (years)	-.117	.063	-.066 [†]		.023	.061	.013		-.354	.154	-.079*	
Gender (Ref = Men)												
Women	.899	.492	.061 [†]		1.835	.477	.125***		1.983	1.205	.053	
Nonbinary gender identity	2.574	1.029	.084*		3.901	.996	.128***		6.143	2.159	.080*	
Race (Ref = White)												
Asian	-.357	.478	-.026		-1.500	.462	-.109**		-2.912	1.169	-.083*	
Black	-.062	.800	-.002		-1.857	.774	-.071*		-1.008	1.957	-.015	
Hispanic or Latinx	.085	.732	.004		-.803	.708	-.033		-3.925	1.791	-.065*	
Mixed	-.211	.674	-.010		-.788	.653	-.036		-1.579	1.650	-.028	
Another race	-.196	1.280	-.005		.538	1.240	.013		-2.304	3.134	-.021	
International Student (Ref = No)	.554	.710	.026		1.835	.477	.125*		3.180	1.738	.060 [†]	
Received Financial Aid (Ref = No)	.234	.347	.021		3.901	.996	.128		1.104	.851	.038	
2. Emotional Health				.322***				.350***				.363***
Pre-existing psychiatric diagnosis (Ref = No)	2.327	.364	.204***		1.495	.352	.131***		5.246	.890	.182***	
Psychological resilience	-.115	.032	-.125***		-.096	.031	-.105**		-.008	.079	-.003	
Distress tolerance	-2.509	.237	-.376***		-2.851	.230	-.429***		-8.241	.581	-.490***	
3. COVID-19 characteristics				.324				.359**				.363
Number of days from pandemic start to survey start	-.006	.005	-.033		-.016	.005	-.097**		-.001	.013	-.001	
COVID-19 transmission rate at the time of relocation	.767	1.797	.013		-2.547	1.740	-.043		1.189	4.399	.008	
4. Campus Relocation				.324				.362*				.364
Were you mandated to vacate from your residence by your university due to the COVID-19 outbreak and thus required to find new living arrangements? (Ref = No)	-.294	.420	-.025		.802	.407	.067*		1.234	1.029	.041	

¹ N's = 791, [†]p < 0.1, *p < .05, **p < .01, ***p < .001.

²Model does not include student type (undergraduate/graduate) due to multicollinearity.

³Beta coefficients from the final model are presented. Unstandardized beta values represent the change in the outcome score by one unit of increase within the predictor. For example, one unit increase of the number of days from pandemic start to survey would be one day; campus relocation would be relocation (vs. relocation). Standardized beta values represent the change in the outcome based on one standard deviation of the predictor.

⁴Significance based on p-values with R^2 represent significance in the change of R^2 from previous block of predictors.

third of the students in this sample reported relocating from their campuses during the spring of 2020 due to the pandemic, and these students were more likely to report COVID-19 related grief, loneliness, and generalized anxiety symptoms than students who did not relocate. This association persisted even after controlling for many covariates including sociodemographic characteristics, pre-existing psychiatric diagnosis, psychological resilience, distress tolerance, COVID-19 transmission rate, and date of survey completion. The association between campus relocation and COVID-19 related grief, loneliness, and generalized anxiety symptoms suggests the psychological impact may last several weeks after students relocate from campus.

Among the students who relocated, approximately 4 out of 10 students reported that they had to leave valuable personal belongings behind when they left campus. Those who left behind valuable belongings were more likely to report COVID-19 worries, COVID-19 grief, and depressive, generalized anxiety, and PTSD symptoms, and this association persisted after controlling for the same covariates as in the previous analysis. While the specific number of days prior to relocation was not associated with specific outcomes, we note that most students had less than one week to move out of their campus residence.

Together, these findings indicate several factors that are associated with the mental health of U.S. college students during the pandemic. Consistent with prior research on relocation under non-pandemic conditions, the sudden campus relocation experienced by many U.S. college students within the first month of the COVID-19 pandemic likely impacted their psychological well-being. Across a range of conditions and populations, forced relocation has been associated with stress, loneliness, grief, depression, sadness, distress, social isolation, loss of relationships, reduced life satisfaction, and other negative effects on both physical and psychological well-being and functioning (Heller,

1982; Kasl, 1972; Niebanck, 1966; Weaver et al., 2020; Wells and Macdonald, 1981). Non-human primates demonstrate increases stress, cortisol, anxiety-like behavior, and self-injurious behavior after relocation (Cinque et al., 2017; Davenport et al., 2008; Watson et al., 2005). Frequent relocation during childhood is associated with a range of negative outcomes including psychological distress, poor health, poor health behavior, and medical illness persisting into adolescence and adulthood, even after adjusting for socio-demographic characteristics (Brown et al., 2012; Glasheen et al., 2019; Green et al., 2019; Jelleman and Spencer, 2008). Relocation during adolescence has been associated with depression and other poor mental health outcomes during college (Glasheen et al., 2019; Li et al., 2019).

Students who were mandated to relocate experienced more grief about the loss of significant life events and vital resources. Research has shown that losses experienced as sudden and unexpected may lead to more intense and complicated grief (Kristensen et al., 2012). These students also reported more feelings of loneliness. People often experience less social support, less comfort in relationships, and challenges building new social networks after relocation (Portes, 1998). Relocation may thus lead to loneliness, and loneliness may have a unique psychological impact on college students for whom peer networks are core to sense of identity and peer socialization is a preferred method of coping (Chao, 2012; Dooley and Fitzgerald, 2013). Finally, students mandated to relocate reported more symptoms of generalized anxiety. Relocation is known to provoke anxiety in both human and animal models. Rhesus monkeys demonstrate anxiety-like behaviors for 6 months after relocation, and disaster survivors who suddenly relocate report increased anxiety (Davenport et al., 2008; Uscher-Pines, 2009).

Students who left behind valuable personal belongings during their relocation reported higher levels of many symptoms. Various factors

Table 5

Multiple regression predicting COVID-19-related worry and grief, and loneliness based on sociodemographic variables, emotional health, COVID-19 characteristics (time and transmission rates), and **relocation experiences** (days allowed to move and leaving behind belongings) among those who had to relocate from campus from April 9 to August 4, 2020.

Blocks of variables entered in three steps	COVID-19 worries				COVID-19 grief				Loneliness			
	B	SE	β	R ²	B	SE	β	R ²	B	SE	β	R ²
1. Sociodemographic characteristics				.073*				.093**				.055
Age (years)	.536	.230	.138*		.178	.182	.055		-.151	.076	-.116*	
Gender (Ref = Men)												
Women	-.421	1.054	-.029		-.503	.833	-.041		.325	.348	.065	
Nonbinary gender identity	.253	1.751	.010		1.672	1.384	.083		.326	.578	.040	
Race (Ref = White)												
Asian	-.407	.943	-.029		-1.456	.745	-.127 [†]		-.517	.311	-.111 [†]	
Black	-.799	1.683	-.028		-3.537	1.330	-.149**		.336	.555	.035	
Hispanic or Latinx	.762	1.280	.036		-1.422	1.012	-.081		-.156	.423	-.022	
Mixed	-1.718	1.210	-.085		-1.299	.956	-.077		-.216	.399	-.032	
Another race	-1.126	2.592	-.025		-2.144	2.049	-.058		-1.019	.856	-.068	
International Student (Ref = No)	-.348	1.694	-.013		-.155	1.339	-.007		.076	.559	.009	
Received Financial Aid (Ref = No)	1.996	.669	.174**		1.163	.529	.122*		.287	.221	.075	
2. Emotional Health				.160***				.252***				.213***
Pre-existing psychiatric diagnosis (Ref = No)	.175	.708	.016		.812	.560	.088		.338	.234	.091	
Psychological resilience	-.064	.066	-.071		-.060	.052	-.080		.004	.022	.014	
Distress tolerance	-1.525	.473	-.235**		-1.750	.374	-.325***		-.814	.156	-.375***	
3. COVID-19 characteristics				.180 [†]				.257				.221
Number of days from pandemic start to survey start	-.024	.010	-.141*		-.010	.008	-.073		-.005	.003	-.089	
COVID-19 transmission rate at the time of relocation	.674	3.477	.012		-.527	2.748	-.011		.161	1.148	.009	
4. Relocation experiences				.198 [†]				.276*				.225
How many days did you have to move out of your residence following your university's campus closing announcement?	-.019	.044	-.026		.029	.035	.048		-.004	.014	-.018	
After being told to relocate, did you have to leave behind any valuable personal belongings? (Ref = No)	1.526	.683	.139*		1.336	.539	.146*		.221	.225	.060	

[†] N = 264, [†] p < 0.1, *p < .05, **p < .01, ***p < .001.

²Model does not include student type (undergraduate/graduate) due to multicollinearity.

³Beta coefficients from the final model are presented. Unstandardized beta values represent the change in the outcome score by one unit of increase within the predictor. For example, the unit for number of days to move out of the residence would be one day; "did you have to leave behind any valuable belongings" would be yes (vs. no, did not leave behind belongings). Standardized beta values represent the change in the outcome based on one standard deviation of the predictor.

⁴Significance based on p-values with R² represent significance in the change of R² from previous block of predictors.

related to the school, the local community, or the student may have caused students to leave behind personal belongings. Characteristics of the student such as difficulty with executive function or an avoidant coping style may have led to poor planning. Shortages of packing supplies or difficulty accessing shipping services due to local businesses closures may have interfered with the logistics of moving their belongings. Poor communication from the college about either the timeline or the resources available to facilitate packing and moving may have caused confusion. Regardless of the specific circumstances that led to the loss of valuable personal belongings, these students reported increase psychological symptoms. Loss of valuable objects generates stress and reduces coping effectiveness (Hobfoll, 1989). Loss of sentimental belongings has been associated with PTSD and depression symptoms following a natural disaster, and perceived tangible losses is a predictor of distress after disaster (Ironson et al., 1997; Paul et al., 2014). Either the actual loss of their personal belongings or the adverse circumstances that led to the loss of personal belongings might can trigger a scarcity mindset, which is associated with stress, anxiety, and impaired problem-solving, and could explain why students who reported leaving personal belongings were more vulnerable to a range of poor psychological outcomes (DeSousa et al., 2020).

Certain vulnerable subpopulations are likely to have experienced unique stressors. Students who reported nonbinary gender identity and students who received financial aid were more likely to report being mandated to relocate. International students were less likely to be mandated to relocate perhaps because universities had policies

providing exceptions to allow international students to remain in the dormitories. Further research is required to better understand these students' specific experiences.

Cross-sectional data cannot delineate causality of identified outcomes, and students' symptoms and well-being were assessed only with self-report measures. Items on the survey pertaining to whether a student was mandated to move and how many days the student had to move are concrete events which should have less recall bias rather than subjective experiences or internal phenomena. As well, the demographics of our study participants differ from the U.S. college student population. For instance, 82.2% of our participants were female, while 55.5% of undergraduate and graduate students in the U.S. are female (Bustamante, 2019) and 21.0 % of our participants were Asian, compared to 7% of U.S. college students. As well, we had a greater proportion of graduate students with 38.1% of our participants were enrolled in graduate school, compared to 19.5% of U.S. college students in general. A limitation is the generalizability.

Psychological safety is critical to learning and development, and students and families trust the college to consider students' psychological well-being (Conrad, 2020). The colleges' communication, policies, and execution during evacuation and mandated relocation were not assessed but may have significantly impacted the students' experience. For example, instrumental support including provision of packing supplies, financial assistance to purchase transportation, and delaying academic deadlines may have alleviated students' stress during the period of relocation, and these institutional policies may have had subsequent

Table 6

Multiple regression predicting depressive, generalized anxiety, and PTSD symptoms based on sociodemographic variables, emotional health, COVID-19 characteristics (time and transmission rates), and **relocation experiences** (days allowed to move and leaving behind belongings) among those who had to relocate from campus from April 9 to August 4, 2020.

Blocks of variables entered in three steps	Depression				Generalized Anxiety				PTSD			
	B	SE	B	R ²	B	SE	β	R ²	B	SE	β	R ²
1. Sociodemographic characteristics				.109**				.066 [†]				.081*
Age (years)	-.396	.202	-.101 [†]		-.383	.199	-.096 [†]		-.606	.518	-.059	
Gender (Ref = Men)												
Women	.591	.927	.040		2.269	.912	.150*		.709	2.376	.018	
Nonbinary gender identity	3.936	1.540	.161*		3.576	1.515	.144*		6.943	3.946	.107	
Race (Ref = White)												
Asian	-.528	.829	-.038		-1.301	.816	-.092		-4.736	2.125	-.129*	
Black	-.424	1.480	-.015		-2.131	1.456	-.073		-3.482	3.793	-.046	
Hispanic or Latinx	.193	1.126	.009		-1.483	1.108	-.069		-5.273	2.886	-.094 [†]	
Mixed	-.537	1.064	-.026		-1.310	1.047	-.064		-6.181	2.727	-.115*	
Another race	.539	2.281	.012		-.592	2.244	-.013		1.050	5.843	.009 [†]	
International Student (Ref = No)	-2.302	1.490	-.087		-.290	1.466	-.011		1.899	3.818	.027	
Received Financial Aid (Ref = No)	.867	.589	.075		.806	.579	.069		2.966	1.508	.097 [†]	
2. Emotional Health				.356***				.385***				.392***
Pre-existing psychiatric diagnosis (Ref = No)	2.127	.623	.191**		.585	.613	.052		3.419	1.597	.116*	
Psychological resilience	-.102	.058	-.112 [†]		-.079	.057	-.086		.024	.149	.010	
Distress tolerance	-2.295	.416	-.352***		-3.249	.409	-.491***		-9.244	1.066	-.537***	
3. COVID-19 characteristics				.371*				.411**				.394
Number of days from pandemic start to survey start	-.017	.009	-.098 [†]		-.030	.009	-.174**		-.022	.024	-.049	
COVID-19 transmission rate at the time of relocation	4.595	3.059	.083		-.452	3.009	-.008		3.432	7.836	.023	
4. Relocation experiences				.388*				.424 [†]				.423**
How many days did you have to move out of your residence following your university's campus closing announcement?	.011	.039	.016		.041	.038	.055		.052	.099	.027	
After being told to relocate, did you have to leave behind any valuable personal belongings? (Ref = No)	1.552	.601	.140*		1.358	.591	.121*		5.351	1.539	.183**	

[†] N = 264, [†]p < 0.1, *p < .05, **p < .01, ***p < .001.

2 Model does not include student type (undergraduate/graduate) due to multicollinearity.

3 Beta coefficients from the final model are presented. Unstandardized beta values represent the change in the outcome score by one unit of increase within the predictor. For example, the unit for number of days to move out of the residence would be one day; “did you have to leave behind any valuable belongings” would be yes (vs. no, did not leave behind belongings). Standardized beta values represent the change in the outcome based on one standard deviation of the predictor.

4 Significance based on p-values with R² represent significance in the change of R² from previous block of predictors.

implications for the students' psychological outcomes. Clear communication, reasonable timelines, and logistical support might reduce the likelihood of adverse experiences such as loss of personal belongings and thus mitigate the psychological consequences on students.

Young adults have experienced an alarming increase in adverse mental health outcomes and suicidality during the pandemic, and those age 18–24 years old have higher rates of anxiety, depression, trauma, and suicidality than any other age cohort according to recent CDC survey data collected during the summer of 2020 (Czeisler et al., 2020). Amidst campus closures during the spring, institutions focused on the risk of COVID-19 transmission with the aim to protect the students' physical well-being. Despite the morbidity and mortality data demonstrating the significant risks associated with young adult mental health and suicidality, educational policy has long de-prioritized mental health as compared to physical health (Conrad and Weintraub Brendel, 2020; Curtin and Heron, 2019). Colleges must recognize the potentially significant psychological impact of their policies on their students and consider how to support their students during potentially traumatic experiences inmitigating adverse mental health outcomes.

Author statement

Rachel Conrad: Conceptualization, Writing - Original Draft. **Hyeouk Chris Hahm:** Writing - Review & Editing, Project administration, Funding acquisition. **Amanda Koire:** Software, Data Curation, Writing - Original Draft. **Stephanie Pinder-Amaker:** Writing - Review

& Editing. **Cindy H. Liu:** Conceptualization, Methodology, Formal analysis, Writing - Original Draft, Supervision, Project administration, Funding acquisition

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Declaration of competing interest

The authors do not have conflicts of interest to declare.

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