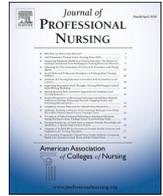




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Stress and depression in undergraduate students during the COVID-19 pandemic: Nursing students compared to undergraduate students in non-nursing majors

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ABSTRACT

Background: The COVID-19 pandemic exacerbated an already alarming mental health crisis on college campuses. Nursing students were uniquely impacted through the loss of clinical practicum experiences.

Purpose: The purpose of this study was to explore relationships between student perceptions of life-stress and depressive symptoms during the COVID-19 pandemic in nursing students compared to students in other academic disciplines. A secondary purpose of this study was to understand nursing student perceptions of how the COVID-19 pandemic impacted their educational experience.

Methods: School-related life stress and depression measures were studied in a cross-section of 2326 undergraduate students using an anonymous online survey. Follow-up qualitative data were collected (N = 12) to further explore relationships between school-related life stress and depression in nursing students.

Results: Nursing students had higher levels of student-life stress but fewer depressive symptoms than students in any other academic major. Students related that social support and belongingness were critical to their academic perseverance.

Conclusions: Differences between nursing and non-nursing students are likely due to a multifactorial combination of social support, resilience, and posttraumatic growth.

College should be a period of transition and transformation from adolescence to adulthood. However, this transition can also be a time of psychological and psychosocial distress. Approximately one in three twenty-first century college students enters higher education with a mental health diagnosis. The numbers of undergraduate students who seriously considered suicide, attempted suicide, or engaged in self-harm doubled between 2009 and 2019 (American College Health Association, 2009, 2019). Even though counseling services are offered on most college campuses, only 40% of students with a positive screening for depression or anxiety engaged in counseling services of any kind during the most recent 12 months (Eisenberg et al., 2020; LeVines et al., 2019).

The COVID-19 pandemic has exacerbated this alarming mental health trend. Eighty percent of college students report that pandemic-related closures of college campuses have negatively impacted their mental health (Active Minds, 2020; López-Castro et al., 2021; Oh et al., 2021). Recent authors have identified dramatic increases in alcohol use among college students as a coping mechanism during the COVID-19 pandemic (Bonar et al., 2021; Buckner et al., 2021; Coakley et al.,

2021; Jackson et al., 2021). A quarter of college students surveyed by the American College Health Association during Fall 2020 scored >13 on the Kessler 6 Non-Specific Psychological Distress Scale, which is consistent with significant impairment in life activities due to severe mental illness (American College Health Association, 2020). Moreover, amid the COVID-19 pandemic, the Centers for Disease Control and Prevention found that 25% of college-age respondents seriously contemplated suicide during the preceding 30 days (Czeisler et al., 2020).

Review of the literature

COVID-19 impact on nursing student academic experience

Numerous international authors have described the pandemic's devastating impact on nursing education and nursing students in developing and developed countries. While international experiences are informative, nurses are educated and regulated quite differently

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based on the geographic region where the education takes place (National Council for State Boards of Nursing (NCSBN), 2020). Thus, this literature review will specifically report the impact of the COVID-19 pandemic on nursing students in the United States.

As a practice profession, nursing students must participate in direct hands-on patient care activities to become licensed. At the same time that schools of nursing shifted from brick and mortar to remote instruction, hospitals across the United States canceled in-person clinical experiences. Both quantitative and qualitative studies have described U.S. nursing student experiences during this abrupt transition as traumatic, stressful, and filled with fear, uncertainty, loneliness, and missed opportunity (Diaz et al., 2021; Fitzgerald & Konrad, 2021; Goddard et al., 2021; Kim et al., 2021; Michel et al., 2021). The presence of depressive symptoms in nursing students was well-documented before the COVID-19 pandemic (McDermott et al., 2020; Tung et al., 2018). Kim et al. (2021) found a three-fold increase in nursing student depression measures during the early months of the COVID-19 pandemic compared to pre-pandemic levels.

Academic responses to the loss of clinical practice opportunities varied greatly by state. In some states, nursing schools were able to substitute virtual activities for clinical experiences (NCSBN, 2020). However, several State Boards of Nursing require a specific number of direct clinical hours for licensure as a registered nurse (NCSBN, 2021). To meet these requirements, some nursing schools canceled admission of new student cohorts (McCrea, 2021) and others deferred graduation until students could complete the requisite clinical requirements for licensure (Sandoval, 2021). Still others allowed final-semester students to graduate early to help meet pandemic-related surges in patient care needs (Feeg & Mancino, 2021).

Mental health and stress in nursing students

The correlation between stress and depression in nursing students is well documented (De Gagne et al., 2021; Finley, 2020; McDermott et al., 2020; Park et al., 2019). Nursing students tend to be older, married, and are more likely to have family commitments outside the classroom than college students in non-nursing majors. Previous authors have found that the multi-faceted demands of nursing student personal responsibilities superimposed upon the academic rigors of nursing school are associated with higher levels of stress, depression, and anxiety in nursing students (Bartlett et al., 2016; Rosenthal et al., 2021; Vore et al., 2019).

Research questions

To this author's knowledge, no published studies have compared the impact of the COVID-19 pandemic on the mental health and academic life stress levels of U.S. nursing students compared to students in non-nursing academic majors. This study aimed to answer the following research questions:

What relationships exist between depressive symptoms and perception of student life stress in nursing students compared to students in other academic disciplines?

What contributed to the academic persistence of nursing students during the COVID-19 pandemic?

Methods

Design

This study used both quantitative and qualitative methods to answer the stated research questions. Quantitative data were collected to explore relationships between depressive symptoms and student perceptions of academic life stress in baccalaureate nursing students compared to undergraduate students in other academic disciplines. Semi-structured interviews explored the student experience of persisting

through nursing school during the COVID-19 pandemic.

Quantitative setting and population

To address the first research question, a retrospective cross-sectional electronic survey was sent to a convenience sample of 10,287 full-time undergraduate students at a Carnegie R1 University in a moderate-sized urban community in the Mountain Southwest. Completed surveys were received from 2206 students yielding a 21.4% response rate. A priori power analysis indicated that a final study sample of 1545 students would be required to detect a small effect size ($w = 0.1$) using goodness of fit contingency tables. A minimum sample of 146 nursing students was required to detect a medium effect with 95% power in a multiple linear regression model with six predictors (G*Power 3.1.9.7). Fosnacht et al. (2017) established a 98% correlation between sample means and population means in college student survey research with a 20% response rate provided the sampling frame included at least 1000 students. Thus, this sample was expected to have sufficient power to demonstrate statistical differences within the study sample.

Qualitative setting and population

To address the second research question, semi-structured interviews were conducted with a purposive sample of 12 nursing students in the final month of their nursing program. The qualitative sample was recruited from a cohort of 64 baccalaureate nursing students from the same University where the quantitative data were collected.

Data collection

Quantitative data collection

Demographic variables were collected from all participants, including age, sex, ethnicity, year in school, academic major, and cumulative GPA. Student life stress was measured using Gadzella et al.'s (2012) revised Student-life Stress Inventory (SSI-R). Depressive symptoms were measured using the nine-item depression module of the Patient Health Questionnaire (Kroenke et al., 2001).

Gadzella's Revised Student Life Stress Inventory

Gadzella et al.'s (2012) revised Student-life Stress Inventory (SSI-R) is a 53-item Likert-scaled measure that examines stressors related to life as a college student and how students react to those stressors. Internal consistency of the total SSI-R inventory is excellent ($\alpha = 0.93$). Concurrent validity of the SSI-R was established through correlations with the Text Anxiety (Spielberger et al., 1978), State-Trait Anxiety (Spielberger et al., 1983), and Beck Depression (Beck et al., 1961) Inventories. The five SSI-R life-stress sub-categories of frustrations, conflicts, pressures, changes, and self-imposed stress are independently validated, as are the four sub-categories that measure emotional, physiologic, and behavioral reactions to stressors. Possible SSI-R scores range from 53 to 265, with higher scores indicating higher levels of student life stress. The SSI-R was chosen for this study over other inventories that measure academic stress because the SSI-R measures the impact of stressors related to academic life outside of the classroom. Permission to use the scale was obtained from the corresponding author of Gadzella et al. (2012).

Patient Health Questionnaire Depression Module (PHQ-9)

The PHQ-9 was psychometrically validated by Kroenke et al. (2001) as an instrument with a high level of sensitivity (88%), specificity (88%), and internal consistency ($\alpha = 0.89$) in diagnosing both the presence and severity of major depression in patients over the age of 18. Use is in the public domain at no cost. The PHQ-9 operationalizes the DSM-IV diagnostic criteria for major depressive disorder using nine Likert scaled items that assess a person's mood over the preceding two weeks. PHQ-9 scores can range from zero to 27, with each item scored based on the number of days the patient experienced the feeling noted in each item.

While the PHQ-9 was initially developed to guide primary care clinicians in diagnosing and monitoring patients with depressive symptoms, recent authors have validated the PHQ-9 for use in college students (Keum et al., 2018; Kim & Lee, 2019).

Qualitative data collection

The general question asked of participants was: *What helped you get through the past year as you completed your nursing degree?* Data were collected using a story path approach (Liehr & Smith, 2018, 2020) where all participants were first queried about their entrance into nursing school (past), their current experience amid the pandemic (present), and their expectations for becoming a professional nurse (future). Table 4 outlines the specific questions related to each time-oriented component of the interview.

Procedure

In the quantitative phase, surveys were distributed electronically to the email address on file with admissions and records for all students enrolled full-time in undergraduate coursework. Responses were collected between February 1 and February 15, 2021, using the Qualtrics XM survey platform. To incentivize response, students who completed the entire survey were given the opportunity to enter a drawing for one of ten Amazon gift cards. Students were provided with a link to an additional Qualtrics XM survey to ensure survey responses could not be associated with entry into the incentive drawing. This second survey allowed students the choice to submit their first name and preferred email address to the pool from which the incentive awards were drawn.

In the qualitative phase, the researcher introduced the study during the first 10 min of a final-semester didactic nursing course from which the purposive sample was obtained. Data were collected from a student cohort with whom the researcher did not otherwise have contact to avoid the perception of coercion. Interested students were invited to contact the researcher by email if they wished to participate in a 45–60-minute semi-structured interview about their experience as a nursing student during the COVID-19 pandemic. Interviews took place during April 2021 to capture participant perceptions of their nursing school experience upon completing their academic journey. All interviews took place via Zoom videoconference to accommodate rapidly evolving COVID-19 protocols. Interviews were audio-recorded and transcribed verbatim. Recordings were discarded once the accuracy of each interview transcription was confirmed.

Data analysis

Quantitative data analysis

Descriptive and inferential statistical methods were used to analyze the sample characteristics and the relationships between sample demographics, student life stress, and depression. Response frequency and cross-tabulation were used to compare demographic variables with student responses on the SSI-R and PHQ-9 survey items. Levene's test for homogeneity of variance was calculated due to the sharply different sample sizes between the nursing ($n = 267$) and non-nursing ($n = 1939$) populations. The Levene's test was non-significant ($F_{1,1975} = 1.41$; $p = 0.23$) so one-tailed t -test was used to measure differences between continuous variables. Chi-square analysis was used to identify relationships between nursing students and students in non-nursing majors. A multiple linear regression model was fitted to the data to create an explanatory model for students whose PHQ-9 scores indicated high levels of depressive symptoms.

Qualitative data analysis

Qualitative data were analyzed using conventional content analysis (Hsieh & Shannon, 2005), a primarily inductive analysis approach. First, the transcripts were read and re-read to gain a sense of the whole meaning. Then, particular transcript segments that were descriptive of the general question of “getting through the pandemic” were highlighted. Highlighted segments with like meanings were grouped for naming. Grouped segments were read and synthesized as interview themes. Trustworthiness was addressed through peer debriefing (with an experienced qualitative researcher who had no connection to data collection) to assure credibility and confirmability (Lincoln & Guba, 1985).

Human subjects

This study received institutional review board approval from the University of Nevada, Reno. Careful attention was given to ensure that students did not feel coerced or unduly influenced to participate. Quantitative data were collected anonymously using a survey design that did not collect identifiers or the I.P. address of the device used to complete the survey. Students who participated in qualitative interviews signed a research consent informing students that (a) interviews would be audio-recorded; (b) a pseudonym would be immediately assigned after the recording was complete; (c) interviews would be transcribed verbatim; and (d) audio-files would be discarded after transcription was confirmed. These procedures were followed precisely by the researcher during all phases of data collection and analysis.

Results

Sample demographics

The mean age of respondents was 21.3 years (SD 4.6), and 68.9% were female ($N = 1520$). Respondents were predominately white (60%; $n = 1324$) with a mean GPA of 3.42. Just over one-third of the study sample were first-generation college students (36.9%; $n = 811$). Data were stratified by the college in which the students' academic majors were housed and by the respondents' year in school (Table 1).

The average nursing student in this sample was 21.9 years of age (SD 5.2), white (68%), female (88.7%), and was enrolled in school full time with a mean cumulative GPA of 3.74 ($n = 266$). Nursing students in this sample were statistically older than non-nursing students ($t_{2165} = 2.32$; $p < 0.05$). Like their non-nursing counterparts, 33.8% ($n = 90$) of

Table 1
Demographic variables.

Demographic variable	Nursing		Non-nursing	
	n	%	n	%
Age				
18–20 years	121	45.3%	1057	55.2%
21–24 years	108	40.5%	663	34.6%
≥25 years	38	14.2%	195	10.2%
Sex				
Female	236	88.7%	655	66.2%
Male	30	11.3%	1283	33.8%
Ethnicity				
White/Caucasian	163	61.3%	1159	59.8%
Asian/Pacific Islander	42	15.8%	232	12.0%
Hispanic/Latinex	31	11.7%	298	15.4%
Black/African American	7	2.6%	55	2.8%
Multi/Bi-Racial	20	7.5%	152	7.9%
Native American/Alaska Native	3	1.1%	15	0.8%
GPA				
A to A–	126	47.4%	611	31.7%
B– to B+	135	50.8%	1100	57.0%
C– to C+	5	1.9%	212	11.0%
≤D	0	0.0%	6	0.3%

Table 2

Means, standard deviations, and t-test comparison of SSI-R scores in nursing students and students in non-nursing academic majors.^a

	Nursing (n = 257)		Non-nursing (n = 1847)		T(2,102)	p
	M	SD	M	SD		
SSI-R total score	68.09	17.17	62.63	15.26	4.808	0.0001
Stressors						
Frustrations	12.62	5.39	11.47	5.05	3.392	0.0007
Pressures	7.36	2.88	6.07	2.77	6.961	0.0001
Changes	9.10	3.14	7.11	3.00	9.906	0.0001
Self-imposed	18.20	3.37	15.91	3.48	9.922	0.0001
Response to stressors						
Emotional	9.70	3.54	8.93	3.34	3.437	0.0003
Behavioral	3.20	2.10	7.16	3.12	-19.732	0.0001
Appraisal	7.40	2.18	5.98	2.27	9.441	0.0001

^a Levene's test for homogeneity of variance $F_{1,1975} = 1.41$; $p = 0.23$.

nursing students were first-generation college students.

Student life stress

Nursing students reported statistically significant higher rates of life stress over the preceding week than non-nursing students ($\chi^2_3 = 19.4$; $p < 0.01$). Specifically, 57.3% of nursing students (n = 153) and 49.1% of non-nursing students (n = 918) rated their overall stress during the past week as “severe” ($\chi^2_1 = 8.3$; $p < 0.01$). Significant differences were also found in student perceptions of the degree to which the COVID-19 pandemic impacted their academic experience. Fifty eight percent (n = 156) of nursing students compared to 44.7% (n = 855) of non-nursing students rated the impact of the COVID-19 pandemic on their overall student-life stress experience as “extreme” ($\chi^2_4 = 30.1$; $p < 0.01$).

Statistically significant differences were identified in nursing student perceptions of their life stress compared to students pursuing non-nursing academic majors. Nursing students perceived their life stress levels to be significantly higher than non-nursing students for total SSI-R scores and on each SSI-R ‘stressors’ and ‘reactions to stressors’ subscale (Table 2). Notably, nursing students were also significantly more likely to report knowledge of ($\chi^2_1 = 4.5$; $p < 0.05$) and use of ($\chi^2_1 = 4.1$; $p < 0.05$) effective stress-management strategies than non-nursing students.

Student life stress and depressive symptoms

Even though nursing students reported higher levels of life stress and expressed the most significant educational impact from the COVID-19 pandemic, nursing students reported statistically significantly lower total PHQ-9 scores than students in any other academic major (Table 3). Nursing students significantly differed from their non-nursing peers in that nursing students were less likely to report feeling “down, depressed, or hopeless” ($\chi^2_3 9.7$, $p < 0.01$), “like a failure” ($\chi^2_3 11.3$; $p < 0.01$), or “like [they] would be better off dead” ($\chi^2_3 9.3$; $p < 0.05$) than students in non-nursing majors.

Participant age was a statistically significant predictor of elevated PHQ-9 scores in both nursing ($t_{230} = -20.7$, $p < 0.01$) and non-nursing students ($t_{1713} = -47.5$; $p < 0.01$). Ethnicity ($\chi^2_2 = 6.35$; $p < 0.05$) and gender ($\chi^2_1 = 22.5$; $p < 0.01$) also were statistically significant predictors of increased PHQ-9 score for non-nursing majors. However, the nursing student sample was underpowered to detect statistically

Table 3

Means, standard deviations, and t-test comparison of PHQ-9 scores by academic major.

	n	M	SD	t (df)	p
Nursing ^a	240	9.80	6.10	-	-
Engineering	319	10.80	6.70	-1.81 (557)	0.0351
Science	349	12.20	6.40	-4.56 (587)	0.0000
Business	243	11.40	6.50	-2.79 (481)	0.0028
Liberal arts	320	12.90	6.60	-5.68 (558)	0.0000
Education	118	11.80	6.60	-2.84 (356)	0.0024
Health sciences	111	11.50	6.70	-2.35 (349)	0.0096

^a Nursing major was independently compared to each of listed academic majors.

Table 4

Qualitative interview questions.

1. What was it like for you to be a nursing student when you were first getting started?
2. And then, the COVID pandemic closed all in-person activities, and students were not allowed in the clinical agencies. Let's focus on that time. Tell me what it has been like for you to be a nursing student during this time of Covid.
3. Talk to me about how this differs from what you envisioned nursing school would be like.
4. What has helped you keep going through this time?
5. How do you feel going to nursing school during a pandemic will shape your experience as a registered nurse?

Table 5

Multiple linear regression reporting impact of study variables on PHQ-9 scores.

Variable	B	SE	t	p	95% CI
Constant	0.48	0.43	1.22	0.024	[0.12, 0.83]
Age	-0.06	0.03	-2.20	0.028	[-0.11, -0.01]
Sex ^a	0.68	0.28	2.40	0.016	[0.12, 1.23]
Ethnicity ^b	-0.52	0.26	-2.01	0.045	[-1.03, -0.01]
Academic major ^c	-3.13	0.40	-7.84	0.000	[-3.91, -2.35]
Academic stress last week ^d	3.17	0.22	14.62	0.000	[2.75, 3.60]
Covid impact on academic experience ^e	1.44	0.14	10.19	0.000	[1.16, 1.72]

^a Female = 1.

^b Non-White = 1.

^c Nursing = 1.

^d 4-Point Likert scale.

^e 5-Point Likert scale.

significant gender and ethnicity differences given an alpha error of < 0.05 ($1 - \beta = 0.79$).

Analytic findings

A multiple linear regression model using PHQ-9 as the dependent variable was fitted to the data (Table 5). The combination of age, sex, ethnicity, student life stress score, major program of study, and the impact of the COVID-19 pandemic on the student's academic experience accounted for 36.2% of the variance in the PHQ-9 score ($F_{6, 1935} = 123.7$; $R^2 = 0.361$; $p < 0.01$). Based on the B coefficients, the PHQ-9 is predicted at:

$$PHQ - 9 \text{ Score} = 0.48 + (-0.07 \times \text{Age}) + (0.68 \times \text{Sex}^a) + (0.58 \times \text{Ethnicity}^b) + (-3.12 \times \text{Nursing Major}^c) + (3.17 \times \text{Student Life Stress over the past week}^d) + (1.44 \times \text{Impact of COVID - 19 pandemic on academic experience}^e)$$

^aFemale = 1; ^b Non-White = 1; ^cNursing = 1; ^d4-point Likert scale; ^e5-point Likert scale.

Qualitative findings

Semi-structured interviews provided contextual data to understand the inverse relationship between student life stress and depression measures in nursing students. While complete presentation of the qualitative findings is beyond the scope of this article, the overarching theme in the qualitative data revolved around the central concepts of belongingness and social support. All 12 of the students interviewed mentioned some combination of family, significant others, and their classmates as the primary influences that helped them persevere. Ten of the 12 (83.3%) students interviewed indicated that the support received from their nursing cohort was integral to their success. One student stated:

I owe it all to my tribe. Just surviving this past year was the hardest thing ever. I mean ... I knew nursing school was going to be hard and I wrapped my head around that. But, this Covid-style nursing school experience is not what I'd wrapped my head around. There were many days I just want to give up. I called my parents twice saying I was coming home. I even packed my bags once ... and then my roommate who is also a nursing student, unceremoniously unpacked them for me ... all over the living room floor.

Another student stated:

Do you mean how did I not jump off a bridge during this completely dystopic nightmare of a year? My classmates were clutch. It definitely helps that we were all going through the same stuff. Not only could they relate to my experience, but we all motivated each other to keep going.

Discussion

College is a time of transition and stress for young adults regardless of academic major. For many emerging adults, entrance into higher education marks the first exposure to independent decision-making without parental oversight. How a student navigates this transition is intrinsically linked to the student's academic experience, mental health, and other social factors (Robbins et al., 2018). The findings of this study demonstrate a previously undescribed inverse relationship between being a nursing student and depressive symptoms compared to students in non-nursing majors. This relationship occurred despite higher student life stress reported by nursing students compared with other undergraduate cohorts. The reasons for these differences are likely a multifactorial combination that includes a sense of belongingness, social support, and posttraumatic growth.

Belongingness

Baumeister and Leary (1995) assert that "human beings are fundamentally and pervasively motivated by a need to belong" (p. 522). Previous authors have found that the need to belong is highest during the transition to adulthood (Marler et al., 2021, in press; von Soest et al., 2020). Nursing students typically matriculate through nursing curricula in a cohort model. This education model allows students to cultivate the social bonds and attachments that are needed to foster a sense of belonging. The collective nature of cohort-based education may have provided a degree of protection against pandemic-related stress and depression in nursing students in this study. (Besser et al. (2020) described a positive relationship between belongingness and academic persistence in college students amidst the academic chaos brought about by the COVID-19 pandemic. It is possible that the cohorted nature of nursing education mitigated the mental health impact of student life

stress and promoted academic persistence in nursing students.

Social support

Every nursing student who participated in a semi-structured interview with the researcher indicated that the student's social support system had the greatest impact on their perseverance through the COVID-19 pandemic. Previous research documents a powerful connection between social support and depressive symptoms in college students. Rankin et al. (2018) found social support a more powerful predictor of depressive symptoms in college students than personality traits, attachment traits, social network size, or perceived stress.

Nursing students were among the first to return to any form of in-person learning (Redden, 2020). While the academic experience of nursing students during the pandemic remained stressful, the ability to directly interact with peers may have moderated the relationship between stress and depressive symptoms in this study. Conversely, elevated depressive symptoms in non-nursing majors support the findings of other authors that isolating college students from social networks contributes to higher levels of anxiety, depression, and suicidality in emerging adults (Arslan et al., 2021; Marler et al., 2021, in press; Moeller et al., 2020).

Posttraumatic growth

Several nursing students interviewed for this study expressed confidence that the adversity they faced during nursing school would help them successfully transition into the rigors of entry-level nursing practice. This sentiment is consistent with the growing body of posttraumatic growth research in the wake of the COVID-19 pandemic. Tedeschi and Calhoun (2004) originally conceptualized posttraumatic growth as a positive change that results from successfully navigating a significant life crisis. While most people facing a significant life crisis experience distressing emotions, some who experience trauma discover meaning in the traumatic event and process the trauma as a means to adjust self-perceptions and re-evaluate priorities, relationships, and attitudes (Tedeschi & Calhoun, 2004). Among the many life crises described by Tedeschi and Calhoun as contributing to posttraumatic growth are college students experiencing stressful life events.

The International Council of Nurses has recognized the COVID-19 pandemic as a mass trauma event (ICN, 2021). While nursing students were excluded from clinical experience during the early months of the COVID-19 pandemic, frontline nurses faced scenarios contributing to widespread posttraumatic stress symptoms (d'Etterre et al., 2021). Clinical activities in all states resumed before a dramatic surge in new COVID-19 infections and death occurred between November 2020 and February 2021. During these months, nursing students witnessed the worst of the COVID-19 pandemic first-hand. They were at the bedside of patients dying from COVID-19, and they worked side by side with nurses who had been working under crisis conditions for months.

Recent research has shown evidence of posttraumatic growth in nurses who frequently cared for patients with COVID-19 (Chen et al., 2021; Cui et al., 2021). Yildiz (2021) examined COVID-19 related posttraumatic growth in nursing students and found that nursing students exhibited higher posttraumatic growth scores than individuals exposed to earthquakes, diagnosed with breast cancer, or diagnosed with HIV. These findings indicate a coexistence between traumatic stress and posttraumatic growth in practicing nurses and in nursing students.

Limitations

While connections between academic stress and depression in college students are well documented, this study is the first to directly measure relationships between depression and life stressors of college students independent of academic performance. While this study provides important data that can support further exploration of causal

relationships, these data represent the cross-sectional experience of undergraduate students from one institution, limiting generalizability. In addition, Gadzella's SSI-R inventory includes an introductory question asking respondents to rate their level of student life stress during the preceding week. While the SSI-R does not explicitly measure academic stress related to exams and grades, one can assume that academic stress is a component of student life stress and stress related to exams and grades. For example, academic life stress may be perceived differently if a student performed poorly (or very well) on an exam or assignment during the preceding week.

Recommendations

As colleges and universities across the United States return to the classroom, academic institutions must not view a return to in-person teaching as a return to the academic landscape we left in March 2020. Pandemic-related mental health impacts on college students will linger for the foreseeable future, and students will need support through this transition. Academic institutions must actively reach out to students as they return to campus to provide the support and social connection required for successful reintegration into campus life.

Community building

Based on these data, attention to community-building is an essential component of the post-COVID academic environment. University counseling centers quickly pivoted to virtual and distance support models as campuses closed across the country. Despite the pandemic's devastating mental health impact on college students, counseling centers experienced dramatic decreases in the number of students seeking support (Madrigal & Blevins, 2021, in press). In fact, only 15% of students who rated their mental health as poor engaged in campus mental health services during the peak of the COVID-19 pandemic (Ezarik, 2021). Conspicuously absent from conversations about the types of support college students need to navigate the COVID-19 pandemic is the student voice. Even though mental health concerns are common among college students, these emerging adults also bring unique perspectives that warrant exploration.

Some college settings have developed peer-to-peer mental health programs where students are a key component of the COVID-19 response. Peer support communities embed support within the environment where students are the most likely to seek it. Students engaged in peer support efforts can give and receive support, "which is essential to cultivating a sense of belonging" (Lyda, 2021, p. 9). Supportive peer groups can also facilitate community building in settings where a sense of community may not currently exist.

Mental Health Ambassador (MHA) programs can be an important component of peer support for college students experiencing life stress and depressive symptoms. MHA programs train students to talk with their peers about mental health and can serve as a critical bridge between students and available campus mental health services. Mental Health First Aid training for MHAs enables students to identify and respond to peers in crisis and may be a critical component of an effective peer support response (National Council for Mental Wellbeing, 2021).

Trauma-informed education

Trauma-informed nursing education must be a critical component of mental health support efforts through the lingering effects of the COVID-19 pandemic. Nursing students have experienced trauma, complicated grief, and secondary stress (Goddard et al., 2021). Trauma-informed nursing education supports student-faculty connection and the development of nurturing relationships that mitigate burnout, reduce compassion fatigue, and secondary trauma. To truly support students, educators must move away from "sage on the stage" teaching modalities to lessen the power imbalance between educators and students. Goddard

et al. (2021) identified "teaching with" students as a critical component of the student-faculty dyad. Rather than "teaching down" to students, "engaging with" them incorporates the caring and compassionate nature of nursing practice from a trauma-informed perspective. Through collaboration and mutuality, students and faculty can be strong allies to collectively resolve challenges and achieve common goals (Carello, 2020). Importantly, a trauma-informed pedagogy should not equate to a relaxation of teaching integrity. Clear expectations of continued professionalism and academic integrity provide important boundaries as students prepare to enter the nursing workforce (Goddard et al., 2021).

Implications for future research

The dampened mental health impact of the pandemic on nursing students in this study suggests that social support may moderate the effect of stress on mental health differently depending on the social dynamics of the student's academic major. Exploration of moderating and mediating factors may identify additional ways colleges can support students as we create a new version of 'normal' in our post-pandemic academic landscape.

Conclusion

Previous research has examined the relationships between social connectedness, resilience, and mental health in college students and in nursing students. However, no existing research has explored the interplay between these constructs among students enrolled in different academic majors. The insights gained through this study may provide an opportunity for cultivating collective posttraumatic growth in academic settings as we move through the catastrophic traumatic stress of the COVID-19 pandemic.

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Declaration of competing interest

The author declares no conflict of interest.

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Data availability

Due to the sensitive nature of the questions asked in this study, datasets will not be made publicly available to maintain the study participants' confidentiality.

References

- Minds, A. (2020). Covid-19 impact on college student mental health. Retrieved 11/12/2021 from <https://www.activeminds.org/wp-content/uploads/2020/04/Student-Survey-Infographic.pdf>.
- American College Health Association. (2009). National college health assessment. Executive summary spring 2009. Author. Retrieved 11/21/2021 from https://www.acha.org/documents/ncha/ACHA-NCHA_Reference_Group_ExecutiveSummary_Spring2009.pdf.
- American College Health Association. (2019). National college health assessment: Executive Summary Spring 2019. Author. Retrieved 11/21/2021 from https://www.acha.org/documents/ncha/ncha-ii_spring_2019_undergraduate_reference%20group_executive_summary.pdf.
- American College Health Association. (2020). National college health assessment: Executive summary fall 2020. Retrieved 11/21/2021 from <https://www.acha.org/>

- documents/ncha/NCHA-III_Fall_2020_Undergraduate_Reference_Group_Executive_Summary.pdf.
- Arslan, G., Yildirim, M., & Zangeneh, M. (2021). Coronavirus anxiety and psychological adjustment in college students: Exploring the role of college belongingness and social media addiction. *International Journal of Mental Health and Addiction*, 1–14. <https://doi.org/10.1007/s11469-020-00460-4>
- Bartlett, M. L., Taylor, H., & Nelson, J. D. (2016). Comparison of mental health characteristics and stress between baccalaureate nursing students and non-nursing students. *The Journal of Nursing Education*, 55(2), 87–90. <https://doi.org/10.3928/01484834-20160114-05>
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497–529.
- Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, 4, 561–571.
- Besser, A., Flett, G. L., & Zeigler-Hill, V. (2020). Adaptability to a sudden transition to online learning during the COVID-19 pandemic: Understanding the challenges for students. *Scholarship of Teaching and Learning in Psychology*, In Press. <https://doi.org/10.1037/stl0000198>. In press.
- Bonar, E. E., Parks, M. J., Gunlicks-Stoessel, M., Lyden, G. R., Mehur, C. J., Morrell, N., & Patrick, M. E. (2021). Binge drinking before and after a COVID-19 campus closure among first-year college students. *Addictive Behaviors*, 118. <https://doi.org/10.1016/j.addbeh.2021.106879>
- Buckner, J. D., Lewis, E. M., Abarno, C. N., Morris, P. E., Glover, N. I., & Zvolensky, M. J. (2021). Difficulties with emotion regulation and drinking during the COVID-19 pandemic among undergraduates: The serial mediation of COVID-related distress and drinking to cope with the pandemic. *Cognitive Behaviour Therapy*, 50(4), 261–275. <https://doi.org/10.1080/16506073.2020.1861084>
- Carello, J. (2020). Trauma-informed teaching and learning principles. Retrieved November 17, 2021 from <https://traumainformedteachingblog.files.wordpress.com/2020/04/titl-general-principles-3.20.pdf>.
- Chen, R., Sun, C., Chen, J. J., Jen, H. J., Kang, X. L., Kao, C. C., & Chou, K. R. (2021). A large-scale survey on trauma, burnout, and posttraumatic growth among nurses during the COVID-19 pandemic. *International Journal of Mental Health Nursing*, 30(1), 102–116. <https://doi.org/10.1111/inm.12796>
- Coakley, K. E., Lardier, D. T., Holladay, K. R., Amorim, F. T., Mechler, H., & Zuhl, M. N. (2021). Mental health severity is associated with increases in alcohol consumption in young adult students during the COVID-19 pandemic. *Alcoholism Treatment Quarterly*, 39(3), 328–341. <https://doi.org/10.1080/07347324.2021.1917325>
- Cui, P. P., Wang, P. P., Wang, K., Ping, Z., Wang, P., & Chen, C. (2021). Posttraumatic growth and influencing factors among frontline nurses fighting against COVID-19. *Occupational and Environmental Medicine*, 78(2), 129–135. <https://doi.org/10.1136/oemed-2020-106540>
- Czeisler, M. E., Lane, R. L., Petrosky, E., Wiley, J. F., Christensen, A., Njai, R., Weaver, M. D., Robbins, R., Facer-Childs, E. R., Barger, L. K., Czeisler, C. A., Howard, M. E., & Rajaratnam, S. M. W. (2020). Mental health, substance use, and suicidal ideation during the COVID-19 pandemic - United States, June 24–30, 2020. *MMWR Morbidity & Mortality Weekly Report*, 69(32), 1049–1057. <https://doi.org/10.15585/mmwr.mm6932a1>
- d'Ettorre, G., Ceccarelli, G., Santinelli, L., Vassalini, P., Innocenti, G. P., Alessandri, F., Koukopoulos, A. E., Russo, A., d'Ettorre, G., & Tarsitani, L. (2021). Posttraumatic stress symptoms in healthcare workers dealing with the covid-19 pandemic: A systematic review. *International Journal of Environmental Research and Public Health*, 18(2), 601. <https://doi.org/10.3390/ijerph18020601>
- De Gagne, J. C., Cho, E., Park, H. K., Nam, J. D., & Jung, D. (2021). A qualitative analysis of nursing students' tweets during the COVID-19 pandemic. *Nursing & Health Sciences*, 23(1), 273–278. <https://doi.org/10.1111/nhs.12809>
- Diaz, K., Staffileno, B. A., & Hamilton, R. (2021). Nursing student experiences in turmoil: A year of the pandemic and social strife during final clinical rotations. *Journal of Professional Nursing*, 37(5), 978–984. <https://doi.org/10.1016/j.profnurs.2021.07.019>
- Eisenberg, D., Ketchen Lipson, S., & Heinze, J. (2020). The healthy minds study. Fall 2020 data report. Retrieved 11/21/2021 from <https://healthymindsnetwork.org/wp-content/uploads/2021/02/HMS-Fall-2020-National-Data-Report.pdf>.
- Ezari, M. (2021). Students struggle but don't seek college's help. Retrieved 11/21/2021 from <https://www.insidehighered.com/news/2021/04/14/students-struggling-not-seeking-campus-mental-health-support>.
- Feeg, V. D., & Mancino, D. J. (2021). Trends in employment of new graduates when COVID-19 first impacted schools. Retrieved 11/21/2021 from National Council of State Boards of Nursing Leader to Leader https://www.ncsbn.org/LTL_Spring2021.pdf.
- Finley, A. (2020). *The Relationship among perfectionism, perceived stress, and coping in baccalaureate nursing students* (Publication Number 989). Doctoral Dissertation. University of Missouri-St. Louis <https://irl.umsl.edu/dissertation/989>.
- Fitzgerald, A., & Konrad, S. (2021). Transition in learning during COVID-19: Student nursing anxiety, stress, and resource support. *Nursing Forum (Hillsdale)*, 56(2), 298–304. <https://doi.org/10.1111/nuf.12547>
- Fosnacht, K., Sarraf, S., Howe, E., & Peck, L. K. (2017). How important are high response rates for college surveys? *The Review of Higher Education*, 40(2), 245–265.
- Gadzella, B. M., Baloglu, M., Masten, W. G., & Wang, Q. (2012). Evaluation of the student life-stress inventory-revised. *Journal of Instructional Psychology*, 39(2), 82–91.
- Goddard, A., Jones, R. W., Esposito, D., & Janicek, E. (2021). Trauma informed education in nursing: A call for action. In press *Nurse Education Today*, 101. <https://doi.org/10.1016/j.nedt.2021.104880>.
- Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277–1288. <https://doi.org/10.1177/1049732305276687>
- ICN. (2021). The COVID-19 effect: World's nurses facing mass trauma, an immediate danger to the profession and future of our health systems. Retrieved 11/21/2021 from <https://www.icn.ch/sites/default/files/inline-files/ICN%20COVID19%20update%20report%20FINAL.pdf>.
- Jackson, K. M., Merrill, J. E., Stevens, A. K., Hayes, K. L., & White, H. R. (2021). Changes in alcohol use and drinking context due to the COVID-19 pandemic: A multimethod study of college student drinkers. *Alcoholism: Clinical and Experimental Research*, 45(4), 752–764. <https://doi.org/10.1111/acer.14574>
- Keum, B. T., Miller, M. J., & Inkelas, K. K. (2018). Testing the factor structure and measurement invariance of the PHQ-9 across racially diverse U.S. college students. *Psychological Assessment*, 30(8), 1096–1106. <https://doi.org/10.1037/pas0000550>
- Kim, S. C., Sloan, C., Montejano, A., & Quiban, C. (2021). Impacts of coping mechanisms on nursing students' mental health during COVID-19 lockdown: A cross-sectional survey. *Nursing Reports*, 11(1), 36–44. <https://doi.org/10.3390/nursrep11010004>
- Kim, Y. E., & Lee, B. (2019). The psychometric properties of the patient health questionnaire-9 in a sample of Korean university students. *Psychiatry Investigation*, 16(12), 904–910. <https://doi.org/10.30773/pi.2019.0226>
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606–613. <https://doi.org/10.1046/j.1525-1497.2001.016090606.x>
- LeVines, P., Gorman, K., Braun, L., Koenig, L., & Bershad, C. (2019). The Association for University and College Counseling Center Directors annual survey: 2019. <https://www.aucccd.org/assets/documents/Survey/2019%20AUCCCD%20Survey-2020-05-31-PUBLIC.pdf>.
- Liehr, P. R., & Smith, M. J. (2018). Story Theory. In M. J. Smith, & P. R. Liehr (Eds.), *Middle range theory for nursing* (pp. 241–264). Springer. <https://doi.org/10.1891/9780826159922.0011>.
- Liehr, P. R., & Smith, M. J. (2020). Claiming the narrative wave with story theory. *Advances in Nursing Science*, 43(1), 15–27. <https://doi.org/10.1097/ans.0000000000000303>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage.
- López-Castro, T., Brandt, L., Anthonipillai, N. J., Espinosa, A., & Melara, R. (2021). Experiences, impacts and mental health functioning during a COVID-19 outbreak and lockdown: Data from a diverse New York City sample of college students. *PLoS One*, 16(4). <https://doi.org/10.1371/journal.pone.0249768>
- Lyda, J. (2021). White Paper. Supporting student mental health through a peer-to-peer community. Retrieved November 12, 2021 from <https://togetherall.com/en-us/wp-content/uploads/sites/4/2021/08/Togetherall-DEI-Whitepaper-2021.pdf>.
- Madrigal, L., & Blevins, A. (2021). In press. 'I hate it, it's ruining my life': College students' early academic year experiences during the COVID-19 pandemic. *Traumatology*. <https://doi.org/10.1037/trm0000336>
- Marler, E. K., Bruce, M. J., Abaoud, A., Henriksen, C., Suksatan, W., Homvisetvongsa, S., & Matsuo, H. (2021). The impact of COVID-19 on university students' academic motivation, social connection, and psychological well-being. In press *Scholarship of Teaching and Learning in Psychology*. <https://doi.org/10.1037/stl0000294>.
- McCrea, L. (2021). Cal state East Bay Department of Nursing Alumni Newsletter (Message from the Chair). <https://www.csueastbay.edu/nursing/files/docs/alumni/newsletter/2020.pdf>.
- McDermott, R. C., Fruh, S. M., Williams, S., Hauff, C., Graves, R. J., Melnyk, B. M., & Hall, H. R. (2020). Nursing students' resilience, depression, well-being, and academic distress: Testing a moderated mediation model. *Journal of Advanced Nursing*, 76(12), 3385–3397. <https://doi.org/10.1111/jan.14531>
- Michel, A., Ryan, N., Mattheus, D., Knopf, A., Abuelezam, N. N., Stamp, K., Branson, S., Heikel, B., & Fontenot, H. B. (2021). Undergraduate nursing students' perceptions on nursing education during the 2020 COVID-19 pandemic: A national sample. *Nursing Outlook*, 69(5), 903–912. <https://doi.org/10.1016/j.outlook.2021.05.004>
- Moeller, R. W., Seehuis, M., & Peisch, V. (2020). Emotional intelligence, belongingness, and mental health in college students. *Frontiers in Psychology*, 11, 93. <https://doi.org/10.3389/fpsyg.2020.00093>
- National Council for Mental Wellbeing. (2021). Mental health first aid for higher education. Retrieved November 17, 2021 from <https://www.mentalhealthfirstaid.org/population-focused-modules/higher-education>.
- National Council for State Boards of Nursing (NCSBN). (2020). A global profile of nursing regulation, education, and practice. *Journal of Nursing Regulation*, 10(4), 1–116. [https://doi.org/10.1016/S2155-8256\(20\)30039-9](https://doi.org/10.1016/S2155-8256(20)30039-9)
- NCSBN. (2020). Changes in education requirements for nursing programs during COVID-19. Retrieved 11/21/2021 from https://www.ncsbn.org/education-requirement-changes_COVID-19.pdf.
- NCSBN. (2021). Member Board Profiles: 2020 Education Survey. Retrieved 11/21/2021 from <https://www.ncsbn.org/2020EducationMBPResponsesfinalbookmarks.pdf>.
- Oh, H., Marinovich, C., Rajkumar, R., Besecker, M., Zhou, S., Jacob, L., Koyanagi, A., & Smith, L. (2021). COVID-19 dimensions are related to depression and anxiety among U.S. College students: Findings from the healthy minds survey 2020. *Journal of Affective Disorders*, 292, 270–275. <https://doi.org/10.1016/j.jad.2021.05.121>
- Park, C., Rosenblat, J. D., Brietzke, E., Pan, Z., Lee, Y., Cao, B., Zuckerman, H., Kalantarova, A., & McIntyre, R. S. (2019). Stress, epigenetics and depression: A systematic review. *Neuroscience and Biobehavioral Reviews*, 102, 139–152. <https://doi.org/10.1016/j.neubiorev.2019.04.010>
- Rankin, J. A., Paisley, C. A., Mulla, M. M., & Tomeny, T. S. (2018). Unmet social support needs among college students: Relations between social support discrepancy and depressive and anxiety symptoms. *Journal of Counseling Psychology*, 65(4), 474–489. <https://doi.org/10.1037/cou0000269>
- Redden, E. (2020). Clinical education starts to resume, haltingly, in many health-care fields. Retrieved November 3, 2021 from <https://www.insidehighered.com/news/2020/06/25/clinical-education-starts-resume-haltingly-many-health-care-fields>.

- Robbins, A., Kaye, E., & Catling, J. C. (2018). Predictors of student resilience in higher education. *Psychology Teaching Review*, 24(1), 44–52.
- Rosenthal, L., Lee, S., Jenkins, P., Arbet, J., Carrington, S., Hoon, S., Purcell, S. K., & Nodine, P. (2021). A survey of mental health in graduate nursing students during the COVID-19 pandemic. *Nurse Educator*, 46(4), 215–220. <https://doi.org/10.1097/NNE.0000000000001013>
- Sandoval, C. (2021). Pandemic delays graduation for some nurses, shuts off some school admissions. Retrieved 11/3/2021 from <https://www.newsy.com/stories/virus-cou-ld-worsen-growing-nursing-shortage>.
- Spielberger, C. D., Gonzales, H. P., Taylor, C. L., Algaze, B., & Amton, W. D. (1978). Examination, stress, and test anxiety. In C. D. Spielberger, & I. B. Sarason (Eds.), *Stress and Anxiety* (pp. 167–191). Hemisphere/Wiley.
- Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the state-trait anxiety inventory*. Consulting Psychologists Press.
- Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, 15(1), 1–18. https://doi.org/10.1207/s15327965pli1501_01
- Tung, Y. J., Lo, K. K. H., Ho, R. C. M., & Tam, W. S. W. (2018). Prevalence of depression among nursing students: A systematic review and meta-analysis. *Nurse Education Today*, 63, 119–129. <https://doi.org/10.1016/j.nedt.2018.01.009>
- von Soest, T., Luhmann, M., & Gerstorf, D. (2020). The development of loneliness through adolescence and young adulthood: Its nature, correlates, and midlife outcomes. *Developmental Psychology*, 56(10), 1919–1934. <https://doi.org/10.1037/dev0001102>
- Vore, E., McGee, A., & Henderson, A. (2019). *Perceived stress in undergraduate nursing students (Publication number 372)*. Master's thesis. Winona State University <https://openriver.winona.edu/nursingmasters/372>.
- Yildiz, E. (2021). Posttraumatic growth and positive determinants in nursing students after COVID-19 alarm status: A descriptive cross-sectional study. *Perspectives in Psychiatric Care*. <https://doi.org/10.1111/ppc.12761>