Mixed Method Approach Towards the Life of University Students During the COVID-19 Pandemic

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(https://hphr.org/edition-60-the-post-covid-workscape/)

Citation

Abstract

Background

The COVID-19 pandemic negatively impacted the higher education system. This mixed-methods study aimed to assess COVID-19 fear, anxiety, and stress among Shenandoah Valley college students.

Methods

An online survey was fielded and completed by n=680 students. Qualitative semi-structured interviews were conducted with 20 students.

Results

The mean participant age was 22.14±5.48 years, and primarily White (81.9%), women (80.4%), and undergraduate (78.0%) students. Approximately 41% were enrolled in health-related majors (41.4%). Women students had significantly higher anxiety, depression, and fear of contracting COVID-19 than men. Undergraduate students had significantly higher depression than graduate students. Qualitative analysis revealed several major themes: psychological stress during the pandemic, disruption in academic life, family support, support from the university, and recommendations for the university.

Discussion

Students' perceptions of university support were related to anxiety, depression, and fear of COVID-19. Students reported a lot of stress in their lives, mitigated by support from their families. Although the university attempted to provide support, students noted that the efforts were inadequate.

Conclusion

While the acute impact of the COVID-19 pandemic has receded, higher education system leaders and policymakers should work together to identify areas to improve student support and develop better communication strategies. These efforts will help manage future disasters.

Introductions

As of July 2023, more than 767 million people contracted COVID-19, and over 6.9 million died worldwide.[1] Measures were implemented by authorities to control the spread of the virus,[2] with higher education institutes switching to online learning.[3] Though necessary, transitioning to virtual environments brought unwanted consequences for many students,[3,4] for example, ajustment to online learning, lifestyle changes, financial burden, lack of social interaction, and access to resources could have negatively impacted students' mental health.[5-9] The pandemic rendered university students more susceptible to psychological health issues, including anxiety, depression, and stress. The authors' previous study indicated that being a woman, fear of infection, reduced sleep quality, loss of employment, uncertainty of the future, and isolation during the quarantine were among the main factors associated with anxiety.[10] It is thus highly crucial to target these mental health indicators and their related factors since existing evidence suggests their association with chronic conditions, obesity, and behavioral disorders, including substance use[11] and suicide.[12,13] Shenandoah Valley, part of the Great Appalachian Valley in Virginia,[14] is an historically underserved region.[15] People living in this region have low socio-economic status, e.g., high level of unemployment, low income, and low educational achievements,[16] which contribute to poorer health condition.[17,18] The student population here is unique. We utilized a mixed-methods strategy to assess the anxiety, depression, and fear of COVID-19 among university students in Shenandoah Valley and identify possible solutions to meet students' needs during a pandemic.

Methods

Design

This study applied a mixed-methods strategy. First, a cross-sectional survey was conducted to assess the stress and anxiety of the students. Then, 20 students participated in one-to-one semi-structured interviews to discuss their lives during the pandemic.

The survey was prepared using three validated tools, namely the Generalized Anxiety Disorder scale (GAD-7),[19-22] the Patient Health Questionnaire (PHQ) scale,[23-26] and the Fear of COVID-19 scale (FCV-19S).[27-30] The survey was implemented using an online survey system (details in the data collection section).

For the qualitative part, a qualitative descriptive approach was utilized to explore their thoughts and experiences of their lives during the pandemic. The first author initially prepared the interview questions and probes, and revised those accordingly in consultation with another author (TJ). These questions were open-ended. These questions were constructed with familiar language to ensure clarity and neutrality and prevent leading language and jargon.[31] NVivo version 12 software was utilized for qualitative analysis.[32]

Approval was granted by the authors' Institutional Review Board (IRB) (protocol number: 21-2386).

Participants

A sample of university students (N=680) was recruited for the survey via email distributions and classroom presentations. Full and part-time undergraduate and graduate students were eligible if they were at least 18 years or older. After removing incomplete (n= 73) responses, a final sample of 607 completed responses was used for data analysis. The mean age of the participants was 22.14 years (*sd* 5.48). The majority of the participants were women (78.9%) and non-Hispanic whites (81.9%). Most respondents were undergraduate students (78.0%) and living in off-campus housing (77.9%). Out of the 607 survey participants, 20 students agreed to participate in the semi-structured interview.

Data Collection

The authors developed the online survey using QuestionPro.[33] The survey system provided a uniform resource location (URL) to access the online survey. Using the authors' institution's bulk email service, the invitation to participate in the survey was sent to all currently enrolled undergraduate and graduate students. A scannable quick response (QR) code was generated for the study, and a flyer was prepared using the QR code and placed on public notice boards throughout the campus. The authors also shared the survey invitation with other faculty members to encourage the students to complete the survey. At the end of the study, students were requested to participate in the qualitative part. A total of 20 students participated in the qualitative part of the study, and each received a $20 prepaid gift card as compensation. No compensation was provided to the survey participants.

Measures

Demographics

Demographic information included age, gender, ethnicity, degree program enrolled, college enrolled, housing status, and COVID-19 diagnosis status (whether the respondent was ever diagnosed with COVID-19). Response options for gender were "man," "woman," and "other." Due to low frequency, several variables were recategorized (gender, ethnicity, degree program enrolled, college enrolled). Gender was recategorized as man and woman since only 11 participants (1.81%) identified as other. Response options for race (African American, Asian, Hispanic, Native American, White, and Other) were recoded into white and non-white. Response options for degree program enrolled (undergrad, graduate, doctoral) were recoded into undergrad and graduate. Response options for college enrollment (Arts and Letters, Business, Education, Health and Behavioral Studies, Integrated Science and Mathematics, Visual and Performing Arts) were recoded into two major categories, College of Health and Behavioral Studies (CHBS), and non-CHBS. Students majoring in health-related topics were included in the CHBS category, and all other majors were under the non-CHBS category. Response options for COVID-19 diagnosis status were yes or no.

Anxiety

Anxiety was evaluated using the Generalized Anxiety Disorder (GAD-7),[19] a validated tool[19-22] that successfully assesses anxiety among different adult populations and is leveraged for its reliability. The questionnaire included questions screening for anxiety on a scale ranging from '0 = not at all sure' to '3 = nearly every day'. Summed scores could range from 0 to 21. A cut-off value of 10 or greater is considered for referral to a psychologist/psychiatrist for further evaluation.[19-22] The levels of anxiety for the study were categorized as none/mild (0 to 9) and moderate to severe anxiety (10 to 21). Cronbach's alpha (α) for GAD-7 was 0.92.[21]

Depression

Depression was determined using the Patient Health Questionnaire (PHQ-9), a validated instrument that health professionals and researchers commonly use.[23-26] The scores in PHQ-9 range from '0 = not at all' to '3 = nearly every day'. The summed-up scores range between 0 to 27. A cut-off value of 10 or more indicates the person should be referred to a psychologist/psychiatrist for further evaluation.[23-26] In this study, PHQ9 scores were recategorized into two categories: none/minimal to mild depression (0 to 9) and moderate to severe depression (10 to 27). Cronbach's alpha (α) for PHQ9 was 0.89.[23,25]

Fear of COVID

The Fear of COVID-19 (FCV-19S) questionnaire,[27] developed at the early onset of the COVID-19 pandemic,[27] was used to assess the individuals' fear of COVID-19.[27] Several studies have reported this questionnaire's high reliability and validity in multiple countries.[27-30] The FCV-19S has seven Likert-type questions with response options including "strongly disagree," "disagree," "neutral," "agree," and "strongly agree," and the score of the repose options are 1 to 5, respectively. A total score is calculated by summing up each item score, ranging from 7 to 35. Cronbach's alpha for FCV-19S is 0.87.[27] The authors received permissions from the FCV-19S development team.[34]

High Cronbach's alpha (α) for GAD-7 (0.92), PHQ-9 (0.89), and FCV-19S (0.87) indicates good reliability of all three scales.[35,36]

Qualitative Data Collection

Participants were asked to share their thoughts on the pandemic, changes in their lifestyles, coping mechanisms, changes in academic life, availability of support system, how their university handled the pandemic and student demands, and their ideas/recommendations for the university administration. Each interview was audio recorded using Zoom.[37] Audio data was initially transcribed using Zoom[37] and

later reviewed and edited by the student assistant (AW).

Data Analysis

For descriptive analysis, means and standard deviations were calculated for continuous variables, and percentages were calculated for categorical variables.

For inferential statistics, bivariate relationships were first calculated between the dependent and predictor variables. Predictor variables having significant relationships with the dependent variables were included in linear regression to identify the association between the continuous dependent variables (FCV-19S, anxiety, depression) among the students with predictor variables. For dichotomized dependent variables (anxiety, depression), logistic regression was done as well. For anxiety, the covariates were gender, COVID-19 diagnosis status, perception of change in stress during the pandemic, perception of ability to manage stress during the pandemic, perception of university's ability to contain COVID-19 infection, perception of university's support during the pandemic. Covariates for depression were age, gender, perception of change in stress during the pandemic, coping mechanism used during the pandemic, perception of the university's ability to contain COVID-19 infection, and perception of university supporting students during the pandemic. For FCV19-S, covariates were gender, COVID-19 diagnosis status, plan for receiving COVID-19 vaccine in the future, perception of change in stress during the pandemic, perception of ability to manage stress during the pandemic, perception of university's ability to contain COVID-19 infection, perception of university supporting students during the pandemic. The significance level of 0.05 was used for all calculations. IBM SPSS Statistics for Windows, Version 28.0, was used as the statistical software.[38]

For qualitative analysis, each transcription was open-coded. Open coding was utilized to identify emerging concepts generated from the raw data.[39,40] The authors used the thematic analysis method to initially identify several categories that represented the students' experiences during the pandemic.[41] These categories were later regrouped into several major themes. Several meetings between the authors were conducted to finalize the themes. Thematic analysis was utilized since it provides a flexible approach to have a rich and detailed account of the data.[42,43]

Results

Demographics

A total of n=680 students participated in the survey (77.9%). Approximately 21% stated that they were diagnosed with COVID-19. Approximately 37.5% had moderate to severe anxiety, and 38.8% had moderate to severe depression. The mean FCV-19S score was 15.78 (SD 6.00) (Table 1).

Table 1. Descriptive statistics of study variables.

Variable	Mean (sd)	# Participants (%)
Age	22.14 (5.48)	–
Gender		
Man	–	117 (19.3)
Woman	–	479 (78.9)
Other		11 (1.81)
Ethnicity		
Non-Whites	–	109 (18.1)
Non-Hispanic Whites	–	494 (81.9)
Degree program enrolled		
Undergraduate	–	472 (78.0)
Graduate	–	133 (22.0)

College enrolled[a]		
CHBS	–	249 (41.4)
Non-CHBS	–	353 (58.6)
COVID-19 diagnosis status[b]		
Yes	–	129 (21.4)
No	–	475 (78.6)
Generalized anxiety (GAD7)	8.47 (5.84)	–
Minimal or mild anxiety		375 (62.5)
Moderate to severe anxiety		225 (37.5)
Depressive disorder (PHQ9)	8.41 (6.24)	–
None/minimal to mild depression		366 (61.2)
Moderate, moderately severe to severe depression		323 (38.8)
Fear of COVID-19 (FCV-19S)	15.78 (6.00)	–
Perception of change in stress during the pandemic		
Increased		484 (79.9)
Decreased or remained same		122 (20.1)
Perception of ability to manage stress during the pandemic		
Can manage		401 (66.2)
Can't manage or don't know		205 (33.8)
Perception of university's ability to contain COVID-19 infection		
Was able to contain		301 (49.9)
Couldn't contain or don't know		302 (50.1)
Perception of university's support during the pandemic		
Provided support		214 (35.5)
Didn't provide support or don't know		388 (64.5)

Coping mechanism used during the pandemic		
University provided		12 (2.0)
Family and friends or online		579 (98.0)
Plan for receiving COVID-19 vaccine in future		
Plan to receive vaccine		362 (74.9)
No plan to receive vaccine or don't know		121 (25.1)

[a]Percentage of students who were enrolled in College of Health and Behavioral Studies (CHBS) and those who were enrolled in other colleges.
[b]Percentage of students who reported if they had a diagnosed COVID-19 infection or not.

Generalized Student Anxiety

The overall multiple linear regression model was significant [R^2= 0.30, $F_{(6, 575)}$= 41.82, $p< 0.01$]. Five significant predictors in the model explained 30% of the variance. Those significant predictors were as follows: gender, COVID-19 diagnosis status, perception of change in stress during the pandemic, perception of ability to manage stress during the pandemic, and perception of the university's support during the pandemic. Women (β= 0.10, $p<0.01$) not diagnosed with COVID-19 (β= 0.08, p= 0.02) perceived a positive change in stress level during the pandemic (β= 0.25, $p<0.01$) reported not being able to manage their stress during the pandemic (β= 0.37, $p<0.01$), and thought that the university did not provide enough support during the pandemic (β= 0.10, p= 0.01) had higher anxiety (Table 2). A logistic regression model indicated that those who perceived increased stress during the pandemic (OR, 5.55, 95% CI, 2.82-10.93) could not manage their stress (OR, 4.25, 95% CI, 2.87-6.28) and thought that the university did not provide enough support (OR= 1.61, 95% CI, 1.03-2.52) had significantly higher odds of moderate to severe generalized anxiety (Table 3).

Table 2. Linear regression model for generalized anxiety disorder (GAD7).

Covariates	β	t	p-value	95% CI Lower	Upper
Gender (women)	0.10	2.77	<0.01*	0.42	2.47
COVID-19 diagnosis status (no)	0.08	2.78	0.02*	0.16	2.11
Perception of change in stress during the pandemic (increased)	0.25	6.80	<0.01**	2.56	4.63
Perception of ability to manage stress during the pandemic (can't manage or don't know)	0.37	10.25	<0.01**	3.71	5.47
Perception of university's ability to contain COVID-19 infection (couldn't contain or don't know)	0.03	0.77	0.44	-0.55	1.27
Perception of university's support during the pandemic (didn't provide support or don't know)	0.10	2.49	0.01*	0.25	2.11

*p<.05; **p<.01. β=Standardized Beta. CI=Confidence Interval.

Table 3. Logistic regression model for generalized anxiety disorder (GAD7).

	β	p-value	OR	95% CI

Covariates				Lower	Upper
Gender (women)	0.38	0.16	1.46	0.86	2.47
COVID-19 diagnosis status (no)	0.42	0.08	1.51	0.94	2.43
Perception of change in stress during the pandemic (increased)	1.71	<0.01**	5.55	2.82	10.93
Perception of ability to manage stress during the pandemic (can't manage or don't know)	1.45	<0.01**	4.25	2.87	6.28
Perception of university's ability to contain COVID-19 infection (couldn't contain or don't know)	0.16	0.47	1.17	0.76	1.79
Perception of university's support during the pandemic (didn't provide support or don't know)	0.48	0.04*	1.61	1.03	2.52
*p<.05; **p<.01. OR: Odds Ratio. CI=Confidence Interval.					

Depressive Disorder Among Students

The overall multiple linear regression model was significant [R^2= 0.11, $F_{(7, 562)}$, P< 0.01]. Four (04) significant predictors in the model explained 11% of the variance. Those significant predictors were: degree program enrolled, perception of change in stress during the pandemic, perception of the university's ability to contain COVID-19 infection, and perception of university supporting students during the pandemic. Undergraduate students (β= 0.13, p= 0.01) who perceived increased stress during the pandemic (β= 0.20, p= <0.01) believed that the university was not able to contain the spread of COVID-19 infection (β= 0.11, p= 0.02), and thought that the university could not provide support (β= 0.13, p< 0.01) had significantly higher depressive disorder (Table 4). The logistic regression model indicated that undergraduate students (OR, 1.96, 95% CI, 1.15-3.34) who perceived increased stress during the pandemic (OR, 2.92, 95% CI, 1.73-4.94) believed that the university wasn't able to contain the spread of COVID-19 infection (OR, 1.53, 95% CI, 1.03-2.27), and thought that the university couldn't provide support (OR, 1.69, 95% CI, 1.11-2.58) had higher odds of having moderate to severe depression (Table 5).

Table 4. Linear regression model for depressive disorder (PHQ9).

	β	t	p-value	95% CI	
Covariates				Lower	Upper
Age	0.01	0.31	0.76	-0.09	0.13
Gender (women)	0.07	1.68	0.09	-0.18	2.34
Degree program enrolled (undergraduate)	0.13	2.68	0.01*	0.51	3.32
Perception of change in stress during the pandemic (decreased or remained same)	0.20	4.82	<0.01**	1.82	4.33
Coping mechanism used during the pandemic (university provided)	<0.01	0.04	0.97	-3.63	3.79
Perception of university's ability to contain COVID-19 infection (couldn't contain or don't know)	0.11	2.40	0.02*	0.24	2.43

| Perception of university supporting students during the pandemic (Didn't provide support or don't know) | 0.13 | 2.82 | <0.01** | 0.50 | 2.78 |

*p< 05; **p< 01. β=Standardized Beta. CI=Confidence Interval.

Table 5. Logistic regression model for depressive disorder (PHQ9).

Covariates	β	p-value	OR	95% CI	
				Lower	Upper
Age	0.01	0.50	1.01	0.97	1.06
Gender (female)	0.27	0.26	1.31	0.82	2.10
Degree program enrolled (undergraduate)	0.67	0.01*	1.96	1.15	3.34
Perception of change in stress during the pandemic (increased)	1.07	<0.01**	2.92	1.73	4.94
Coping mechanism used during the pandemic (university provided)	0.08	0.91	1.08	0.28	4.25
Perception of university's ability to contain COVID-19 infection (couldn't contain or don't know)	0.43	0.03*	1.53	1.03	2.27
Perception of university supporting students during the pandemic (Didn't provide support or don't know)	0.53	0.01*	1.69	1.11	2.58

*p<.05; **p<.01. OR=Odds Ratio. CI=Confidence Interval.

Student Fear of COVID-19

The overall multiple linear regression model was significant [R^2= 0.34, $F_{(7, 456)}$= 33.81, P< 0.01]. Five (05) significant predictors in the model predicted 34% variance. Those significant predictors were gender, COVID-19 diagnosis status, plan for receiving COVID-19 vaccine in the future, perception of change in stress during the pandemic, and perception of ability to manage stress during the pandemic. Women (β= 0.19, P< 0.01) not diagnosed with COVID-19 (β= 0.15, P< 0.01) who planned to receive the vaccine in the future (β= 0.18, P< 0.01) who perceived increased stress during the pandemic (β= 0.28, P< 0.01) that they could not manage the stress (β= 0.21, P< 0.01), and who perceived the university could not contain the spread of COVID-19 infection (β= 0.12, P< 0.01) had significantly higher fear of contracting COVID-19 (Table 6).

Table 6. Linear regression model for fear of COVID-19 (FCV-19S).

	β	t	p-value	95% CI	
Covariates				Lower	Upper
Gender (women)	0.19	4.86	<0.01**	1.63	3.84
COVID-19 diagnosis status (no)	0.15	4.02	<0.01**	1.14	3.31
Plan for receiving COVID-19 vaccine in future (plan to receive vaccine)	0.18	4.56	<0.01**	1.47	3.62

Perception of change in stress during the pandemic (increased)	0.28	6.99	<0.01**	3.08	5.48
Perception of ability to manage stress during the pandemic (can't manage or no answer)	0.21	5.33	<0.01**	1.73	3.76
Perception of university's ability to contain COVID-19 infection (couldn't contain or don't know)	0.12	2.77	<0.01**	0.44	2.57
Perception of university supporting students during the pandemic (didn't provide support or don't know)	0.02	0.55	0.58	-0.79	1.41
*p<.05; **p<.01. β=Standardized Beta. CI=Confidence Interval.					

Qualitative Results

Psychological Stress During the Pandemic

One of the major themes that emerged was increasing stress during the pandemic. All the participants described having anxiety about being infected with COVID-19 or infecting others (family members, friends). One participant mentioned, "…*while I was home before I went to college, it made me very nervous. I was very careful about [using a] mask, the hand sanitizer because. My parents are in their 50s, and I just wanted to be careful.*" – Participant 9.

Students were stressed about being unable to meet their friends and families. One student shared, "*I have never been more stressed in my life, so that's been pretty difficult…*" – Participant 7.

Another student said, "…*Isolation, I guess it did accentuate my stress and anxiety. Another … mental issue I faced was like loneliness and like seclusion, yeah.*" – Participant 6.

Some students had the additional stress of losing their part-time jobs at the university and finding alternatives to survive. One such student wrote, "…*no one was really like hiring around here like somewhere open somewhere close, and I needed just like some money, so I started door dashing to make money…*" – Participant 7.

Disruption in Academic Life

Almost everyone mentioned having difficulty adjusting to online classes, lack of attention to class lectures, difficulty understanding lecture materials, and time management issues. One student said, "*I don't know about others, but it was hard for me. Honestly, I have not learned anything this semester…*" – Participant 7.

Another student shared the frustration of missing an in-person class, "*There were a few classes, the one thing that was a bummer for me was right before COVID hit, I was in two of my favorite classes I've ever had…*" – Participant 11.

A senior undergraduate student mentioned, "*Academically, I learned best like in a classroom, so it made me get really distracted very easily being at home. And then, also, like trying to just finish up senior year and then not knowing what's going to happen with college and stuff. And now, like being in my room like working is still hard, even though I've done it for over a year.*" – Participant 12.

Family Supportt

Some students mentioned receiving family support during the pandemic. They noted that their family members understood their hardships and struggles. One of them said, "*I'm pretty close with my family. I think I'm pretty lucky. So, you know, when it started, I couldn't go out and see my friends, my boyfriend, whoever. So we would go on family walks, and we would all play games, listen to music, eat dinner outside, [and] just try and make the most of our time.*"- participant 9.

Another participant said he appreciated being with family members, "…*You know, I get to be at home, where I feel most comfortable. I'm with my family. This is great.*" – Participant 13

University Support

Students' reaction to the support received from the university was mixed. Although most of them stated that teachers were flexible and accommodating, some said they did not receive adequate support from their teachers. As one participant explained, "*I think overall it kind of depended on the professor, but for the most part they were very lenient. They were understanding, you know. If everyone's going through something, they may not want to share … if you need an assignment to be more flexible … As long as you reached out to [the professors] and told them, 'Hey, something's going on, like, I need some wiggle room, they were all very understanding, which I appreciate … a lot*." – Participant 9.

Another student expressed similar feelings, "*I feel like [my professionals were] as accommodating as they could be. There are some teachers who have just not really given us any means of communication. They have kind of rejected emails and like made office hours unnecessarily complicated to figure out..*" – Participant 6.

One student mentioned that they needed more than accommodation from their teachers. She said, "*Professors were trying to accommodate us, but it was mainly emotional accommodation, not necessarily to help me learn the subject.*" – Participant 7.

Students who needed additional support from the university, such as career preparation, were left behind. One of them shared, "*I feel like I don't have … a good … benchmark of where I need to be right now [professionally] … like looking for internships. [It can] be stressful starting out because you don't have a lot of the information that you may think you need.*" – Participant 10.

Recommendation for the University

Students had several recommendations/ideas on how the university administration could improve their support system and implement the COVID policies better. The university offered quarantine locations (a sick dorm) in the student housing for those students diagnosed with COVID-19. Once the students no longer tested positive for COVID-19, they could leave the sick dorm. One student mentioned the lack of oversight of the quarantining student dorm locations, saying, "*The idea of the isolation dorms. I've heard stories of people who aren't sick going in there because they didn't know it was a sick dorm, and I've heard of people like leaving the isolation dorm to go get food, um, so I think they're kind of unsupervised there, which definitely isn't helping because, if a sick person leaves the dorms [to] go to a dining hall [they can expose others].*" – Participant 14. – Participant

Students informed that the LiveSafe app, a third-party app the university used to monitor students' response to their COVID symptoms, was not adequate, and thus suggested that the university adopt a better way to monitor student responses. One participant said, "*I think for me personally, I feel like the LiveSafe app wasn't the [best choice]. I was like, okay, well, I'm still feeling this, this, and this, but I kind of just have to check it off anyways that it's, you know, so I feel like a lot of people didn't pay attention to that…*" – Participant 9.

Another student suggested implementing more restrictions in dorms and throughout the campus to prevent the spread of COVID-19. She said, "*I think that I've seen a lot of students living in dorms just throw miniature parties or have large access groups of people. [They need to] do have a better … regulate their in-person living.*" – Participant 19.

Discussion

Women had significantly higher anxiety than men in the study. Moderate to severe anxiety was significantly higher among women with increased stress. These results were consistent with other studies.[44-51] Gender differences in anxiety levels are related to biological and psychosocial factors.[46,49,52-54] Women have a higher perception of threat and a greater sensitivity to the loss of control compared to men [55, 56], which puts them at risk of anxiety during times of crisis.[57] Hellemans, Willems and Brengman [52] and Prowse, *et al*. [49] mentioned that women students used social media more than men and read more articles on COVID-19 than men in the study,[49,52] Conversely, men used other methods, such as video games, to reduce their stress during the pandemic.[53]

Undergrads had higher depression than graduate students. Moderate to severe depression was also significantly higher in undergraduate students with increased stress. Other researchers also reported the same[58,59,58-60] younger undergraduate students are less experienced in coping mechanisms to deal with stress. So, they might suffer more from depressive disorder during the pandemic. We found female students had nearly significantly higher depression than males, corroborating findings from other studies conducted during the pandemic.[50,58,61-64] In Grineski *et al.*'s study among U.S. university students, women had 1.16 times higher odds of having depressive disorder than men.[62] In another study, women had significantly higher depression than men.[58] Salk also reported significantly higher depressive disorders among women.[65] Underlying mechanisms to explain why women students had significantly higher depression are challenging to apprehend. However, researchers proposed a combination of social factors, biological factors (hormonal difference), and experience of stressful life events as underlying factors.[66]

Fear of COVID-19 was significantly higher among women students, similar to what other studies reported.[67-69] Women students might have anticipated more COVID-19-related complications than men. The difference in coping mechanisms in women can also contribute to their higher FCV-19S scores. Students without COVID-19 during the study had higher stress and fear of COVID-19. Those who did not receive the COVID-19 vaccine but planned to receive it in the future also had a higher fear of getting the disease. Someone not infected

with the COVID-19 virus did not experience how it felt to have the condition during the early and middle of the pandemic. Therefore, those students had higher stress and more fear of the disease than others who already had the disease. Someone who did not have the COVID-19 vaccine also had more fear because they knew they were not protected against the COVID-19 infection.

Our study revealed important information on how students perceived their university's approach towards pandemic management and supporting the student population. Students who perceived their university did not provide adequate support had higher odds of moderate to severe anxiety, depression, and more fear of COVID-19. In addition, those who perceived the university could not contain the spread of infection also had higher odds of moderate to severe depression and more fear of COVID-19.

Results from our qualitative analysis complement the quantitative part. Students were stressed during the pandemic. They discussed their life, family members, academic life, and starting a career during the pandemic. They talked about family support being vital to them and that living isolated for a long time was stressful. Financial difficulty was another struggle for students during this time. Lack of oversight by the administration on student movement/gathering was another major complaint. Students recommended having more restrictions and a better monitoring system by the university. However, they also appreciated the support they received from faculty. The relatively small effect size in the regression models (30% for GAD-7, 11% for PHQ-9, and 34% for FCV-19S) identified in the quantitative analysis can be discussed with the help of the qualitative results. There might be other predictor variables associated with students' anxiety, depression and fear of COVID-19 that the survey did not identify. For example, qualitative analysis revealed that students appreciated support from their friends and family, but the survey did not have any questions to record that response. Although the study did not interview university faculty/leadership members, we must consider that the perspectives of the students and the college/university administration can differ on pandemic-related issues. Students did not necessarily know all the pandemic containment activities the university adopted, and the university administration might have done better in sharing their pandemic-related activities. Some participants described how university students did not seek support from their institution, although their universities offered the services.[70]

Many in-person services, such as mental health support systems, were ineffective in providing online support. Furthermore, some students who neglected to use university-based support systems may already have had stress and depressive disorders before the pandemic started but didn't have adequate support, considering that the university and the surrounding area already have a lack of mental health care professionals.[71-73] Adjusting to online classes and lacking in-person communication with peers and teachers also stressed the students, which might have caused a lack of interest in utilizing the university's services.[74, 75] Some students might not have realized that they required psychological support or did not feel interested in seeking support due to a lack of awareness, personal belief, and social stigma associated with psychological issues.[76] Increased demand for psychological support and the inability to accommodate the high demand might also contribute to the lack of utilization of the resources. Studies showed that U.S. higher education had an overall inadequate psychological support system even before the pandemic.[77] Researchers identified an inability to transition support services from in-person to online, and an insufficient number of support personnel also contributed to reduced use of university-based services by the students.[78] The authors suggest that the university administration dedicate resources towards student support, especially mental health care, to prepare for future large-scale disasters. However, budget deficits at many institutions can be challenging.[79,80] Therefore, we recommend robust collaboration between the policymakers and university leadership.

Although our study was one of the first mixed-methods studies to assess life during the pandemic among Shenandoah Valley University students, it has some limitations. First, the study was done only one time. Therefore, the authors could not determine whether the stress, anxiety, and fear of COVID-19 reduced over time. It will be interesting to examine whether students' stress, depression, and fear of COVID-19 reduced over time. No significant difference was noted between the White and non-White student population. This could be due to the small number of non-White student respondents (100). Furthermore, the study did not include some demographic variables that could have influenced the dependent variables, such as linguistic differences, family income, and residency status in the US. We did not interview university leadership. Therefore, it was not possible to access and identify all the pandemic-related interventions the administration adopted. Our participants were from one public university. Therefore, comparison among local universities was not possible. The authors recommend that universities compare regional and national university results on similar variables for administrative planning purposes.

Conclusions

University students suffered from anxiety, depression, and fear of COVID-19 due to multiple vital factors in their personal and academic lives during the pandemic. The pandemic is now contained, and universities are back to pre-pandemic activities. However, the university leadership should take the results of this study seriously to prepare for future large-scale emergencies.

Acknowledgements

Disclosure Statement

Data Availability Statement

Study data can be accessed by requesting the corresponding author.

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