Original Article

Factors Affecting Stress and Depression in Bangladeshi Students: A Cross-sectional Study

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Abstract

Introduction: During the COVID-19 pandemic, Bangladeshi students had to deal with drastic changes. In-person education was suspended, and online education was introduced along with movement restrictions within the community. This study aimed to assess the prevalence of stress, depression, and their combination among Bangladeshi students and evaluate their association with demographic factors and media usage during the pandemic. **Methods:** A cross-sectional study was conducted online using a structured questionnaire between January 2021 and January 2022 on 1377 students by a convenience sampling method. Demographic factors along with media usage frequency were recorded. The Perceived Stress Scale-10 was used to assess stress. Depression was evaluated by the WHO-5 Well-Being Index. **Results:** The average age of the participants was 20.8 ± 3.1 years; 51.6% of them were male. The prevalence of high stress, depression, and a coexistence of high stress and depression (CHSD) was 24.8%, 49.5%, and 20.9%, respectively. These indices significantly increased in females and with increasing age groups of participants. Students with inferior self-perceived health had higher odds of suffering from stress and CHSD, whereas students with general/poor health had the highest odds of high media usage and to suffer from high stress, depression, and CHSD. Students with high stress were found to have 9.49 times and 27.9 times higher probability to suffer from depression than students with moderate and low stress, respectively. **Conclusion:** This study has identified some important factors that can act as possible indicators to evaluate the prognosis of mental health problems among Bangladeshi students during public health emergencies.

Keywords: *COVID-19, depression, mental health, stress, students*

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Introduction

The COVID-19 pandemic, one of the most significant global catastrophes in centuries, had significant and far-reaching effects on society, especially the economy, health care, and education. The mental health of people has been significantly impacted because of the negative effects of the pandemic. Even years after the beginning of a pandemic, major concerns about mental health can be high.[1,2] Numerous psychological crises were brought on by the sudden increase in confirmed COVID-19 cases and fatalities, both in the susceptible and affected communities as well as in the public.[3-5] Stressful life events related to COVID-19 were more likely to result in posttraumatic stress disorder, depression, anxiety, insomnia, perceived stress, and adjustment disorder symptoms.[6,7]

Stress can be defined as "a nonspecific response of the body to any demand."[8] Stress can affect people's emotions, behavior, and cognition in addition to physical responses.[9] Everybody experiences stress in different ways, just as every person can get stressed by different events. Due to its association with a number of adverse health outcomes and diseases, stress has long been a central research topic in the field of health science.[10] Various factors can lead to psychological anguish during an outbreak of an infectious disease.[11] On the other hand, depression is a mood disorder that causes persistent feelings of sadness, emptiness, and loss of joy. It can significantly impact a person's thoughts, behavior, and mental as well as physical well-being. Causes or triggers of depression may vary and often involve a mix of psychological and environmental factors.[7,12] In March 2020, Bangladesh, like many other nations, imposed movement restrictions to stop the rapid spread of COVID-19. Beginning on March 17, 2020, Bangladesh closed all of

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its educational institutions.[13] Since April, universities, colleges, and schools gradually offered online courses and evaluations.[14] From primary to tertiary level, the pandemic impacted millions of students and instructors in Bangladesh.[15] Due to the sudden shift to online mode of classes, teachers as well as young learners faced many difficulties which caused a long-lasting negative impact on students' learning and mental health. The aim of this study was to investigate the prevalence of stress and depression among students because of the coronavirus outbreak and the subsequent suspension of in-person classes in Bangladesh and to find the possible association of these mental conditions with their demographic profiles and media usage.

Methods

Study design

This was a cross-sectional survey.

Setting

The survey was conducted online using social media and messaging platforms between January 2021 and January 2022.

Participants

A total of 1377 Bangladeshi students, aged a minimum of 14 years and studying at college, undergraduate, or postgraduate level in Bangladesh, were included in the study. The inclusion and exclusion criteria are shown in Figure 1.

Variables

The study variables can be categorized into three major components, i.e., sociodemographic characteristics and daily media exposure, level of perceived stress, and level of depression.

Measurements

Data about sociodemographic characteristics that included gender, age, educational level (college, undergraduate, and postgraduate), occupation (only students and students with part-time jobs), division of residence, type of locality (urban and rural), and self-rated health (SRH) (poor/general, good, and very good/excellent) were recorded. Data about the daily media exposure of participants were recorded using a three-point scale (low, average, and frequent). Stress and depression were measured as described previously.[16] The Perceived Stress Scale (PSS-10) of Sheldon Cohen was used to assess stress.[17] This scale consists of ten questions that were used to measure the perception of stress experienced by the participants over the past month. It included a five-point Likert scale that captures responses ranging from never (0) to very often (4). Total scores of 0–13 indicate low stress, 14–26 indicate moderate stress, and 27–40 indicate high stress. The PSS is an easily and widely used tool with acceptable psychometric properties.[18] Third, the WHO-5 Well-Being Index (WHO-5) was used to assess depression.[19,20] This method uses five questions that measure psychological well-being on a subjective level, which consists of positive word items that reflect the presence or absence of well-being rather than depressive symptomatology. Participants were asked to report the existence of these positive feelings on a six-point scale (5 points to 0 points). Total scores below 13 indicate depression.[19]

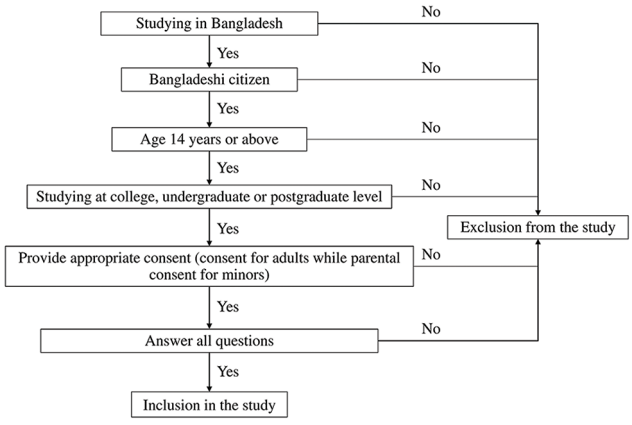

Figure 1: Inclusion and exclusion criteria of the study

Bias

The questionnaire of PSS-10 and WHO-5 was written in English, whereas the study population was native Bengali speakers with some knowledge of English language. Therefore, the study was at risk of undercoverage bias as those with lower English language skills might not participate in the study. To reduce this risk, the study questionnaire was translated into Bengali, and both English and Bengali texts were available side by side. Then, a pilot study was performed on 59 Bangladeshi students in January 2021 using online messaging platforms. The participants were allowed to provide feedback on any other issues. The pilot study participants were aged 15–23 years; 49.2% were males, and 59.3% were from the Dhaka division. They were studying in college, undergraduate or postgraduate levels in Bangladesh. Based on the pilot study, the form for the survey was modified to improve clarity. The pilot study followed the same ethical guidelines as described in the "Ethical consideration" section. The study was done by convenience sampling method and was self-reported. It may be affected by sampling bias and recall bias.

Sample size estimation

The minimum sample number was calculated using Slovin's formula. Considering the study population of 5.8 million students and a margin of error of 5%, the minimum number of samples required for the survey was 400.

Quantitative variables

The quantitative variables in this study were age, level of perceived stress, and level of depression.

Statistical analysis

The prevalence of stress and depression and the combination of the two were assessed by counting the observed percent of the cases by categorical variables of the covariates. The Chi-squared tests were performed to understand the significance of the distribution of covariates on media exposure, stress, depression, and a combination of stress and depression. Multinomial logistic regression analyses were used to assess the association between covariates and the levels of stress, depression, media exposure, and combinations of high stress with depression. Gender, age group, education level, status of part-time jobs, residence division, type of residence locality, and SRH were common independent factors (CIFs) for all multinomial logistic regression analyses. For assessing the association of stress with other factors, the CIF, media usage, and depression were considered independent variables, whereas stress was the dependent variable (outcome measure), and the reference category of stress was "low." For assessing the association of depression with other factors, the CIF, media usage, and stress were considered independent variables, whereas depression was the dependent variable, and the reference category of depression was "no." The association of media usage with other factors was assessed considering the CIF, stress, and depression as independent variables, whereas media usage was the dependent variable. The reference category of media usage was "low." The association of Coexistence of high stress and depression (CHSD) with other factors was assessed considering the CIF and media usage as the independent variables, whereas CHSD was the dependent variable. The reference category of CHSD was "no." The analyses were performed using IBM SPSS Statistics version 27.0.1.0 for Windows (New York, United States, IBM).

Ethical consideration

The adult students were contacted to contribute to this online survey by sharing links to the online form in student groups on social media platforms. For college students (as they are surely minors), their parents were reached out through messaging apps. The parents shared the links to their minor sons/daughters and filled out the parental consent form if they had no objections to their sons/daughters participating. For all participants, the first section of the survey contained informed consent or an informed parental consent form. The aim of the project was explained, and it was mentioned that any information that could reveal personal identity would not be collected. Rigorous data privacy protection was guaranteed. There was also a statement that gave freedom for prospective participants to skip the link obtained if they were not interested. There was no compulsion to distribute or fill out this online questionnaire. Freedom to withdraw from the study was mentioned. Before moving to the next section and filling out the questionnaire, adult participants were required to provide consent, whereas parental consent was required for participants aged 14 years to below 18 years. All sections of the online form were written in Bengali and English. This study protocol was approved by the Institutional Review Board of the North South University (OR-NSU/IRB/0111).

Results

Demographic and mental health profile of the participants

A total of 1721 responses were collected in this survey, among which 1377 students completed the online survey entirely and the rest were excluded from the study. Among them, 51.6% were male, the mean age was 20.8 ± 3.1 years, and most belonged to the age group of 18–21 years. Most were postgraduate students, residing in Dhaka division,

Table 1: Demographic and mental health profile of the participants

Attributes	Frequency (%) (*n*=1377)
Gender	
Male	710 (51.6)
Female	667 (48.4)
Age (years)	
Below 18	177 (12.9)
18–1	687 (49.9)
Above 21	513 (37.3)
Education	
College	118 (8.6)
Undergraduate	629 (45.7)
Postgraduate	630 (45.8)
Occupation	
Student	1179 (85.6)
Part-time jobs	198 (14.4)
Residence (division)	
Dhaka	893 (64.9)
Rangpur	281 (20.4)
Others	203 (14.7)
Locality	
Urban	1013 (73.6)
Rural	364 (26.4)
Self-rated health	
General/poor	688 (50.0)
Good	378 (27.5)
Very good/excellent	311 (22.6)
Media Usage	
Low	364 (26.4)
Average	348 (25.3)
Frequent	665 (48.3)
Stress	
Low	150 (10.9)
Moderate	885 (64.3)
High	342 (24.8)
Depression	
Yes	682 (49.5)
No	695 (50.5)

lived in urban areas, with general/poor SRH. Most students had moderate levels of stress, and nearly half of them had depression. Further details are given in Table 1.

Prevalence of stress and its association with other factors

The prevalence of moderate and high stress is shown in detail in Table 2. Univariate analysis showed that gender,

Table 2: Association of stress with other factors

Stress	Variables	Prevalence, frequency (%)	Chi-square test (*P*)	Multinomial logistic regression	
				AOR (CI)	*P*
Moderate	Gender				
	Male	495 (69.7)	<0.001	Base outcome	-
	Female	390 (58.5)		1.04 (0.67–1.61)	0.866
	Age group (years)				
	Below 18	132 (74.6)	<0.001	Base outcome	-
	18–21	405 (59.0)		0.67 (0.38–1.16)	0.151
	Above 21	348 (67.8)		2.54 (1.16–5.55)	0.020
	Education				
	Postgraduate	405 (64.3)	<0.001	Base outcome	-
	Undergraduate	426 (67.7)		1.21 (0.72–2.03)	0.470
	College	54 (45.8)		0.34 (0.17–0.66)	0.001
	Occupation				
	Student	760 (64.5)	<0.001	Base outcome	-
	Part-time jobs	125 (63.1)		0.04 (0.22–0.61)	<0.001
	Residence				
	Rangpur division	205 (73.0)	<0.001	Base outcome	-
	Dhaka division	548 (61.4)		1.23 (0.70–2.17)	0.468
	Others	132 (65.0)		0.94 (0.47–1.89)	0.868
	Locality				
	Urban	630 (62.2)	0.003	Base outcome	-
	Rural	255 (70.1)		1.38 (0.87–2.17)	0.169
	SRH				
	Good	237 (62.7)	<0.001	Base outcome	-
	General/poor	432 (62.8)		1.80 (1.13–2.87)	0.013
	Very good/excellent	216 (69.5)		0.76 (0.47–1.24)	0.276
	MU				
	Low	235 (64.6)	0.059	Base outcome	-
	Average	231 (66.4)		0.69 (0.41–1.18)	0.178
	Frequent	419 (63.0)		0.92 (0.57–1.48)	0.719
	Depression				
	Yes	363 (53.2)	<0.001	Base outcome	-
	No	522 (75.1)		0.33 (0.21–0.53)	<0.001
High	Gender				
	Male	125 (17.6)	<0.001	Base outcome	-
	Female	217 (32.5)		1.34 (0.80–2.25)	0.262
	Age group (years)				
	Below 18	18 (10.2)	<0.001	Base outcome	-
	18–21	186 (27.1)		2.14 (0.97–4.72)	0.060
	Above 21	138 (26.9)		5.39 (1.98–14.66)	0.001
	Education				
	Postgraduate	181 (28.7)	<0.001	Base outcome	-
	Undergraduate	128 (20.3)		0.70 (0.31–1.58)	0.695
	College	33 (28.0)		0.89 (0.49–1.62)	0.388
	Occupation				
	Student	306 (26.0)	<0.001	Base outcome	-
	Part-time jobs	36 (18.2)		0.38 (0.20–0.73)	0.003
	Residence				

Contd...

Table 2: Contd...

Stress	Variables	Prevalence, frequency (%)	Chi-square test (*P*)	Multinomial logistic regression	
				AOR (CI)	*P*
	Rangpur division	28 (10.0)	<0.001	Base outcome	-
	Dhaka division	267 (29.9)		4.28 (1.99–9.19)	<0.001
	Others	47 (23.2)		1.59 (0.65–3.91)	0.313
	Locality				
	Urban	276 (27.2)	0.003	Base outcome	-
	Rural	66 (18.1)		1.44 (0.82–2.54)	0.209
	SRH				
	Good	96 (25.4)	<0.001	Base outcome	-
	General/poor	205 (29.8)		2.03 (1.18–3.48)	0.011
	Very good/excellent	41 (13.2)		0.50 (0.27–0.95)	0.033
	MU				
	Low	96 (26.4)	0.059	Base outcome	-
	Average	69 (19.8)		0.43 (0.23–0.82)	0.010
	Frequent	177 (26.6)		0.89 (0.51–1.55)	0.671
	Depression				
	Yes	288 (42.2)	<0.001	Base outcome	-
	No	54 (7.8)		0.037 (0.02–0.06)	<0.001

The reference category of stress: Low. SRH: Self-rated health, MU: Media usage, AOR: Adjusted odd ratio, CI: 95% confidence interval

age group, education, occupation, residence, locality, SRH, and depression significantly impacted the stress level in the students. The results of a multivariate analysis reveal that certain factors increase the likelihood of students experiencing moderate to high stress levels. Specifically, students who are aged above 21 years, are not engaged in any part-time jobs, have general or poor SRH, or are suffering from depression are at significantly higher risk. This means that students who fall into these categories should take extra care to manage their stress levels. Further details are shown in Table 2.

Prevalence of depression and its association with other factors

The prevalence of depression is shown in detail in Table 3. Univariate analysis showed a significant impact of gender, residence, SRH, media usage, and stress on depression. According to the results of multivariate analysis, it was found that the odds of suffering from depression were significantly higher for females, students residing in the Rangpur division, those with general/poor SRH, low media usage, or high stress levels. In other words, the aforementioned factors were identified as strong predictors of depression. Further details are shown in Table 3.

Media usage frequency and its association with other factors

The prevalence of average to frequent media usage is shown in detail in Table 4. All factors except stress showed a significant impact on media usage in univariate analysis. The results of the multivariate analysis suggest that females, students who reported general/poor SRH, or who did not suffer from depression had a higher likelihood of being average or frequent media users. These findings provide valuable insights into the factors that influence media consumption habits, particularly among young people. Further details are shown in Table 4.

Coexistence of high stress and depression

According to the findings, the probability of experiencing CHSD were significantly higher in female students, those who are college students, those who reside in Dhaka, or those who have general or poor SRH. The adjusted odds of CHSD increased significantly as the age (grouped) of the students increased. Further details can be found in Table 5.

Discussion

This study aimed to evaluate the prevalence of stress and depression among Bangladeshi students studying in college to postgraduate levels over 1-year time period during the COVID-19 pandemic and to find the possible associations of these mental health conditions with their demographic profiles and media usage. It was found that being a female, aged above 21 years, being a low-frequency media user, having general/poor SRH, and having coexisting mental health conditions can significantly increase the chances of suffering from one or more mental health issues.

In this study, it was observed that the possibility of having depression and CHSD was significantly greater among females than males. The tendency to have high stress is also higher in females. Such tendency of females suffering more from mental health problems was similar to reports published on females of various countries, for example, Bangladesh,[21] Saudi Arabia,[22] Columbia,[1] and Poland.[23] The exact reason for the higher likelihood of females suffering from mental disorders is unknown, but societal customs, different roles, and some other factors are

Table 3: Association of depression with other factors

Depression	Variables	Prevalence, frequency (%)	Chi-square test (*P*)	Multinomial logistic regression	
				AOR (CI)	*P*
Yes	Gender				
	Male	314 (44.2)	<0.001	Base outcome	-
	Female	368 (55.2)		1.85 (1.39–2.45)	<0.001
	Age group (years)				
	Below 18	97 (54.8)	0.323	Base outcome	-
	18–21	335 (48.8)		0.71 (0.47–1.06)	0.095
	Above 21	250 (48.7)		0.96 (0.58–1.60)	0.880
	Education				
	Postgraduate	308 (48.9)	0.541	Base outcome	-
	Undergraduate	320 (50.9)		1.03 (0.74–1.44)	0.850
	College	54 (45.8)		0.89 (0.52–1.54)	0.694
	Occupation				
	Student	572 (48.5)	0.067	Base outcome	-
	Part-time jobs	110 (55.6)		1.39 (0.97–2.01)	0.076
	Residence				
	Rangpur division	163 (58.0)	<0.001	Base outcome	-
	Dhaka division	406 (45.5)		0.27 (0.18–0.41)	<0.001
	Others	113 (55.7)		0.53 (0.33–0.88)	0.013
	Locality				
	Urban	492 (48.6)	0.235	Base outcome	-
	Rural	190 (52.2)		0.89 (0.64–1.22)	0.454
	SRH				
	Good	169 (44.7)	<0.001	Base outcome	-
	General/poor	377 (54.8)		1.40 (1.04–1.88)	0.026
	Very good/excellent	136 (43.7)		1.17 (0.82–1.67)	0.396
	MU				
	Low	211 (58.0)	0.001	Base outcome	-
	Average	160 (46.0)		0.64 (0.45–0.91)	0.012
	Frequent	311 (46.8)		0.60 (0.45–0.81)	0.001
	Stress				
	Moderate	363 (41.0)	<0.001	Base outcome	-
	Low	31 (20.7)		0.34 (0.21–0.53)	<0.001
	High	288 (84.2)		9.49 (6.77–13.31)	<0.001

The reference category of depression: No. SRH: Self-rated health, MU: Media usage, AOR: Adjusted odd ratio, CI: 95% confidence interval

suggested.[24] Moreover, fluctuating levels of hormones in females are often linked to structural changes of the brain and associated with level of several mental health problems which are discussed in detail in these reviews.[25,26] In this study, it was also observed that the probability of more frequent media usage than a low media usage was significantly higher in females than males, which can be an effect of any one or several factors described above. Although the odds of suffering from depression are higher for low-media users, females who use media more frequently have higher odds of having depression. Further research on this issue is required to understand it in depth.

The possibility of experiencing high stress and CHSD increased with increasing age groups of the participants. The association was significant for both issues in above 21-year-old students. This result was similar to previously published reports.[27,28] Media usage for above 18-year-old students was higher compared to the students aged below 18 years, and no significant effect of age group on depression was observed. No clear association of education level on stress and depression was observed. However, the probability of higher media usage and to have CHSD was greater in college students. This was interesting as the probability of CHSD increased with age groups, whereas college was the lowest level (compared to undergraduate and postgraduate) that our participants were studying. This opposite association of stress with age groups and education level may be caused by students who are studying at lower education levels for their age groups due to difficult personal circumstances. However, further research is required to understand such a relationship.

Students with part-time jobs had a lower possibility of experiencing high stress and CHSD but a lower possibility

Table 4: Association of media usage with other factors

Media usage	Variables	Prevalence, frequency (%)	Chi-square test (*P*)	Multinomial logistic regression	
				AOR (CI)	*P*
Average	Gender				
	Male	149 (21.0)	<0.001	Base outcome	-
	Female	199 (29.8)		2.35 (1.65–3.36)	<0.001
	Age group (years)				
	Below 18	36 (20.3)	0.002	Base outcome	-
	18–21	192 (27.9)		2.61 (1.54–4.42)	<0.001
	Above 21	120 (23.4)		2.66 (1.38–5.10)	0.003
	Education				
	Postgraduate	146 (23.2)	<0.001	Base outcome	-
	Undergraduate	158 (25.1)		0.77 (0.51–1.17)	0.223
	College	44 (37.3)		3.07 (1.55–6.08)	0.001
	Occupation				
	Student	316 (26.8)	<0.001	Base outcome	-
	Part-time jobs	32 (16.2)		0.47 (0.28–0.76)	0.002
	Residence				
	Rangpur division	74 (26.3)	0.001	Base outcome	-
	Dhaka division	221 (24.7)		0.52 (0.31–0.86)	0.012
	Others	53 (26.1)		0.53 (0.29–0.98)	0.043
	Locality				
	Urban	255 (25.5)	0.001	Base outcome	-
	Rural	93 (25.5)		0.85 (0.58–1.25)	0.406
	SRH				
	Good	84 (22.2)	<0.001	Base outcome	-
	General/poor	201 (29.2)		2.07 (1.43–3.0)	< 0.001
	Very good/excellent	63 (20.3)		1.12 (0.71–1.78)	0.629
	Stress				
	Moderate	231 (26.1)	0.059	Base outcome	-
	Low	48 (32.0)		1.50 (0.89–2.54)	0.131
	High	69 (20.2)		0.60 (0.40–0.91)	0.017
	Depression				
	Yes	160 (23.0)	0.001	Base outcome	-
	No	188 (27.1)		1.55 (1.09–2.19)	0.014
Frequent	Gender				
	Male	332 (46.8)	<0.001	Base outcome	-
	Female	333 (49.9)		1.60 (1.18–2.18)	0.003
	Age group (years)				
	Below 18	74 (41.8)	0.002	Base outcome	-
	18–21	327 (47.6)		1.50 (0.97–2.32)	0.066
	Above 21	264 (51.5)		1.23 (0.71–2.13)	0.469
	Education				
	Postgraduate	342 (54.3)	<0.001	Base outcome	-
	Undergraduate	268 (42.6)		0.54 (0.38–0.78)	0.001
	College	55 (46.6)		1.22 (0.65–2.30)	0.531
	Occupation				
	Student	573 (48.6)	<0.001	Base outcome	-
	Part-time jobs	92 (46.5)		0.85 (0.58–1.24)	0.399
	Residence				
	Rangpur division	108 (38.4)	0.001	Base outcome	-
	Dhaka division	452 (50.6)		0.90 (0.57–1.42)	0.645
	Others	105 (51.7)		1.00 (0.58–1.72)	0.995

Contd...

Table 4: Contd...

Media usage	Variables	Prevalence, frequency (%)	Chi-square test (*P*)	Multinomial logistic regression	
				AOR (CI)	*P*
	Locality				
	Urban	515 (50.8)	0.001	Base outcome	-
	Rural	150 (41.2)		0.74 (0.53–1.04)	0.083
	SRH				
	Good	179 (47.4)	<0.001	Base outcome	-
	General/poor	337 (49.0)		1.56 (1.14–2.14)	0.006
	Very good/excellent	149 (47.9)		1.28 (0.88–1.87)	0.193
	Stress				
	Moderate	419 (47.3)	0.059	Base outcome	-
	Low	69 (46.0)		1.16 (0.72–1.87)	0.545
	High	177 (51.8)		0.99 (0.70–1.39)	0.952
	Depression				
	Yes	311 (45.6)	0.001	Base outcome	-
	No	354 (50.9)		1.66 (1.23–2.24)	< 0.001

The reference category of media usage: Low. SRH: Self-rated health, AOR: Adjusted odd ratio, CI: 95% confidence interval

Table 5: Factors affecting the coexistence of high stress with depression

CHSD	Variables	Prevalence, frequency (%)	Chi-square test (*P*)	Multinomial logistic regression	
				AOR (CI)	*P*
Yes	Gender				
	Male	101 (14.2)	<0.001	Base outcome	-
	Female	187 (28.0)		1.94 (1.43–2.64)	<0.001
	Age group (years)				
	Below 18	18 (10.2)	<0.001	Base outcome	-
	18–21	147 (21.4)		1.89 (1.05–3.42)	0.035
	Above 21	123 (24.0)		2.08 (1.07–4.03)	0.031
	Education				
	Postgraduate	156 (24.8)	<0.001	Base outcome	-
	Undergraduate	102 (16.2)		0.78 (0.55–1.10)	0.155
	College	30 (25.4)		1.17 (1.01–2.97)	0.048
	Occupation				
	Student	260 (22.1)	0.011	Base outcome	-
	Part-time jobs	28 (14.1)		0.83 (0.52–1.32)	0.431
	Residence				
	Rangpur division	19 (6.8)	<0.001	Base outcome	-
	Dhaka division	231 (25.9)		2.10 (1.18–3.74)	0.011
	Others	38 (18.7)		1.25 (0.64–2.41)	0.512
	Locality				
	Urban	243 (24.0)	<0.001	Base outcome	-
	Rural	45 (12.4)		0.71 (0.48–1.04)	0.078
	SRH				
	Good	72 (19.0)	<0.001	Base outcome	-
	General/poor	181 (26.3)		1.63 (1.18–2.25)	0.003
	Very good/excellent	35 (11.3)		0.72 (0.46–1.14)	0.156
	MU				
	Low	81 (22.3)	0.149	Base outcome	-
	Average	60 (17.2)		0.52 (0.34–0.76)	0.001
	Frequent	147 (22.1)		0.74 (0.53–1.03)	0.073

The reference category of CHSD: No. CHSD: Coexistence of high stress and depression, SRH: Self-rated health, MU: Media usage, AOR: Adjusted odd ratio, CI: 95% confidence interval

of being a frequent media user. Both relationships are logical and understandable. Earning additional money for their family during the economic crisis caused by the pandemic probably aided in reducing their stress, and they

would have less time to use/consume any media. However, previous (before the pandemic) studies on students in Ghana[29] and reports published on students in the United Kingdom[30] mentioned that students with part-time jobs experienced a higher level of stress compared to students doing no additional jobs. These opposing results indicate that the perception of stress may vary depending on the situation. An activity might seem like an added level of stress at one time, but the same activity might release stress at other times. Personal, cultural, and societal differences may also impact the perception of stress.

SRH had a similar effect on the adjusted odds of experiencing high stress and CHSD. Students with inferior SRH had higher odds of suffering from perceived stress and CHSD. Moreover, students with general/poor health had the highest odds of high media usage and to suffer from depression. The results were similar to previous studies.[16,31] Moreover, a study done in Sweden reported that poorer SRH is associated with endocrine changes and provides a biological perspective on the issue.[32] Therefore, SRH below good can be a strong predictor of the prognosis of mental health issues among Bangladeshi students.

Interestingly, higher media usage is found to be significantly associated with lesser odds of having depression. This finding is the opposite of the odds described by a study performed in China which showed a higher possibility of having depression as social media exposure was increased.[16] This could be attributed to the differences of perception of stress and depression between cultures, differences in the demographic profile of the population, and the differences in the types and contents of media consumed by the study populations. Therefore, further studies are needed to fully understand the trend observed in this study.

High perceived stress was found to have a significant association with depression. The adjusted odds of depression increases as the level of stress increases. Students with high perceived stress were found to have 9.49 times and 27.9 times higher probability to suffer from depression than students with moderate and low stress, respectively. Similar results are reported by previous studies.[33] Therefore, perceived stress can be a useful predictor to find students with mental health issues, and regular assessments should be performed.

Limitations

This study was limited by being a cross-sectional study done by convenience sampling method. The sample number was not huge, and data were self-reported and may be affected by many factors. It was not possible to verify that the participants actually fulfilled the inclusion and exclusion criteria as the study was done online during movement restrictions due to the COVID-19 pandemic. The participant's self-reported data had to be trusted. Some students below 18 years of age also participated in the study. Although the form involved a section to obtain consent from their parents, verifying who gave the consent was impossible as the study was done online. However, below 18 years old constitutes a large portion of university and college students, and therefore, understanding their mental health condition is necessary. Moreover, due to the commitment to participants' data privacy, no personal information was collected, and therefore, future data collection from the same participants after the pandemic and opening of in-person classes was not possible. The ratio of participating students in each education level was not similar, and participation beyond Dhaka and Rangpur districts was low. This study used WHO-5 to determine depression like a previously described study.[16] Although the WHO-5 scale has been recommended in several studies,[34,35] a more established method could be used to determine depression. However, this study revealed some important factors that may be considered predictors of the prognosis of mental health problems in Bangladeshi students. Further research on these factors should be done to validate them as prognostic indicators for mental health issues in students.

Conclusion

The present study identified some factors which can be possible indicators of the prognosis of mental health issues among Bangladeshi students. Moreover, the prevalence of high stress and depression and their combinations were observed among Bangladeshi students at an alarming level. Special care for female students might be necessary as they were found to suffer from stress, depression, and their combination higher than male students. This study may play an important role in predicting mental health issues at an early stage. It is evident from the study that many students will require counseling to battle their mental health issues. Educational institutions should establish mental health support facilities and conduct regular mental health assessments to aid in the well-being of the students.

Authors' contributions

The authors contributed to the manuscript as follows. Concepts (authors 1-8), design (authors 1, 2, 8), definition of intellectual content (authors 1-8), literature search (1, 2, 4-7), data acquisition (authors 4-7), data analysis (authors 1-3), statistical analysis (authors 1, 3), manuscript preparation (authors 1, 2), manuscript editing (authors 1-8), manuscript review (authors 1-8), guarantors (authors 1, 2, 8).

Data availability statement

The data supporting this study's findings are available on request from the corresponding author. The data are not publicly available due to ethical restrictions.

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Conflicts of interest

There are no conflicts of interest.

References

1. Pedrozo-Pupo JC, Pedrozo-Cortés MJ, Campo-Arias A. Perceived stress associated with COVID-19 epidemic in Colombia: An online survey. Cad Saude Publica 2020;36:e00090520.
2. Huremović D. Introduction. In: Psychiatry of Pandemics: A Mental Health Response to Infection Outbreak, Huremović D (ed). Springer International Publishing, New York, U.S.A. 2019. p. 1-6.
3. Zandifar A, Badrfam R. Iranian mental health during the COVID-19 epidemic. Asian J Psychiatr 2020;51:101990.
4. Badrfam R, Zandifar A. Stigma over COVID-19; new conception beyond individual sense. Arch Med Res 2020;51:593-4.
5. Zahangir MS, Rokonuzzaman M. Depression, anxiety and stress among people infected with COVID-19 in Dhaka and Chittagong cities. Heliyon 2022;8:e10415.
6. Zandifar A, Badrfam R, Mohammadian Khonsari N, Mohammadi MR, Asayesh H, Qorbani M. Prevalence and associated factors of posttraumatic stress symptoms and stigma among health care workers in contact with COVID-19 patients. Iran J Psychiatry 2020;15:340-50.
7. Santomauro DF, Herrera AM, Shadid J, Zheng P, Ashbaugh C, Pigott DM, *et al*. Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID 19 pandemic. Lancet 2021;398:1700-12.
8. Fink G. Stress: definition and history. In: Stress science: neuroendocrinology, Fink G (ed). Elsevier Inc., Oxford, U.K. 2010;9:3-14.
9. Scott SB, Graham-Engeland JE, Engeland CG, Smyth JM, Almeida DM, Katz MJ, *et al.* The effects of stress on cognitive aging, physiology and emotion (ESCAPE) project. BMC Psychiatry 2015;15:146.
10. Cohen S, Janicki-Deverts D, Miller GE. Psychological stress and disease. JAMA 2007;298:1685-7.
11. Khan AH, Sultana MS, Hossain S, Hasan MT, Ahmed HU, Sikder MT. The impact of COVID-19 pandemic on mental health and wellbeing among home-quarantined Bangladeshi students: A cross-sectional pilot study. J Affect Disord 2020;277:121-8.
12. Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations. Gen Psychiatr 2020;33:e100213.
13. Sultana F, Reza HM. Are SAARC countries prepared to combat COVID-19 to save young, working-age population? AIMS Public Health 2020;7:440-9.
14. Khan MM, Rahman ST, Islam ST. Online education system in Bangladesh during COVID 19 pandemic. Creative Education 2021;12:441-52.
15. Uddin M. Effects of the Pandemic on the Education Sector in Bangladesh. The Financial Express. Available from: https://thefinancialexpress.com.bd/views/effects-of-the-pandemic-on-the-education-sector-in-bangladesh-1592061447. [Last accessed on 2020 Jun 13].
16. Gao J, Zheng P, Jia Y, Chen H, Mao Y, Chen S, *et al.* Mental health problems and social media exposure during COVID-19 outbreak. PLoS One 2020;15:e0231924.
17. Cohen S, Williamson GM. Perceived stress in a probability sample of the United States. In: The Social Psychology of Health. Spacapan S., Oskamp S. (eds.). Sage Publications Inc, California, U.S.A. 1988. p. 31-67.
18. Taylor JM. Psychometric analysis of the ten-item perceived stress scale. Psychol Assess 2015;27:90-101.
19. World Health Organization. Regional Office for E. Wellbeing Measures in Primary Health care/the DepCare Project: Report on a WHO Meeting: Stockholm, Sweden 1998;12-13. Available from: https://iris.who.int/handle/10665/349766. [Last accessed on 2023 Aug 07].
20. Faruk MO, Alam F, Chowdhury KU, Soron TR. Validation of the bangla WHO-5 well-being index. Glob Ment Health (Camb) 2021;8:e26.
21. Chowdhury U, Suvro MA, Farhan SM, Uddin MJ. Depression and stress regarding future career among university students during COVID-19 pandemic. PLoS One 2022;17:e0266686.
22. AlAteeq DA, Aljhani S, AlEesa D. Perceived stress among students in virtual classrooms during the COVID-19 outbreak in KSA. J Taibah Univ Med Sci 2020;15:398-403.
23. Debowska A, Horeczy B, Boduszek D, Dolinski D. A repeated cross sectional survey assessing university students' stress, depression, anxiety, and suicidality in the early stages of the COVID 19 pandemic in Poland. Psychol Med 2020;15:1-4.
24. Kiely KM, Brady B, Byles J. Gender, mental health and ageing. Maturitas 2019;129:76-84.
25. Rehbein E, Hornung J, Sundström Poromaa I, Derntl B. Shaping of the female human brain by sex hormones: A review. Neuroendocrinology 2021;111:183-206.
26. Wieczorek K, Targonskaya A, Maslowski K. Reproductive hormones and female mental wellbeing. Women. 2023;3:432-44.
27. WHO. The Health Behavior in School-Aged Children (HBSC) (2005/2006) Survey School Report; 2006. Available from: https://www.nichd.nih.gov/sites/defaultfiles/publications/pubs/documents/HBSC-2005_2006-Final.pdf. [Last accessed on 2023 Jul 05].
28. Wahed WY, Hassan SK. Prevalence and associated factors of stress, anxiety and depression among medical Fayoum university students. Alexandria Journal of Medicine 2017;53:77-84.
29. Taylor ME, Owusu Banahene NO. Stress among part time business students: A study in a Ghanaian university campus. IFE Psychologia: An International Journal 2010;18:112-29.
30. Group US. Unite Student Living Report. Available from: https://www.unite group.co.uk/sites/default/files/2017 03/student living report 2004.pdf. [Last accessed on 2023 Nov 09].
31. Ambresin G, Chondros P, Dowrick C, Herrman H, Gunn JM. Self-rated health and long-term prognosis of depression. Ann Fam Med 2014;12:57-65.
32. Halford C, Anderzén I, Arnetz B. Endocrine measures of stress and self-rated health: A longitudinal study. J Psychosom Res 2003;55:317-20.
33. Cristóbal-Narváez P, Haro JM, Koyanagi A. Perceived stress and depression in 45 low- and middle-income countries. J Affect Disord 2020;274:799-805.
34. Krieger T, Zimmermann J, Huffziger S, Ubl B, Diener C, Kuehner C, *et al.* Measuring depression with a well-being index: Further evidence for the validity of the WHO well-being index (WHO-5) as a measure of the severity of depression. J Affect Disord 2014;156:240-4.
35. Garland AF, Deyessa N, Desta M, Alem A, Zerihun T, Hall KG, *et al.* Use of the WHO's perceived well-being index (WHO-5) as an efficient and potentially valid screen for depression in a low income country. Fam Syst Health 2018;36:148-58.