Research Article

Determinants of Generalized Anxiety, Depression, and Subjective Sleep Quality among University Students during COVID-19 Pandemic in Bangladesh

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ABSTRACT

The aim of this study was to determine the risk factors associated with generalized anxiety, depression, and subjective sleep quality among university students during the Coronavirus Disease 2019 (COVID-19) pandemic in Bangladesh. Data for this web-based cross-sectional study were collected from 1317 university students from 49 universities using a self-administered e-questionnaire in the last week of April 2020. Findings suggest that university students have been experiencing heightened generalized anxiety (51%), depression (45.9%), and poor subjective sleep quality (27.1%). Results also indicate that university students were severely frightened about COVID-19. The severity of fear and geographical locations were the key determinants in shaping the state of mind as well as subjective sleep quality of university students. It is, therefore, strongly recommended to initiate not only effective strategies to reduce the transmission of COVID-19 but also a strict monitoring mechanism to detect the presence of mental ailments among university students, and to offer necessary supports through family, community, and institutional agencies to curb psychological problems, especially during this unprecedented health emergency.

1. INTRODUCTION

In December 2019, the novel Coronavirus Disease 2019 (COVID-19), which originated in Wuhan, the capital of Hubei province, China, spread around the world, forcing the World Health Organization (WHO) to recognize this unanticipated health emergency as a global pandemic on March 11, 2020 [1]. Like the high case-fatality rate of its predecessors, Severe Acute Respiratory Syndrome (SARS) in 2002 and Middle East Respiratory Syndrome (MERS) in 2012 [2], the New Coronavirus, has also become a global challenge in the absence of specific antidotes or vaccines. As of November 17, 2020, more than 53 million people have been infected worldwide, and about 1.3 million individuals have died, mostly in the Americas and Europe [3].

International communities across the globe have been mobilizing different strict antiepidemic preventive measures to contain "human-to-human" transmission in the absence of effective vaccines or antiviral drugs [4,5]. These include shutting down both administrative and educational institutions, closing the transit system and public spaces, and introducing online/distant learning for students and "work from home" for employees [5–7]. Moreover, governments are also trying to improve public awareness through different strategic interventions, such as providing daily updates on mass media, to encourage people to practice "social distancing" and "home staying" [7–9]. Although some countries relied initially on "herd immunity" [10], later on attention was given to development of effective vaccines for treating infected individuals and people at risk [11]. Some COVID-19 vaccines currently undergoing clinical trials show promising outcomes; however, scientific uncertainties as well as the possible unavailability and unequitable access to low- and middle-income countries continue to revolve around these vaccines [4,12]. Thus, experts have been emphasizing the use of nontherapeutic interventions to minimize the spread of COVID-19 [4,5,12]. However, prolonged isolation in the form of quarantine and social distance generates a sense of isolation, stigmatization, and deprivation, and subsequently produces the symptoms of anxiety and depression [13–17], especially among students as they were found to be at higher risk of developing mental health problems during SARS in China [18]. Their increased exposure to mass media [8,9] with daily updates of new infections and fatalities is also amplifying anxiety and fear [19,20].

Studies found that the combination of anxiety and fear profoundly affects sleep quality [21–24], particularly among the younger population [24–26]. It is important to note that the impact of an outbreak of infectious diseases on mental health problems may exist even after the end of an epidemic, as evidenced from SARS and MERS cases [27,28], and may adversely affect the psychological adjustments of students [18].

Since the beginning of the COVID-19 pandemic, the mental health problems of people, including infected, suspected, and noninfected individuals, has been measured systematically both at individual and social levels in different countries [29–31] to reduce "moral panic" and to devise effective measures for the mental well-being of people [6,8,9,32,33], especially students [33–36]. However, people are worried about getting infected if they interact with others, and such discernment—the by-product of an ongoing pandemic—has been increasing anxiety, depression, and stress among people [37]. Studies suggest the presence of heightened fear, anxiety, and stress in the general population during health emergencies [27,38], and these negative emotional and mental health settings adversely affect the sleep quality of the public [21,25], particularly university students [39]. Thus, a systematic and holistic approach to address mental health issues and associated risk factors could be an effective way of implementing targeted interventions to reduce panic among the mass population and to boost resilience [40]. For example, the active psychological interventions in China during the SARS epidemic in 2002 proved to be an effective mechanism to reduce mental stress [41]. Hence, this study was designed to address the mental health issues of university students in the present context of the COVID-19 pandemic. In this background, the main objectives of this paper were to measure the presence of anxiety, depression, and sleep quality among university students in Bangladesh, and to identify their determinants. The outcome is to prescribe coping strategies for policymakers to improve the overall mental health conditions of students, and the general population at large, in Bangladesh.

2. MATERIALS AND METHODS

2.1. Participants and Data Collection Procedures

Before the countrywide lockdown, all educational institutions in Bangladesh were initially closed from March 18, 2020 until the end of the month, and later extended up to the end of May, 2020. Hence, this web-based cross-sectional study was carried out in the last week of April 2020, from April 22 until April 30, 2020. Moreover, to comply with the WHO recommendation for "social distancing" (i.e., avoiding face-to-face contact with potential participants), we opted to use e-questionnaire. The target population consisted of university students in Bangladesh, and based on specific criteria, for example, (1) a Bangladeshi and (2) enrolled in a public or private university. A total of 1365 anonymous responses from 49 universities across the country were received. The participants were recruited via an online survey through their Facebook account using the widely used Google form. From the initial batch of responses, 1317 responses were deemed suitable for use in this study after a thorough scrutiny.

2.2. Ethical Issues

This study was conducted in accordance with the Declaration of Helsinki, and formal ethical approval was granted from the Ethical Clearance Committee of Khulna University, Khulna, Bangladesh. The participants responded to this online survey by filling up a written informed consent letter in the first section of the e-questionnaire. All participants, responding anonymously to the e-questionnaire, were provided with information concerning the research purpose, confidentiality of information, and right to revoke participation without prior justification in the consent form.

2.3. Variables

2.3.1. Basic characteristics

A range of factors was included in this study, such as age, sex, enrolled program, place of residence, division (the principal administrative territory in Bangladesh), and the 4-Point Fear of COVID-19 Scale (4P-FCV-19S), based on previous studies [8,29,34]. Furthermore, religion, relationship status, marital status, and type of university were included so we could understand their influence on the extent of anxiety, depression, and sleep quality during the COVID-19 pandemic in Bangladesh.

2.3.2. Fear

We used the 4P-FCV-19S, developed from the FCV-19S by Ahorsu et al. [29], to measure fear experienced by university students. The original FCV-19S, a seven-item unidimensional scale, used 5-point Likert-type responses, in which higher scores signified greater fear. In the self-reporting 4P-FCV-19S, we used the seven-item unidimensional construct. However, it was measured on a 4-point Likert-type response, excluding "neither agree nor disagree," and the score ranged from 0 (strongly disagree) to 3 (strongly agree). We conducted a Confirmatory Factor Analysis (CFA). Following a Principal Component Analysis (PCA) by varimax rotation, the preliminary sampling adequacy analysis was satisfactory, with a Kaiser–Meyer–Olkin (KMO) value of 0.890 and Bartlett's test of sphericity was significant as well ($\chi^2_{120} = 3658.112_{21}$, $p < 0.000$). The PCA results suggest a single construct, accounting for 55.45% of the total variance. Subsequently, a CFA was executed to verify the coherence of the single construct. The seven items were validated by assessing the Construct Reliability (CR) as well as the Average Variance Extracted (AVE). The results, obtained from CFA, were satisfactory: root mean square error of approximation = 0.045 < 0.060; standardized root mean square residual = 0.014 < 0.080; and Comparative Fit Index (CFI) = 0.996 < 0.950 [42,43]. The internal consistency ($\alpha = 0.865$), CR (0.86), and AVE (0.47) of the unidimensional measurement of 4P-FCV-19S were satisfactory and within the threshold [44–46]. The responses of 4P-FCV-19S were recoded into "not afraid," "moderately afraid," and "severely afraid."

2.3.3. Generalized anxiety

Previous COVID-19-related studies have measured the anxiety by different instruments, including Generalized Anxiety

Disorder Scale-7 (GAD-7) [8,9,34], Coronavirus Anxiety Scale [30], Short Health Anxiety Inventory [31], and Hospital Anxiety and Depression Scale [29]. A few have assessed the variability of different instruments to predict the nature and extent of anxiety [47,48]. In this study, however, we measured anxiety using GAD-7 [49]. The self-reporting GAD-7 consisted of seven items assessing the prevalence of anxiety symptoms over the past 2 weeks. On a 4-point scale, including "not at all" (score = 0), "several days" (score = 1), "more than half of the days" (score = 2), and "nearly every day" (score = 3); the total score ranged from 0 to 21. The presence of anxiety symptoms was calculated by a total score of 10 or greater, with a higher score indicating the existence of severe anxiety [9,49]. The Cronbach α in this study was 0.87.

2.3.4. Depression

We assessed the depression by the WHO Five Well-Being Index (WHO-5) [50]. The self-reporting WHO-5 contained five items, with a 6-point scale ranging from 5 ("all the time") to 0 ("at no time"), reflecting the presence or absence of well-being. The total score ranged from 0 to 25, and a summed score lower than 13 indicates depression among the participants [8,9,50]. In this study, the Cronbach α was 0.88.

2.3.5. Subjective sleep quality

The Pittsburgh Sleep Quality Index (PSQI) was developed by Buysse et al. [51]. The self-reporting PSQI, which consists of seven components with a total of 24 questions, assesses the quality of sleep during the previous month. Each element has its own unique score, ranging from 0 to 3, with higher points signifying poor subjective sleep quality. In this study, we used only the first component of PSQI—"subjective sleep quality"—on a 4-point scale: "very good," "fairly good," "fairly bad," and "very bad," scored as 0, 1, 2, and 3. The responses were recoded into "good" ("very good" and "fairly good") and "bad" ("fairly bad" and "very bad").

2.4. Statistical Analysis

Data were analyzed in three consecutive stages (see Data Repository) using SPSS version 20 (SPSS Inc., Chicago, IL, USA) and AMOS version 23 (IBM, Armonk, NY, USA). First, CFA was performed to validate the 4P-FCV-19S. Second, Pearson's Chi-square (χ^2) test of independence was performed in bivariate analysis to measure the association of explanatory variables with anxiety, depression, and sleep quality at a 5% level of significance. Finally, the multivariable logistic regression model was performed considering the variables found statistically significant in Pearson's χ^2 test. Findings were shown using the Adjusted Odds Ratio (AOR) with 95% confidence intervals (95% CI).

3. RESULTS

3.1. Basic Characteristics

Table 1 illustrates the characteristics of participants. Among the participants, 61.2% were from the age group of 21–24 years, and the average age was 22.1 (standard deviation, ±2.2) years. Nearly 60% of the participants were male, and nine out of 10 students were Muslims (86.7%) and not engaged in any relationship (84.5%). Less than 10% of all participants were married. Two-thirds of the students lived in urban areas (64.1%), and about half of them (46.4%) were from the Khulna division. Among the participants, 64.1% were enrolled in undergraduate programs, mostly in public universities (87.5%). Three out of five students were experiencing FCV-19 in Bangladesh.

3.2. Prevalence of Anxiety, Depression, and Sleep Quality among University Students

Table 1 also shows the prevalence of anxiety, depression, and subjective sleep quality among university students in Bangladesh. The overall prevalence of anxiety, depression, and poor subjective sleep quality was 51%, 45.9%, and 27.1%, respectively. In case of anxiety, the prevalence of anxiety was almost the same among various age groups and religious sects. By contrast, anxiety was higher among females (54.4%) and "single" (52.4%) students than among those who are involved in any type of relationship. Likewise, anxiety was highly prevalent among students from the Khulna division (56.1%), and those who were severely frightened of COVID-19 (80.5%). For depression, students in the 21–24 (48.5%) years age group were more depressed than their older and younger counterparts. Female students suffered from greater depression (51.5%) than males. Interestingly, students from public universities showed a higher rate of depressive symptoms (47.3%) than those who attended private universities. Moreover, FCV-19 played a critical role as the severity of depression was higher among students with greater fear of the pandemic (56.4%). In case of sleep quality, apparently older (32%) and female (31.6%) students experienced poor subjective sleep quality during the COVID-19 pandemic than their younger and male counterparts, respectively. Likewise, subjective sleep quality tends to be poorer for urban students (29.9%) and students enrolled in graduate and postgraduate programs (28%). Like anxiety and depression, poor subjective sleep quality was more prevalent among students who were severely terrified of the COVID-19 pandemic (43%) than those who felt moderate or no fear.

In addition, Table 1 also shows the association of anxiety, depression, and sleep quality with various explanatory factors. Findings indicate that sex ($p = 0.035$), relationship status ($p = 0.021$), division ($p = 0.004$), and 4P-FCV-19S ($p < 0.001$) were significantly associated with anxiety. Meanwhile, age ($p < 0.001$), sex ($p = 0.033$), type of university ($p = 0.005$), and 4P-FCV-19S ($p < 0.001$) had a statistically significant influence on the prevalence of depression among university students. Finally, results suggest that age ($p = 0.050$), sex ($p = 0.002$), place of residence ($p = 0.003$), enrolled program ($p = 0.004$), and 4P-FCV-19S ($p < 0.001$) significantly explained the sleep quality of students.

3.3. Multivariate Analysis

From the bivariate analysis, the significant factors of at least one case of anxiety or depression or poor subjective sleep quality were considered to present unadjusted effects of different independent variables. In multivariate analysis, the binary logistic regression models were carried out to identify the adjusted effect of the

Table 1 | Prevalence of anxiety, depression and sleep quality among university students

Variables	n	%	Anxiety			Depression			Sleep quality		
			n	%	p	n	%	p	n	%	p
Overall	1317	100	672	51.0		604	45.9		357	27.1	
Age (in years)											
≤20	333	25.3	171	51.4		144	43.2		75	22.5	
21–24	806	61.2	412	51.1	0.955	391	48.5	<0.001	225	27.9	0.050
≥25	178	13.5	89	50.0		69	38.8		57	32.0	
Sex											
Male	766	58.2	372	48.6	0.035	320	41.8	0.033	183	23.9	0.002
Female	551	41.8	300	54.4		284	51.5		174	31.6	
Religious identity											
Muslim	1142	86.7	581	50.9	0.782	515	45.1	0.154	312	27.3	0.656
Others	175	13.3	91	52.0		89	50.9		45	25.7	
Relationship status											
Single	1113	84.5	583	52.4	0.021	506	45.5	0.497	294	26.4	0.187
In a relationship	204	15.5	89	43.6		98	48.0		53	26.0	
Marital status											
Unmarried	1243	94.4	640	51.5	0.168	573	46.1	0.481	332	26.7	0.184
Married	74	5.6	32	43.2		31	41.9		25	33.8	
Place of residence											
Rural	473	35.9	248	52.4	0.445	201	42.5	0.066	105	22.2	0.003
Urban	844	64.1	424	50.2		403	47.7		252	29.9	
Division											
Barishal	28	2.1	11	39.3		14	50.0		8	28.6	
Chattogram	169	12.8	71	42.0		82	48.5		42	24.9	
Dhaka	247	18.8	121	49.0		112	45.3		74	30.0	
Khulna	611	46.4	343	56.1	0.004	281	46.0	0.793	183	30.0	0.058
Mymensingh	64	4.9	35	54.7		23	35.9		11	17.2	
Rajshahi	117	8.9	59	50.4		57	48.7		26	22.2	
Rangpur	70	5.3	30	42.9		30	42.9		11	15.7	
Sylhet	11	0.8	2	18.2		5	45.5		2	18.2	
Enrolled program											
Undergraduate	846	64.2	431	50.9	0.938	398	47.0	0.157	225	26.6	0.004
Graduate and postgraduate	471	35.8	241	51.2		206	43.7		132	28.0	
Type of university											
Public	1152	87.5	587	51.0	0.893	545	47.3	0.005	304	26.4	0.121
Private	165	12.5	85	51.5		59	35.8		53	32.1	
4P-FCV-19S											
Not afraid	184	14.0	43	23.4		54	29.3		33	17.9	
Moderately afraid	784	59.5	348	44.4	<0.001	353	45.0	<0.001	174	22.2	<0.001
Severely afraid	349	26.5	281	80.5		197	56.4		150	43.0	

explanatory variables. The odds ratio measured the adjusted effect of the independent variables along with a 95% CI after controlling for the effects of all other explanatory variables.

3.3.1. Determinants of anxiety

Table 2 presents the findings of the multivariate analysis of anxiety. The results showed that several factors, such as relationship status, division, and FCV-19, were the most significant determinants of anxiety among university students in Bangladesh. Results revealed that students involved in a relationship had higher adjusted odds of anxiety (AOR = 0.68; 95% CI, 0.49–0.96; p = 0.026) than those with "single" relationship status. Among seven administrative divisions, students from Chattogram, Dhaka, Khulna, Rajshahi, Rangpur, and Sylhet had 0.32 (95% CI, 0.19–0.52; p < 0.001), 0.47 (95% CI,

0.30–0.74; p = 0.001), 0.50 (95% CI, 0.34–0.75; p = 0.001), 0.46 (95% CI, 0.27–0.78; p = 0.004), 0.32 (95% CI, 0.17–0.60; p < 0.001), and 0.15 (95% CI, 0.03–0.75; p = 0.021) times lower odds of anxiety than those from Barishal. Furthermore, students who were moderately and severely afraid of COVID-19 were 2.06 (95% CI, 1.47–2.88; p < 0.001) and 10.39 (95% CI, 6.88–15.68; p < 0.001) times more likely to develop anxiety, respectively, than those who were not afraid at all.

3.3.2. Determinants of depression

Table 2 demonstrates the level depression among university students of Bangladesh. The results reveal that division, type of university, and FCV-19 have a significant impact on depression. Students from private universities were 0.58 times (95% CI, 0.40–0.83; p = 0.003) less likely to be depressed than those enrolled in public

Table 2 | Binary logistic regression analysis of anxiety, depression, and sleep quality and their predictors

Variables	Anxiety				Depression				Poor subjective sleep quality			
	AOR	95% CI for AOR		*p*	AOR	95% CI for AOR		*p*	AOR	95% CI for AOR		*p*
		Lower	Upper			Lower	Upper			Lower	Upper	
Age (years)												
≤20												
21–24	0.93	0.71	1.23	0.617	1.22	0.94	1.60	0.137	1.18	0.87	1.60	0.291
≥25	1.00	0.64	1.57	0.991	0.91	0.59	1.39	0.654	1.60	1.01	2.56	0.049
Sex												
Male												
Female	0.99	0.77	1.28	0.949	1.23	0.97	1.55	0.095	1.22	0.93	1.59	0.149
Relationship status												
Single												
In a relationship	0.68	0.49	0.96	0.026	1.09	0.80	1.50	0.584	1.07	0.76	1.52	0.703
Place of residence												
Rural												
Urban	0.95	0.74	1.22	0.667	1.23	0.97	1.56	0.092	1.27	0.97	1.67	0.088
Division												
Barishal												
Chattogram	0.32	0.19	0.52	<0.001	0.41	0.26	0.66	<0.001	0.19	0.11	0.33	<0.001
Dhaka	0.47	0.30	0.74	0.001	0.38	0.24	0.59	<0.001	0.23	0.14	0.37	<0.001
Khulna	0.50	0.34	0.75	0.001	0.39	0.26	0.57	<0.001	0.21	0.14	0.32	<0.001
Mymensingh	0.55	0.29	1.02	0.058	0.27	0.14	0.49	<0.001	0.12	0.06	0.26	<0.001
Rajshahi	0.46	0.27	0.78	0.004	0.43	0.26	0.71	0.001	0.18	0.10	0.32	<0.001
Rangpur	0.32	0.17	0.60	<0.001	0.36	0.20	0.65	0.001	0.11	0.05	0.23	<0.001
Sylhet	0.15	0.03	0.75	0.021	0.42	0.12	1.48	0.179	0.17	0.04	0.84	0.03
Enrolled program												
Undergraduate												
Graduate and post-graduate	0.99	0.76	1.30	0.964	0.86	0.66	1.11	0.246	0.91	0.68	1.22	0.538
Type of university												
Public												
Private	0.90	0.62	1.30	0.561	0.58	0.40	0.83	0.003	1.17	0.80	1.72	0.41
4P-FCV-19S												
Not afraid												
Moderately afraid	2.06	1.47	2.88	<0.001	1.67	1.20	2.32	0.002	0.92	0.64	1.32	0.64
Severely afraid	10.39	6.88	15.68	<0.001	2.66	1.84	3.85	<0.001	2.45	1.65	3.64	<0.001

universities. Among the seven administrative divisions, the odds of depression in students who hail from Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, and Rangpur were 0.41 (95% CI, 0.26–0.66; *p* < 0.001), 0.38 (95% CI, 0.34–0.59; *p* < 0.001), 0.39 (95% CI, 0.26–0.57; *p* < 0.001), 0.27 (95% CI, 0.14–0.49; *p* < 0.001), 0.43 (95% CI, 0.26–0.71; *p* = 0.001), and 0.36 (95% CI, 0.20–0.65; *p* = 0.001) times lower than those from Barishal division. Meanwhile, students who were moderately and severely afraid of COVID-19 were 1.67 (95% CI, 1.20–2.32; *p* = 0.002) and 2.66 (95% CI, 1.84–3.85; *p* < 0.001) times more likely to experience depression, respectively, than those who were not afraid.

3.3.3. Determinants of poor subjective sleep quality

Table 2 presents the determinants of poor subjective sleep quality among Bangladeshi students. Various factors, such as age, division, and FCV-19, had a significant impact on poor subjective sleep quality. Older students (≥25 years old) were 1.60 times (95% CI, 1.01–2.54; *p* = 0.049) more likely to experience poor subjective

sleep quality than those from the younger age cohort. Students who lived in Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet had 0.19 (95% CI, 0.11–0.33; *p* < 0.001), 0.23 (95% CI, 0.14–0.37; *p* < 0.001), 0.21 (95% CI, 0.14–0.32; *p* < 0.001), 0.12 (95% CI, 0.06–0.26; *p* < 0.001), 0.18 (95% CI, 0.10–0.32; *p* < 0.001), 0.11 (95% CI, 0.05–0.23; *p* < 0.001), and 0.17 (95% CI, 0.04–0.84; *p* = 0.030) times lower odds of poor subjective sleep quality compared with the students from Barishal division. The odds of poor subjective sleep quality among severely afraid students were 2.45 times (95% CI, 1.65–3.64; *p* < 0.001) higher compared with those who were not afraid of the COVID-19 pandemic.

4. DISCUSSION

This study aimed to identify the prevalence of anxiety, depression, and subjective sleep quality among university students in Bangladesh and determine the factors contributing to the presence of anxiety and depression symptoms and changes in sleep quality during the COVID-19 pandemic. Findings reveal that symptoms of anxiety (51%) and depression (45.9%) were on the rise among

university students, whereas sleep quality has been decreasing as more than 27.1% of students were experiencing poor subjective sleep quality. The nationwide survey on mental health in Bangladesh suggests that the prevalence of anxiety, depression, and poor subjective sleep quality was 6.7%, 4.5%, and 0.9%, respectively [52]. The extraordinary increase of anxiety, depression, and poor subjective sleep quality during health emergencies is not uncommon. Previous studies often reported heightened mental health problems among people of different cohorts during and after epidemics [53–57] and the recent pandemic around the world [9,29–31,33,34,58].

Further findings indicate that symptoms of anxiety and depression, along with poor subjective sleep quality, were strongly related to division—the principal administrative regions in Bangladesh. Students from all administrative divisions, with some exceptions, showed symptoms of anxiety, depression, and poor subjective sleep quality. In a similar vein, Yang et al. [35], in a study conducted on Chinese university students, observed that students from all provinces in China, irrespective of "severity of the risk," showed similar symptoms of anxiety and fear as a result of "mass hysteria" [59]. Other studies associated heightened mental health problems with proximity of an epicenter of an outbreak [6,8,34,60]. There is no denying that health systems around the world are getting overwhelmed with increased demands for necessary health assistance, especially for COVID-19 patients. Hence, limited health facilities, together with unmet needs, especially for people at higher risk, propel widespread panic among general populations. In Bangladesh, the government implemented a countrywide lockdown and adopted a public campaign of social distancing as well as respiratory and hand hygiene. Nevertheless, the limited number of healthcare facilities designated for treatment of infected patients together with the insufficient number of testing centers, and shortage of test kits and Personal Protective Equipment (PPE) for front-line personnel (e.g., like healthcare professionals) are contributing to the surge of infections in Bangladesh [61], and to greater panic in the general population, particularly among university students. Studies have indicated that students often experience serious mental health problems during public health emergencies [34,36,62,63].

Another factor adversely affecting anxiety, depression, and sleep quality of university students in Bangladesh was fear, measured by 4P-FCV-19S. Previous studies addressing the psychological impact of the large-scale epidemic suggest that people, both infected and noninfected, who are suffering from fear of diseases are highly susceptible to prolonged mental health problems [18,57]. The "info-demic" overload through mass media is also influencing the nature and magnitude of mental health issues, including fear, during epidemics and pandemics [8,9,64]. As in many other countries, the people of Bangladesh were well informed about the outbreak of COVID-19 and the declaration of the pandemic through mainstream mass media. Studies suggest that exposure to mass media during medical health emergencies may have a positive influence on forming risk perceptions [65]. However, overwhelming negative information during lockdown also amplifies mass panic among people regarding the disease itself and generates stigmatization as well as discrimination against the infected, the suspected, and the people at risk of infection because of the intense uncertainty [14,66–69]. Stigmatization during and after the crisis may lead to suicidal behavior in certain individuals, as studies reported increased suicide rate during various health emergencies, such as the great influenza epidemic of 2018 [57], SARS epidemic in 2003 [70], and even the current pandemic [66–69].

Findings of this study show that university type has a significant influence on the presence of depression among university students in Bangladesh during the COVID-19 pandemic. Students from public universities were more susceptible to depression than their counterparts in private universities during the pandemic. Previous studies tracing depression among university students in Bangladesh suggest that the likelihood of depression is higher among students from lower socioeconomic background than students from higher socioeconomic families [71] largely because of strained financial conditions as well as uncertainty over their future career [72]. Needless to say, private universities in Bangladesh are "profit-making" institutions that commercialized education by fixing unrestrained, high tuition fees [73,74], thus making it difficult for middle- or lower-income families to send their children to private universities. During the pandemic, their struggle has worsened even further as preventive interventions, such as lockdown and home quarantine, have disrupted the financial and production activities of small and medium business enterprises [75], compelling family members to get engaged in odd jobs, intensifying mental health problems [76] and sometimes leading to self-destructive activities such as self-harm and suicide [66,69].

The validity of these observations is subjected to various issues. For example, data were collected quickly within a week. However, the participants' further experiences over the coming weeks would bring greater clarity about the phenomenon reported here. Self-rating scales were used for assessing generalized anxiety, depression, subjective sleep quality, as well as fear. Hence, the risk of false judgment and biases of social desirability cannot be denied. This study, which is cross-sectional in nature, might not accurately explain the causal relation between anxiety, depression, and subjective sleep quality with explanatory factors. Furthermore, data were collected from a small population sample using Facebook, covering only university students, and may not be generalized to other settings and populations. A nationwide, large-scale study would present different experiences and issues. Therefore, systematic longer follow-up studies are recommended to determine the impact of COVID-19 on the mental health of the public, including the younger population in Bangladesh.

5. CONCLUSION

Like many other developing countries, Bangladesh focused mainly on controlling COVID-19 transmission at community levels and providing treatment to infected as well as suspected patients. However, the findings of the current study show that the young population is experiencing adverse and heightened mental health problems, regardless of geographical variations, with possible prolonged mental health outcomes if the problem is not adequately addressed. Furthermore, FCV-19 among university students is also growing at an unprecedented rate, a result of overexposure to unreliable and unconfirmed information in media outlets. Considering the current situation, the government of Bangladesh needs to implement its "safety" and "survival" strategies in different phases. First, policymakers, guided by expert opinion, should launch a nationwide epidemiological study addressing the nature and magnitude of mental health problems, including anxiety, depression, fear as well as stress, and relevant issues with emphasis on young adults. Based on the outcomes, they should implement age-specific emergency psychological interventions and supports—for infected,

suspected, and noninfected individuals. Second, the University Grants Commission of Bangladesh, together with government health authorities, should provide necessary information by setting up a support network using available online platforms to assist students, faculties, and other professionals involved in higher academia to fight against mental ailments during the ongoing health emergency. Finally, lawmakers should initiate an active surveillance and monitoring system to reduce "misinformation" and "infodemic" to help curb mass panic in Bangladesh.

CONFLICTS OF INTEREST

The authors declare they have no conflicts of interest.

AUTHORS' CONTRIBUTION

T-E-AS acquisition of data, preparing the first draft, giving approval for the final version to be published. BA data analysis/interpretation, preparing the first draft, giving approval for the final version to be published. BK acquisition of data, giving approval for the final version to be published. NJ acquisition of data, preparing the first draft, critically reviewing the paper, giving approval for the final version to be published. TAS critical review of the paper, giving approval for the final version to be published. MTH principal investigator and corresponding author, conception/design of the protocol, data analysis/interpretation, preparing the first draft, critically reviewing the paper, giving approval for the final version to be published. MNI study supervision, critical review of the paper, giving approval for the final version to be published.

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