

Students' Mental Health and Learning Outcomes during COVID-19 Pandemic: A Study at a Public University in Bangladesh

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Abstract

The consequences of COVID-19 have led to the prolonged closure of educational institutions, causing severe hardship for students. Despite the abrupt shift from face-to-face to online education, a number of challenges have emerged that have affected various facets of students' lives. The present study was designed to evaluate university students' mental health and learning outcomes during the COVID-19 pandemic. This research also sought to identify the learning recovery tactics employed by students. An online survey was conducted using Google forms among 431 students of a public university in Bangladesh. They answered a questionnaire package that asked them about their sociodemographic traits, their everyday lives, how they felt about COVID-19, their learning outcomes, their learning recovery strategies, and the 7-item Generalized Anxiety Disorder Scale (GAD-7). Data were analyzed using Statistical Package for the Social Sciences (SPSS version 26.0). The study's findings showed that 9.05% of respondents had severe anxiety, 23.2% had moderate anxiety, and 46.4% had mild anxiety. Research also revealed that male students experienced less anxiety than female pupils (OR=0.648, 95% CI=-0.805,-0.064). Students' anxiousness was associated with lower household income. (OR=13.50, 95%CI=1.166, 4.04). Other factors that contributed to students' anxiety included having COVID-19-affected family members (OR=1.52, 95%CI=0.027, 0.814) and fear of contracting the virus. (OR=1.48, 95%CI=0.027, 0.761). Moreover, this study found that the pandemic had an adverse effect on students' learning outcomes. About 20 per cent of students reported that they did not attend online classes due to poor or no internet connection, lack of necessary online learning tools, and pricey internet access. About 75 per cent of students

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experienced learning disruption due to prolonged university closure. They also mentioned that they faced concentration difficulties while studying. Students' academic performance was adversely affected by the outbreak. They had to bear an additional load for their learning recovery. The majority of students made an effort to make up for lost learning by studying more, communicating with their teachers more frequently, utilizing online resources, and participating in group studies and library work.

Keywords: COVID-19, Mental health, Anxiety, Learning disruption, Learning recovery, Learning outcome

Introduction

Over the past few years, humans have gone through a difficult time due to the coronavirus disease (COVID-19). It is a highly infectious and potentially fatal disease caused by the SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) virus (World Health Organization [WHO], 2020a), which originated at Wuhan city of China, in December 2019 and rapidly spread across the globe (Zhu et al., 2020). The World Health Organization declared it a Public Health Emergency of International Concern (PHEIC) on 30 January 2020 and a pandemic on 11 March 2020 (WHO, 2020a). As of 28 January 2023, over 674 million confirmed cases of COVID-19 with 6,756,838 deaths have been reported globally (Worldometers.info, 2023a). The Institute of Epidemiology Disease Control and Research in Bangladesh recorded the first three cases on 8 March 2020 ("3 Bangladeshis infected", 2020). As of 28 January 2023, more than two million individuals in this country have been diagnosed with COVID-19, and 29,441 deaths have occurred as a result of the disease (Worldometers.info, 2023b).

As there was no proven treatment for COVID-19 before the invention of the vaccine, the WHO (2020b) recommended preventative behaviors such as maintaining a distance of at least 1 meter between individuals, wearing a mask that fits properly, keeping rooms well-ventilated, avoiding crowds and close contact, frequently washing hands, or using an alcohol-based rub and coughing into a bent elbow or tissue were the most effective ways to prevent and slow down the spread of the virus. However, among the aforementioned strategies, physical distancing - a conscious effort to reduce close contact between people (Tiffany, 2020) was challenging because it contradicts cultural norms of communication we have internalized throughout our lives (Furman University, 2020). In response, many countries have taken unprecedented steps to limit close contact, including closing schools, shops, restaurants, and clubs,

prohibiting public activities, and encouraging or imposing work from home (De Vos, 2020). Even after vaccination, physical distancing was required due to the extremely contagious nature of the disease.

An educational institution is a place where large gatherings occur, and maintaining physical distance is difficult. Consequently, most countries worldwide closed their educational institutions completely or partially for a long time (The World Bank et al., 2021). The United Nations has described it as the "longest disruption to education in history" worldwide (Ahmed, 2022). More than 1.6 billion students across the globe were impacted by COVID-19 (The World Bank et al., 2021). Bangladesh experienced a similar situation. This country's educational institutions were closed non-stop for 543 days from 17 March 2020 to 11 September 2021 (Ahmed, 2022). After four months of opening, universities were shut down again from 21 January to 6 February 2022. ("Schools closed as", 2022). A study by UNICEF (2021) showed that over 40 million pupils from pre-primary through higher education in Bangladesh had been affected by the pandemic's protracted shutdown of educational institutions.

The government of Bangladesh swiftly responded to the problem and ensured continued education (Rahman & Sharma, 2020). The Ministry of Education (MoE) and Ministry of Primary and Mass Education (MoPME) launched various remote learning programs using "Sangsad TV" and their respective web platforms: e-konnect, Facebook, and YouTube (Biswas et al., 2020). Both public and private universities introduced online classes. However, access to online learning differed across households (Rahman & Sharma, 2020). Since the majority of residents in this country live below the poverty line, it is sometimes impossible for them to afford pricey devices for online education (Emon et al., 2020). Moreover, the majority of students in this country come from rural areas where Internet access is a luxury. (Piya et al., 2022). A study conducted by UNESCO (2020) demonstrated that only about 56% of homes in Bangladesh have access to television. Another study found that 59 per cent of rural households in Bangladesh do not have access to smartphones, 49 per cent do not have access to computers, and 54 per cent lack internet access ("54% Bangladeshi rural", 2020). According to UNICEF (2021), two out of every three pre-primary to upper secondary students in Bangladesh were not reached by remote education during school closure. A survey carried out by Islam et al. (2020), using 2038 samples from private and public universities in Bangladesh, revealed that 55 per cent of students were unable to attend online classes due to inadequate internet connections, and 44.7% were unable to attend online classes due to a lack of equipment. These facts imply that due to the prolonged shutdown of

educational institutions and unequal mitigation strategies, learning inequality among students has been exacerbated.

Apart from these learning losses, students' mental health has also suffered immensely. According to Hozumi (2021), school closures and a lack of face-to-face teaching and learning activities have a devastating effect not only on children's education but also on their health, safety, and psychological well-being. The effects of Covid-19 on the mental health and education of Bangladeshi students have been the subject of several studies. Sayeed et al. (2020) found a high level of depression symptoms, anxiety, and stress symptoms among students during Covid-19. The study by Faisal et al. (2022) revealed that university students experienced high levels of anxiety, depression symptoms, and low mental health statuses when transitioning to the coronavirus' new norms in April 2020. Piya et al. (2022) showed that during school closure, most students focused less on their studies and spent more time on social media and online meetings, increasing their overall internet usage. A study by Safa et al. (2021) demonstrated that a significant proportion of Bangladeshi medical students were suffering from pandemic-related psychosocial effects. However, relatively few studies have evaluated students' learning outcomes after the reopening of educational institutions. The present study aimed to assess university students' mental health status and learning outcomes during the Covid-19 pandemic. The specific aims of this study are as follows:

1. To identify the factors affecting the mental health of university students during the COVID-19 pandemic.
2. To know the impact of this pandemic on their learning outcomes.
3. To explore the strategies applied by university students to recover learning losses.

Materials and methods

Study population and sample

This study was conducted among the students of Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopalganj. There were 12000 students in total (BSMRSTU, n.d.). We estimated the sample size using Slovin's formula, which is as follows:

$$n = \frac{N}{1 + Ne^2}$$

Where we considered N as the total number of students = 12000 and error margin $e = 0.05$. Hence the required sample size was 387. However, 431 respondents completed the survey, and we included all in the analysis. The inclusion criterion was to be a current student of the university.

Data collection procedure

The survey was performed from March 17th to April 17th, 2022. Using snowball sampling, a semi-structured questionnaire link created with 'Google Forms' was distributed to respondents via social media. Before they began the questionnaire, we briefed the study's main objectives to participants. In addition, each respondent's consent was obtained prior to the survey, and their identities remained anonymous throughout our research.

Instruments

The questionnaire was divided into five sections. The first segment dealt with the respondents' sociodemographic characteristics, such as age, gender, educational level, and family income. The second section asked respondents whether they and their family members were infected with COVID-19. This section also contained questions about students' perceptions of COVID-19. The third component consisted of inquiries regarding daily activities, including sleep duration, study time, and time spent on social media. The following section addressed issues pertinent to students' mental health. The participants responded to the 7-item Generalized Anxiety Disorder Scale (GAD-7) in this section. The GAD-7 is a 7-item self-administered questionnaire designed to diagnose and measure the severity of generalized anxiety disorder (Ahn et al., 2019). Respondents rate the frequency at which they have been bothered by each symptom over the past two weeks using a 4-item Likert scale ranging from 0 (never) to 3 (almost every day) (Ahn et al., 2019). The scores are then added on a scale of 0 to 21. Cut-off marks for mild, moderate, and severe anxiety are 5, 10, and 15, respectively (Williams, 2014). The final section addressed the impact of the COVID-19 pandemic on the learning outcomes of university students. It questioned whether or not students had access to online education resources and whether or not they experienced learning disruptions and concentration difficulties. Students were questioned regarding their academic achievement from the semester before the pandemic and the semester following the university's reopening during the pandemic. This section also included questions concerning their learning recovery tactics.

Data analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS version 26.0). A descriptive statistical analysis was performed to demonstrate the respondents' socio-demographic and other specified features. The relationship between sample characteristics and anxiety levels during the COVID-19 pandemic was assessed using non-parametric tests (Mann-Whitney U test and Kruskal-Wallis test).

Statistically significant variables (p-value less than 0.05) were identified and incorporated in ordinal logistic regression analyses. The odds ratio (OR) with a confidence interval of 95% was utilized to determine the strength of associations.

Results

Socio-demographic characteristics of the participants

The socio-demographic details of the respondents are shown in Table 1. In total, 431 students participated in the survey. 92.3 per cent of them were between the ages of 18 and 24. The table also reveals that there were more male participants (66.1%) than female participants (33.9%). Over 90% of respondents were undergraduate students. Sixty-one per cent of those surveyed live with their families, and the majority of them have more than five family members. Regarding family income, 42.9% of students' families earn between BDT 5001 and BDT 15000. Only a few students stated that their family income exceeds 50,000 Taka.

Table 1: Socio-demographic characteristics of students (n = 431)

Variables	Categories	n (%)
Age	18-24	398 (92.3)
	25 and above	33 (7.7)
Gender	Male	285 (66.1)
	Female	146 (33.9)
Level of Education	Undergraduate	400 (92.8)
	Graduate	31 (7.2)
Living with parents	Yes	263 (61.0)
	No	168 (39.0)
Family size	<= 4	167 (38.7)
	5 and above	264 (61.3)
Family income per month	<=5000	12 (2.8)
	5001-15000	185 (42.9)
	15001-25000	105 (24.4)
	25001-50000	102 (23.7)
	50001-75000	12 (2.8)
	75001+	15 (3.5)

Mental health status of the participants during the pandemic

Table 2 demonstrates the mental health of university students during the COVID-19 outbreak. We found that 78.7 per cent of the total participants had mild to severe anxiety, while 21.3% had no symptoms. The percentages of students who experienced mild, moderate, and severe anxiety were 46.4%, 23.2%, and 9.05%, respectively.

Table 2: Level of anxiety among students (n = 431)

Anxiety Level	n (%)
Normal	92(21.35)
Mild	200 (46.40)
Moderate	100 (23.20)
Severe	39 (9.05)

The relationship between the demographic variables of university students and their anxiety levels is illustrated in Table 3. Gender had a significant effect on anxiety ($P < 0.05$). Female students were more anxious than male students. Students from low-income families had a high anxiety level ($P < 0.05$), indicating that household income was an additional factor influencing students' mental health. Students infected with COVID-19 or who had a family member infected with COVID-19 were more likely to experience anxiety ($P < 0.05$). We also found an association between fear of COVID-19 infection and anxiety ($P < 0.05$). On the other hand, respondents' family size, sleep duration, and the amount of time they spend in front of digital devices had no significant effect on anxiety ($P > 0.05$).

Table 3: Factors associated with students' anxiety level

Variables	Anxiety Label				Total	Statistic s	P
	Normal	Mild	Moderate	Severe			
Gender							
Male	70 (24.6)	130 (45.6)	62 (22.8)	23 (8.1)	285 (66.1)	-2.315 ^a	0.021
Female	22 (15.1)	70 (47.9)	36 (24.7)	18 (12.3)	146 (33.9)		
Number of family members							
<=4	34 (20.4)	78 (46.7)	37 (22.2)	18 (10.8)	167 (38.7)	-0.472 ^a	0.637
>=5	58 (22.0)	122 (46.2)	61 (23.1)	23 (8.7)	264 (61.3)		
Family income per month							
<=500	0	2	5	5	12	5 ^b	<0.00

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	0	(0.0)	(16.7)	(41.7)	(41.7)	(2.8)		1
	5001-15000	50 (27.0)	86 (46.5)	39 (21.1)	10 (5.4)	185 (42.9)		
	15001-25000	21 (20.0)	55 (52.4)	19 (18.1)	10 (9.5)	105 (24.4)		
	25001-50000	17 (16.7)	42 (41.2)	30 (29.4)	13 (12.7)	102 (23.7)		
	50001-75000	0 (0.0)	7 (58.3)	3 (25.0)	2 (17.7)	12 (2.8)		
	75000+	4 (26.7)	8 (53.3)	2 (13.3)	1 (6.7)	15 (3.5)		
Facing financial problems due to COVID 19								
	Yes	50 (17.9)	128 (45.7)	71 (25.4)	31 (11.1)	280 (65.0)	-3.004 ^a	0.003
	No	42 (27.8)	72 (47.7)	27 (17.9)	10 (6.6)	151 (35.0)		
Infected with COVID-19								
	Yes	13 (15.9)	33 (40.2)	25 (30.5)	11 (13.4)	82 (19.0)	-2.422 ^a	0.015
	No	79 (22.6)	167 (47.9)	73 (20.9)	30 (8.6)	349 (81.0)		
Family member infected with COVID-19								
	Yes	21 (17.9)	49 (41.9)	32 (27.4)	15 (12.8)	117 (27.1)	-2.070 ^a	0.038
	No	71 (22.6)	151 (48.1)	66 (21.0)	26 (8.3)	314 (72.9)		
Fear of COVID-19 infection								
	Yes	55 (19.9)	121 (43.8)	70 (25.4)	30 (10.9)	276 (64.0)	-2.124 ^a	0.034
	No	37 (23.9)	79 (51.0)	28 (18.1)	11 (7.1)	155 (36.0)		
Sleep duration (per 24 hours)								
	<=6	35 (22.4)	78 (50.0)	29 (18.6)	14 (9.0)	156 (36.2)	-1.199 ^a	0.231
	>= 7	57 (20.7)	122 (44.4)	69 (25.1)	27 (9.8)	275 (63.8)		
Time spend with digital devices (per 24 hours)								
	1-3	40 (20.6)	86 (44.3)	44 (22.7)	24 (12.4)	194 (45.0)	0.276 ^b	0.276
	3-6	44 (23.3)	91(48.1)	41 (21.7)	13 (6.9)	189 (43.9)		
	6+	8 (16.7)	23 (47.9)	13 (27.1)	4 (8.3)	48 (11.1)		

^a Mann-Whitney U test

^b Kruskal-Wallis test

Results of ordinal multivariate analysis of factors associated with anxiety during the COVID-19 crisis are displayed in Table 4. Significant factors from the non-parametric test were included in the ordered logistic regression analysis. In the model test, $P < 0.05$ implies that the OR value of at least one variable was statistically significant. Therefore, $\chi^2 = 13.455$, $p > 0.05$, obtained in the test of parallel lines, indicates a good model fit with the observed values.

Table 4: Ordinal regression analysis of factors affecting university students' anxiety

Factors	Number	OR	SE	P	95% CI		
					Lower Bound	Upper Bound	
Gender							
Male	285 (66.1%)	0.648	0.189	0.022	-0.805	-0.064	
Female	146 (33.9%)	0 ^a	-	-	-	-	
Family income per month							
<=5000	12 (2.8%)	13.50	0.733	0	1.166	4.04	
5001-15000	185 (42.9%)	1.14	0.502	0.796	-0.855	1.114	
15001-25000	105 (24.4%)	1.45	0.516	0.47	-0.639	1.385	
25001-50000	102 (23.7%)	2.34	0.518	0.101	-0.165	1.865	
50001-75000	12 (2.8%)	3.30	0.718	0.096	-0.212	2.603	
75001+	15 (3.5%)	0 ^a	-	-	-	-	
Facing financial problems due to COVID-19							
Yes	280 (65.0%)	1.77	0.19	0.003	0.198	0.941	
No	151 (35.0%)	0 ^a	-	-	-	-	
Infected with COVID-19							
Yes	82 (19.0%)	1.74	0.227	0.014	0.111	1.001	

No	349 (81.0%)	0 ^a	-	-	-	-	
Family member infected with COVID-19							
Yes	117 (27.1%)	1.52	0.201	0.036	0.027	0.814	
No	314 (72.9%)	0 ^a	-	-	-	-	
Fear of COVID-19 infection							
Yes	276 (64.0%)	1.48	0.187	0.035	0.027	0.761	
No	155 (36.0%)	0 ^a	-	-	-	-	

SE Std Error, OR Odds ratio, CI Confidence Interval

^a Reference group

The results indicated that male students experienced less anxiety than their female counterparts (OR=0.648, 95% CI=-0.805,-0.064). Furthermore, lower family income (OR = 13.50, 95% CI = 1.166, 4.04) and an unstable financial condition (OR=1.77, 95% CI = 0.198, 0.941) were identified as risk factors for students' anxiety. Having family members infected with COVID-19 (OR=1.52, 95% CI = 0.027, 0.814) and fear of getting infected with this virus (OR = 1.48, 95% CI = 0.027, 0.761) were also risk factors of their anxiety.

Impact of COVID-19 on learning outcomes of the respondents

Learning outcomes are statements that describe what a learner should know, comprehend, and be able to demonstrate at the end of a learning period (Adam, 2015). In this research, students' semester final results (Grade Point Average) were considered as their learning outcomes. For this section, respondents were initially questioned about their participation in online classes. Bar graph 1 shows the number of students who were present in online classes is 342, whereas 20% of students did not attend online classes. The causes of skipping e-learning are shown in bar diagram 2. Multiple answer set was accepted for this question. The most prevalent reason for missing online classes, as stated by 30 percent of respondents, was poor or no internet connection. Insufficient online educational resources were also a significant factor. It was cited by more than 20 percent of students. Another striking observation is that a sizable number of students (28%) could not afford the cost of internet connectivity even though they reside in locations with mobile network coverage and broadband availability.

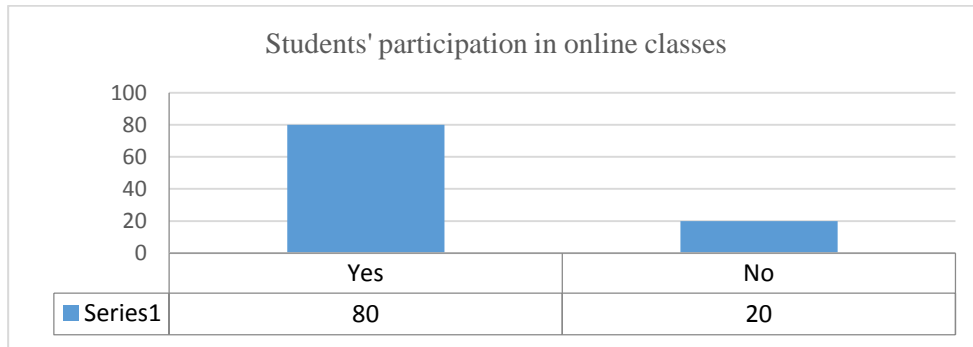


Figure 1: Students’ participation in online classes

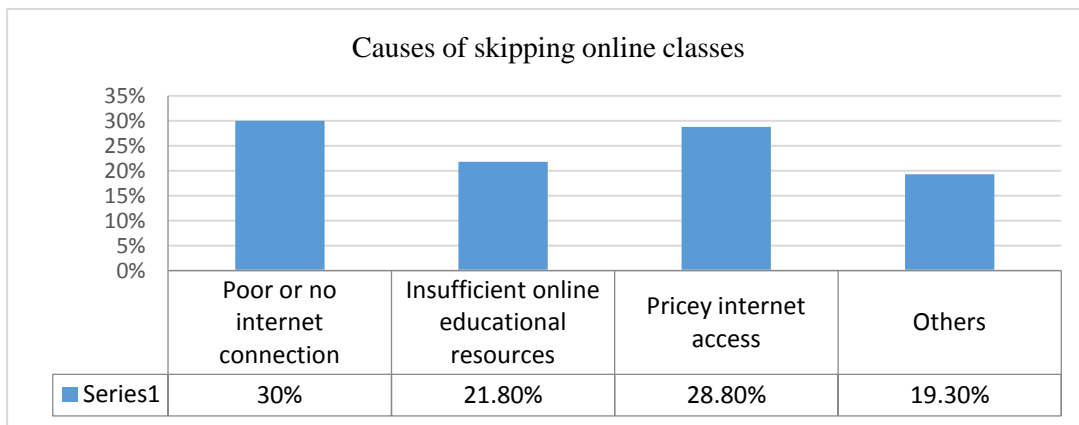


Figure 2: Causes of skipping online classes

Students were asked if the campus closure would disrupt their learning. Figure 3 illustrates the outcome. This indicates that about 75% of students experienced disruptions to their learning during the campus closure. They were also asked to mention the problems faced during campus closure, which are illustrated in figure 4. More than half of the students said they could not attend face-to-face classes, which hampers their learning outcomes. Practical laboratory classes are essential for science and engineering education. Twenty per cent of the students said that they could not attend practical classes. More than 10 per cent of students reported that they could not visit the library or engage in group study.

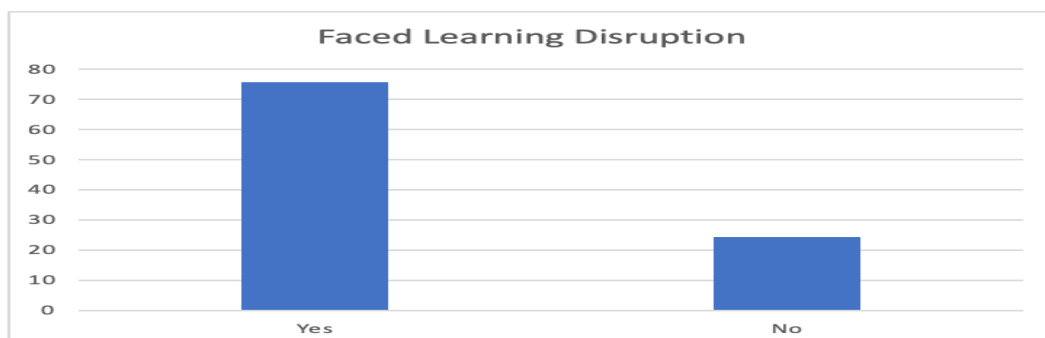


Figure 3: Faced learning disruption

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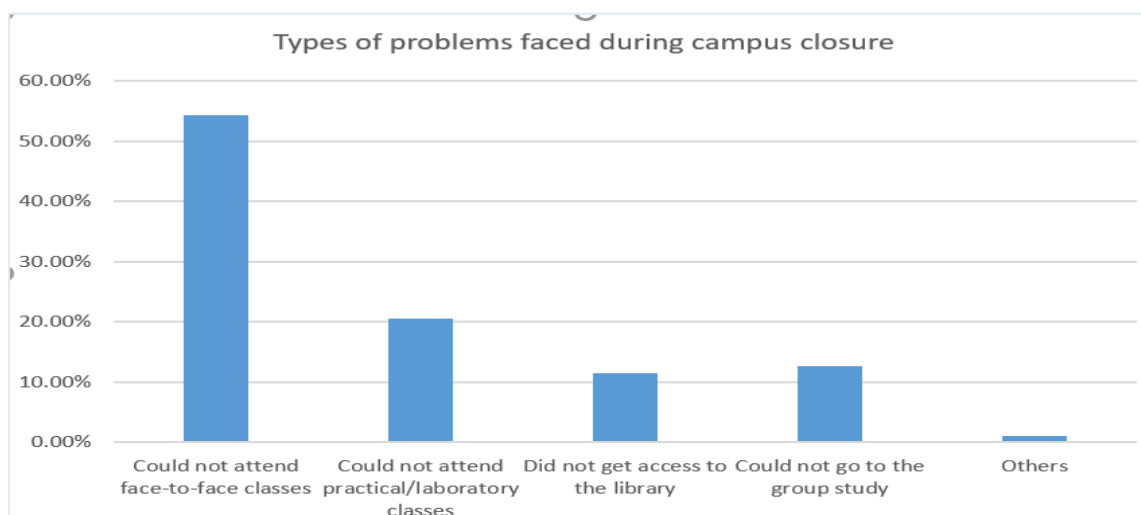


Figure 4: Types of problems faced by students during campus closure

Table 5: Facing difficulty to focus while studying during campus closure (n = 431)

Facing difficulty to focus	n (%)
Yes	352 (81.7)
No	79 (18.3)
Total	431

Participants were asked if they had any attention difficulties due to the campus shutdown. The majority of the student replied that they find it difficult to concentrate (81.7%) while studying. On the other hand, only 18.3 % of respondents mentioned that they did not feel any concentration difficulty.

Table 6: Comparison between students' learning outcomes before and during the COVID-19 pandemic (n = 304)

Grade Point Average	Before the Pandemic n (%)	During the Pandemic n (%)
A+ (4)	1(0.3)	1(0.3)
A (3.75-3.99)	19(6.3)	12(3.9)
A- (3.5-3.74)	64(21.1)	34(11.2)
B+ (3.25-3.49)	105(34.5)	100(32.9)
B (3.00-3.24)	80(26.3)	112(36.8)
B- (2.75-2.99)	23(7.6)	32(10.5)
C+ (2.5-2.74)	10(3.3)	6(2.0)
C (2.25-2.49)	1(0.3)	4(1.3)
C- (2-2.24)	1(0.3)	3(1.0)

Students were asked about their GPAs (Grade Point Averages) for the last semester prior to the pandemic and the first semester during the pandemic. Among the total respondents, 304 students answered the question since the others had not yet received their results. The results, as presented in Table 6, indicate a decline in the overall academic performance of the students.

The number of students who achieved higher GPAs has been decreased, while the number of students who obtained lower GPAs has been increased. During the pandemic, 112 students earned GPAs between 3.0 and 3.24, compared to 80 before the pandemic. Sixty-four students had GPAs ranging from 3.5 to 3.74 prior to the outbreak, but this figure fell by nearly half during the pandemic. Concurrently, the number of pupils who obtained A or A- grades previous to the pandemic has been declined.

Table 7: Strategies followed by the participants for learning recovery

Strategies	Response* n (%)
Spending more time on study	186 (44.6)
Communicate with teachers more often	122(29.3)
Group study	62(14.9)
Library work	28(6.7)
Usage of the internet resources	118(28.3)
Others	1(0.2)

* Multiple responses counted

71% of students reported that they had to bear an additional load for learning loss recovery. They were questioned regarding their learning recovery tactics, as shown in Table 7. The majority of students (44.6%) stated that they made an effort to study more in order to make up for lost learning. Students' second most prevalent strategy (29.3%) was communicating with teachers more frequently. 28.3% of students reported that they used online resources to support their learning recovery. Students who went to the library and studied in groups made up 6.7% and 14.9% of the total, respectively.

Discussion

The main goal of this study was to assess the mental health and learning outcomes of university students in Bangladesh during the COVID-19 pandemic. Findings from this study indicated that 78.7% of university students experienced anxiety during the outbreak. In this group of students, 9.05% experienced severe anxiety, 23.2% experienced moderate anxiety, and 46.4% were afflicted with mild anxiety. This finding can be compared to a study conducted in 2022 by Pia et al., which found that

78.2% of Bangladeshi students had mild to severe anxiety due to the COVID-19 pandemic. Hoque et al. (2021) also found that about 82.5% of undergraduate students in Bangladesh suffered from mild to severe anxiety during the pandemic. On the contrary, the study by Sayeed et al. conducted among Bangladeshi students from April 29th to May 7th, 2020, indicated that 26.6% of participants had mild to severe anxiety symptoms. Thus, it can be stated that anxiety levels among Bangladeshi students increased due to the spread of the coronavirus and repeated school closures.

This study revealed a correlation between university students' anxiety and their gender, parental income per month, and COVID-19 infection in either the student or a member of their family. Similar findings were made by Cao et al. (2020), who found that Chinese college students' anxiety levels increased when they had COVID-19-infected friends or family members. A study by Alam et al. (2021) also observed that having family members affected by the coronavirus, facing insecurity, using social media, and smoking habits exacerbated the mental health imbalances of university students in Bangladesh. However, the present study revealed that students' family size, sleep duration, and how much time they spent using digital devices have no effect on their anxiety. Multivariate logistic regression analysis also indicated that anxiety levels of university students varied depending on their gender. Male students were less anxious than their female peers. Additionally, this analysis revealed lower family income was a risk factor for participants' anxiety. Students who were afflicted with coronavirus and had affected family members were more likely to be anxious.

Another concern of this study was to know the impact of COVID-19 on students' learning outcomes. The study's findings showed that about 20% of students did not participate in online classes. They cited poor or no internet connection, a lack of necessary online learning tools, and pricey internet access as reasons for missing online classes. Most respondents (about 75 per cent) said that the shutdown of the university campus disrupted their learning. Students (81.7%) also reported that they faced trouble focusing on their studies due to the university's protracted closure. Similarly, Dutta and Smita (2020), in their study, demonstrated that the learning disruptions, difficulty in social interaction, physical and mental health issues, and economic crisis induced by the COVID-19 outbreak had disparate effects on tertiary students' academic education and learning behaviors.

In this study, the GPAs of students from the last semester preceding the pandemic were compared to those from the first semester after the university reopened. The comparison showed that during the pandemic,

fewer students got higher grades. Twenty students received A or A+ grades before the pandemic, but only 13 did so after it. This drop in GPAs showed that COVID-19 had an impact on students' academic performance. This study also found that students had to bear an additional load to make up for lost learning. 44.6% of students stated that they tried to recover from learning losses by devoting more time to study. About 30% of them mentioned they communicated with their teachers more often in order to improve. In addition to these, they studied in groups and used internet resources to reduce the learning gap.

This study is one of the first few studies conducted in Bangladesh on university students' mental health and learning outcomes. However, it has several drawbacks to acknowledge, including the snowball sampling method for recruiting students through online, which may indicate sample bias. This also restricts the findings' generalization. Another weakness of this study is that only one self-administered assessment, the 7-item Generalized Anxiety Disorder Scale (GAD-7), was used to diagnose mental health.

Conclusion

During the COVID-19 pandemic, the majority of university students (78.7%) experienced varying degrees of anxiety. The female students were more anxious than their male counterparts. Lower family income, COVID-19 infection, having family members with this condition, and fear of becoming infected were identified as risk factors for students' anxiety. This study also found that COVID-19 had a negative impact on student learning outcomes. A substantial number of students did not attend online classes due to poor or no internet connection, lack of essential online learning tools, and the high cost of internet access. The majority of students indicated that their education had been interrupted by the university's prolonged closure. Most of them had difficulties to concentrate while studying. During the outbreak, their overall GPAs declined. Students had to bear an additional load for their learning recovery. Based on these findings, the study recommended that effective measures should be taken to improve students' mental health and their learning recovery.

Reference

- Adam, S. (2006). An introduction to learning outcomes: A consideration of the nature, function and position of learning outcomes in the creation of the European Higher Education Area. In E. Froment, J. Kohler, L. Purser & L. Wilson (Eds.), *EUA Bologna Handbook: Making Bologna Work* (1st ed., Vol. B 2.3-1, pp 1–24), Raabe academic publishers, Berlin.
- Ahmed, M. (2022, February 13). Learning loss from COVID-19: Can a generational threat be averted? *The Daily Star*. Retrieved from <https://www.thedailystar.net/recovering-covid-reinventing-our-future/blueprint-brighter-tomorrow/news/learning-loss-covid-19-2960811>
- Ahn, J. K., Kim, Y., & Choi, K. H. (2019). The psychometric properties and clinical utility of the Korean version of GAD-7 and GAD-2. *Frontiers in Psychiatry, 10*, 127.
- Alam, M.K., Ali, F.B., Banik, R. *et al.* Assessing the mental health condition of home-confined university level students of Bangladesh due to the COVID-19 pandemic. *J Public Health (Berl.)* **30**, 1685–1692 (2022). <https://doi.org/10.1007/s10389-021-01542-w>
- Biswas, K., Asaduzzaman, T. M., Evans, D. K., Fehrler, S., Ramachandran, D., & Sabarwal, S. (2020). TV-Based Learning in Bangladesh: Is it Reaching Students? World Bank, Washington, DC.
- BSMRSTU (Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopalganj). (n.d.). BSMRSTU (Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopalganj). Retrieved December 1, 2022, from <https://www.bsmrstu.edu.bd/s/>
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry research, 287*, 112934.
- De Vos, J. (2020). The effect of COVID-19 and subsequent social distancing on travel behavior. *Transportation Research Interdisciplinary Perspectives, 5*, 100121. <https://doi.org/10.1016/j.trip.2020.100121>
- Emon, E. K. H., Alif, A. R., & Islam, M. S. (2020). Impact of COVID-19 on the institutional education system and its associated students in Bangladesh. *Asian Journal of Education and Social Studies, 11*(2), 34-46.

- Faisal, R. A., Jobe, M. C., Ahmed, O., & Sharker, T. (2022). Mental health status, anxiety, and depression levels of Bangladeshi university students during the COVID-19 pandemic. *International journal of mental health and addiction*, 20(3), 1500-1515.
- Furman University. (2020, March 18). Why social distancing is so difficult; how research explains our behavior. *News wise*. Retrieved from <https://www.newswise.com/coronavirus/why-social-distancing-is-so-difficult-how-research-explains-our-behavior>
- Hoque, M. N., Hannan, A., Imran, S., Alam, M. A., Matubber, B., & Saha, S. M. (2021). Anxiety and its determinants among undergraduate students during E-learning in Bangladesh amid covid-19. *Journal of Affective Disorders Reports*, 6, 100241.
- Dutta, S., & Smita, M. K. (2020). The impact of COVID-19 pandemic on tertiary education in Bangladesh: students' perspectives. *Open Journal of Social Sciences*, 8(09), 53. learning in Bangladesh amid covid-19." *Journal of Affective Disorders Reports* 6 (2021): 100241.
- Hozumi, T. (2021, August 24). First day of school 'indefinitely postponed' for 140 million first-time students around the world – UNICEF: At least eight million of these young learners have been waiting for over a year. Retrieved from <https://www.unicef.org/bangladesh/en/press-releases/first-day-school-indefinitely-postponed-140-million-first-time-students-around-world>.
- Islam, M.S, Tanvir, K.M., Amin, M.A and Salam, M (2020). Online classes for university students in Bangladesh during the Covid-19 pandemic- is it feasible? *The Business Standard*. Retrieved from: <https://www.tbsnews.net/thoughts/online-classes-university-students-bangladesh-during-covid-19-pandemic-it-feasible-87454>
- Piya, F. L., Amin, S., Das, A., & Kabir, M. A. (2022). Impacts of COVID-19 on the Education, Life and Mental Health of Students in Bangladesh. *International Journal of Environmental Research and Public Health*, 19(2), 785.
- Rahman, T., & Sharma, U. (2021). A simulation of COVID-19 school closure impact on student learning in Bangladesh.
- Safa, F., Anjum, A., Hossain, S., Trisa, T. I., Alam, S. F., Abdur Rafi, M., Podder, V., Koly, K. N., Azad, D. T., Ahmad, W. U., Nodi, R. N., Ashraf, F., Quamrul Akhter, S., Ahmed, H. U., & Hasan, M. T. (2021). Immediate psychological responses during the initial period of the COVID-19 pandemic among Bangladeshi medical students.

Children and Youth Services Review, 122, 105912.
<https://doi.org/10.1016/j.childyouth.2020.105912>

Sayeed, A., Kundu, S., Al Banna, M. H., Hasan, M. T., Begum, M. R., & Khan, M. S. I. (2020). Mental health outcomes during the COVID-19 and perceptions towards the pandemic: findings from a cross sectional study among Bangladeshi students. *Children and youth services review*, 119, 105658.

Schools closed as Covid curbs back again. (2022, January 22). *The Daily Star*. Retrieved from <https://www.thedailystar.net/youth/education/news/schools-closed-covid-curbs-back-again-2944281>

The World Bank, UNESCO and UNICEF (2021). *The State of the Global Education Crisis: A Path to Recovery*. Washington D.C., Paris, New York: The World Bank, UNESCO, and UNICEF.

Tiffany, K. (2020, March 13). The Dos and Don'ts of 'Social Distancing'. *The Atlantic*. Retrieved from <https://www.theatlantic.com/family/archive/2020/03/coronavirus-what-does-social-distancing-mean/607927/>.

UNESCO. (2020). *Bangladesh Brings Education to the Airwaves*. Retrieved from <https://www.unesco.org/en/articles/bangladesh-brings-education-airwaves>

UNICEF. (2021). The future of 37 million children in Bangladesh is at risk with their education severely affected by the COVID-19 pandemic. Retrieved from <https://www.unicef.org/bangladesh/en/press-releases/future-37-million-children-bangladesh-risk-their-education-severely-affected-covid>

Williams, N. (2014). The GAD-7 questionnaire. *Occupational medicine*, 64(3), 224-224.

World Bank. (2021, March 30). *Mission: Recovering Education in 2021*. Retrieved from <https://www.worldbank.org/en/topic/education/brief/mission-recovering-education-in-2021>.

World Health Organization. (2020a). Coronavirus disease 2019 (COVID-19): Retrieved from https://www.who.int/health-topics/coronavirus#tab=tab_1

World Health Organization. (2020b). *Advice for the public: Coronavirus disease (COVID-19)*

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>

Worldometers.info. (2023a, January 28). COVID Live - Coronavirus Statistics - Worldometer. Retrieved from <https://www.worldometers.info/coronavirus/>

Worldometers.info. (2023b, January 28). Bangladesh COVID - Coronavirus Statistics - Worldometer. Retrieved from <https://www.worldometers.info/coronavirus/country/bangladesh/>

Zhu, H., Wei, L. & Niu, P. The novel coronavirus outbreak in Wuhan, China. *Global Health Research Policy* **5**, 6 (2020). <https://doi.org/10.1186/s41256-020-00135-6>

3 Bangladeshis infected with coronavirus: IEDCR. (2020, March 8). *The Daily Star*. Retrieved from <https://www.thedailystar.net/coronavirus-deadly-new-threat/news/iedcr-confirms-3-coronavirus-patients-hospitalised-bangladesh-1878022>

54% Bangladeshi rural households lack internet access: Survey. (2020, September 13). *The Daily Star*. Retrieved from <https://www.thedailystar.net/country/news/54-bangladeshi-rural-households-lack-internet-access-survey-1960661>

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