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Research Paper

Anxiety and Its Determinants among Undergraduate Students during E-learning in Bangladesh Amid Covid-19

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ABSTRACT

Background: The universities of Bangladesh are closed for more than seventeen months due to the covid-19 pandemic. This prolonged detachment has psychological consequences among the students. This study assessed the anxiety level and its determinants among the undergraduate students of Bangladesh, along with constraints faced by them during e-learning.

Methods: A web-based cross-sectional survey among 206 undergraduate students was conducted using a well-structured questionnaire. Their anxiety level was estimated using Zung's self-rating anxiety scale (SAS) and determinates were identified by employing a Tobit model. The problem confrontation index (PCI) was used to rank the constraints.

Results: About 82.5% of the undergraduate students in Bangladesh are experiencing mild to extreme anxiety, while 14.08% are experiencing extreme anxiety. Students' gender, father's year of schooling, family size, residential area, academic year, current accommodation, and access to high-speed internet affect their level of anxiety. Learning alone at home, lacking access to learning resources and inaccessibility to other e-learning platforms are the top three constraints students faced during e-learning.

Limitations: Self-reported data, socio-demographic variables and online survey.

Conclusion: Covid-19 has been causing anxiety among the students. This study recommends providing better internet services for facilitating e-learning along with access to different e-learning platforms.

1. Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is a highly contagious virus responsible for coronavirus disease 2019 or COVID-19. The first known case was identified at the end of December 2019 in Wuhan city of China (Page et al., 2021; Chahrour et al., 2020). The initial outbreak of COVID-19 in Wuhan spread rapidly in the other parts of China. The central government of China imposed a lockdown in Wuhan and other cities in Hubei on 23 January 2020 to lower the risk of further disease transmission (Xiang et al., 2020; Sahu, 2020). The World Health Organization (WHO) declared a Public Health Emergency of International Concern on 30 January 2020 and later declared a

pandemic on 11 March 2020 (WHO, 2020). As of 21 August, COVID-19 affects 223 countries and infected more than 211 million people worldwide, resulting in more than 4429425 deaths (Worldometer, 2021). Bangladesh is one of the worst-affected countries in this pandemic because of its dense population and other factors (Johns Hopkins Coronavirus Resource Center, 2020; Mamun and Griffiths, 2020; Shammi et al., 2020; Islam et al., 2020; WHO, 2020). On 08 March 2020, Bangladesh identified its foremost COVID-19 patient (Reuters, 2020). Like other countries, the COVID-19 positive cases and deaths continuously surged in Bangladesh (Worldometer, 2021). To protect the people of Bangladesh, the government declared a lockdown throughout the nation from 26 March to reduce the spread and risk of infection

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(Anwar et al., 2020).

From March 2020, Bangladesh announced to close all educational institutions, and approximately 40 million students are affected so far due to this pandemic (The Business Standard, 2020). It has been 17 months since these educational institutions, including all the universities, are closed. Several reports showed that university students are at high risk during such pandemics for depression and anxiety (Zivin et al., 2009; American College Health Association, 2018). Early literature has reported the impact of such pandemics on students' psychology, acute depression, and anxiety (Mosley et al., 1994; Aktekin et al., 2001). A study in China reported that among 7143 students, 0.9% had severe anxiety, 2.7% had moderate anxiety, and 21.3% had mild anxiety during the COVID-19 pandemic (Cao et al., 2020). Another report on 1210 students from 194 cities in China reported that 53.8% of students having severe to moderate psychological impact (Wang et al., 2020). Odriozola-González et al. (2020) reported the psychological impacts on Spanish university students, which showed that 34.19% of students have depression symptoms; 21.34% have anxiety symptoms. However, in Bangladesh, very little research has been found on the impact of COVID-19 on the education and anxiety of Bangladeshi university students. Hence, this study aims to determine the learning challenges and the level of anxiety among university students in Bangladesh during extended lockdown at the COVID-19 pandemic.

2. Materials and methods

2.1. Study design and sampling

A cross-sectional online survey was conducted among undergraduate students from different public universities in Bangladesh to evaluate their anxiety and challenges of e-learning. 'Google Form' (an online self-administered data collection tool by 'Google LLC') was used as a survey tool, and the link of the questionnaire was sent to participants via emails and social media platforms. An invitation to complete the survey was sent to a total of 2163 undergraduate students of public universities. Two hundred six students consented to participate in the online survey by giving their information where response rate was 9.52 percent. The data collection was launched on 13 March 2021 and continued to 05 April 2021. Before the final survey, the questionnaire was tested in a pilot study with ten random students. Based on the pilot study findings, the questionnaire was revised and finalized where needed according to the objectives. Besides, the purposes of the study were briefly explained to the respondents, and their consent was ensured prior to the data collection. The questionnaire included information about the student's socioeconomic characteristics and questions regarding their emotional, physical and mental symptoms during university lockdown to estimate their anxiety and challenges faced in e-learning.

2.2. Empirical methods

2.2.1. Estimation of anxiety level

This study analyzed the anxiety level of the students during the COVID-19 pandemic using Zung's self-rating anxiety scale (SAS). SAS, developed by Zung (1971), has affective psychometric properties found in several recent studies (Wang and Zhao, 2020; Dunstan et al., 2017). This scale focuses on the most common general anxiety disorders; coping with stress typically causes anxiety. SAS is self-administered, and questions usually have a response of a 4-point scale (Ramirez and Lukenbill, 2008). It works as a Likert-type scale of 1 to 4 where 1 = 'a little of the time', 2 = 'some of the time', 3 = 'good part of the time', and 4 = 'most of the time'. Questions 1-5 illustrate the emotional pointers of anxiety, while questions 6-20 imply the physical symptoms of anxiety. For each respondent, the totality of the scores from 20 items ranges from

20 to 80. The entirety of the scores is then converted to an "Anxiety Index," with scores ranging from 25 to 100. According to Zung (1971), an Anxiety Index less than 45 specifies 'Normal anxiety,' a value in the range of 45-59 specifies 'Mild to moderate anxiety,' a value in the range of 60-74 designates 'Moderate to severe anxiety', and values ≥ 75 indicates 'Extreme anxiety.'

2.2.2. Tobit model to estimate determinants affecting the level of anxiety

The regression analysis has been employed to identify the determinants affecting students' level of anxiety. In this study, students' anxiety is an important kind of limited dependent variable that has a corner solution response. It is a continuous variable, but it has a boundary i.e., from zero to eighty. In this situation, the Tobit model can estimate the determinants (Wooldridge, 2002). This model is widely used in various studies with such type of limited dependent variable (Nazu et al., 2021; Prodhon and Khan, 2018; Tansel and Bircan, 2006). The model can be specified as follows:

$$y^* = \beta_0 + x\beta + u, u | x \sim \text{Normal}(0, \sigma^2) \quad (1)$$

$$y = \max(0, y^*) \quad (2)$$

The latent variable y^* satisfies the classical linear model assumptions; in particular, it has a normal, homoscedastic distribution with a linear conditional mean. Eq. (2) implies that the observed variable, y , equals y^* when $y^* > 0$, but $y = 0$ when $y^* \leq 0$. Because y^* is normally distributed, the density of y given x is the same as the density of y^* given x for positive values. The model was employed in this study as follows:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + \beta_8 X_{8i} + \beta_9 X_{9i} + U_i \quad (3)$$

Here,

Y_i = SAS Score; X_1 = Gender; X_2 = Academic year; X_3 = Father's year of schooling; X_4 = Mother's year of schooling; X_5 = Family size; X_6 = Family income; X_7 = Residential area; X_8 = Current accommodation; X_9 = Access to high-speed internet; β_0 = Intercept; β_1 to β_9 = Co-efficient to be estimated.

2.2.3. Problem confrontation index (PCI)

Constraints faced by students in this study were analyzed using Problem Confrontation Index (PCI). A four-point rating scale was used for measuring the problem confrontation score. The respondents were asked to respond against 11 major constraints which they faced in e-learning during university lockdown. The weights assigned for each response were: 3 for high confrontation, 2 for medium confrontation, 1 for low confrontation, and 0 for not at all. Then, Problem Confrontation Index (PCI) for individual constraint was computed by using the following formula:

$$PCI = (P_H \times 3) + (P_M \times 2) + (P_L \times 1) + (P_N \times 0) \quad (4)$$

Where,

PCI = Problem Confrontation Index

P_H = No. of the respondents expressed constraint as 'high.'

P_M = No. of the respondents expressed constraint as 'medium.'

P_L = No. of the respondents expressed constraint as 'low.'

P_N = No. of the respondents expressed constraint as 'not at all.'

Thus, the PCI of individual constraint could range from 0 to 333, where 0 indicates 'no' constraint confrontation and 333 indicates 'high' constraint confrontation. Finally, the constraints were ranked based on their respective PCI.

3. Results

3.1. Demographic analysis

The demographic characteristics of the students in this study are shown in Table 1. The age distribution of the respondents ranged from 18 years to 24 years which is the usual age range of the undergraduate students in Bangladesh. However, their mean age was 20.64 years. About 53.40 % of the students were female, and 46.60 % were male. The mean years of schooling by the students' fathers and mothers were 10.52 and 8.37 years, respectively. The average family size was 4.47 members. Respondents of this study were from different academic years, such as 1st (25.73%), 2nd (16.50%), 3rd (18.45%), 4th (27.18%), and 5th (12.14%). Some disciplines in universities in Bangladesh have 5-year programs. Therefore, both 4th and 5th-year students are in their last year of graduation.

About 47.09% of the students were from urban areas, where approximately 43.20% were from rural areas. After announcement of university closure in Bangladesh due to Covid-19, all the students were sent back from the hostels to their homes which were mainly in rural and sub-urban areas. However, some students were living in the rented messes with other students mainly for continuing online classes as internet facilities in their localities were very poor. In this study, about 95.15% of the respondents stayed with their families, and the rest stayed in rental messes or apartments with their friends or alone. The average monthly family income of the respondents was 32557.5 BDT.

3.2. Levels of anxiety among students during the pandemic

The anxiety level among students was estimated based on Zung's anxiety index. Internal consistency of the 20 items in the self-rating anxiety scale (SAS) was high (Cronbach's alpha = 0.8726). Anxiety levels of the agricultural university students in this study is presented in Table 2. It reveals that about 29.1% and 14.08% of them are experiencing moderate to severe and extreme anxiety, respectively, due to the extended university lockdown. However, most of the students (39.32%) are experiencing mild to moderate anxiety, and about 17.5% were normal.

Table 1

Demographic characteristics of the respondents (n=206).

Characteristics	% of respondents	Mean	SD
Age (years) (min=18, max=24)		20.64	1.356
Gender			
Female	53.40		
Male	46.60		
Father's year of schooling (years)		10.52	6.181
Mother's year of schooling (years)		8.37	5.903
Family size (number)		4.47	1.431
Academic year			
1 st year	25.73		
2 nd year	16.50		
3 rd year	18.45		
4 th year	27.18		
5 th year	12.14		
Residential area			
Urban	47.09		
Sub-urban	9.71		
Rural	43.20		
Current accommodation			
Staying with family	95.15		
Otherwise	4.85		
Monthly family income (BDT)		32557.5	35659.15
Below 20000	24.24		
20000-30000	30.30		
30000-45000	12.12		
45000-60000	25.76		
Above 60000	7.58		

Note: SD= Standard Deviation.

Table 2

The anxiety level of the students (n=206).

Level of anxiety	Frequency	Percentage
Normal anxiety	36	17.50
Mild to moderate anxiety	81	39.32
Moderate to severe anxiety	60	29.10
Extreme anxiety	29	14.08

3.3. Determinants of university students' anxiety level during the pandemic

The determinants of university students' anxiety were identified by employing the Tobit regression model. The results were presented in Table 3. It reveals that the gender of the students has a significant positive effect on their anxiety level. Female students are more likely to suffer from anxiety than their counterparts. In this study, respondents do not much differ from each other in terms of their age. Besides, age is associated with their academic year. That's why the students' academic years are considered in the model, and it shows significant effects on their anxiety level. Students currently in 4th and 5th year are more likely to feel anxiety. The year of schooling of the students' father showed a negative impact on their anxiety, indicating that students whose father is educated are less likely to feel anxiety. The family size of the student has a significant negative influence on their anxiety.

The residential area also affected the student's anxiety levels. Students from urban areas are more prone to feel anxiety than those from rural and sub-urban areas. Current accommodation has a significant and positive effect on the students' anxiety. It implies that students who are not staying with their families are more affected by anxiety than those staying with their families. Lastly, students' access to high-speed internet influences their anxiety levels negatively. That means students with low-speed internet are more likely to feel anxiety than their counterparts.

3.4. Constraints faced by university students in e-learning during lockdown

This study identified the constraints faced by university students in e-learning during lockdown using the problem confrontation index (PCI). The results of PCI are presented in Table 4. It shows that learning alone is

Table 3

Results of Tobit model to identify determinants of anxiety level.

Variables	Anxiety score	
	Co-efficient	Standard error
Gender (0=male, 1=female)	2.108**	0.912
Academic year (base= 1 st year)		
2 nd year	1.055	1.725
3 rd year	1.192	2.214
4 th year	6.226***	1.083
5 th year	12.770***	1.790
Father's year of schooling (years)	-1.110***	0.161
Mother's year of schooling (years)	-0.005	0.081
Family size (number)	-0.369***	0.062
Family income (Tk.)	-0.001	0.001
Residential area (base= Rural)		
Sub-urban	-0.070	1.708
Urban	2.166**	0.951
Current accommodation (0=family, 1=otherwise)	3.776*	2.289
Access to high-speed internet (0=no, 1=yes)	-2.194**	0.989
Constant	62.242***	5.146
Observations (N)	206	
LR $\chi^2(13)$	149.02***	
Pseudo R2	0.1001	
Log pseudolikelihood	-669.86938	

Note: ***, ** and * denotes significant at 1%, 5% and 10% level.

Table 4
Constraints faced by students in lockdown.

Constraints	High	Medium	Low	Not at all	Total weighted score	Rank order
Learning alone makes it difficult	84	109	9	4	479	1
Lack of adequate learning resources at home	34	137	16	19	392	2
Low access to other online learning platforms	41	84	72	9	363	3
Internet service is poor in locality	24	113	56	13	354	4
Parents cannot help much in study	19	115	60	12	347	5
E-learning is not effective for higher education	18	113	62	13	342	6
Unable to study effectively from home	28	48	99	31	279	7
Lack of enough internet data to facilitate e-learning	24	35	125	22	267	8
Parents have low ICT knowledge to help in e-learning	0	2	185	19	189	9
Lack of proper training in e-learning from university	6	12	141	47	183	10

the most severe constraint for students during the lockdown. It obtained a score of 479 out of 618. The second most constraint was the lack of adequate learning resources at home. The third constraint found in this study was low access to other online learning platforms. The poor internet service in their locality ranked fourth. Other constraints are parents not being able to help much in study, e-learning not being effective for higher education, unable to study effectively from home, lack of enough internet data to facilitate e-learning, parents having low ICT knowledge to help in e-learning, and lack of proper training in e-learning from university, respectively.

4. Discussion

The whole world is going through inexpressible hardship due to the Covid-19 pandemic. It has been affecting every aspect of life ever since its inception. Education is one of the worst affected sectors, especially in developing countries like Bangladesh. All the educational institutions are closed since March 2020. This prolonged shutdown affects the psychological health of the students, especially those of higher studies. Hence, this study assessed the anxiety level of university students along with its determinants and constraints faced by them during e-learning. Findings from the online cross-sectional survey reveal that about 82.5% of the undergraduate students in Bangladesh is experiencing mild to extreme level of anxiety. Previous studies also reported a high presence of anxiety among the students. [Islam et al. \(2020\)](#) reported that 87.7% of students suffer from anxiety, whereas [Shamsuddin et al. \(2013\)](#) found that 64.8% of medical students have different anxiety levels. Anxiety among students is mainly due to the sense of uncertainty about an academic and professional career.

Results reveal that female students exhibited higher anxiety than male students, which is in line with [Di Marco et al. \(2006\)](#). Previous literature reported that stress exposure increases rates of mental problems in females ([Zhang et al., 2020](#)). Students of last year are experiencing more anxiety than others. These students are very close to their graduation, but they have yet to complete it due to the lockdown, which could explain the results. Father's education affected the students' anxiety levels negatively. Educated persons are more aware of mental health issues. That's why they are more concerned about their children's mental health. This study also reveals that students from large families are less affected by anxiety. [Ozer et al. \(2008\)](#) also found similar results among Mexican adolescents. People from large families usually have fewer mental problems due to the favorable environment ([Grinde and Tambs, 2016](#)). Urban students are feeling more anxiety which conforms with the findings of [Özdin and Özdin \(2020\)](#). This is because urban areas in Bangladesh are more affected by Covid-19 due to dense population ([Islam et al., 2020](#)). Besides, there are limited recreational options in cities during the pandemic. The findings also indicate that students living without their families are experiencing more anxiety due to the stress of living alone and inadequate nutrient intake. This result is in line with the findings of [Arusha and Biswas \(2020\)](#). The necessity of high-speed internet during this pandemic is immense, and it is

compulsory for participating in e-learning. This study found that students who do not have high-speed internet connections feel more anxiety. Students often cannot connect or get interrupted during a class because of a poor internet connection.

The problem confrontation index reveals that the biggest constraint in e-learning is to learn alone. In universities, they can discuss their study topic with their classmates, seniors, and teachers, facilitating easy and better learning. Besides, students have access to books, journals, datasets, and other learning resources from the university library, which is not possible during the lockdown. That's why the second-ranked problem was the lack of adequate learning resources at home. The third most constraint was low access to other online learning platforms. Many online platforms such as Udemy, Coursera, Edx, Skillshare, etc., provide different academic and skill development courses conducted by worldwide popular teachers and personnel. Since most of the courses are paid for, many students cannot access these courses. Poor internet connection ranked fourth since most regions in Bangladesh do have good internet connectivity, which hinders students in e-learning. Similar findings were reported by [Almaiah et al. \(2020\)](#).

Some limitations of this study should be acknowledged. Firstly, it relied on self-reported data, and the respondents may not have provided stable responses to questions identifying their anxiety. Secondly, this study did not consider the physiological data of the respondents. Students' physical factors may influence their anxiety level, which needs future longitudinal or experimental studies. Thirdly, this study was conducted based on an online survey, and only virtually available students participated.

5. Conclusion

Universities in Bangladesh are closed due to Covid-19 for more than a year. This extended university lockdown has adverse effects on the mental health of the students. Therefore, this study assessed the anxiety level of university students and identified the determinants of their anxiety. Additionally, constraints faced by them in e-learning during this lockdown were examined. A primary dataset collected from an online survey was used where different information of the students was gathered. Zung Self-Rating Anxiety Scale (SAS) is used to assess the anxiety level, and the Tobit model was employed to identify the determinants. Results reveal that 29.1% and 14.08% of the students were experienced moderate to severe and extreme anxiety, respectively. Various factors influenced their anxiety level. Female students, students from urban areas, last academic year students, and students living without family are more likely to feel anxiety.

On the other hand, students with educated fathers, students from large families, and students who have access to high-speed internet are less prone to feel anxiety. Moreover, students face problems in learning alone at home and lack access to learning resources and other e-learning platforms. This study suggested providing better internet services for facilitating e-learning. Universities should provide students institutional access to different e-learning platforms. This study would play a vital

role in policy making to understand students' mental health and facilitate better e-learning at home and abroad.

CRedit authorship contribution statement

Md. Najmol Hoque: Conceptualization, Data curation, Writing – original draft. **Afsana Hannan:** Data curation, Writing – original draft. **Shahin Imran:** Investigation, Writing – review & editing. **Muhammad Ashiqul Alam:** Resources, Formal analysis. **Bidyut Matubber:** Investigation, Writing – review & editing. **Sourav Mohan Saha:** Methodology, Formal analysis, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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