



## Research article

## Impact of online education on fear of academic delay and psychological distress among university students following one year of COVID-19 outbreak in Bangladesh

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## ABSTRACT

**Objectives:** Extreme fear of academic delay (FAD) and psychological distress among students have arisen as great public health concerns worldwide due to the devastating actions of coronavirus disease 2019 (COVID-19). The precise aim of this study was to assess the impact of ongoing online education on current university students' FAD and psychological stress symptoms following one year of calamitous COVID-19 outbreak in Bangladesh.**Methods:** A cross-sectional web-based survey was conducted from March 15 to 30, 2021, for data collection through a snowball simple sampling technique among Bangladeshi University students, where a total of 1,299 respondents (age:  $\geq 18$  years) responded in the questionnaire. After obtaining informed consent from the participants, we evaluated the association of various sociodemographic factors and the effects of current e-Learning activities on FAD and subsequent psychological distress among university students in Bangladesh. After excluding the partial responses ( $n = 177$ ), we analyzed the clean data sheet ( $n = 1,122$ ) by three consecutive statistical methods: univariate, bivariate, and multivariate analyses.**Results:** Alarmingly, near 60% of the current students exerted extreme FAD and were suffering from severe stress. Besides, 78.1% of students having severe FAD were severely psychologically stressed. Logistic regression analyses revealed that the students of the female gender, rural area, lower-income families, and who suffered from the highest FAD were more significantly ( $p < 0.05$ ) stressed than their reference groups.**Conclusion:** The current analysis demonstrates that most Bangladeshi university students are battling with the unrivaled trend of FAD and facing severe psychological stress symptoms, which must be alleviated by the concerted efforts of the Government, Universities, and educationalists.

## 1. Introduction

Worldwide outbreak of coronavirus disease 2019 (COVID-19), caused by a pathogenic and highly transmissible etiological severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has become a substantial global concern and humanitarian crisis, with around 139 million confirmed cases and near 3 million deaths, as reported on April 16, 2021 [1, 2]. The World Health Organization has declared this public health emergency as pandemic on March 11, 2020, due to its quick upward

trend of infections, mortality, and morbidity [3]. Almost all of the countries in the world have imposed several anti-epidemic measures such as lockdown, physical distancing, isolation, quarantine, and so on, to impede the community transmission of this fatal virus, which has been eventually impacting people's socioeconomic status along with psycho-emotional disturbances [4].

Bangladesh, a densely populated country of around 165 million people, has been facing this global catastrophe since March 8, 2020 [5]. Like other countries, Bangladesh has declared lockdown on March 26,

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2020, which was extended for several periods up to May 30, 2020, to halt the spread of this deadly virus [6].

It has been a very common trend that the fear of any major epidemic or pandemic outbursts has several acute and chronic effects on people's emotions, lifestyle, mental health, and relationship status. The previous two major pandemics, Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS), severely affected the local people's psychological health [7, 8]. The ongoing COVID-19 outbreak has been escalating and threatening human beings' welfare, particularly university students, one of the most vulnerable groups of sufferers. The uncertainty of academic and professional careers owing to unprecedented home quarantine experience under strict lockdown has negatively impacted university students' mental health and well-being. For example, recently, Hossain et al. [9] have investigated the current university students' psychological health situation in a pilot study and reported that more than 50% of the students were suffering from major depressive and generalized anxiety disorders simultaneously due to the devastating COVID-19 outbreak in Bangladesh.

To limit the rapid transmission of COVID-19 and burden on the health system, the global community has brought several strategies to implement the concept of "social distancing" practically, and consequently, many educational institutions have hitherto been shut down [10]. It has been reported that the country-wise closure of educational institutions due to the COVID-19 outbreak has adversely affected more than 60% of students [11]. As the access to the classroom has been restricted, that is why a paradigm shift was happened in teaching techniques from class-based to e-Learning systems, i.e., distance-learning models [12].

In the current advanced technological period, the e-Learning system continues to be more popular day by day at an explosive rate. Despite the present digital era and significant technological success, technophobia is still persistent in a broad range, most prominently in the context of online education [13]. Several major concerns like technological, economic, personal, families, institutional and communities' obstacles, so on, might have a direct association behind this technophobia [14]. Besides, insufficient learning materials and dissatisfied content for both instructors and students made the situation more challenging. Although the online class is one of the best options as of alternative to physical class during the COVID-19 pandemic, most of the students experience limited happiness in this e-Learning method rather than several psychological problems like anxiety due to lack of enjoyment [15]. Besides, several questions have raised regarding faculty skill to deal with substantial technology, financial drawbacks for students to manage IT materials, infrastructural deficiency for many universities to facilitate quick virtual teaching, hardly access to internet facilities for a significant share of students, unmanageable lab and practical courses, controversial online assessment and evaluation, and so on, profoundly deteriorate the academic schedule and subsequently cause severe fear of academic delay and psychological disorders among university students [16].

Inevitable academic delay or session jam among current students of various private or public institutions has become another great fear due to the COVID-19 outbreak, which influences the gravity of several psychological parameters. UNESCO stated during the early phase of the COVID-19 pandemic that worldwide, 1.5 billion students in 188 countries were out of education and facing a great fear of academic gap because of the unprecedented home confinement and institutional closure due to the prolonged lockdown [17]. A survey revealed that around 83% of students experienced the worst psychological illness, and 26% of the participants were out of access to psychological health support [17]. A recent survey in China reported that around 25% of college students were suffering from anxiety due to economic stressors and severe fear of the academic gap [18]. Another report delineated the road map of the academic year gap in last year due to the COVID-19 outbreak that might have impacted the overall mental health situation of university students [19]. Aucejo et al. [20] evaluated the impact of COVID-19 on higher education, and reported that 13% of students delayed graduation, 40% lost income, and lower-income students were 55% more likely to have delayed graduation than the higher-income peers. In

another study, 'separation from school' significantly contributed to students' perceived stress (effects, -0.78, std. error = 0.02, 95% confidence interval = -0.113, -0.049,  $p < 0.001$ ), which negatively impacted on their physical and psychological health [21]. Besides, Kuhfeld et al. [22] reported that prolonged time institutional missing might harm student performance. Furthermore, Engzell et al. [23] found little or no students' improvement while learning from home in a study conducted in Netherland and suggested that this decline in student success rate might be even higher in weaker infrastructural countries or if long-time institutional closure sustains.

To date, there are a few published reports regarding the correlated research on online education, FAD, and mental stress among university students in Bangladesh rather than several studies on psychological distress on adults population [24, 25, 26, 27, 28, 29, 30]. Various professionals, such as government/private employees, doctor/health worker, housewife, businessman, retired, unemployed, students, etc., have been enrolled in these surveys. Most of the studies demonstrated that older adults, female gender, married, unemployed, students, and health professionals were suffering from more psychiatric complications. These reports also traced out the economic hardship as a promoter of psychological stress in most cases.

Currently, there are 107 private universities run by various private organizations with high tuition fees and 46 public universities subsidized by the government. Students' socioeconomic status from various private and public universities is vastly different, and it is a common belief that students of reputable private universities generally own wealthy families with higher social status [31]. In the COVID-19 era, many international reports uncovered several epidemic-induced psychological abnormalities such as suicidal thoughts (11.4%), severe distress (22.4%), high level of anxiety (27.7%), depression (16.1%), and perceived stress (24.7%), etc., are prevailing among the quarantined university students in France [32]. Another study reported that 67.05%, 46.55%, and 34.73% of university students of China were suffering from traumatic stress, depressive symptoms, and anxiety symptoms, respectively [33]. Along with the global studies, some specific student-based reports from Bangladesh, such as Islam et al. [34], demonstrated that 35.2%, 40.3%, and 37.7% of participants were struggling with severe symptoms of depression, anxiety, and stress, respectively.

Several pieces of evidence suggest that mental health effects due to large-scale disasters like the COVID-19 pandemic can vary over time within a few months or years following the disaster [35, 36]. Therefore, in this present study, we intended to explore the impact of online classes on fear of academic delay (FAD) and psychological distress among current university students following one year of the COVID-19 outbreak in Bangladesh. Specifically, the current analysis might be a representative study for the international community or might also depict the equivalent effects among university students from countries with similar socioeconomic status, no prior experiences of online education, and unprecedented FAD.

## 2. Methods

### 2.1. Study design

A web-based cross-sectional survey was designed through google form under three segments: section A included demographic information, section B held FAD-related questions, and section C was designed for psychological distress interventions. The study contained a total of 22 questions in both English and Bangla versions, where a professional way performed the forward and backward translation. The investigation was started with several demographic questions like gender, age, educational level, current living area, including family monthly income, duration of online classes, and so on. The questionnaire was drafted following the adaption from previous studies, and all the queries related to the assessment of FAD and psychological distress were validated in the Bangladesh context [15, 37].

Based on currently available literature and the target group of students, several hypotheses might be developed for focusing the strong association between covariates and outcome variables to implement the current study objective. Practically, there were several obstacles and challenges regarding the e-Learning way to be established and run effectively in alternate to the physical class in Bangladesh. Apart from the vulnerable online education, fear of session jam due to the COVID-19 outbreak greatly influences severe mental health problems among university students. Thus, the current study evaluated the following two constructed hypotheses. *Hypothesis 1*: There might be a significant strong association between online education and psychological distress ( $H_1$ ). *Hypothesis 2*: There might be a significant strong relationship between the fear of academic delay (FAD) and psychological distress ( $H_1$ ).

## 2.2. Sampling technique

A web-based snowball simple sampling strategy was applied to recruit the target samples in the current study [38]. The potential participants who had access to several prominent social media platforms (Facebook, Messenger, Instagram, and so on) in Bangladesh responded to the questionnaire voluntarily with no financial incentive. The respondents had an optimal opportunity to share the link with other students who might meet the criteria to participate in the survey. A standard formula,  $n = (Z_{\alpha/2})^2 \times [p(1-p)/(d)^2]$ , was used for generalizing the sample size, where  $n$  is the estimated sample size, and  $p$  denotes the expected proportion of the population (here assumed to be 50% for the maximum sample size, i.e.,  $p = 0.5$ ).  $Z_{\alpha/2} = 1.96$ , the value of normal distribution at 5% significance level, and  $d$  signifies the 5% tolerated standard error. Hence, the enumerated sample size was 384. After adjusting and eliminating the missing or incomplete responses, the sample size of this study finally reached 1,122 that might lead to more reliable and representative data for a better comprehension of the study outcomes.

## 2.3. Participants, ethics, and approval

Individuals aged more than or equal 18 years of university students, who had internet access and understood the purpose of the survey and wished to take part in it, were asked to respond to the study. A brief description of the background introduced the questionnaire, aim, protocol, usefulness, announcing of anonymity and privacy, instructions for filling the survey, and sharing the link to the participants' close community. This questionnaire-based research was performed by following all guidelines and ethical protocols of the World Medical Declaration of Helsinki [39]. Besides, all respondents' informed consent was taken before participating in the research, and the collected data were preserved in private and confidential. The Ethical Review Committee of the Faculty of Biological Sciences, University of Dhaka, Bangladesh, approved all ethical points of the current research after critically reviewing the protocol and procedures and finally provided an ethical approval number (Ref. No. 120/Biol. Scs.).

## 2.4. Data collection

The major three categorized universities in Bangladesh, public universities governed by government, private universities governed by various private authorities, and other universities governed by both government and private authorities, were targeted to collect responses from current university students. The created google link was shared for data collection in various well-known social media groups and pages operated by university students. Finally, from March 15 to 30 of 2021, a total of 1,299 participants responded to the survey.

## 2.5. Data analysis

After scrutinizing the excel datasheet, we analyzed 1,122 data upon cleaning and excluding the partial and incomplete data. Descriptive

statistics (frequency and percentage distributions) for univariate analysis and chi-square ( $\chi^2$ ) test for searching the association of various variables with FAD and psychological distress have been conducted. Besides, a binary logistic regression was applied to determine the potential variables associated with FAD and psychological stress after adjusting other factors. All the analyses have been conducted using software IBM SPSS (version 20). The two-sided statistical significance level was less than five percent ( $p < 0.05$ ) during statistical analyses [40].

## 2.6. Assessment of FAD and psychological stress

In order to measure the severity of psychological distress among university students, modified Kessler psychological distress scale (K10: "Yes = 1" vs. "No = 0," Range: 0 to 10) has been used, which was validated by previous studies [15, 41]. However, we have enumerated Cronbach's alpha reliability coefficient value as of 0.875, which indicated an excellent internal consistency of the scale [42]. The cut-off scores were 0–4, above 4 to 5, above 5 to 6, and above 6 to 10 for defining well, mild, moderate, and severe psychologically distressed, respectively [43]. Categorically, five validated questions (FAD-5: "Yes = 1" vs. "No = 0," Range: 0 to 5) [15] were set to assess FAD among current university students in Bangladesh, where the cut-off scores were 0–2, above 2 to 4, and above 4 to 5 for mild, moderate, and severe FAD, respectively.

## 3. Results

### 3.1. Demographic characteristics

Among the total 1,299 respondents, 1,122 students responded in the questionnaire completely where 55.20% ( $n = 619$ ) were from private universities, and 50.5% ( $n = 567$ ) were female gender (Table 1). The major share ( $n = 715$ ; 63.7%) of the participants belonged to the 21–24 age range among the three age groups ( $\leq 20$  years, 21–24 years,  $> 24$  years), and around 65% of students are currently living in the urban area. A significant proportion ( $n = 436$ ; 38.9%) of the students' family income are below 25,000 BDT (Bangladeshi taka) per month, and almost half of the students ( $n = 538$ ; 47.9%) are engaged with  $\geq 4$  h online educational programs. Similarly, all other demographic variables with their frequency and percentage distributions are summarized in Table 1.

Categorically, Figure 1 reveals that although around 43% ( $n = 483$  out of 1122) acquired mild to moderate FAD, more than half of the current students exerted severe fear of academic gap ( $n = 639$ ; 57.0%). On the other hand, though 22.5% ( $n = 253$  out of 1122) students achieved psychological stress score below or equal to 4 on the Kessler scale (K10), the lion's share of students ( $n = 670$  out of 1122; 59.7%) obtained above 6 psychological score to be categorized as severely distressed. Besides, 17.8% ( $n = 199$  out of 1122) respondents were classified in mild to moderately stressed conditions after one year of devastating COVID-19 situation in Bangladesh.

### 3.2. Chi-square ( $\chi^2$ ) analysis of FAD and psychological distress

During bivariate analysis, the  $\chi^2$  test was applied to investigate the association of various factors with severe symptoms of psychological distress, and the findings were tabulated in Table 2. The chi-square test demonstrated that all the listed variables, except 'online educational duration' ( $p = 0.169$ ), and 'gender' ( $p = 0.102$ ), were significantly associated with severely distressed conditions ( $p < 0.05$ ) of the university students after a year COVID-19 outbreak in Bangladesh. Numerically, the female students were 4.8% more severely distressed compared to male students (62.1% vs. 57.3%;  $p = 0.102$ ). Rural students significantly exhibited 14.2% more symptoms of psychological stress than the urban students (68.9% vs. 54.7%;  $p < 0.001$ ). Besides, the students, who belonged to the families with monthly income less than 25,000 BDT, significantly showed 14.8% (70.9% vs. 56.1%;  $p < 0.001$ ), and 26.2% (70.9% vs. 44.7%;  $p < 0.001$ ) more mentally distressed conditions

**Table 1.** Frequency and percentage distributions of demographic characteristics and covariates to investigate the psychological distress conditions and fear of academic delay (FAD) among the university students after one-year COVID-19 outbreak in Bangladesh (N = 1,122).

Variables	Options	Number (N)	Percentage (%)
1. Gender	Male	555	49.5
	Female	567	50.5
2. Age (years)	≤20	144	12.8
	21–24	715	63.7
	>24	263	23.4
3. Education level (year)	1st/2nd/3rd	524	46.7
	4th/5th/Master's	598	53.3
4. Current living area	Urban	727	64.8
	Rural	395	35.2
5. Monthly family income (BDT)	<25,000	436	38.9
	25,000 to 50,000	478	42.6
	>50,000	208	18.5
6. Total online educational duration per day	0 to below 2 h	214	19.1
	2 to below 4 h	370	33.0
	4 to below 6 h	366	32.6
	≥6 h	172	15.3
7. University type	Private	619	55.2
	Public	367	32.7
	Others	136	12.1

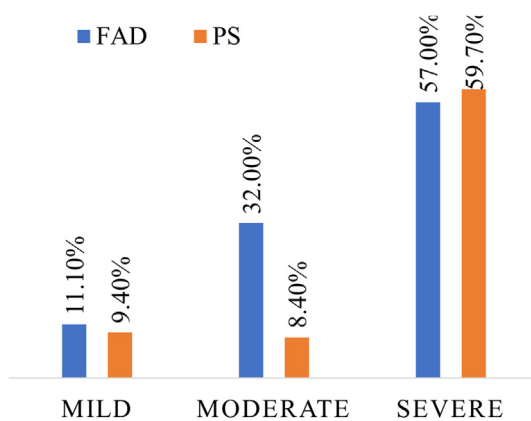
**Note:** 'Public' and 'private' universities are government and private sector owned universities, respectively. 'Others' category contains both government and private owned equivalent institutions. BDT = Bangladeshi taka; 1 USD = 84.64 BDT as of April 14, 2021.

compared to the rest two counter groups (25,000 to 50,000 and above 50,000 BDT), respectively. Consistently, public university students were significantly 14.8% more severely distressed than the private university students (68.9% vs. 54.1%;  $p < 0.001$ ), and 8.6% more severely stressed than the students of other category institutions (68.9% vs. 60.3%,  $p < 0.001$ ). Furthermore, early-stage students were more likely to be associated with severe psychological stress than the late-stage students (1st/2nd/3rd vs. 4th/5th/master's: 64.1% vs. 55.9%,  $p = 0.005$ ).

One of the primary interests of the current study was that the  $\chi^2$  analysis established a significant correlation between the severity of the FAD and severely distressed symptoms. Alarming, 78.1% of students having severe FAD were severely psychologically stressed, whereas the students having mild and moderate FAD showed 21% and 40.4% stressed symptoms, respectively (Table 2).

### 3.3. Logistic regression analysis of FAD and severe psychological distress

A binary logistic regression analysis was conducted during multivariate analysis to assess the significant association of potential factors with FAD



**Figure 1.** Distribution and gravity of university students' fear of academic delay (FAD) and subsequent psychological stress (PS) after one year of the COVID-19 outbreak in Bangladesh.

and severe psychological stress symptoms after adjusting other factors, and the findings were abridged in Table 3. Consistently, the female students were significantly more stressed than the male students (male vs. female: AOR = 0.692, 95% confidence interval [CI]: 0.519, 0.923;  $p = 0.012$ ), and rural students were more likely to be significantly distressed than the urban students (urban vs. rural: AOR = 0.608, 95% CI: 0.444, 0.834;  $p = 0.002$ ). Notably, the students came from the families with monthly income less than 25,000 BDT were 2.25 times more likely to be mentally stressed than that of having more than 50,000 BDT family income (<25,000 vs. > 50,000 BDT: AOR = 2.525, 95% CI: 1.492, 3.401;  $p < 0.001$ ). Besides, the public and private university students reported that they were extremely suffering from 1.8 (95% CI: 1.511, 2.919;  $p = 0.011$ ) and 1.9 (95% CI: 1.186, 3.097;  $p = 0.008$ ) times, respectively, more psychologically distressed conditions than the respondents from other institutions. Expectedly, the students suffering from severe FAD were more likely to have a significant stressful situation than the students who have mild (vs. severe: AOR = 0.078, 95% CI: 0.048, 0.128;  $p < 0.001$ ) and moderate (vs. severe: AOR = 0.190, 95% CI: 0.141, 0.257;  $p < 0.001$ ) FAD. Similarly, Table 3 delineated all the potential factors associated with severe psychological distress symptoms among university students after one year of the COVID-19 outbreak in Bangladesh.

## 4. Discussion

The current research's exact and fundamental objective is to assess the severity of FAD and current psychological distress situations and explore the associated factors related to severe mental stress among university students after a year of the COVID-19 outbreak in Bangladesh. Besides, the study also sought to correlate the impact of online education with FAD and psychological stress. Notably, the extreme fear of session jam significantly influenced the present unfortunate adverse mental health situation among university students in Bangladesh. Therefore, it is crystal and evident that the Bangladeshi university students have been suffering from several unmeasurable psychological stress symptoms with the advancement of FAD in the COVID-19 era.

In addition, the study assumption was that the online educational programs might impact current psychiatric problems and fear of the academic gap during the COVID-19 outbreak. Specifically, both  $\chi^2$  and

**Table 2.** Chi-square ( $\chi^2$ ) test for evaluating the association of different factors with severely stressed conditions and fear of academic delay (FAD) among university students after one-year COVID-19 outbreak in Bangladesh.

Variables	Options	Severely distressed				p-value
		No		Yes		
		N	%	N	%	
1. Gender	Male	237	42.7	318	57.3	0.102
	Female	215	37.9	352	62.1	
2. Age (years)	≤20	43	29.9	101	70.1	0.010
	21–24	308	43.1	407	56.9	
	>24	101	38.4	162	61.6	
3. Education level (year)	1st/2nd/3rd	188	35.9	336	64.1	0.005
	4th/5th/Master's	264	44.1	334	55.9	
4. Current living area	Urban	329	45.3	398	54.7	<0.001
	Rural	123	31.1	272	68.9	
5. Monthly family income (BDT)	<25,000	127	29.1	309	70.9	<0.001
	25,000 to 50,000	210	43.9	268	56.1	
	>50,000	115	55.3	93	44.7	
6. Total online educational duration per day	0 to below 2 h	75	35.0	139	65.0	0.169
	2 to below 4 h	156	42.2	214	57.8	
	4 to below 6 h	143	39.1	223	60.9	
	≥6 h	78	45.3	94	54.7	
7. University type	Private	284	45.9	335	54.1	<0.001
	Public	114	31.1	253	68.9	
	others	54	39.7	82	60.3	
Fear of academic delay (FAD)	Mild	98	79.0	26	21.0	<0.001
	Moderate	214	59.6	145	40.4	
	Severe	140	21.9	499	78.1	

Here, BDT = Bangladeshi taka; 1 USD = 84.64 BDT as of April 14, 2021.

regression analyses endorsed no significant effect of online class duration on FAD and symptoms of severe psychological stress among Bangladeshi university students. Nevertheless, this web-based study reported that above half of the respondents were suffering from severe FAD and psychological stress after one year of the COVID-19 epidemic in Bangladesh. More importantly, the findings of the study ascertained that the current psychological distress was significantly mediated by FAD, where online education might have potentially displayed a catalytical role for the present emotionally damaged situation.

The current e-Learning assessment revealed that near 80% of the respondents were unhappy and dissatisfied with ongoing online educational programs due to the quick decision of nationwide closure of educational institutions, which were consistent and concurred with the previous reports [44, 45]. In response to another query, more than 82% of students answered that they were suffering from fear of their exam assessment system. There are several logical, sensible, and acceptable reasons behind the fear as of infrastructural barriers with technological challenges, difficulty in grading long-answer type questions, cheating susceptibility, and transitioning to open-book exams. Besides, around

**Table 3.** Logistic regression analysis for finding potential factors associated with fear of academic delay (FAD), and severe psychological distress conditions based on the Kessler scales (K10).

Variables	Categories	AOR	95% CI		p-value
			Lower	Upper	
Gender	Male vs. Female	0.692	0.519	0.923	0.012
Age (year)	≤20 vs. > 24	0.987	0.543	1.792	0.965
	21-24 vs. > 24	0.719	0.490	1.054	0.091
Education level	1st/2nd/3rd vs. 4th/5th/Master's	1.324	0.948	1.849	0.099
Current living area	Urban vs. Rural	0.608	0.444	0.834	0.002
Family income (BDT)	<25,000 vs. > 50,000	2.252	1.492	3.401	<0.001
	25,000–50,000 vs. > 50,000	1.279	0.874	1.872	0.205
Duration of online education	0 to <2 vs. ≥ 6	1.103	0.672	1.809	0.699
	2 to <4 vs. ≥ 6	0.794	0.513	1.227	0.299
	4 to <6 vs. ≥ 6	0.864	0.562	1.328	0.504
University type	Private vs. others	1.833	1.151	2.919	0.011
	Public vs. others	1.916	1.186	3.097	0.008
Fear of academic delay (FAD)	Mild vs. Severe	0.078	0.048	0.128	<0.001
	Moderate vs. Severe	0.190	0.141	0.257	<0.001
Constant		2.777			0.002

**Abbreviation:** AOR = adjusted odds ratio, CI = confidence interval, BDT = Bangladeshi taka; 1 USD = 84.64 BDT as of April 14, 2021.

85% of respondents do not know about their potential final exam date, and approximately 90% of students were suffering from job insecurity. These critical parameters, the uncertainty of the final exam, session jam, delay in graduation, and job insecurity for the current university students are the worst catalysts for worsening the depressive symptoms and psychological feelings during the COVID-19 outbreak [46]. So, unprecedented disruptions of academia, quick-shifting for e-Learning, technophobia, and imbalanced internet access are the major causes for this dissatisfaction towards online education, which subsequently proliferated the fear of academic chasm of the current university students in Bangladesh.

To the best of our knowledge, there was no published report regarding the integration of online education, FAD, and subsequent psychological distress among university students in Bangladesh rather than several studies on psychological distress among the general population [24, 25, 26, 27, 28, 29, 30] and medical professionals [47, 48, 49]. However, only a nearly alike study is available online conducted on intermediate college students in Bangladesh [15]. The current findings revealed that the female students exhibited a significantly higher rate of psychological stress than male students, which is similar to the previous epidemiological surveys in Bangladesh conducted by Islam et al. [34] (Depression, Anxiety, and Stress Scale [DASS-21] score for male vs. female = 48.27 vs. 58.74) and Safa et al. [49] (Anxiety level for male vs. female = 43.1% vs. 54.0%,  $p = 0.030$ ). A potential reason might be that women are more likely to do extra household works in disaster time which could account for higher risk of being more vulnerable [34].

The family income of students is crucial amongst all the socioeconomic factors, and the financial stability of family matters on mental health well-being. The present evidence suggests that the students from lower-income families exhibited significantly higher stress than the students from solvent families, which is easily understandable and consistent with the previous report (stable vs. unstable financial condition: OR = 2.920, 95% CI = 1.910, 3.540;  $p < 0.001$ ) [50]. The COVID-19 outbreak with strict lockdown has mostly brought unmeasurable crisis for lower-income families with debts, the decline in income, and overall economic pressure that mediated the family members to be traumatized condition [38]. Additionally, the current study demonstrated that the rural students were more likely to be sufferer from higher mental stress than the urban students, where the interpretation was contrasting to the report by Dhar et al. [50] (Urban vs. rural: OR = 1.940, 95% CI = 1.830, 2.740;  $p < 0.001$ ). The poor economy, lower safety measures, lack of hygiene, and inequality of educational and cultural manners might be specific and considerable reasons that promoted the infection fear in rural areas [50]. Apart from the issue mentioned above, the regression analysis found no significant differences among various age groups of the students in Bangladesh, which has been supported by the earlier disclosed result [38].

Moreover, the current data and evidence suggest that the 'university type' is crucial in realizing the prevalence of severe psychological problems among students in Bangladesh. Notably, Bangladeshi university students are currently struggling with several unique emotional disorders such as stress, depression, anxiety, insomnia, fear, loneliness, and so on [9, 51]. However, the potential association of students from public institutions with more stressed conditions than any category (private/other) university students is consistent with various published reports [52]. Indeed, this key and mental distress influencing factor was abstained to be evaluated in several self-reported previous studies [34, 38, 49, 50]. The major stressors behind the factor include lower socioeconomic barriers, unsatisfactory remote learning, self-and social stigma, and future insecurity in the context of academic and career prospects [52]. Shafiq et al. [31] reported that the public university students were 46% more likely unable to attend online class than the private university students (70% vs. 24%) due to limited internet access and unaffordability. Besides, lack of friend/social support, physical inactivity, relationship break-up with family and batchmates, vulnerable study conditions, social isolation, loneliness, and so on also worsened the fear

and subsequent psychological distress among the university students in Bangladesh [53, 54, 55]. Although the  $\chi^2$  test traced the potential association of education level with the severity of psychological distress, the current multivariate analysis endorsed no significant relationships among the variables ( $p > 0.05$ ). Nonetheless, Kecojevic et al. [56] demonstrated that the upper-stage undergraduate students in New Jersey (United States of America) were more likely to exhibit higher mental health problems.

The study supports several hypothetical causes behind the gravity of FAD and consequent psychological stress. Apart from, the previous studies and several parameters related to the e-Learning system during the investigation of FAD among the current university students were potentially responsible for severe mental health imbalance. Far distance between teachers and students, e-Learning registration complexity, ineffective study plan and procedure, lack of trained instructor, one-way teaching methods, resource inequality, substantial costs for e-Learning materials, and so on, certainly have a negative impact on education that subsequently keep growing up significant psychological distortion among current students in Bangladesh [15]. Furthermore, the ongoing pandemic situation has an unavoidable long-run effect on the economic crisis, monthly family income, and individual's mental health well-being. Therefore, it can be disclosed that university students are battling with the unrivaled trend of FAD and facing symptoms of severe psychological stress after one year of the COVID-19 outbreak in Bangladesh.

#### 4.1. Practical implications

To the best of our knowledge, this study is the first-ever report for finding the significant association of FAD with university students' mental health disturbances after one year of the COVID-19 pandemic in Bangladesh. The results obtained in this study might also represent the current mental or psychological conditions of the university students of other countries having similar socioeconomic and cultural features. The study findings will help the government, educationalists, and institutional administrations recognize the mental health situation of the current university students and take more effective measures to rapidly resolve the symptoms of psychological stress. The present outcomes would also examine the understanding of the significantly associated factors responsible for mental stress conditions. Besides, the current study traced the strong relationship among online class education trends, FAD, and psychological distress of university students in Bangladesh. Undoubtedly, the central reason behind the ongoing mental health problems is fear of the academic break that must be tackled by several efficient actions like implementing a smooth and successful e-Learning system, attractive learning contents, institutional and instructor psychological counseling and economic and professional security.

#### 4.2. Limitations

The study is not flawless research rather than contains some drawbacks. Firstly, internet-based responses may not be considered as representative data for those having no online facilities. Secondly, self-reporting during the web-based survey might have several biases. Thirdly, the current research did not investigate the association of all the critical parameters of online education with FAD. However, we found no impact of duration of online education on FAD, which warrants further vigorous assessment to be ascertained for the association of the rest of the parameters with FAD and subsequent psychological distress among university students during the COVID-19 outbreak in Bangladesh.

#### 4.3. Future research

Several future pieces of research might be proposed to highlight comparing the psychological stress levels of students due to the COVID-19 outbreak with other age groups of people, including distinct professionals. Besides, vigorous research needs to be conducted to integrate stressors and mental health complications among university students in

Bangladesh. Furthermore, the new normal trends, such as online exam assessment, teaching, and learning systems, must be studied whether these approaches are equally effective for all students with diverse socioeconomic status. Study for policy development should be intensified to assess the rapid shipping from physical class to e-Learning methods, availability of prevailing digital resources, and the current artificial intelligence to tackle present psychological vulnerability.

## 5. Conclusions

The current empirical research confirmed that the current university students are struggling against several symptoms of severe psychological stress and the highest fear of academic instability after a year of devastating COVID-19 outbreak in Bangladesh. Indeed, the clear findings also reflected the gravity of the ongoing mental health situation, which has been negatively multiplied several times by the significant impact of FAD among the current university students in Bangladesh. In this circumstance, we suggest intensive psychological care with economic stability by both approaches, individually and collectively, and smooth educational programs to lessen the academic gap must be ensured from Government, Universities, and educationalists' concerted efforts. Thus, the study outcomes might be helpful for local and international epidemiologists to assess the situation and invent appropriate interventions to mitigate the fear of the academic gap and subsequently ensure the psychologically sound health of university students.

## Declarations

### Author contribution statement

Md. Jamal Hossain: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Foyez Ahmmed: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

S. M. Abdur Rahman: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Sherejad Sanam, Talha Bin Emran, Saikat Mitra: Performed the experiments; Contributed reagents, materials, analysis tools or data.

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### Data availability statement

Data included in article/supplementary material/referenced in article.

### Declaration of interests statement

The authors declare no conflict of interest.

### Additional information

Supplementary content related to this article has been published online at Data In Brief.

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