

# The link between Facebook addiction and depression among university students: Evidence from a lower-middle income country

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## Abstract

**Background and Aims:** Among all the social media, Facebook is the most popular social networking site among students. That raises a chance of excessive Facebook usage being a form of addiction to hamper students' mental health. The primary goal of this study was to find the association of Facebook addiction with the depression level of university students during the COVID-19 pandemic.

**Method:** Four hundred ten university students from Bangladesh were selected randomly as samples for this investigation. In this study, the Bergen Facebook Addiction Scale and nine-item Patient Health Questionnaire were used to assess the level of Facebook Addiction and depression status of the students, respectively. Ordered probit models were employed to identify the connection between Facebook addiction and depression. Ordinary least square models were utilized further to check the robustness of the findings.

**Results:** Ordered probit results confirm that Facebook addiction increases the likelihood of having heightened depression among university students. Besides, sex, household income, and history of being infected by COVID-19 also appeared to be correlated with the depression level of the students.

**Conclusion:** Creating opportunities for students to participate in more physically demanding outdoor activities should be prioritized as it could ultimately enhance their capacity to mitigate depression. Appropriate measures must be taken to increase the number of recreational facilities on the campus for students, considering their age, gender, and preferences.

## KEYWORDS

Bangladesh, COVID-19, depression, Facebook addiction, LMIC, University Students

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## 1 | BACKGROUND

Among all the social media, Facebook is the most popular social networking site among students, as the thing stands.<sup>1</sup> This popularity can sometimes be associated with a specific form of internet addiction known as Facebook addiction.<sup>2</sup> Hence, checking the link between Facebook and the psychological wellbeing of students has received considerable attention from social scientists worldwide.<sup>3,4</sup> However, the evidence is mixed. Several studies have documented the benefits of students' Facebook usage. For example, university students use social media like Facebook to control negative emotions, bond with peers, and reduce worry and tension.<sup>3,5</sup> Besides, Facebook also provides psychosocial benefits like perceived emotional and social support<sup>6</sup>; reduced feelings of isolation<sup>7</sup>; enhanced wellbeing<sup>8</sup>; greater health and wellness satisfaction<sup>9</sup>; and subjective happiness.<sup>8,10</sup>

Nevertheless, these positive impacts of Facebook usage cannot conceal its psychologically harmful effects on the other hand. For instance, excessive use of social media, particularly Facebook, has been identified as a form of addiction that can hamper students' mental health by elevating the level of depression and stress.<sup>11</sup> Besides, uncontrolled and addictive Facebook usage might interrupt their learning process,<sup>12</sup> leading to psychological impairments<sup>13</sup> and reduced parent and peer attachment.<sup>12</sup> Moreover, excessive Facebook usage is negatively associated with physical activity and positive mental health predictors (e.g. level of emotion, social and psychological wellbeing) and positively associated with adverse mental health predictors like daily stress.<sup>14</sup>

Bangladesh, a lower-middle-income country in South Asia, also shares a similar picture to other countries in the world in terms of the extent of Facebook usage and its negative consequences. Facebook has been massively popular among Bangladeshi students, primarily university students, as approximately 46% of the total Facebook users in Bangladesh are aged between 18 and 24 years.<sup>15</sup> The popularity of Facebook comes with a cost, as the health outcomes related to Facebook usage have mostly been detrimental. Hosen et al.<sup>16</sup> reported that excessive Facebook use among university students in Bangladesh results in sleeping disturbance, worsened eyesight, and back and neck pain. Another study stressed that more than 5 h of Facebook use could predict depression symptoms among university students in Bangladesh.<sup>4</sup> One study revealed a 39.7% Facebook addiction rate among Bangladeshi university students, and subsequently, the country has been reported to have nearly one in two young addict users.<sup>17</sup> However, these studies were conducted before COVID-19.

The episode of COVID-19 is crucial to study university students' mental health for two reasons in the context of Bangladesh. First, more than nine million new users joined Facebook in Bangladesh between 2020 and 2021,<sup>\*</sup> reflecting the unprecedented surge in Facebook usage during the pandemic. This upsurge in users can add to the rising rate of problematic usage of Facebook in Bangladesh.<sup>18</sup> Second, the closure of educational institutions and pandemic-related

restrictions in Bangladesh (e.g., social distancing, isolation, home quarantine, etc.) induced psychological mediators, such as sadness, worry, fear, anger, annoyance, frustration, guilt, helplessness, loneliness, and nervousness among young adults.<sup>18,19</sup> Taken together, it will be exciting to measure the contribution of Facebook addiction to the depression level of university students during COVID-19, as very few studies looked at this association.<sup>20</sup> Therefore, we undertake this study to find the association of Facebook addiction with the depression of university students during the COVID-19 pandemic. The findings of the study will be helpful to the policymakers to enable necessary policy measures to limit the detrimental effects of Facebook on university students' depression.

The article is set out as follows. Section 2 explains the materials and methods employed in this study. Section 3 presents the results of the study, while Section 4 provides the discussion and Section 5 provides conclusion and recommendations.

## 2 | MATERIALS AND METHODS

### 2.1 | Sampling

We employed a two-stage cluster sampling technique for this cross-sectional study. First, we randomly chose four universities from the list of permitted universities on the University Grants Commission of Bangladesh website. Second, after obtaining complete lists of students from the universities,<sup>†</sup> we had to draw a random sample of 385 students using Cochran's formula, conceiving a 5% margin of error at the 95% confidence level and a population proportion of 0.5 following a previous study.<sup>21</sup> Being precautionous about the nonresponse bias, we randomly selected 417 students from the list by generating random numbers through a popular random number generator, namely, Calculator. net.<sup>‡</sup>

### 2.2 | Data collection

Primary data were collected from the selected students administered between March 2021 and May 2021 using a structured questionnaire. The data was obtained throughout a period when the average infection rate was around 10 per cent.<sup>5</sup> The link to the online questionnaire was mailed among the selected samples via online platforms (e.g., Google, Facebook Messenger, WhatsApp, etc.). The study's purpose, ethical permission and approval letters from university registrars, data confidentiality statement, and anonymity declarations<sup>\*\*</sup> were detailed on the questionnaire's first page. In the questionnaire, information was mainly collected on the following aspects of the students: (i) demographic profile; (ii) social and economic status of his/her family; (iii) academic status; (iv) perceptions regarding the use of Facebook; (v) mental and physical health condition; and (vi) COVID-19 infection status of the students and their family.

## 2.3 | Measures

### 2.3.1 | Outcome variable

We measured depression using a 9-item depression scale Patient Health Questionnaire (PHQ-9).<sup>22</sup> This PHQ-9 scale is a popular tool to assess the severity of depression.<sup>18,23</sup> We distributed PHQ-9 scores across the following ranges: 0–4, 5–9, 10–14, 15–19 and 20–27, and coded them as “none/minimal depressed = 1,” “mild depressed = 2,” “moderately depressed = 3,” “moderately severe depressed = 4,” and “severe depressed = 5,” respectively. The Cronbach's  $\alpha$  was 0.78, indicating good internal consistency.

### 2.3.2 | Explanatory variable of interest

To capture Facebook addiction, we use the Bergen Facebook Addiction Scale (BFAS),<sup>24</sup> which is a widely adapted and comprehensively applied measure of behavioral addiction.<sup>4,18,25</sup> BFAS has six items based on different dimensions (salience, tolerance, mood modification, withdrawal, relapses, and conflicts) and each of them is measured with a 5-point Likert scale. The total score ranges from 6 to 30, where a higher score corresponds to a greater level of Facebook addiction. One can be considered a Facebook addict if a Facebook addiction score is more than or equal to 18.<sup>4,18</sup> We obtained a Cronbach's alpha value of 0.82, implying a very good internal consistency.

### 2.3.3 | Control variables

We included a set of control variables to control for the confounding effects. We depended on the findings of previous literature to select the control variables.<sup>4,10,18</sup> We accounted for demographic variables like sex (male = 1, female = 0) and age (in years). In addition, socioeconomic variables like the relationship status of the student (married or in a relationship = 1, single = 0) and monthly family income (in Bangladeshi Taka) were also incorporated. Based on previous studies, we also included a behavioral variable, that is, smoking status (smoker = 1, nonsmoker = 0).<sup>26</sup> Finally, we integrated health-related variables, e.g., COVID-positive (infected by COVID-19 in the past 3 months = 1, 0 otherwise), disability (physically disabled = 1, 0 otherwise), and chronic disease (affected by chronic disease = 1, 0 otherwise), into our models.

## 2.4 | Statistical analysis

A descriptive analysis (e.g., frequency, percentage and mean where appropriate) was conducted to explore the students' demographic, economic, health, and academic status. Then, we moved to the econometric estimation of exploring how Facebook addiction triggers depression among the students. Considering the measure of the outcome variable, the ordinal nature of the values of the outcome variable appeals to ordered probit or ordered logit models as

the most appropriate econometric model.<sup>27–29</sup> We relied on the ordered probabilistic (Ordered Probit) model to capture the effect of the explanatory variable of interest and control variables on depression. We estimated two different models to capture the effect of the explanatory variable of interest on the outcome. Model 1 is a null model (no control variables), and Model 2 is fully controlled, using all control variables.

We checked the robustness of the models in two ways. First, we disaggregated the sample between male and female sub-samples and fitted them into the full control ordered probit model. Second, we performed an ordinary least square (OLS) estimation to capture the effect of explanatory variables on the outcome, as recent literature suggests that OLS can also produce reliable estimates if the outcome variable is ordered.<sup>30</sup>

## 3 | RESULTS

### 3.1 | Sociodemographic and health-related background of the students

410 students returned the questionnaire, and no response was omitted due to any potential response error. Table 1 provides the respondents' sociodemographic and health-related backgrounds of the survey respondents. 60% of the respondents were male, and the rest were female. The mean age of the respondents was 22 (1.77) years. Less than one-fifth of the respondents (14.88%) were in a relationship or married at the time of the survey. The student's physical health was generally in better condition as around 95% of them had no disabilities.<sup>††</sup> And nearly 96% never suffered from any chronic disease. Students also demonstrated possession of healthy habits, such as about 87% of them were non-smokers. Among the students, around one-third (28.54%) of them had a history of being COVID-19 infected in a span between March 2020 and March 2021. The mean household income of the students was 25,959 (2336.98) BDT.

Table 1 also shows that nearly half of the students (48.54%) were Facebook addicts. Furthermore, almost four-fifths (82.68%) of the students were seen to suffer from mild to severe depression, as only 17.32% of them were found to be none or minimally depressed.

### 3.2 | Determinants of severe depression status of students

Column (1) and column (2) of Table 2 provide the estimation results of two ordered probit models. Depression was strongly associated with Facebook addiction, sex, household income, and COVID-19 infection history. For ease of reading, we describe the results from the full control model. Facebook addiction was found to be expected to 0.66 increase the log odds of being at a higher level of depression ( $\beta = 0.66$ ,  $p < 0.01$ ). Being a male was negatively associated with the levels of depression ( $\beta = -0.40$ ,  $p < 0.01$ ), which means female students usually have a higher level of depression than male students.

**TABLE 1** Socio-demographic and health-related background of the students.

Variables	Category	n	%	Mean (SD)
Age (in years)	-	-	-	22 (1.77)
Sex	Male	246	60	-
	Female	164	40	-
Relationship status	In a relationship/married	61	14.88	-
	Otherwise	349	85.12	-
Household Income (Monthly in Taka)	-	-	-	25,959 (2336.98)
Disabilities	Yes	19	4.63	-
	No	391	95.37	-
Smoking Status	Smoker	53	12.93	-
	Nonsmoker	357	87.07	-
COVID-19 infection history	Positive	117	28.54	-
	Otherwise	293	73.46	-
Chronic disease	Yes	15	3.66	-
	No	395	96.34	-
FA	Addicted	199	48.54	-
	Nonaddicted	211	51.46	-
Depression	None/minimal	71	17.32	-
	Mild	121	29.51	-
	Moderate	117	28.54	-
	Moderately severe	75	18.29	-
	Severe	26	6.34	-

Household income had a negative association with depression; however, the effect size is minimal ( $\beta = -0.01$ ,  $p < 0.01$ ). In addition, COVID-19 infection status was positively associated with depression ( $\beta = 0.65$ ,  $p < 0.05$ ), implying that university students who were COVID-19 infected were at a greater risk of falling into a higher level of depression than those who were not infected.

Column (3) and column (4) of Table 2 show the results of the OLS models we estimated to check the robustness of our primary analyses. The results of the OLS estimation reiterated our findings from the ordered probit models, as the effect sizes and the direction of the associations were reasonably similar to the ordered probit model.

In addition, the ordered probit model was estimated for male and female samples separately to check the robustness of the ordered probit model (Figure 1). Results were similar to the ordered probit model fitted to the pooled sample regarding Facebook addiction ( $\beta = 0.66$  and  $0.63$  for male and female, respectively;  $p < 0.01$ ). The same was true for the household income's effect sizes and relationships. However, the effects of age, COVID-19 infection history, and chronic disease of the respondents varied from the main models. For instance, age did not correlate with depression in the full sample models. However, the female sample model shows a positive and

significant association between age and depression ( $\beta = 0.10$ ,  $p < 0.05$ ). Moreover, the COVID-19 infection history of the students had a positive and significant association with depression in the full sample ordered probit model. Nevertheless, in the female sample model, we failed to find any association between COVID-19 infection history and depression. Finally, although the full sample ordered probit model did not show any significant association between chronic disease and depression, the female sample ordered probit model showed a significantly positive association between these two variables ( $\beta = 1.08$ ,  $p < 0.01$ ). Full results are available in (Appendix A1).

In sum, although the separate sample models showed heterogeneous results in terms of the control variables, the direction and extent of the relationship between depression and Facebook addiction were seen to be consistent in all the models.

## 4 | DISCUSSION

This study aimed to check the nexus between depression and Facebook addiction among university students during the COVID-19 pandemic. We found a strong positive association between depression and Facebook addiction in all the analyzed models. This finding is

**TABLE 2** Link between depression and Facebook addiction estimated by ordered probit and OLS models.

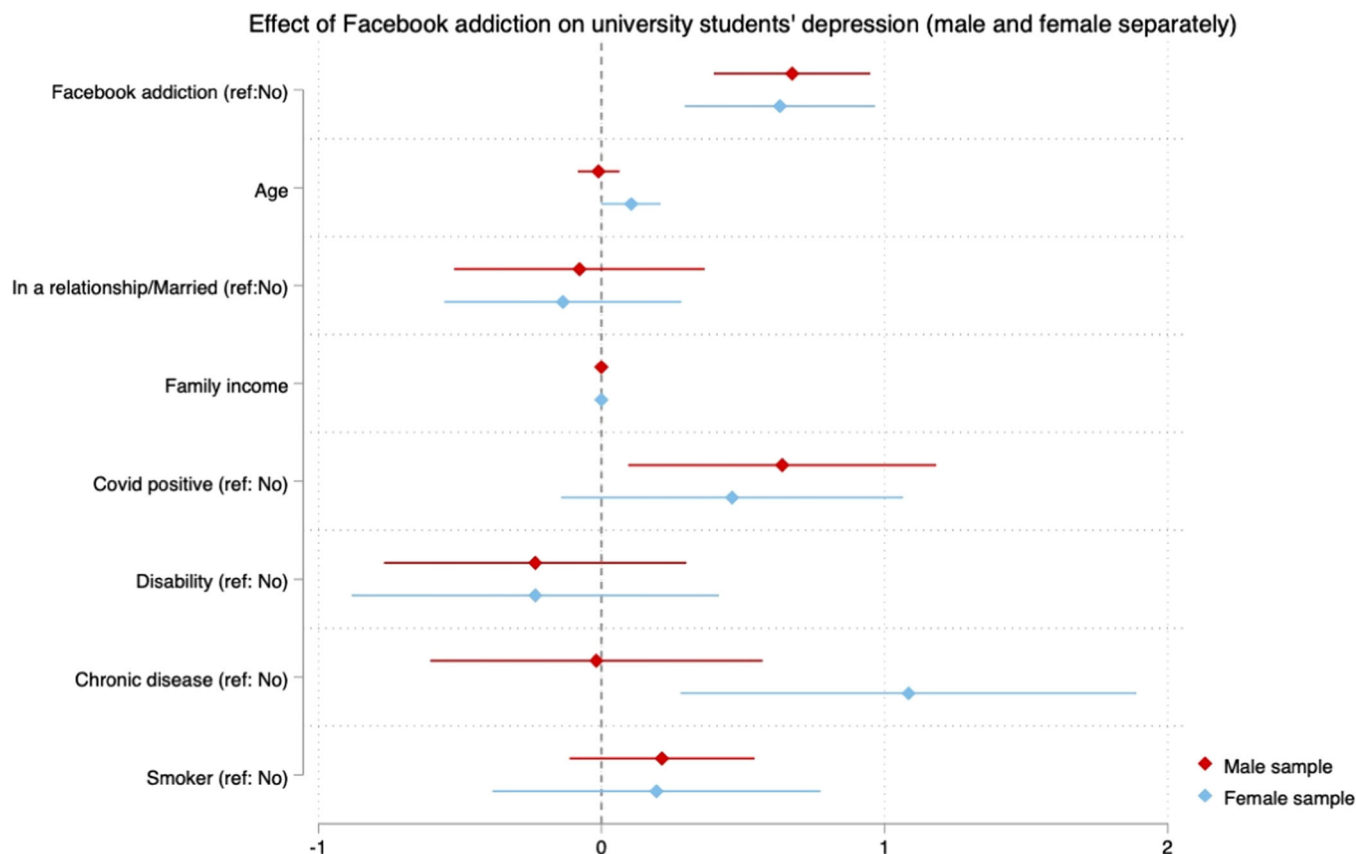
Variables	(1) Depression	(2) Depression	(3) Depression	(4) Depression
Facebook addiction (ref: No)				
Yes	0.63*** (0.13)	0.66*** (0.11)	0.72*** (0.11)	0.63*** (0.10)
Sex (ref: Female)				
Male		-0.40*** (0.14)		-0.38*** (0.11)
Age		0.02 (0.03)		0.03 (0.02)
Relationship status (ref: Otherwise)				
In a relationship/married		-0.08 (0.15)		-0.09 (0.15)
Household income		-0.01*** (0.00)		-0.01*** (0.00)
Covid positive (ref: No)				
Yes		0.65** (0.23)		0.50** (0.09)
Disability (ref: No)				
Yes		-0.28 (0.24)		-0.27 (0.23)
Chronic disease (ref: No)				
Yes		0.41 (0.26)		0.39 (0.26)
Smoker (ref: No)				
Yes		0.23 (0.15)		0.21 (0.17)
Constant			2.32*** (0.07)	2.56*** (0.65)
Observations	410	410	410	410
R-squared			0.10	0.23

Note: Columns (1) and (2) represent the ordered probit models. Columns (3) and (4) represent the OLS models. Robust standard errors in parentheses. \*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$ .

similar to another previous study that connected Facebook addiction to depression; however, that study was conducted in the pre-COVID-19 era. This link between depression and Facebook addiction is also valid worldwide. For example, Błachnio et al.<sup>31</sup> reported that excessive Facebook use caused psychological trauma and physical health problems in Poland. Turkish students with severe despair, anxiety, and insomnia had higher Facebook Addiction (Facebook addiction) intensity.<sup>32</sup> However, our study differs from these for two reasons. First, Błachnio et al.<sup>31</sup> did not focus solely on university students, as respondents from different age groups and

occupational categories were included. On the contrary, our study was conducted among university students only. Second, Koc and Gulyagci<sup>32</sup> carried out their research among college students in the pre-pandemic era, whereas our study was conducted after the outbreak of the COVID-19 pandemic among university students who are at a higher level than college students.

Furthermore, the magnitude of Facebook addiction has increased among Bangladeshi university students amid the pandemic. In this study, using the BFAS cut-off score, we found that around 49% of the students are addicted to Facebook. Using the same BFAS cut-off



**FIGURE 1** Results of ordered probit estimations measuring the association of explanatory variables with depression for both male and female samples. demonstrates the plots representing estimation results from the male and female sample models for each explanatory variable. The standardized regression coefficients (variances were standardized to 1) were presented with their corresponding confidence intervals (shown by the corresponding bars). The explanatory variable of interest, Facebook addiction, had more substantial effects on depression than the other explanatory variables. All the regression coefficients have been standardized to compare using plots.

score, Mamun and Griffiths<sup>18</sup> found that 39.7% of 300 university students in Bangladesh were at risk of Facebook addiction before COVID-19. This implies a rise in Facebook addiction among university students, although the increment can vary from study to study unless the sample is not nationally representative.

Besides our primary explanatory variable, we have found that depression is also related to several variables we used in our model to account for confounding effects. One of the variables is sex, as we found that females were more prone to depression than their male counterparts. This finding of our study is consistent with the study of Solomou and Constantinidou<sup>33</sup> and Adewuya et al.<sup>23</sup> which revealed that women were at higher risk of increased depression and anxiety than their male counterparts. Two potential mechanisms might put females closer to depression than males. First, Roberts et al.<sup>34</sup> found that women spend more time on their phones than men, exchanging texts and emails and using Facebook. Second, during the COVID-19 pandemic, female students reported higher lockdown weariness than male students.<sup>35</sup> Household income is another variable that had a significant negative association with depression. This finding is similar to another study that reported that students from lower socioeconomic backgrounds conceive poorer mental health than those from

higher socioeconomic backgrounds.<sup>36</sup> As a potential mechanism behind this finding, financial instability and the urge to secure a better future can fuel depression. A university student from a high-income family may be at the ease of keeping himself/herself free from financial pressure. This is a luxury that poorer students do not have. Moreover, they try to unburden their family from financial insecurity by getting a good job. In most cases, the preparation to get a good job starts from their early graduation days, activating depression and other ingredients of poorer mental health.<sup>37</sup> Finally, COVID-19 infection history was also influential in causing depression among university students. A similar thing was reported in a past study where researchers stated that the mental impact was more severe than physical complications in the case of coronavirus infection for many of those infected.<sup>38</sup>

## 5 | CONCLUSION AND RECOMMENDATIONS

Although our results do not vary significantly from the findings that emerged from other studies worldwide, they should still be interpreted with some caution as our study has certain limitations. First, this study

targeted university students, while students enrolled in other academic institutions like medical colleges or polytechnic institutes were omitted. Second, our data is primarily comprised of Economics students, which can limit its generalizability. Including students from all academic disciplines would have been undoubtedly intriguing; however, we could not materialize the idea during the pandemic. Third, this study is a study of mere correlation, not causation. This necessitates another study that will extricate the endogeneity and establish a causal effect of Facebook addiction on mental wellbeing.

Nevertheless, our study can provide evidence of how problematic Facebook use can be associated with poor mental health. Thus, necessary steps should be taken to conduct a vast media campaign to raise students' awareness regarding the problematic use of Facebook. Moreover, the focus should be given to creating opportunities for students to participate in more physically demanding activities that could ultimately enhance their capacity to mitigate depression during any future pandemic situation. In addition, respective faculty members and other nonacademic staff can perform an initial screening and counsel the students who encounter mild to severe depression. Last but not least, appropriate measures must be taken to increase the number of recreational facilities on the campus for students, considering their age, gender, and preferences.

#### AUTHOR CONTRIBUTIONS

**Md Shamsuddin Sarker:** Conceptualization; writing—original draft.  
**Asif Imtiaz:** Formal analysis; visualization; writing—review and editing.  
**Shejuti Haque:** Conceptualization; writing—original draft.  
**Kazi Tanvir Mahmud:** Writing—original draft.

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#### CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

#### ETHICS STATEMENT

The Ethical Review Board of the Department of Economics, Southeast University, Bangladesh, has approved this study.

#### TRANSPARENCY STATEMENT

The lead author Asif Imtiaz affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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#### ENDNOTES

\* According to The Digital Report published by We Are Social. The following link can navigate to the data: <https://wearesocial.com/uk/blog/2022/01/digital-2022-another-year-of-bumper-growth-2/>

† After our best effort, we could only make a student list predominantly for Economics discipline.

‡ We made a list of the students in the sampling frame and chose only those students for the survey whose corresponding serial numbers were generated by the random number generator.

§ According to the digital report published by the Embassy of France in Dhaka, Bangladesh: <https://bd.ambafrance.org/COVID-19-Bangladesh-Update-1-May-2021-2743>

\*\* We did not ask for the name or ask any question that might lead to the potential identification of a student. Respondents did not have to send the filled-out questionnaires back individually, as the responses were automatically recorded in the database.

†† Disability symptoms included eyesight problems, hearing and speech disorders, autism, and chronic diseases such as diabetes, heart disease, respiratory disease, high blood pressure, etc.

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## APPENDIX

Table A1

TABLE A1 Link between depression and Facebook addiction (male and female separately).

Variables	(1) Male sample	(2) Female sample
Facebook addiction (ref: No)		
Yes	0.67*** (0.14)	0.63*** (0.17)
Age	-0.01 (0.04)	0.10** (0.05)
Relationship status (ref: Otherwise)		
In a relationship/married	-0.08 (0.23)	-0.14 (0.21)
Household income	-0.01*** (0.00)	-0.01*** (0.00)
Covid positive (ref: No)		
Yes	0.64** (0.28)	0.46 (0.31)
Disability (ref: No)		
Yes	-0.23 (0.27)	-0.23 (0.33)
Chronic disease (ref: No)		
Yes	-0.02 (0.30)	1.08*** (0.41)
Smoker (ref: No)		
Yes	0.21 (0.17)	0.19 (0.30)
Observations	246	164

Note: Robust standard errors in parentheses.

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$ .