



RESEARCH ARTICLE

MENTAL HEALTH AMONG UNIVERSITY STUDENTS DURING COVID-19 LOCKDOWN IN BANGLADESH: A CROSS SECTIONAL STUDY

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ABSTRACT

Around 64.9% Students from the total respondents were anxious and 46.3% were showed to have depressive symptoms in the whole study. These percentages are comparatively high for suffering from different mental issues. In the study, there were 56.5% were male participants and 43.5% were female. Besides, Compared to the female students, male students were showed to have more anxiety (37.7%). Among the total respondents 60.4% were in twenty one to twenty four age range and the rest 43.5% were in the age range of twenty five to thirty. Anxiety and depressive symptoms were comparatively high in the twenty five to thirty age range (41.8%), (48.4%) students compared to the twenty one to twenty four age range students. There is a positive association of age with anxiety. Moreover, those students who were doing under-graduation program found with 34.0% anxiety symptoms and the students were in post-graduation found with 30.5% anxiety symptoms and rest of them were doing others educational course surprisingly found with high percentage of anxiety symptoms (60.0%). However the depressive symptoms among under-graduation, post-graduation and others were high. Those who were doing other educational course found with extensive percentage of depressive symptoms (80.0%) and this is literally inimical. There is a positive association of their educational level with depressive symptoms. In the whole study it is found that, students who stayed university area have showed the higher anxiety symptoms (47.4%) than the students stayed at home during the COVID-19 lockdown and there is a positive association (p-value 0.004) of it with anxiety. Similarly, those who stayed university area have showed with great depressive symptoms (52.6%) compared to the students who stayed at home during the COVID-19 epidemic. However, students who faced mental issues, they were showed to have more anxious (35.1%) and depressive symptoms (47.1%). For long time been in this problem is comparatively high to have anxiety and depressive symptoms. The students who were more than 5 months showed to have more anxiety (62.5%) and depressive symptoms (62.5%) than those who suffered by two months. There is a positive association (.033) of this time with anxiety. However, those who didn't take treatment (36.9%), were showed to have bad mental condition (50.0%). There is a strong association with anxiety.

KEYWORDS

Mental health; COVID-19 lockdown; cross sectional study; Bangladesh

1. INTRODUCTION

Mental health builds spiritual, non-physical and social comfort. It invades how we reflect, consider and function. It also helps determine how we handle stress, relate to others and make choices. Mental health is significant at every stage of life, from childhood and puberty through youth. Moreover, mental health is an undivided part of health, actually there is no wellness without mental wellbeing. Mental health is further than the lack of mental illness or incapability. Accurate mental wellbeing is a must in every period of life from childhood and juvenile to youth. Wholly a lifetime, an individual can experience mental health issue at any stage. This simulates not only mood and behavior but also changes the way of thinking, of looking at life and fighting challenges (Charlson et al., 2019).

Even though mental health is a highly personal thing, what affects one person may not affect the other person. We don't usually talk about mental health. But it is necessary to taking care of mental health besides the physical health. Nowadays, mental health problem is increasing. People

are facing different kinds of mental health problem, more especially in this COVID-19 pandemic. Mental health problem may also be referred to as mental health conditions. In 2019, 1 in every 8 people or 970 million people around the world were living with a mental health disorder, with anxiety and depressive disorders the most common (GBD, 2022).

Mental health problem is increasing in students day by day. Mental health problems can affect many areas of students' lives, reducing their quality of life, academic achievement, physical health and satisfaction with the university experience and negatively affecting relationships with friends and family members. These issues can also have long term consequences for students, affecting their future employment, earning potential and overall health (Charlson et al., 2019). However some significant factors contribute to mental health problems. These factors include life experiences such as trauma or abuse, biological factors such as genes or chemistry of the brain and even the family history of mental health problems can affect an individual.

We know that, Coronavirus disease 2019 (COVID-19) is explicated as

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affliction caused by a novel coronavirus exclaimed harsh keen and sharp wheezing disorder coronavirus 2 (SARS-CoV-2), which was first recognized between an outburst of wheezing sickness occurrences in Wuhan city, Hubei Province, China. The Coronavirus disease 2019 has escalated swiftly all over the world (Pieh et al., 2021).

As COVID-19 expands simply allying people who are in immediate junction, the mass governments have executed demarcation to avert the unbridled expand of the virus (Pieh et al., 2021). Despite the fact that communal detaching and more estimates namely the utilization of individual defensive tool could aid to carry the unbridled spreading of COVID-19, they could be negatively influence mental health (Brooks et al., 2020).

Bangladesh remarked the first COVID-19 occurrences on March 8, 2020, as announced by the institute of Epidemiology, Disease Control and Research (IEDCR), Bangladesh (Saha and Gulshan, 2021). For reducing this vigorous outburst circulation in the society levels, a total of public health estimates namely (a) striking nationwide lockdown, (b) closing down all type of educational academy, (c) segregating the stimulated occurrences, (d) separating the doubted incidents, (e) enclosing communal and bunch movements, etc. were accomplished all over the world (Al Mamun et al., 2022; Brooks, 2020; Hossain, et al., 2020). These estimates are predictably constructive to defeat its communication.

For mention, 44% and 31% phenomenon and mortality rates were specified for the people with isolate measures, therefore it was 96% and 76% for the non-isolate people (Nussbaumer-Streit et al., 2020). Clearly, phenomenon and mortality rates decline after striking these obstructive measures. Despite the fact that, these measures have necessary to defeat the outburst, successive mental health collision are not vanished, which calculates mental health fluctuations by psychological pressure like undergoing fear and fright, feeling defeated and pierced, facing a shortage of basic supplies, lacking authentic and reliable information, overwhelming with stigma, losing from jobs, and facing financial recession, etc. and these devastating issues are alleged for subsequent suicide occurrences in globally including Bangladesh (Bhuiyan et al., 2020; Dsouza et al., 2020; Mamun, 2021; Panigrahi et al., 2021; Sakib et al., 2020; Sakib, 2021).

For instance, a systematic review (Xiong et al., 2022) reported high rates of mental health outcomes (ie, up to 50.9% anxiety, 48.3% depression, 53.8% post-traumatic stress disorder, 38% psychological distress, and 81.9% stress were found) among the general population globally. However, all education institutions were closed initially from March 18 to March 31, 2020 across the country and later extended to the mid of June 2020 in phases (Islam et al., 2022). During the COVID-19 pandemic, however, students' psychological health becomes a concern of interest as all the educational institutions were closed down, and their social circle, communication, and interaction processes were also changed (Alawamleh et al., 2020).

In this situation, spending time in home quarantine or isolation is not enjoyable for most of the people because it limits their freedom and worries about losing their employment and being bored. It also lead to melancholy and anxiety because of the separation from the people and the dread of illness (Tasnim et al., 2020). While students are confined and out of both university, study and on schedule, they might feel both immediate and longer term consequences of stress, anguish, rage, boredom, loneliness and other emotions (Alawamleh et al., 2020; Chen and Lucock, 2022; Islam et al., 2020). News, misinformation and rumors regarding COVID-19 enhance students' anxious thoughts and influence their future (Spitzer et al., 2006).

In the COVID-19 epidemic, though there is minimal information about mental conditions among students (Al Mamun et al., 2021). Obtaining established GAD, PHQ measurements may assist in evaluating the need for action to abate student pandemic effects on mental health (Barzilay et al., 2020; Patient, 2013). Though, it is difficult to pursue the mental health of university students in Bangladesh during the COVID-19 pandemic, I've attempted to extend those findings to university students in Bangladesh, emphasizing GAD, PHQ levels and the variables involved. This research was designed to investigate different aspects of mental health and coping including anxiety, depression, attribute of life among university students in Bangladesh.

1.2 Literature of The Review Based on Similar Studies

As Coronavirus disease may also increase negative thoughts and emotions within students and about their future, found that high level of anxiety and depression with more than 50% experiencing levels above the clinical

cut offs and females scoring significantly higher than males (Chen and Lucock, 2022).

According (a systematic review) reported high rates of mental health outcomes (ie, up to 50.9% anxiety, 48.3% depression, 53.8% post-traumatic stress disorder, 38% psychological distress, and 81.9% stress were found) among the general population globally (Xiong et al., 2020).

Islam et al. (2020) in their studies found that, the age group 18-29 years of Bangladeshi students the anxiety, depression and stress were respectively 76.1%, 71.5% and 70.1% for atleast mild symptoms, 62.9%, 63.6% and 58.6% for at least moderate symptoms, 35.2%, 40.3% and 37.5% for atleast severe symptoms and 19.7%, 27.5% and 16.5% for at least very severe symptoms (Islam et al., 2020)

There was found that, the prevalence rate of mild to severe symptoms of depression, anxiety and stress ranged from 46.92% to 82.4%, 26.6% to 96.82% and 28.5% to 70.1% respectively (Al Mamun et al., 2021; Firoj al Mamun et al., 2021).

Some researcher (2021) invented those living near the pandemic's atrocious invaded areas enhanced Italy's psychological heartbreak. Student greater inclination to support in directing the epidemic was associated by gained worry, exposing that deleterious inspection over one's cure risk administration might result in psychological heartbreak (Villani et al., 2021).

According to found that morally all students in USA were anxious about the COVID-19 epidemic. Students with moderate to severe anxiety more likely to relate poor sleep quality during the COVID-19 epidemic (Ulrich et al., 2021).

Many university students in Bangladesh had moderate to severe anxiety and stress. Being disconnected with sleep, living in an urban region, not involving in physical functions, being female, internet browsing for many hours a day and smoking were significantly associated to depression, anxiety and stress (Islam et al., 2020).

It is found that sleep, cigarette smoking, previous suicidal thoughts, suicide attempt history of suicidality, sadness, anxiety and stress were all strongly associated with suicidal ideation among university students in Bangladesh. Male students has less suicidal thoughts compared to female. Suicidal thoughts were more common among students who suffered from depression, anxiety or stress (Tasnim et al., 2020).

The COVID-19 outburst puts dread and stress on Bangladeshi Citizens. It has showed that strain of the participants impairs the sound sleep, causes short temper, makes disorder in the home life and even turns themselves to suicidal ideators (Amit et al., 2020). It is also found that economic challenges and unavailability of food are linked together, while hamper of formal education and plan increase the stress of career seekers. Overall, socio-economic conditions of mass people forced lockdown without ensuring the core human necessities, poor governance, communication and healthcare facilities create public concern and disturb human life (Amit et al., 2021).

Based on the prevalence of depression, anxiety and stress among university students has grown in Pakistan (Saeed et al., 2021). It also identified significant gender distinctions in most depression, anxiety and stress meaning that the men faced more significant levels of sadness, anxiety and stress than women (Saeed et al., 2021).

2. MATERIAL AND METHODS

2.1 Data Sources and Study Design

The sources of data are from where data is obtained. According to nature, the source of data can be two types such as primary source and secondary source. When the data are collected from the specific person or actual situation is called primary source. On the other hand, in a study various types of documents are used as secondary source. In this study primary sources are used. Data was derived from universities (public, private and national) of Bangladesh. A cross-sectional study was conveyed. A questionnaire was created to collect data based on basic information, GAD-7 and PHQ-9 from February to April 2022 (Islam et al., 2020; Spitzer et al., 2006). A survey link of google form questionnaire was created and the link of it was sent to the respondents by their personal mail, social media (Messenger, WhatsApp). I also asked them to share the link with their friends. After going through the study's aim and purpose, respondents submitted their information. No financial stimulant was given to the participants and all the information was confidential and reliable.

2.2 Anxiety Measurement Scale

GAD-7 is a seven-item self-reported questionnaire for screening and severity measurement of generalized anxiety disorder (Spitzer et al., 2006). The GAD-7 asks how often participants have been worried by anxiety symptoms. The items are rated on a 4-point Likert scale indicating symptom frequency, rating from 0 to 3 that is 0 for Not at all to 3 for Nearly every day. The total score range was 0-21, with higher scores indicating GAD. The total score can be interpreted as implying no anxiety (0-10), anxiety (11-21), with a reasonable cutoff value for determination cases of GAD at 10 points (Barzilay et al., 2022).

2.3 Depression Measurement Scale

PHQ-9 is the nine-item depression scale for the patient health questionnaire (Patient, 2013). The PHQ-9 asks how frequently respondents have been concerned by problems. Categories are valued on a 4-point Likert-type scale, ranging from 0 to 3 that is 0 for Not at all to 3 for Nearly every day. Total score is ranged 0-27, with higher scores import higher depression. Based on original validation studies, total score can be interpreted as no depression (0-10) and depression (11-27). A cut-off score of 10 is suggested as indicating an analysis of depressive disorder (Bhatt, 2016).

2.4 Data collection and Methods

Data collection methods means by which and by how the data were obtained from the respondents. In this method the required steps are following:

2.5 Preparation of questionnaire

According to the goal of this research problem an e-questionnaire was made. Data has been collected through individual questionnaire. The questionnaire was designed the following characteristics:

- Number of questions in the questionnaire should be limited.
- A respondent should adequately be assumed that his/her identity will not be against his/her interest.
- Avoid long and confusing questions and formulate simple and short question.
- Start with easy questions and then slowly put the difficult ones.
- Question of sensitive nature should be minded.

To avoid unnecessary trouble and hazardous situation pretesting of the schedule was done and modification of the contents of the schedule was made in the light of pretesting. A draft questionnaire was first prepared and pretesting of the same was completed. It was then finalized for e-survey by eliminating the anomalous and inconsistencies present in the draft questionnaire. Questions are arranged in logical sequence and all questions relating to one aspect are grouped under on sub-head. Most of the questions are close-ended and the answers chosen by the respondents were indicated by the tick mark. An open-ended question is included to find out the options of the opinions of the respondents with having space provided for writing answers. Considering the difficulties of analysis of open-ended questions, I kept the number of open-ended to minimum. While designing the questionnaire, Attention was given to the wording of the questions so that the respondent found it simple and understood easily. In certain situation local dialect of some terminologies is used.

2.6 Data Collection

The data should be collected keeping in view the objectives of the study. The editing of the complete questionnaires helped in amending and recording errors and eliminating data that are obviously erroneous and inconsistent. All kinds of mistakes have been corrected where it was found in questionnaires and all answers have been observed carefully. As a result, there is no irrelevant information. The tendency should not collect too many data but the important one and some of which are never subsequently examined and analyzed.

2.7 Data Processing

The easiest procedure of analyzing the data is to use compute program. At present nobody thinks to analyze the data without a suitable computer program. No other alternative is available to analyze the data quickly, easily and correctly. So I have selected a suitable computer program for data entry and analysis.

2.8 Computerization and Statistical Analysis

Data were analyzed using Microsoft Excel 2010 and SPSS Version 20. Data input, editing, graphs were finished using Microsoft Excel. The Excel file was imported into the SPSS software. Categories of dependent variable were created. Described statistics (frequencies, percentages) and chi-square test were performed. Binary logistic regression with the results expressed as odds ratio (OR) was performed with a 95% CI for determining significant associations between categorical dependent and independent variables. The association of variables were taken statistically significant where the p-value was <0.05.

2.9 Variable

Variable is a characteristic which varies over time, place and individual.

In this study I selected the following Independent and Dependent variables which are

- Educational Institution
- Gender
- Age
- Educational level
- Living area during COVID-19 lockdown
- Involvement of teaching or learning
- Duration of time been in this problem
- Took treatment or not
- Current mental condition
- Anxiety
- Depression

Table 1: Description of the Selected Independent Variables Along with Their Categories

Variables	Categories
Educational Institution	Public, Private and National university
Gender	Male, Female
Age	21-24, 25-30
Education Level	Under-graduation, Post-graduation, Others
Living area during COVID-19 lockdown	University area, at home
Involvement of teaching or learning	Yes, No
Duration of time been in the problem	2 months, 3 months, 4 months, ≥5 months
Took treatment or not	Yes, No
Current Mental Condition	Good, Improving day by day, Not improving, Bad, Others

2.10 Chi-Square Test

The Chi-square test was developed by David and Spruill, which is called the test for goodness of fit to analyze categorical data (Moore and Spruill, 1975). Here the Chi-square was applied to test the probability of independence of a distribution of data. It was a significant statistic that provided highly effective results. The data needed to calculate the Chi-square statistic must be random, raw, mutually exclusive, taken from independent variables, and drawn from a sufficiently large sample. The number logically independent values that can fluctuate in a data sample is called degrees of freedom. The Chi-square test was a valuable technique that may have revealed a lot about the nature of research data. The Chi-square formula is given below-

$$\chi^2 = \frac{(O_i - E_i)}{E_i}$$

Where O_i denotes the observed frequency and E_i denotes the expected frequency. The above statistics is in equation follows the Chi-square distribution with n-1 degrees of freedom.

2.11 Logistic Regression Model

Logistic regression is a classification algorithm used for assigning observations to a distinct set of classes. Logistic regression can forecast the connection between independent and response variables. The main assumptions of logistic regression are as follows-

- The dependent/response variable must be dichotomous such as 1 or 0, and the independent variable must be both discrete and continuous.
- There is no multi-co-linearity among the independent variables.
- A linear relationship between the dependent and independent variables is not required.
- The independent variables do not need to be multivariate normal, though multivariate normality yields a more stable solution. Also the error terms do not need to be multivariate normally distributed.

Logit regression function:

$$\log_e \left(\frac{p}{1-p} \right) = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_p x_{ip} + \epsilon_i$$

Where p denotes the probability of success and 1-p is the probability of failure, p lies between 0 to 1, then $\log_e \left(\frac{p}{1-p} \right)$ the range must be from +1 to -1.

3. RESULTS

3.1 Frequency Distribution

Table 2: Frequency Distribution for Different Selected Variables		
Variable	Frequency	Percentage
Educational Institution		
Public University	173	75.2%
Private University	40	17.4%
National University	17	7.4%
Gender		
Male	130	56.5%
Female	100	43.5%
Age		
21-24	139	60.4%
25-30	91	43.5%
Marital Status		
Married	47	20.4%
Unmarried	183	79.6%
Current Educational Level		
Under-graduation	156	67.8%
Post-graduation	59	25.7%
Others	15	6.5%
Living area during lockdown		
University area	78	33.9%
At home	152	66.1%
Current work status		
Employed full time	16	7%
Employed part time	41	17.8%
Self-employed	26	11.3%
Unemployed, looking for work	76	33%
Student	54	23.5%
Home carer	17	7.5%
COVID-19 positive		
Yes	41	18.1%
No	186	81.9%

Table 2: Frequency Distribution for Different Selected Variables		
Involving Teaching or Learning		
Yes	170	73.9%
No	60	26.1%
Facing mental Problem		
Yes	176	76.5%
No	54	23.5%
Taking Own Life		
Never	122	53%
Seldom	65	28.3%
Very often	33	14.3%
All time	3	1.3%
Time been in the problem		
2 months	41	17.8%
3 months	117	50.9%
4 months	56	24.3%
>5 months	16	7%
Took Treatment		
Yes	35	15.2%
No	195	84.8%
Shared Problem		
Yes	151	65.7%
No	79	34.3%
Current Health Status		
Good	56	24.3%
Improving day by day	32	13.9%
Not improving	9	3.9%
Bad	14	6.1%
Others	34	14.8%
Anxiety		
Minimal(0-4)	33	14.3%
Mild(5-9)	102	44.3%
Moderate(10-14)	58	25.2%
Severe(≥ 15)	37	16.1%
Depression		
Minimal(0-4)	38	16.5%
Mild(5-9)	71	30.9%
Moderate(10-14)	65	28.3%
Moderately Severe(15-19)	39	17.0%
Severe(≥ 20)	17	7.4%

Frequency distribution is operated to sort the accumulated data in table form. After data accumulation, data should be showed in a relevant way for superior understanding. Sorting the data in such a way that, all its characteristics are epitomized in a table. This is known as frequency distribution. The following table represents the frequency and percentage of different selected variables.

From the above Table 2 it can be said that, most of the respondents were from public university (75.2%), and the left were from private and national university (24.8%). Among all the respondents, 56.5% were male and the left 43.5% were female, age group 21-24 was more (60.4%) than the age group 25-30(43.5%). Most of the students were in under-graduation (67.8%), 25.7% students had completed their graduation and the left 6.5% were in other higher studies program. Among all the students 66.1% were at home during COVID-19 lockdown, only a few (33.9%) stayed near the university area during this lockdown. Most of the students were unemployed (33.0%) and they were looking for work, employed full time were a few (7%). Most of them were involved in teaching or learning program (73.9%) during COVID-19 lockdown. More than two third

students faced mental problem (76.5%) because all the educational institutions were closed for too long and they can't communicate with their friends and others and were also worried about future. Lamentably they thought to take their own life randomly (28.3%). Although most of them facing mental some mental issues, only a few took treatment (15.2%) and they shared their problems with others (65.7%). Most of the students were too much anxious (65%) and depressed (47%). Students were found mild to severe symptoms of anxiety (85.6%), 83.6% depressive symptoms mild to severe were also found among students, that is really lamentable. As, most of the students have anxious and depressive symptoms, it is important to know about their current mental health condition. According to the results, among all the students, 56(24.3%) were at good state, 32(13.9%) were improving day by day. However, 9(3.9%) were not

improving and sadly 14(6.1%) were at bad condition. Moreover, others conditions' students were 34(14.8%) those were not willing to share their current mental health condition. According to this result, it is showed that, during the COVID-19 lockdown most of the students were depressed and anxious and worried about their future.

3.2 Bivariate Analysis

Bivariate analysis influences the exploration of bivariate data. It is one of the purest forms of statistical analysis. It is used to figure out if there is a connection between two sets of grades. It is also used to find the correlation between two variables. The following table represents association between anxiety and selected covariates.

Table 3: Assessing Association Between Anxiety and Selected Covariates

Factor	n (%)	Anxiety		p-value
		No n (%)	Yes n (%)	
Overall		80(34.6)	150(64.9)	
Educational Institution				
Public University	173(75.2)	116(67.1)	57(32.9)	0.025
Private University	40(17.4)	28(70.0)	12(30.0)	
National University	17(7.4)	6(35.3)	11(64.7)	
Gender				
Male	130(56.5)	81(62.3)	49(37.7)	0.291
Female	100(43.5)	69(69.0)	31(31.0)	
Age Group				
21-24	139(60.4)	97(69.8)	42(30.2)	0.048
25-30	91(43.5)	53(58.2)	38(41.8)	
Education level				
Under-graduation	156(67.8)	103(66.0)	52(34.0)	0.094
Post-graduation	59(25.7)	41(69.5)	18(30.5)	
Others	15(6.5)	6(40.0)	9(60.0)	
Place you been during Lockdown				
University Area	78(33.9)	41(52.6)	37(47.4)	0.004
At home	152(66.1)	109(71.7)	43(28.3)	
COVID-19 Positive				
Yes	41(18.1)	24(58.5)	17(41.5)	0.357
No	186(81.9)	123(66.1)	63(33.9)	
Involvement in teaching or learning				
Yes	170(73.9)	111(65.3)	59(34.7)	0.967
No	60(26.1)	39(65.0)	21(35.0)	
Faced any mental problem				
Yes	176(76.5)	135(64.9)	73(35.1)	0.819
No	54(23.5)	15(68.2)	7(31.8)	
Shared Problem				
Yes	151(65.7)	100(66.2)	51(33.8)	0.657
No	79(34.3)	50(63.3)	29(36.7)	
Time been in the problem				
2 Months	41(17.8)	29(70.0)	12(29.3)	0.003
3 Months	117(50.9)	73(62.4)	44(37.4)	
4Months	56(24.3)	42(75.0)	14(25.0)	
≥5 Months	16(7.0)	6(37.5)	10(62.5)	
Took Treatment				
Yes	35(15.2)	27(77.1)	8(22.9)	0.108
No	195(84.8)	123(63.1)	72(36.9)	
Current mental health status				
Good	56(24.3)	49(87.5)	7(12.5)	<0.001
Improving day by day	32(13.9)	12(43.8)	18(56.2)	
Not improving	9(3.9)	5(55.6)	4(44.4)	
Bad	14(6.1)	7(50.0)	7(50.0)	
Others	34(14.8)	19(55.9)	15(44.1)	

Anxiety: Among the total 230 respondents 150(64.9%) were found to have mild to severe anxiety symptoms. Where, the public university students had higher anxiety 57(32.9%) than the private university 12(30.0%). Male students were more anxious 49(37.7%) than the female students 31(31.0%). Students with age range twenty five to thirty (41.8%)

had higher anxiety than the other group. Anxiety also extensive among the others level of education students (60.0%). Also, students who lived at university area showed higher anxiety symptoms than the students who lived at home during the COVID-19 lockdown. The p-value is 0.004 that is less than 0.05. So, it can be said that there is a positive association among

them. On the other hand, students who were not COVID-19 positive, anxiety symptoms were less (66.1%) than who were positive. So, it is clear that, COVID-19 positive is a risk factor of being anxious. Besides, students who were involved in any teaching or learning (34.7%) had less anxiety symptoms than the students were not involved in teaching or learning during the COVID-19 lockdown. Students who shared their mental health problems, they are less anxious (33.8%) than those who didn't share (36.7%) their problem. Those who had faced mental problem 73(35.1%)

were more anxious than the others and the students who were in the problem more than 5 months (62.5%) had showed symptoms of anxiety than the other groups and the p-value is 0.003 that is less than 0.05. So, it can be said that, it is positively associated. Among the total respondents, who didn't take any treatment 123(63.1%) had showed anxiety than those who took treatment. All over, those who had mentally good 49(87%) were not as anxious as the others. The p-value is <0.001, that has strong association.

Table 4: Assessing Association Between Depression and Selected Covariates

Factor	n (%)	Depression		
		No n (%)	Yes n (%)	p-value
Overall		123(53.2)	107(46.3)	
Educational Institution				
Public University	173(75.2)	94(54.3)	79(45.7)	0.096
Private University	40(17.4)	24(60.0)	16(40.0)	
National University	17(7.4)	5(29.4)	12 (70.6)	
Gender				
Male	130(56.5)	74(56.9)	56 (43.1)	0.232
Female	100(43.5)	49 (49.0)	51 (51.0)	
Age Group				
21-24	139(60.4)	76(54.7)	63 (45.3)	0.653
25-30	91(43.5)	47(51.6)	44 (48.4)	
Education level				
Under-graduation	156(67.8)	89 (57.1)	67 (42.9)	0.023
Post-graduation	59(25.7)	31(52.5)	28 (47.5)	
Others	15(6.5)	3(20.0)	12 (80.0)	
Place you been during Lockdown				
University Area	78(33.9)	37(47.4)	41(52.6)	0.188
At home	152(66.1)	86(56.6)	66(43.4)	
COVID-19 Positive				
Yes	41(18.1)	21(51.2)	20(48.8)	0.863
No	186(81.9)	100(53.8)	86(46.2)	
Involvement in teaching or learning				
Yes	170(73.9)	94(55.3)	76(44.7)	0.370
No	60(26.1)	29(48.3)	31(51.7)	
Faced any mental problem				
Yes	176(76.5)	110(52.9)	98(47.1)	0.579
No	54(23.5)	13(59.1)	9(40.9)	
Shared Problems				
Yes	151(65.7)	84(55.6)	67(44.4)	0.366
No	79(34.3)	39(49.4)	40(50.6)	
Time been in the problem				
2 Months	41(17.8)	27(65.9)	14(34.1)	0.117
3 Months	117(50.9)	57(48.7)	60(51.3)	
4Months	56(24.3)	33(58.9)	23(41.1)	
≥5 Months	16(7.0)	6(37.5)	10(62.5)	
Took Treatment				
Yes	35(15.2)	21(60.0)	14(40.0)	0.401
No	195(84.8)	102 (52.3)	93(47.7)	
Current mental health status				
Good	56(24.3)	37(66.1)	19(33.9)	0.369
Improving day by day	32(13.9)	15(46.9)	17(53.1)	
Not improving	9(3.9)	6(66.7)	3(33.3)	
Bad	14(6.1)	7(50.0)	7(50.0)	
Others	34(14.8)	18(52.9)	16(47.1)	

Depression: Table 4 shows a numerous number of students 107(46.3%) were found to have mild to severe depressive symptoms. Among all the participants, female students (51.0%) were carrying more depressive symptoms than the male students. Students age range with twenty five to thirty (48.4%) had higher depressive symptoms than the left age range. Students those who were in Post-graduation and others program (47.5%) and (80.0%) had showed more depression than under-graduate students. Here the p-value is 0.023 that is less than 0.05. So, there is a significant association with depression. Besides, the students who were at university area (52.6%) during COVID-19 lockdown were carrying more depressive symptoms than the students who were at home during the COVID-19 lockdown. Students who were COVID-19 positive there were more likely to have depressive symptoms (48.8%) compared to who did not positive. On the other hand, among 230 valid participants 176(76.5%) respondents faced mental problems and there is a high risk of being depressed 98(47.1%). However, among all the participants, those who shared their mental health condition/problem, they are less depressed (44.4%) compared to who did not share (50.6%). Moreover, the risk of being depressed among the students who were facing problems more than 5 months (62.5%) than the others.

3.3 Binary Logistic Regression

Binary logistic regression is a regression model where, the target variable is binary, that is, it can take only two values, 0 or 1. It is the most utilized regression model in readmission prediction, given that the output is modeled as re-admitted (1) or not re-admitted (0). The following table shows the associated covariates by performing binary logistic regression.

Table 5: Binary Logistic Regression Result for Selected Covariates Associated with Anxiety				
Covariates	Anxiety			
	p-value	Odds Ratio (OR)	95% CI	
			Lower	Upper
Gender				
Male ^{ref}				
Female	0.046	3.032	1.022	8.997
Age				
21-24 ^{ref}				
25-30	0.031	1.953	1.062	3.591
Education Level				
Under-graduation ^{ref}				
Post-graduation	0.007	0.132	.030	0.568
Others	0.023	0.231	.065	0.818
Living area during lockdown				
University area	0.003	2.369	1.333	4.209
At home ^{ref}				
Involvement of teaching or learning				
Yes ^{ref}				
No	0.788	0.911	0.462	1.795
Time been in problem				
2 months	0.042	0.272	0.077	0.956
3 months	0.140	0.430	0.140	1.321
4 months	0.017	0.225	0.066	0.765
≥5 months ^{ref}				
Took Treatment				
Yes ^{ref}				
No	0.135	0.498	0.200	1.241

Anxiety: The binary logistic regression from table 5 shows the p-value of gender, age, education level, living area during lockdown and time been in the problem is less than 0.05, so it can be said that they are significantly associated with Anxiety. Female respondents 3.032(OR: 3.032, 95%CI:

1.022-8.997, p-value: 0.046) times more likely to suffer from anxiety than the male respondents. On the other hand, age group 25-30, 1.953(OR: 1.953, 95%CI: 1.062-3.591, p-value: 0.031) times more likely to suffer from anxiety than the age group 21-24. Those who lived at university area 2.369(OR: 2.369, 95%CI: 1.333-4.209, p-value: 0.003) times more likely to suffer from anxiety than those who stayed at home during the COVID-19 lockdown. Students who are in post-graduation level .132(OR: 0.132, 95%CI: .030-.568, p-value: 0.007) times less likely to suffering from anxiety than the students were doing under-graduation during the COVID-19 lockdown and others educational level 0.231(OR: .231, 95%CI: 0.065-.818) times less likely to suffer from Anxiety than the under-graduation students during the COVID-19 lockdown. 2 months been in any mental problem 0.272(OR:0.272, 95% CI: 0.077-0.956, p-value: 0.042) times less likely to suffer from Anxiety than of ≥5 months. Similarly, 4 months .225(OR: 0.225, 95%CI 0.066-0.765, p-value: 0.017) times less likely to suffer anxiety than those who were in the problem for ≥5 months. Overall, it measured that most of the students were likely to have anxiety symptoms.

Table 6: Binary Logistic Regression Result for Selected Covariates Associated with Depression

Covariates	Depression			
	p-value	Odds Ratio(OR)	95% CI	
			Lower	Upper
Gender				
Male ^{ref}				
Female	0.868	1.074	0.461	2.503
Age				
21-24 ^{ref}				
25-30	0.774	1.090	0.606	1.962
Education Level				
Under-graduation ^{ref}				
Post-graduation	0.026	5.328	1.226	23.161
Others	0.053	1.113	0.428	2.893
Living area during lockdown				
University area ^{ref}				
At home	0.133	0.642	0.360	1.145
Involvement of teaching or learning				
Yes ^{ref}				
No	0.495	1.242	0.667	2.314
Time been in problem				
2 months ^{ref}				
3 months	0.049	2.091	0.968	4.517
4 months	0.415	1.439	0.660	3.448
≥5 months	0.094	2.920	0.835	10.087
Took Treatment				
Yes ^{ref}				
No	0.454	1.341	0.623	2.889

Depression: From the above Table 6, the p-value of education level and time been in any mental problem is less than 0.05, so they are significantly associated with Depression. Those who were post-graduation students 5.328(OR: 5.328, 95%CI: 1.226-23.161, p-value: 0.026) times more likely to suffering from depression than those of under-graduation students. On the other hand, those who were been mental problem of 3 months 2.091(OR: 2.091, 95%CI: 0.968-4.517, p-value: 0.049) times more likely to suffer from depression than those who were in the problem for ≥5 months. The results showed that, in the COVID-19 lockdown the university students were at high risk of being depressed that is inimical.

4. DISCUSSION

Many public health edges were already in place in Bangladesh during COVID-19 outbreak, assigned to enlarging mental health uncertainty among university students. The study measures anxiety and depression and current mental condition due to COVID-19 pandemic. Prevalence estimation of anxiety and depression are 65 and 46 per 100 students. This percentage is comparatively high. Binary logistic regression reveals that,

gender, age, education level, living area during this lockdown period, time duration of suffering are significantly associated with anxiety, whereas, education level, time duration of suffering are significantly associated with depression.

Previously conducted studies in Bangladesh about mental health problems based on anxiety and depression among students found that age, gender, exercise, lagging academically, providing private tuition, living with family, place of residence were significantly associated [14]. But the current study doesn't include all the associated factors from previous works due to a different sampling frame in this research. Due to COVID-19, under-graduation and post-graduation and others higher level study background university students are taken to find the anxiety and depression to know their mental health.

The study disclosed that, male students were more depressed than the female students. As we all know that, during COVID-19 lockdown all type of educational institutions were closed. As a result, all the students were at their home. Staying home day by day was, they feel bored and worried about their study and career. Male students were more worried about their family. For this they have many depressive symptoms and it was increasing day by day.

The study discloses that, 25-30 age range students were more depressed than the other category. Due to this lockdown, their educational progress was totally stopped. Most of the students in this age range were stucken at graduation or post-graduation level. Though online education program was started but most of the students couldn't attend the online class due to not having android mobile phone and unavailability of internet connection especially in rural area. Moreover, online education was the new term in the lockdown, so almost all students were facing problems with this system. Eventually, many of them were extremely worried about to finish their graduation and post-graduation program. Because, before finishing their study they couldn't join in any job sector. This made them depressed and anxious.

However the study discloses that, during COVID-19 lockdown, the students who stayed at university area, were more anxious and depressed compared to those who stayed at home. Due to this COVID-19 lockdown, most of the students were gone to their home. They stayed with their family for a long time. They spent this crucial time with their family member. They got mental support from their family although they were worried about their family and future. But those were at university area, they were alone. Even they couldn't go outside as they used to before. They couldn't stay with their family. Many uncertain thoughts surrounded them, some of thought to attempt suicide. Due to this reason, they were extreme anxious and depressed.

This study disseminates that, the students who were involved teaching or learning in this lockdown period, they were less likely to depressed and anxious compared to those who were not involved in any teaching or learning system. Involvement to something is actually better for mental health, especially this lockdown period. In this lockdown, students have learnt many skillful course for further implement. Those were not involved in any teaching or learning they were found more anxious and depressed.

This study reveals that, those who faced different mental issues, they were more anxious and depressed. Normally, when a student was nearly to finished his/her study, he/she got worried about family and future. During COVID-19 all types of educational institutions were closed, so nearly every students were out of their study, friend circle, social works and others. Also social distancing was compulsory to maintain. Gradually, students were getting different mental issues. They were more involving into mobile phone, online games and so many unproductive works. Anxiousness and depressiveness were arising into them badly. Even, they were involving many unethical activities. All over this COVID-19 Pandemic was harmful for the students.

Moreover, those who didn't share their problems to their closest one, they were more likely to be depressed and anxious. Sharing and discussion about ones' problem can solve many critical situations. In this lockdown period, maximum student were facing different kinds of mental issues. Sharing those problems with family member or nearest person can lighten those problems. Most of the time, students do not want to share their mental state with others. They became depressed. But this is necessary to share problems. Due to not sharing mental issues, many students commit even suicide or involved many unethical activities. So, avoiding or ignoring or not sharing mental health problem is a risk factor of anxious and depressive factor.

However, those who didn't take treatment, they were more likely to have

anxiety and depressive symptoms compared to those who took treatment. It is necessary to take treatment of our mental health like we do for our physical well-being. Mental health is necessary. Most of the people do not want to take treatment for mental health issues. They simply avoid or take that normally. But especially the students shouldn't do that. Sometimes a psychiatrist consultation is must to being mentally well. So, taking treatment is an important factor for anxiety and depression.

This study reveals that, those who are in post-graduation program and others level of study background were more anxious and depressed than the under-graduation students. They are at high risk of suffering mental health issues.

The study discloses that, for keeping well mental health, students should share their problems with family member or others closest persons. In this study students were asked to give their opinion how to keep their mental health well during the COVID-19 lockdown. Most of them said, sharing problem with family members, spending time with family members, regular prayer, physical exercise, involving different productive and skillful course, reading books may helpful to keep mental health well during COVID-19 lockdown.

However, this situation due to COVID-19 lockdown has created an inimical impact on university students. Due to COVID-19 lockdown their regular normal life was broke down. Eventually, they are at high risk of facing mental health problems. Authorities should take necessary steps to overcome this situation of the students.

5. CONCLUSION

Among the total 230 respondents 150(64.9%) were found to have mild to severe anxiety symptoms. The study showed a significant frequency of anxiety and depression among the university students from different education level in Bangladesh during the COVID-19 lockdown. It is noticed that, students were suffering from anxiety and depression and mental health issues due to this epidemic because the whole face to face communication, all the educational institutions were totally off. Students couldn't come back to their study for a long time. Moreover, due to maintaining social distance effects on them badly. They were worried about their education and career. Presence of anxiety and depressive symptoms were high among the twenty five to thirty age range students who were doing post-graduation and others higher level of education. Also, the students who lived at university area showed higher anxiety symptoms than the students who lived at home during the COVID-19 lockdown. That shows the positive association with anxiety.

Besides, the students who were involved in teaching and learning, were less anxious and depressed compared to those who were not involved in teaching and learning. On the other hand, among 230 valid participants 176(76.5%) respondents faced mental problems and there is a high risk of being depressed 98(47.1%). Moreover, the risk of being depressed among the students who were facing problems more than 5 months (62.5%) than the others. Overall, the COVID-19 lockdown has created an inimical impact on mental health of university students in Bangladesh.

RECOMMENDATION

The whole study was conveyed among 230 university students in Bangladesh to know their mental health status during COVID-19 lockdown. A Cross-sectional study was conducted. GAD-7 and PHQ-9 measurement scale were used. Based on the summary and conclusions presented, the following recommendations are suggested-

- The study revealed the factors (educational institution, age group, education level, living area during lockdown, time of suffering those problems, current mental health status) are associated with anxiety and depression among university students during COVID-19 lockdown. Other factors are recommended to develop the study.
- The current study has used only Binary logistic regression, for further research, it is recommended to use multinomial logistic regression to determine associated factors for better results.
- As in the present study, sample size was too small so the study can be developed by taking Graduate student along with post graduate students.
- The present study is cross-sectional, a national board longitudinal study can be evaluated for further analysis.
- In the present study, GAD-7 and PHQ-9 were used to measure the total mental health condition, it is recommended to use DASS-21, WHO-5, DASS-21 to measure the psychological conditions.

REFERENCES

- Al Mamun, F., Gozal, D., Hosen, I., Misti, J. M., and Mamun, M. A., 2022. Predictive factors of insomnia during the COVID-19 pandemic in Bangladesh: a GIS-based nationwide distribution. *Sleep medicine*, 91, Pp. 219–225. <https://doi.org/10.1016/j.sleep.2021.04.025>
- Al Mamun, F., Hosen, I., Misti, J. M., Kaggwa, M. M., and Mamun, M. A., 2021. Mental Disorders of Bangladeshi Students During the COVID-19 Pandemic: A Systematic Review. *Psychology research and behavior management*, 14, 645–654. <https://doi.org/10.2147/PRBM.S315961>
- Alawamleh, M., Al-Twait, L. M., and Al-Saht, G. R., 2020. The effect of online learning on communication between instructors and students during Covid-19 pandemic. *Asian Education and Development Studies*, 11(2). <https://doi.org/10.1108/aeds-06-2020-0131>
- Amit, S., Barua, L., and Kafy, A. A., 2021. A perception-based study to explore COVID-19 pandemic stress and its factors in Bangladesh. *Diabetes and metabolic syndrome*, 15(4), 102129. <https://doi.org/10.1016/j.dsx.2021.05.002>
- Barzilay, R., Moore, T. M., Greenberg, D. M., DiDomenico, G. E., Brown, L. A., White, L. K., Gur, R. C., and Gur, R. E., 2020. Resilience, COVID-19-related stress, anxiety and depression during the pandemic in a large population enriched for healthcare providers. *Translational Psychiatry*, 10(1), Pp. 1–8. <https://doi.org/10.1038/s41398-020-00982-4>
- Bhatt, K. N., Kalogeropoulos, A. P., Dunbar, S. B., Butler, J., and Georgiopolou, V. V., 2016. Depression in heart failure: Can PHQ-9 help?. *International journal of cardiology*, 221, Pp. 246–250. <https://doi.org/10.1016/j.ijcard.2016.07.057>
- Bhuiyan, A., Sakib, N., Pakpour, A. H., Griffiths, M. D., and Mamun, M. A., 2020. COVID-19-Related Suicides in Bangladesh Due to Lockdown and Economic Factors: Case Study Evidence from Media Reports. *International journal of mental health and addiction*, 1–6. Advance online publication. <https://doi.org/10.1007/s11469-020-00307-y>
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., and Rubin, G. J., 2020. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet (London, England)*, 395(10227), Pp. 912–920. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8)
- Charlson, F., van Ommeren, M., Flaxman, A., Cornett, J., Whiteford, H., and Saxena, S., 2019. New WHO prevalence estimates of mental disorders in conflict settings: a systematic review and meta-analysis. *The Lancet*, 394(10194), Pp. 240–248. [https://doi.org/10.1016/s0140-6736\(19\)30934-1](https://doi.org/10.1016/s0140-6736(19)30934-1)
- Chen, T., and Lucock, M., 2022. The mental health of university students during the COVID-19 pandemic: An online survey in the UK. *PLoS one*, 17(1), e0262562. <https://doi.org/10.1371/journal.pone.0262562>
- Dsouza, D. D., Quadros, S., Hyderabadwala, Z. J., and Mamun, M. A., 2020. Aggregated COVID-19 suicide incidences in India: Fear of COVID-19 infection is the prominent causative factor. *Psychiatry research*, 290, Pp. 113145. <https://doi.org/10.1016/j.psychres.2020.113145>
- GBD, 2022. Results, Institute for Health Metrics and Evaluation. <https://vizhub.healthdata.org/gbd-results/>
- Hossain, M. M., Sultana, A., and Purohit, N., 2020. Mental health outcomes of quarantine and isolation for infection prevention: a systematic umbrella review of the global evidence. *Epidemiology and health*, 42, e2020038. <https://doi.org/10.4178/epih.e2020038>
- Islam, M. S., Sujana, M., Tasnim, R., Sikder, M. T., Potenza, M. N., and van Os, J., 2020. Psychological responses during the COVID-19 outbreak among university students in Bangladesh. *PLoS one*, 15(12), e0245083. <https://doi.org/10.1371/journal.pone.0245083>
- Islam, M. S., Sujana, M., Tasnim, R., Sikder, M. T., Potenza, M. N., and van Os, J., 2020. Psychological responses during the COVID-19 outbreak among university students in Bangladesh. *PLoS one*, 15(12), e0245083. <https://doi.org/10.1371/journal.pone.0245083>
- Islam, M.A., Barna, S.D., Raihan, H., Khan, M.N.A., Hossain, M.T., 2020. Depression and anxiety among university students during the COVID-19 pandemic in Bangladesh: A web-based cross-sectional survey. *PLoS ONE* 15(8): e0238162. <https://doi.org/10.1371/journal.pone.0238162>
- Mamun, M. A., Sakib, N., Gozal, D., Bhuiyan, A. I., Hossain, S., Bodrud-Doza, M., Al Mamun, F., Hosen, I., Safiq, M. B., Abdullah, A. H., Sarker, M. A., Rayhan, I., Sikder, M. T., Muhit, M., Lin, C. Y., Griffiths, M. D., and Pakpour, A. H., 2021. The COVID-19 pandemic and serious psychological consequences in Bangladesh: A population-based nationwide study. *Journal of affective disorders*, 279, Pp. 462–472. <https://doi.org/10.1016/j.jad.2020.10.036>
- Mohammed, A. Mamun, and Mark D. Griffiths., 2021. Fear of COVID-19 and Depression: A Comparative Study Among the General Population and Healthcare Professionals During COVID-19 Pandemic Crisis in Bangladesh. *Int J Ment Health Addiction*. <https://doi.org/10.1007/s11469-020-00477-9>
- Moore, D. S., and Spruill, M. C., 1975. Unified Large-Sample Theory of General Chi-Squared Statistics for Tests of Fit. *The Annals of Statistics*, 3(3), Pp. 599–616. <http://www.jstor.org/stable/2958431>
- Nussbaumer-Streit, B., Mayr, V., Dobrescu, A. I., Chapman, A., Persad, E., Klerings, I., Wagner, G., Siebert, U., Ledinger, D., Zachariah, C., and Gartlehner, G., 2020. Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review. *The Cochrane database of systematic reviews*, 9(9), CD013574. <https://doi.org/10.1002/14651858.CD013574.pub2>
- Panigrahi, M., Pattnaik, J. I., Padhy, S. K., Menon, V., Patra, S., Rina, K., Padhy, S. S., and Patro, B., 2021. COVID-19 and suicides in India: A pilot study of reports in the media and scientific literature. *Asian journal of psychiatry*, 57, 102560. <https://doi.org/10.1016/j.ajp.2021.102560>
- Patient, 2013. Patient Health Questionnaire (PHQ-9). *Patient.info*. <https://patient.info/doctor/patient-health-questionnaire-phq-9>
- Pieh, C., Budimir, S., Delgadillo, J., Barkham, M., Fontaine, J., and Probst, T., 2021. Mental Health During COVID-19 Lockdown in the United Kingdom. *Psychosomatic medicine*, 83(4), Pp. 328–337. <https://doi.org/10.1097/PSY.0000000000000871>
- Saeed, W. , Irfan, S. , Zafar, N. , and Cheema, F., 2021. Prevalence of Depression, Anxiety, and Stress Among University Students After the COVID-19 First Wave in Pakistan. *Pakistan Journal of Humanities and Social Sciences*, 9(3), Pp. 392–398. <https://doi.org/10.52131/pjhss.2021.0903.0145>
- Saha, P., and Gulshan, J., 2021. Systematic Assessment of COVID-19 Pandemic in Bangladesh: Effectiveness of Preparedness in the First Wave. *Frontiers in public health*, 9, 628931. <https://doi.org/10.3389/fpubh.2021.628931>
- Sakib, N., Akter, T., Zohra, F. Israfil Bhuiyan, A. K. M.
- Sakib, N., Bhuiyan, A., Hossain, S., Al Mamun, F., Hosen, I., Abdullah, A. H., Sarker, M. A., Mohiuddin, M. S., Rayhan, I., Hossain, M., Sikder, M. T., Gozal, D., Muhit, M., Islam, S., Griffiths, M. D., Pakpour, A. H., and Mamun, M. A., 2020. Psychometric Validation of the Bangla Fear of COVID-19 Scale: Confirmatory Factor Analysis and Rasch Analysis. *International journal of mental health and addiction*, Pp. 1–12. Advance online publication. <https://doi.org/10.1007/s11469-020-00289-x>
- Spitzer, R. L., Kroenke, K., Williams, J. B., and Löwe, B., 2006. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of internal medicine*, 166(10), Pp. 1092–1097. <https://doi.org/10.1001/archinte.166.10.1092>

Tasnim, R., Islam, M. S., Sujan, M., Sikder, M. T., and Potenza, M. N., 2020. Suicidal ideation among Bangladeshi university students early during the COVID-19 pandemic: Prevalence estimates and correlates. *Children and youth services review*, Pp. 119, 105703. <https://doi.org/10.1016/j.chilyouth.2020.105703>

Ulrich, A. K., Full, K. M., Cheng, B., Gravagna, K., Nederhoff, D., and Basta, N. E., 2021. Stress, anxiety, and sleep among college and university students during the COVID-19 pandemic. *Journal of American college health : J of ACH*, Pp. 1-5. Advance online publication. <https://doi.org/10.1080/07448481.2021.1928143>

Villani, L., Pastorino, R., Molinari, E., Anelli, F., Ricciardi, W., Graffigna, G., and Boccia, S., 2021. Impact of the COVID-19 pandemic on psychological well-being of students in an Italian university: a web-based cross-sectional survey. *Globalization and Health*, 17(1)

Xiong, J., Lipsitz, O., Nasri, F., Lui, L., Gill, H., Phan, L., Chen-Li, D., Iacobucci, M., Ho, R., Majeed, A., and McIntyre, R. S., 2020. Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of affective disorders*, 277, Pp. 55-64. <https://doi.org/10.1016/j.jad.2020.08.001>

