Prevalence of Depression, Anxiety, and Stress Among Undergraduate Students During Open and Distance Learning (ODL)

Nur Faezah Jamal, Nurhasniza Idham Abu Hasan, Mohd Sapuan Baharuddin and Suzainiwati Suhaimi

Prevalence of Depression, Anxiety, and Stress Among Undergraduate Students During Open and Distance Learning (ODL)

Nur Faezah Jamal[1], Nurhasniza Idham Abu Hasan[2], Mohd Sapuan Baharuddin[3] and Suzainiwati Suhaimi[4]

[1,2,3]Department of Statistics, Faculty of Computer & Mathematical Sciences Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400 Tapah Road, Perak, Malaysia, [4]Department of Statistics, Faculty of Computer & Mathematical Sciences, Universiti Teknologi MARA, Kelantan Branch, 18500 Machang, Kelantan, Malaysia

Abstract

The World Health Organization (WHO) has declared COVID-19 a pandemic after the outbreak became increasingly severe. The Malaysian government has taken various measures to reduce the spread of COVID-19 to protect Malaysians from the adverse effects of COVID-19 infection. One action taken by the Ministry of Higher Education Malaysia is to close all educational institutions that previously conducted face-to-face learning and replace it with open and distance learning (ODL). The unprecedented experience of 'home quarantine' has a wide range of effects on students' mental health. This study aimed to assess depression, anxiety, and stress levels and examine the relationship between socio-demographic characteristics and the Depression and Anxiety Stress (DASS) subscale among undergraduate students. A cross-sectional survey of 258 undergraduate students in the public universities in Malaysia was conducted between October 2021 and January 2022 using convenience sampling techniques. The survey instrument used in this study was designed and adapted based on the Depression and Anxiety Stress scale-21 (DASS-21). An independent sample T-test and a One-Way ANOVA were used to investigate the association between these perspectives. The findings revealed that 30.2% had severe depression, 52.3% experienced very severe anxiety, and 36.4% experienced moderate stress among undergraduate students. Anxiety and stress showed significant differences between gender, age group, level of education, and place of residence compared with depression. Therefore, it is important to identify students with mental health issues to receive appropriate interventions. Further studies are needed to design intervention program strategies for this group of students.
Keywords: Anxiety, COVID-19, Depression, Open and Distance Learning, Stress

Introduction

Wuhan, Hubei Province in China, was the first place to have an outbreak of Coronavirus Disease 2019, also known as COVID-19, which occurred in December 2019, with an unknown cause (Paul et al., 2020; Wang et al., 2020). The World Health Organization (WHO) declared COVID-19 as a pandemic on 11 March 2020 because the situation of the epidemic is very

alarming. The COVID-19 pandemic brings a significant impact on many people worldwide, both in the economic sector and even in mental health. A total of 6.32 million people was the latest record of deaths due to COVID-19 in June 2022, which shows that a large number of people worldwide are becoming victims of this deadly virus infection (Worldometer, 2022). Malaysia is no exception to the COVID-19 pandemic outbreak. The first case recorded in Malaysia was on 25 January 2020 (Asita, 2020). Therefore, the Malaysian government has taken various measures to reduce the spread of the COVID-19 epidemic by implementing a nationwide closure on 18 March 2020 to protect Malaysians from the worsening effects of the disease. Among the measures taken by the Ministry of Higher Education Malaysia was the closure of all educational institutions that previously operated face-to-face learning to open and distance learning (ODL).

Online learning has become an alternative to face-to-face learning since the emergence of COVID-19. Initially, the implementation of online learning in early 2020 caused confusion and annoyance among students and educators. Some educational institutions have constraints on the willingness of educators to impart knowledge and use online teaching tools (Santos et al., 2021). The emergence of COVID-19 has caused most students and educators to be unprepared to face this abrupt learning change situation. Thus, this unpreparedness has contributed to students' mental health problems that can lead to a deterioration in their academic performance (Perveen et al., 2020). There has been previous research reporting that a variety of persistent student mental health issues related to academic needs in the secondary and tertiary education systems were prevalent even before the COVID-19 epidemic struck. The main causes that contribute to academic stress are depression, anxiety, and stress due to family profiles, student life practices, and physical and psychological health issues (Zulkifli and Mohammed, 2020).

The World Health Organization (2017) reported that depression, anxiety, and stress were affecting people around the world before the emergence of COVID-19. Various studies have shown that mental health disorders are prevalent, especially among university students (Leones et al., 2020; Shamsuddin et al., 2013; Stallman, 2010; Eisenberg et al., 2007). A study carried out by Shamsuddin et al. (2013) at a public university in Malaysia, reported that 27.5% and 9.7%, respectively, suffered from moderate and severe or very severe depression; 34% and 29% had moderate and severe or very severe anxiety, respectively. Meanwhile, a different study by Ahmad et al (2022) that involved vocational students in Malaysia in 2021 during the COVID-19 pandemic found that 30% of them had severe or very severe depression, 41% had anxiety, and 20% had stress. These two studies showed a significant increase in mental health disorders in learning among students, especially during the implementation of ODL.

The consequences of the spread of the COVID-19 virus and online learning have profoundly impacted psychology and spirituality among students. Many studies have reported that the COVID-19 pandemic has contributed to adverse threats to physical health and community life, such as feelings of anxiety and stress (Dong and Zheng, 2020; Liu, 2020; Shigemura et al., 2020; Qui et al., 2020). Furthermore, university students have reported facing high levels of stress and anxiety problems due to the ongoing COVID-19 outbreak (Kecojevic et al., 2020; Wang and Zhao, 2020). Therefore, the mental health of undergraduate students is prevalent and should be well controlled, even though this COVID-19 outbreak brings great infection and unbearable psychological stress. Many previous studies have stated that the contagious effects of COVID-19 are contributors to mental health disorders. However, studies show the mental health of students affected by the COVID-19 epidemic and online learning is still

lacking. Thus, this study took the approach of determining the level of depression, anxiety, and stress as well as examining the relationship between socio-demographic characteristics and the DASS subscale among undergraduate students during online learning throughout this pandemic. If these students' mental health issues are adequately addressed, the findings of this study will have a significant impact on society, especially students.

Material and Method
Study Design and Sampling
The research was a correlational study to determine the relationship between psychological distress-anxiety, stress, and depression. The sample of this study consisted of 258 undergraduate students in public universities in Malaysia and was conducted between October 2021 and January 2022. The respondents were selected using the convenience sampling technique. A structured questionnaire consists of five main themes: 1) socio-demographics (7 items), 2) perceived regarding ODL (7 items), 3) Depression (7 items), 4) Anxiety (7 items), and 5) Stress (7 items). The questionnaire was distributed to respondents through Google Forms using WhatsApp, Facebook, and Instagram. Then, a group of experts was asked to assess the instrument in terms of relevance and correctness of the questions as well as simplicity and importance. All participants were requested to sign a consent form before filling out the questionnaire to register their willingness to participate.

Research Instrument
The survey instrument used in this study were constructed and adapted based on Depression and Anxiety Stress (DASS) survey measures. The Depression and Anxiety Stress 21 scale (DASS-21) is a set of three self-report scales designed to measure the emotional states of depression, anxiety, and stress using a 21-item (Lovibond and Lovibond, 1995). It consists of depression, anxiety, and stress dimensions with seven items representing each. All items were rated using a scale of 1 to 4 ;(1) (did not apply to me at all), (2) applied to me to some degree or some of the time, (3) applied to me to a considerable degree or a good part of the time, and (4) applied to me very much, or most of the time. The DASS-21 was adopted in this research to assess the mental status of the students among ODL.

Since DASS-21 is a compressed version of the DASS (the Long Form has 42 items), the final score of each item group (depression, anxiety, and stress) must be multiplied by two (×2) (Ronk et al., 2013). The minimum score is zero and the maximum score is 42. The final score of DASS is categorized in Table 1.

Table 1
The severity of depression, anxiety, and stress

Rating	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severely	28+	20+	34+

The depression scale assesses a range of depressive syndromes including dysphoria, hopelessness, and lack of interest or involvement. A higher score indicates a higher level of depression, categorized by scores as normal (0-9 points), mild, moderate, and severe; scores

of 28 and above indicate extremely severe depression. The anxiety scale assesses the subjective experience of the anxiety effect, autonomic arousal, skeletal muscle effects, and situational anxiety. Scores are classified as normal (0-7 points), mild, moderate, and severe, with scores of 20 or more indicating extremely severe anxiety. The stress scale assesses difficulty relaxing, being irritable or overreactive and impatient, and being easily upset or agitated: normal (0-14), mild, moderate, and severe, with scores of 34 or more indicating extremely severe stress (Al Omari et al., 2020).

Statistical Analysis
All the categorical variables were presented as frequencies and percentages while Mean ± Standard Deviation (SD) was used for all the continuous variables. In order to compare the mean differences in DASS scores, an Independent sample T-test, and One Way ANOVA was used. A correlation was analysed using the Pearson correlation coefficient to describe the strength and direction of the relationship between depression, anxiety, and stress. The value of correlations was interpreted using the following criteria: 0-0.25 = very weak correlation, 0.25-0.5 = moderate correlation, 0.5-0.75 = good correlation and >0.75 = high correlation (Mesfin and Kibret, 2013). The statistical significance level was set at a p–value< 0.05. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 16.0 (SPSS, Inc., Chicago, IL, USA). The Cronbach's alpha value is represented in Table 2.

Table 2
The Cronbach alpha for DASS scores

Indicator	Cronbach's Alpha
Depression	0.890
Anxiety	0.871
Stress	0.881

Based on the results in Table 2, the Cronbach's alpha reliability test for the items in each construct is more than 0.8. Thus, all the items used to measure the students' mental health are adequate and reliable. This finding is consistent with other previous studies (Azlan et al., 2020; Gritsenko et al., 2021).

Results
General characteristics
A total of 258 participants have completed the survey. Out of 258, 84.5% of the participants were female (218/258), and 15.5% were male (40/258). Most of the highest levels of participants' education were bachelor's degrees, which represented 206 (79.8%) of the total, and the rest were diploma levels. While in terms of age groups, most of the participants were 21–23 years old, which is 194(75.2%), followed by 18–20 years, 24–25 years, and 30 years old, representing 46 (17.8%), 16 (6.2%), and 2 (0.8%), respectively. This study showed that 181 (70.2%) of the participants lived with their families, 61 (23.6%) lived in hostels, and 16 (6.2%) lived in temporary houses. In addition, this study reported that about 209 (81%) of the participants stated they did not prefer the ODL method, while the rest preferred this method. The result of the survey also revealed that more than half of the participants (61.2%) are from urban areas, and 38.8% of the participants are from rural areas. With regard to internet access, the majority of the participants (58.9%) had moderate internet quality, followed by good quality (35.3%) and bad quality (5.8%).

Level of Emotional States among Undergraduate Students Levels

Table 3 shows the level of depression, anxiety, and stress among undergraduate students. The analysis of depression reported that the majority of the participants had severe (32.2%) scores on the depression subscale followed by moderately severe depression (30.6%), extremely severe (22.1%), but 12.4% had scores in the mild range, and 2.7% are classified as normal. On the anxiety subscale, more than half of the participants had extremely severe anxiety (52.3%) and followed by severe anxiety by 27.5%. As for stress, 36.4% had moderate symptoms of stress and 20.5% had severe stress. Based on the score ranges from the DASS manual, the mean level of depression, anxiety, and stress for all participants were found at a severe level (21.209 ± 6.932), an extremely severe level (20.709 ± 6.952), and a moderate level(20.826 ± 6.934) respectively.

Table 3

Participants' performance on three subscales of Depression, Anxiety, and Stress Scale-21 items (DASS-21)

Construct	Depression [a]	Anxiety [a]	Stress [a]
Mean ± SD	21.209 ± 6.932	20.709 ± 6.952	20.826 ± 6.934
Range of Score	7 - 28	7 - 28	7 - 28
Categories (%)			
Normal	7 (2.7)	5 (1.9)	52 (20.2)
Mild	32 (12.4)	4 (1.6)	48 (18.6)
Moderate	79 (30.6)	43 (16.7)	94 (36.4)
Severe	83 (32.2)	71 (27.5)	53 (20.5)
Extremely severe	57 (22.1)	135 (52.3)	11 (4.3)

[a] Subscales of DASS

Correlations among Subscales

Correlations among DASS subscales were high. Table 4 shows that depression was correlated with anxiety, and stress at 0.778 and 0.744 respectively. However, anxiety was correlated with stress at 0.818 which indicates there is a strong positive correlation between the anxiety scale and stress scale.

Table 4

Correlation among subscales

Construct	Depression	Anxiety	Stress
Depression	-	0.778	0.744
Anxiety	0.778	-	0.818
Stress	0.744	0.818	-

Note: Upper diagonal represents correlations among DASS-21 subscales.
Lower diagonal represents correlations among DASS-21 subscales.
* All correlations are significant at a 0.01 level (2-tailed)

Analysis of DASS Subscales with Respect to Demographic Characteristics

The relation between socio-demographic characteristics and DASS subscales was demonstrated in Table 5. The result indicates that there were statistically significant differences in the mean scores of anxieties ($P = 0.012$) and stress ($P = 0.053$) between females and males, where significantly higher scores for males than females. This study also revealed

that there was a significantly different mean score for the age group for both anxiety ($P = 0.034$) and stress ($P = 0.007$), where the mean score of anxiety for less than 20 years old was slightly higher than 21 – 23 years old. Meanwhile, the mean score of stress for those greater than 24 years old was slightly higher than 21 – 23 years old. On the other hand, there were found statistically significant differences in the mean scores of anxieties ($P = 0.022$) and stress ($P = 0.017$) between two different levels of education, where significantly higher scores for a bachelor's degree than a diploma. However, in terms of place of residence, there was a significantly different mean score for rural than urban for both anxiety ($P = 0.045$) and stress ($P = 0.012$), where the mean score of anxiety for urban (21.284 ± 7.088) was slightly higher than rural (19.800 ± 6.664) while the mean score of stress for urban (21.595 ± 7.10) also was slightly higher than rural (19.610 ± 6.667).

Table 5
Relation between socio-demographic and DASS subscales

	Depression		Anxiety		Stress	
Characteristics	Mean ± SD	P-value	Mean ± SD	P-value	Mean ± SD	P-value
Gender						
Male	21.600 ± 7.070	0.704	23.400 ± 7.171	0.012*	22.975 ± 7.601	0.053*
Female	21.138 ± 6.920		20.216 ± 6.812		20.431 ± 6.749	
Age Group						
<20 years	20.109 ± 7.795	0.335	21.320 ± 6.552	0.034*	22.833 ± 8.480	0.007*
21-23 years	18.370 ± 6.082		21.124 ± 6.990		22.222 ± 7.659	
>24 years	18.174 ± 7.487		21.217 ± 6.656		23.389 ± 6.912	
Education Level						
Diploma	20.904 ± 7.616	0.742	18.750 ± 6.744	0.022*	18.558 ± 7.652	0.017*
Bachelor's degree	21.286 ± 6.766		21.204 ± 6.932		21.398 ± 6.639	
Place of Residence						
Rural	20.460 ± 7.083	0.086	19.800 ± 6.664	0.045*	19.610 ± 6.667	0.012*
Urban	21.684 ± 6.814		21.284 ± 7.088		21.595 ± 7.10	

*: Significant at 0.05

Discussion
Most universities have launched fully online learning by 2020, in line with government guidelines in implementing measures to prevent the spread of the virus and curb the epidemic. At overseas universities as well, they adopt the same way of learning that most students continue their online learning after the spring break in 2020 (Schlenz, 2020). Even though online learning is nothing new, especially in Malaysia, most of the participants in the

current survey claimed that they did not prefer the ODL as a method of teaching during the pandemic. This selection is because they choose to interact face-to-face, which contributes to a more precise understanding of the subjects studied and can improve students' academic achievement. These results support the study of Mather and Sarkans (2018); they revealed that the main reason for the selection of face-to-face interaction was due to classroom interaction with peers, faculty, and course content.

The main goal of this study was to assess students' levels of depression, anxiety, and stress. The findings of this study through the assessment of the level of depression showed that 32.2% experienced severe depressive symptoms and 30.6% had moderate depressive symptoms. These findings have been supported by Ahmad et al (2022) involving vocational students in Malaysia in 2021 during the COVID-19 pandemic, which found that 30% of them suffered from severe or very severe depression. There were also findings studied before the pandemic that found Malaysian university students face depression, with 27.5% categorised as moderate and 9.7% suffering from severe or very severe depression (Shamsuddin et al., 2013). A high increment in the level of depression can be seen during the occurrence of this COVID-19 with the change of learning methods to ODL.

As for the findings of a recent study through the assessment of the level of anxiety, it was reported that more than half of the participants experienced very severe anxiety (52.3%), followed by severe anxiety by 27.5%. These findings were consistent with a similar study by Astutik et al. (2020), who found that the level of anxiety among newly established remote campus students in Indonesia was 51.1%, and another study from universities in Malaysia in 2021 reported 47% reported mild to very severe anxiety symptoms (Ahmad et al., 2022). Those involved fall under the category of higher COVID-19 disease-related anxiety levels (Cleofas and Rocha, 2021). The result of this study involving stress among students found that 36.4% experienced moderate stress symptoms and 20.5% experienced severe stress. These findings are in line with studies that have been conducted by several researchers in Malaysia (Ghafar et al., 2021; Ahmad et al., 2022) and India (Ahmed and Prashantha, 2018; George and Joseph, 2018).

Based on the results stated, there is a high relationship between the level of anxiety and stress among undegraduate students. These may be due to anxiety and pressure of not being able to achieve each other's goals in the study, as well as the fear of facing additional commitments in online learning, such as internet problems, constraints of interaction with friends, and others. This result is consistent with the findings from Daniel (2013); Jensen and Nutt (2015), who strongly agree that loneliness and lack of friendship can result in anxiety and stress. Meanwhile, Chernomas and Shapiro (2013) argue that anxiety and stress are closely related to weaknesses in coping strategies among students.

The second objective of this study was to examine the relationship between socio-demographic characteristics and the DASS subscale. This study revealed that male students experience a higher level of anxiety and stress than female students. These may be due to a few of these male students working part-time to support their families and causing physical and mental fatigue after studying. This physical and mental fatigue has contributed to a confused and restless mind, which can increase their stress level during online learning. The findings of this study are consistent with the analysis of Rezaei-Adryani et al (2007) and Islam et al. (2020), who found that male students are more prone to anxiety and stress than female students. This study contradicts the studies by Abdallah and Gabr (2014), who stated that

women are more prone to anxiety than men due to high self-esteem and feelings of inadequacy; and Gao et al (2020) revealed that first and second-year female students scored higher in anxiety than male students. Additionally, potential stress can occur during the transition period from school to university or college life (Ramachandiran and Dhanapal, 2018).

The study also showed that the older age group had higher levels of stress and anxiety. These findings are in line with the findings by Tangade et al (2011), who stated that among the factors contributing to the occurrence of these mental health problems were fear of failure in lessons and anxiety about whether to succeed in studies, which is the most stressful thing among students, especially during the final years of education at university. This stress may occur due to increased workload and very limited leisure time. However, this study is inconsistent with the findings from Bayram and Bilgel (2008), who reported that younger age groups experience high levels of stress among students in Turkey.

In this study, students living in rural areas with limited facilities were recorded with lower levels of anxiety and stress than students living in urban areas. This may be because handling a calmer rural lifestyle makes them better able to control their emotions and stress. This statement is further reinforced by Pykett et al (2020), who stated that stress, anxiety, and mental disorders have long been associated with urbanization.

Conclusion

Studies on mental health problems among students are widely conducted around the world. The emergence of this COVID-19 pandemic has triggered an increase in levels of depression, anxiety, and stress among students globally. In conclusion, this study stated that severe to moderate levels of depression, anxiety, and stress were recorded during the implementation of ODL throughout this pandemic. The results of this study are very important to the Ministry of Higher Education to provide guidance and solutions to mental health problems among students in online learning so as not to become more serious. For university students, more attention needs to be given as most of them study independently during their studies, which has contributed to a high increase in levels of depression, anxiety, and stress among them during the pandemic (Aylie et al., 2020). The attitude of harboring feelings among these students has greatly affected their academic performance. Therefore, students with mental health problems need to be quickly identified so that appropriate intervention measures, such as holding counseling sessions for these students, can be implemented before their mental health is further affected.

Corresponding Author

Nur Faezah Jamal
Department of Statistics, Faculty of Computer & Mathematical Sciences Universiti Teknologi MARA, Perak Branch, Tapah Campus, 35400 Tapah Road, Perak, Malaysia.
Email: nurfa210@uitm.edu.my

References

Abdallah, A. R., & Gabr, H. M. (2014). Depression, anxiety and stress among first year medical students in an Egyptian public university. *Int Res J Med Med Sci*, *2*(1), 11-19.

Ahmad, W. N. W., Azman, M. N. A., & Kassymova, G. K. (2022). Correlates of mental health on online distance learning during COVID-19 among Malaysia vocational students. *International Journal of Public Health*, *11*(1), 254-262.

Ahmed, M., & Prashantha, B. (2018). Perceived stress and source of stress among undergraduate medical students of Government Medical College, Mysore. *Int J Community Med Public Health*, *5*(8), 3513-3518.

Al Omari, O., Al Sabei, S., Al Rawajfah, O., Abu Sharour, L., Aljohani, K., Alomari, K., Shkman, L., Al Dameery, K., Saifan, A., Al Zubidi, B. and Anwar, S. (2020). Prevalence and predictors of depression, anxiety, and stress among youth at the time of COVID-19: an online cross-sectional multicountry study. *Depression research and treatment*, *2020*.

Asita, E. (2020). COVID-19 outbreak in Malaysia. *Osong Public Health and Research Perspectives*, *11*(3), 93-100.

Astutik, E., Sebayang, S. K., Puspikawati, S. I., Tama, T. D., Sintha, D. M., & Dewi, K. (2020). Depression, anxiety, and stress among students in newly established remote university campus in Indonesia. *Malaysian Journal of Medicine and Health Sciences*, *16*(1), 270-277.

Aylie, N. S., Mekonen, M. A., & Mekuria, R. M. (2020). The psychological impacts of COVID-19 pandemic among university students in Bench-Sheko Zone, South-west Ethiopia: a community-based cross-sectional study. *Psychology research and behavior management*, *13*, 813.

Azlan, A. A., Hamzah, M. R., Sern, T. J., Ayub, S. H., & Mohamad, E. (2020). Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. *Plos one*, *15*(5), e0233668.

Bayram, N., & Bilgel, N. (2008). The prevalence and socio-demographic correlations of depression, anxiety and stress among a group of university students. *Social psychiatry and psychiatric epidemiology*, *43*(8), 667-672

Chernomas, W. M., & Shapiro, C. (2013). Stress, depression, and anxiety among undergraduate nursing students. *International journal of nursing education scholarship*, *10*(1), 255-266.

Cleofas, J. V., & Rocha, I. C. N. (2021). Demographic, gadget and internet profiles as determinants of disease and consequence related COVID-19 anxiety among Filipino college students. *Education and Information Technologies*, *26*(6), 6771-6786.

Daniel, K. (2013). Loneliness and depression among university students in Kenya. *Global Journal of Human-Social Science Research*, *13*(4), 11-18.

Dong, M., & Zheng, J. (2020). Headline stress disorder caused by Netnews during the outbreak of COVID-19. *Health expectations: an international journal of public participation in health care and health policy*, *23*(2), 259.

Eisenberg, D., Gollust, S. E., Golberstein, E., & Hefner, J. L. (2007). Prevalence and correlates of depression, anxiety, and suicidality among university students. *American journal of orthopsychiatry*, *77*(4), 534-542.

Gao, W., Ping, S., & Liu, X. (2020). Gender differences in depression, anxiety, and stress among college students: a longitudinal study from China. *Journal of affective disorders*, *263*, 292-300.

George, S., & Joseph, B. B. (2018). Level of stress and its causes among 1st-year dental students-a cross-sectional study. *National Journal of Physiology, Pharmacy and Pharmacology*, *8*(11), 1518-1521.

Ghafar, N. M. A., Jamal, N. F., & Hasan, N. I. A. (2021). Perceived Stress Among UiTM Students During Open and Distance Learning (ODL). *International Journal of Academic Research in Business and Social Sciences*, *11*(8), 1780–1792.

Gritsenko, V., Skugarevsky, O., Konstantinov, V., Khamenka, N., Marinova, T., Reznik, A., & Isralowitz, R. (2021). COVID 19 fear, stress, anxiety, and substance use among Russian and Belarusian university students. *International Journal of Mental Health and Addiction*, *19*(6), 2362-2368.

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.

Kaliyaperumal, K. I. E. C. (2004). Guideline for conducting a knowledge, attitude and practice (KAP) study. *AECS illumination*, *4*(1), 7-9.

Kecojevic, A., Basch, C. H., Sullivan, M., & Davi, N. K. (2020). The impact of the COVID-19 epidemic on mental health of undergraduate students in New Jersey, cross-sectional study. *PloS one*, *15*(9), e0239696.

Leones, L. M. B., Berba, C. M. P., Chua Jr, A. V., & Sandoval-Tan, J. (2020). Caring for the carers: safeguarding oncologists' mental health in the time of COVID-19. *ecancermedicalscience*, *14*.

Liu, K. (2020). How I faced my coronavirus anxiety. *Science*, *367*(6484), 1398-1398.

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour research and therapy*, *33*(3), 335-343.

Madihie, A., & Said, M. S. (2015). Depression, anxiety, and stress scale (DASS-21) among counselling students: a preliminary study. *Journal of Cognitive Sciences and Human Development*, *1*(1), 90-101.

Mather, M., & Sarkans, A. (2018). Student perceptions of online and face-to-face learning. *International Journal of Curriculum and Instruction*, *10*(2), 61-76.

Mesfin, Y. M., & Kibret, K. T. (2013). Assessment of knowledge and practice towards hepatitis B among medical and health science students in Haramaya University, Ethiopia. *PloS one*, *8*(11), e79642.

Paules, C. I., Marston, H. D., & Fauci, A. S. (2020). Coronavirus infections more than just the common cold. *Jama*, *323*(8), 707-708.

Perveen, A., Hamzah, H., Ramlee, F., Othman, A., & Minhad, M. (2020). Mental health and coping response among Malaysian adults during COVID-19 pandemic movement control order. *Journal of Critical Reviews*, *7*(18), 653-660.

Pykett, J., Osborne, T., & Resch, B. (2020). From urban stress to neurourbanism: how should we research city well-being?. *Annals of the American Association of Geographers*, *110*(6), 1936-1951.

Qiu, J., Shen, B., Zhao, M., Wang, Z., & Xie, B. ve Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *General psychiatry*, *33*(2).

Ramachandiran, M., & Dhanapal, S. (2018). Academic Stress Among University Students: A Quantitative Study of Generation Y and Z's Perception. *Pertanika Journal of Social Sciences & Humanities*, *26*(3).

Rezaei-Adryani, M., Azadi, A., Ahmadi, F., & Azimi, A. V. (2007). Comparison level of stress, Anxiety, Depression and quality of life in dormitory resident students. *Iranian Journal of Nursing Research*, *4*(2), 31-38.

Ronk, F. R., Korman, J. R., Hooke, G. R., & Page, A. C. (2013). Assessing clinical significance of treatment outcomes using the DASS-21. *Psychological assessment*, *25*(4), 1103.

Santos, J., De Jesus, L. F., Sealmoy, R. R., & Fajardo, R. R. C. (2021). Online distance learning amidst COVID-19. *IJERI: International Journal of Educational Research and Innovation*, (15), 291-304.

Schlenz, M. A., Schmidt, A., Wostmann, B., Kramer, N., & Schulz-Weidner, N. (2020). Students' and lecturers' perspective on the implementation of online learning in dental education due to SARS-CoV-2 (COVID-19): A cross-sectional study. *BMC medical education*, *20*(1), 1-7.

Shamsuddin, K., Fadzil, F., Ismail, W.S.W., Shah, S. A., Omar, K., Muhammad, N. A., Jaffar, A., Ismail, A., and Mahadevan, R. (2013). Correlates of depression, anxiety and stress among Malaysian university students. *Asian journal of psychiatry*, *6*(4), 318-323.

Shigemura, J., Ursano, R. J., Morganstein, J. C., Kurosawa, M., & Benedek, D. M. (2020). Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target populations. *Psychiatry and clinical neurosciences*, *74*(4), 281.

Stallman, H. M. (2010). Psychological distress in university students: A comparison with general population data. *Australian psychologist*, *45*(4), 249-257.

Tangade, P. S., Mathur, A., Gupta, R., & Chaudhary, S. (2011). Assessment of stress level among dental school students: an Indian outlook. *Dental research journal*, *8*(2), 95.

Wang, C., & Zhao, H. (2020). The impact of COVID-19 on anxiety in Chinese university students. *Frontiers in psychology*, *11*, 1168.

Wang, D., Hu, B., Hu, C., Zhu, F., Liu, X., Zhang, J., Wang, B., Xiang, H., Cheng, Z., Xiong, Y., and Zhao, Y. (2020). Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus–infected pneumonia in Wuhan, China. *Jama*, *323*(11), 1061-1069.

World Health Organization. (2017). *Depression and Other Common Mental Disorders: Global Health Estimates*. Available online at: https://apps.who.int/iris/bitstream/handle/10665/254610/WHO-MSD-MER-2017.2-eng.pdf

Worldometer. (2022). Number of deaths cases, Covid-19 Coronavirus Pandemic https://www.worldometers.info/coronavirus/

Zulkifli, N. I. C., & Mohammed, N. F. (2020). A Study of relationship between mental health and smoking among adolescences in Tanjong Malim District. *Jurnal Pendidikan Bitara UPSI*, *13*(2), 48-57.