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IMPACT OF ONLINE TEACHING AND LEARNING TOWARDS MENTAL HEALTH OF UNIVERSITY STUDENTS

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Abstract

The landscape of higher education has been changed from face-to-face mode to fully online teaching and learning (OTL) due to long practice of lockdown caused by COVID-19 pandemic which forced the education industry to adapt to the new norm of teaching and learning. This study aimed to determine the impact of online learning towards the mental health status of higher education students. Survey-based research was conducted using online Google Form questionnaires among University Selangor (UNISEL) students who already experienced OTL for at least one semester involving seven faculties. A total of 184 students were chosen and the mental health status of UNISEL students was classified by using DASS-21 questionnaires. The sample size was suggested at 170 with 90% confidence level. A pilot study was done with 20 respondents and Cronbach's Alpha test was done to check for questionnaire validity ($p<0.05$). The outcome was about 22.3%, 38.0%, and 15.2% in severe to extremely severe groups of depression, anxiety, and stress respectively. Significant factors that contributed to OTL related mental health status were the age of respondent, gender, body mass index (BMI), internet connectivity, student's satisfaction on OTL and MCO challenges influences such as course works, feeling stuck, condition at home, unable to socialize with other and too many responsibilities or chores ($p<0.05$). In conclusion, this study managed to reveal the impact of OTL due to COVID-19 lockdown which has given a tremendous effect mentally on university students which require immense adaption to new learning technologies and significant investment from universities administrations.

Keywords: COVID-19 pandemic, mental health status, online teaching and learning

1. Introduction

Malaysia has exercised Movement Control Order (MCO) since March 2020 as a response to the WHO's declaration of pandemic (Abdalqader et al., 2020). It is to curb the spread of the COVID-19 cases by maintaining social distancing and close contact with asymptomatic infected individuals. However, MCO has impacted tremendously in all sectors including education. As a result of the fatal pandemic of COVID-19, online teaching and learning (OTL) have changed drastically. Education institutions are threatened globally and there is a fear that they will be closed for a long period (Dhawan, 2020). Many countries outside Asia have declared shut down of educational institutions impacting the life of approximately sixty billion students across the globe because the institutions are not ready to meet the challenges of giving protection and safe educational facilities to students.

1.1. Online Teaching & Learning (OTL)

Any education that employs information and communication technology (ICT) as a delivery mechanism and allows students to build their knowledge based on their experiences through the knowledge construction process is referred to as e-learning. Learning objectives, measured approaches, course length, content quality and flexibility, as well as collaborative learning support are included in pedagogical factors (Zhu et al., 2018). The expertise in pedagogics remains restricted to make it impossible for potential educators to create a new knowledge-based focus on diverse educational speakers because the core context of teaching and dynamics must be thoroughly understood and interpreted (Setuju et al., 2018). To use technologies more effectively, any university must work out various options of online pedagogical approaches (Rapanta et al., 2020).

Many studies characterized the efficacy of OTL based on the subjective metrics perceived, satisfied, expressed, and commented to students (Barteit et al., 2020). As technology usage is essential for OTL, instructors and students must be able to prepare themselves with skills for OTL, online communication skills as well as the readiness towards the OTL such as internet connectivity, printing facilities and comfortable space, data usage and devices needed (Bestiantono et al., 2020). Modern technology problems include software bugs, installation problems, login problems, and audio and video problems. These challenges and concerns amplify if one does not have skills in the latest technology to conduct live online sessions, record and editing videos as well as handling online tutorials of demo sessions (Chung et al., 2020). Besides that, OTL is more difficult if the instructor and/or student is older, lacks understanding of the most recent technologies as well as technophobia which results in lower student satisfaction and affects their academic performance (Rajab et al., 2020). The main contributing factor to OTL has been identified by Esani (2010) who demonstrated OTL hinders engaging teacher-class discussions as technological parameters and distance change spontaneity, unable to retain student commitment. While Barteit et al. (2020) showed insufficient training for all parties involved, poor technical support and lack of good plan and strategy for OTL affect learning satisfaction.

1.2. Mental Health Status Among University Students

Mental health is a state of well-being where everyone is aware of their ability to cope with the stresses of normal life, able to function productively and effectively and contribute to their community according (Schroeder & Biddle, 2016). It is not only important in adulthood, but according to Szab and Lovibond (2006), children also suffer from mental health problems. Students are also among those who are prone to mental health deterioration especially when movement control order (MCO) regulation during the COVID-19 pandemic. There is a big difference between mental health and mental illness (Hanafiah & Van Bortel, 2015). Therefore, the terminology should not be used interchangeably. A normal mental state individual may not always have good mental health, but still, be able to perform daily activities as usual. In contrast to those with mental illness, where daily functions will be affected and need medical attention to preserve normal individual. Many studies have been conducted to determine the level of the mental health status of university students around the world due to COVID-19 pandemic. They were reported around 30 to 50 % of the students were having depression, anxiety, and/or stress (Lan et al., 2020).

Social influence plays an important role in a student ensuring mental health during online learning and teaching because the impact of interpersonal control on actual usage is positive (Aldholay et al., 2018). Due to lockdown, many families lost their job, and students were forced to be helped by their parents on their finances and some of them live independently by doing a part-time job or multiple jobs while studying to meet their end needs which might contribute to increased pressure to their mental and physical health (Tang, 2020). In addition, learning at home through online requires complete equipment so that learning can be implemented perfectly which also increase the expenditure of the students and their family (Sahu, 2020).

2. Problem Statement

Long MCO exercise caused people to experience psychological effects from the outbreak of COVID-19, such as anxiety, fear, worry, anxious, and depressed among others (Cao et al. 2020). A wide variety of behaviors, including increased phone data plan usage, decreased physical activity, and restriction of locations to be visited and limited social interactions which cause feelings of trapped could impact mental health (Huckins et al., 2020). Some students might be at higher risk of social isolation and develop health problems during the COVID-19 crisis due to a lack of communication with others. This is especially true if they live by themselves, receive less social support, have less direct contact to close family members and friends, stay with abusive form family members, or are less well-integrated into a social network of students. According to Elmer et al. (2020), students who are at higher risk for negative mental health consequences are female students. High levels of sex steroid receptors have been the biological explanation for this bias. Women depend more than men on social networks and if the females do not have such support networks during the crisis, they may become worse off than males. Due to the severe impact of poor mental health status on overall well-being and academic performance, we aim to determine the impact of online learning on the mental health status of UNISEL students and the related factors to the OTL landscape towards mental health of students.

3.   Research Questions

The study was conducted to answer the following research questions:

i.   What is the distribution of mental health status of UNISEL students who have been practicing OTL?

ii.   Which demographic factors affect the different mental health statuses of UNISEL students?

iii.   How does lockdown exercise contribute to the mental health conditions of UNISEL students?

iv.   How does OTL satisfaction associates with the mental health status of UNISEL students?

4.   Purposes of the Study

The rapid increase in cases of COVID-19 infection, worldwide, has created uncertainty and anxiety about what is going to happen (Lischer et al., 2021). It also creates high stress among students at all levels from pre-school to higher education. The outcome of this study hopes to gain insight into the potential impact of the COVID-19 outbreak on the education landscape and the mental health of undergraduate students. Thus, conducting an empirical evaluation of the impacts of the COVID-19 pandemic and the subsequent lockdowns on the socio-psychological status and anxiety among higher education students, particularly UNISEL students helps improve the quality of education in UNISEL and nationwide. This study could contribute to better series of understanding to improve well-being and academic performance by implementing new ideas, and strategies in virtual environments and systems from faculties. This is aligned with Sustainable Development Goals (#3 Good Health and Well-being) and National Policy (Malaysian Mental Healthcare Performance, 2016) which has been classified as 'requires immediate attention or action remedial action' by the Malaysian Government.

5.   Research Methods

5.1. Sampling

The research was performed at the University Selangor (UNISEL) through an online survey. UNISEL is a Selangor state government university. It involves seven faculties located on two branches, located in Bestari Jaya and Shah Alam. UNISEL of Bestari Jaya branch consists of four different faculties which are Faculty of Communication, Visual Art, and Computing (FCVAC), Faculty of Education and Social Sciences (FESS), Faculty of Engineering and Life Sciences (FELS), and Centre for Foundation and General Studies (PADU), while Shah Alam branch consists of two faculties which is Faculty of Health Sciences (FHS), and Faculty of Business and Accountancy (FBA) and include postgraduate faculty which is Selangor Business School (SBS). Students were mostly undergraduates, and all underwent fully OTL with the longest duration was since April 2020. Data collection was done only after obtaining ethical approval from Research Ethics Committee.

Survey-based research in which involved various fields of students in UNISEL using a questionnaire that was carried out to elucidate the potential impact of OTL during the COVID-19 pandemic on the mental health of UNISEL students. Distribution of questionnaire through online distribution of Google Form. From the questionnaire responses, data were analyzed using SPSS software

version 26. The recommended sample size was 170 UNISEL students but we collected more considering 20% response retribution. All participants voluntarily gave their informed consent to participate after being informed about the purpose of the study. The questionnaires were anonymous to ensure confidentiality and the reliability of data. However, after data validation, only 184 respondents were selected for this study after data cleaning. The inclusion criteria of the respondent must be undergraduate and postgraduate UNISEL students. Students must be agreeing to the consent form to participate in this study. They also must agree to participate in the study before continue answering the question in all sections. While exclusion criteria include already diagnosed mental disorder individuals and first-semester students due to lack of impact of OTL on their mental health.

5.2. Methodology

A self-reported response questionnaire was developed according to a validated questionnaire in 4 sections as followed; Section A (Study information & consent form), Section B (Participant demographic (Lischer et al., 2021), Section C (Online Teaching and Learning Experience adapted from, Chung et al., 2020) & Section D (Mental Health Status (DASS-21) from (Lovibond & Lovibond, 1995).

5.3. Data Analysis

In a pilot test, the researchers handed out the questionnaire to 20 respondents. In this part, either the Likert scale question is valid or is not tested using the pilot study. This part of the analysis used Cronbach's Alpha. A test for the calculation of the reliability or internal consistency of a computed score of Cronbach's Alpha and the result should be between 0 and 1. The researcher first held data on Cronbach's alpha for 20 respondents as illustrated in Table 1. Since Cronbach's Alpha is more than 0.70 is considered reliable.

Table 1. Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
0.723	0.775	41

The mental health status of UNISEL students during OTL was determined by output according to DASS-21 scoring system from each participant to classify the mental health status of the students whether in depression, anxiety and stress, or normal condition. Interpretation of DASS score was done according to Table 2 and recommended cut-off score for conventional severity labels (normal, mild, moderate, severe, and extremely severe) according to depression, anxiety, and stress. The DASS factor score on a 4 point which starts from 0 regarding never, 1 for sometimes, 2 often and the last one is 3 points for almost always. According to Osman et al. (2012), the total score of each factor must be multiplied by 2 for the final score. Determination of the association of demographic factors to OTL-related mental health status of UNISEL students was tested by using the Pearson Chi-Square test, Fisher's Exact Test, and Linear-by-Linear Association at $\alpha = 0.05$ level of significance. Pearson Chi-Square was used to determine if there is a difference between two or more groups of categorical variables.

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Table 2. Mental health status according to the DASS-21 score

	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 severe	28+	20+	34+

6. Findings

Data was collected from Google Form questionnaires to accommodate the MCO standard operating procedure during the duration of data collection. The demographic data helps to understand the outcomes of this study. Out of 184 students, most of the participants in this research were female students compared to males (65.8% and 34.2% respectively). The majority were below 20 to 49 years old (63.04%), 25% of respondents were below 20 years old, 9.2% of students were 30 to 39 years old, and 2.7% of students were 40 to 49 years old. While for the student's socioeconomic status, it was identified that more than half of the UNISEL students were B40 (58.7%), 35.3% were M40 category, while 5.98% were T20 category. We also identified students' body mass index (BMI) which was found a contributing factor to mental health status (Balantekin et al., 2021). Most of the students were in the normal BMI category (54.9%), 15.8% were overweight, followed by underweight (13.6%), 9.2% were obese I category, 4.3% were obese II category, and 2.2% of the UNISEL students were obese III.

6.1. OTL status of UNISEL Students

More than half of the participants were degree students (57.1%), 28.8% were diploma students, 10.9% were foundation students and 3.3% were postgraduate students. In addition, most of the participants were from West Malaysia (82.1%) while 17.9% of students were from East Malaysia which contributes to 83.2% of the students living in urban areas, 15.2% were in rural areas and only 1.6% of students were staying in a university hostel and most of them are international students.

We determined the student's internet connectivity (excellent, good, average, and poor) according to the location of the students while they were having OTL. Out of 184 students, more than half of the students were having good connectivity (54.7%), 31.5% had an average connection, 19.6% had excellent connectivity and only 3.3% were having poor internet connectivity. Most of the students who had excellent internet were from urban areas and most of the students with poor internet connections were from rural areas. No in-campus students were reported to have a poor internet connection.

Table 3. Student's internet connectivity according to their OTL location

	Home in city /urban areas	Home in rural areas	University hostel	Total
Excellent	31 (16.8%)	5 (2.7%)	0 (0.0%)	36 (19.6%)
Good	76 (41.3%)	7 (3.8%)	1 (0.5%)	84 (54.7%)
Average	45 (24.5%)	11 (6.0%)	2 (1.1%)	58 (31.5%)
Poor	1 (0.5%)	5 (2.7%)	0 (0.0%)	6 (3.3%)
Total	153 (83.2%)	28 (15.2%)	3 (1.6%)	184 (100.0%)

6.2. Mental Health Status

The mental health status of UNISEL students which includes depression, anxiety, and stress was divided into three categories, normal, mild to moderate, and severe to extremely severe. In the depression group, 22.3% of the UNISEL students suffered from severe to extremely severe depression, 35.4% were mild to moderate and 42.4% were in normal status. While in the anxiety group, the highest was from severe to extremely severe level with 38.0% of the students, followed by mild to moderate anxiety (31.5%) and normal (30.4%). In addition, UNISEL students showed the lowest percentage of severe to extremely severe levels in the stress group (15.2%). Only 23.4% of the students were having mild to moderate stress and more than half of the participants were normal for the stress group (Figure 1).

Mental health (MH) disorders become a great public health concern throughout the globe with 792 million in 2017 living with a mental health disorder which is slightly more than 1 in 10 people globally (10.7%) (James et al., 2018). According to World Health Organisation (WHO) report (2021), there were more than 800,000 suicide cases reported globally every year, and it is contributing to a significant proportion of health problems in most countries, including Malaysia as reported by Malaysian Mental Healthcare Performance (2016). Many MH studies have been done on adolescents and especially among university students around the globe. A study conducted among medical and health sciences students showed that 14 to 45 percent of the students were having moderate-to-extremely severe forms of depression (Mukhtar & Hashim, 2010). While in Canada, 34 to 80 percent of university students were having moderate to extremely severe forms of depression, anxiety, or stress (Othman et al., 2019). According to Statista Research Department (2019), in Malaysia, amongst respondents who have experienced mental health issues, 11% of respondents are aged 18 to 24 years old, which is the highest compared to the other age groups. A study conducted in China among the youth also found that approximately 40.4% of the participants had psychological problems (Liang et al., 2020). A recently published data conducted by a group of researchers in China among university students indicated that mental health issues have seriously affected university students (Zhang et al., 2021). The same finding was also reported in Malaysia, where they indicated that nearly a quarter of university students experience severe to extremely severe levels of anxiety and depression symptoms (Shamsuddin et al., 2013). They also concluded that implementing lockdown exercises during the COVID-19 pandemic had a substantial impact on university students' negative emotional symptoms, happiness, and work-life balance (Wan Mohd Yunus et al., 2021).
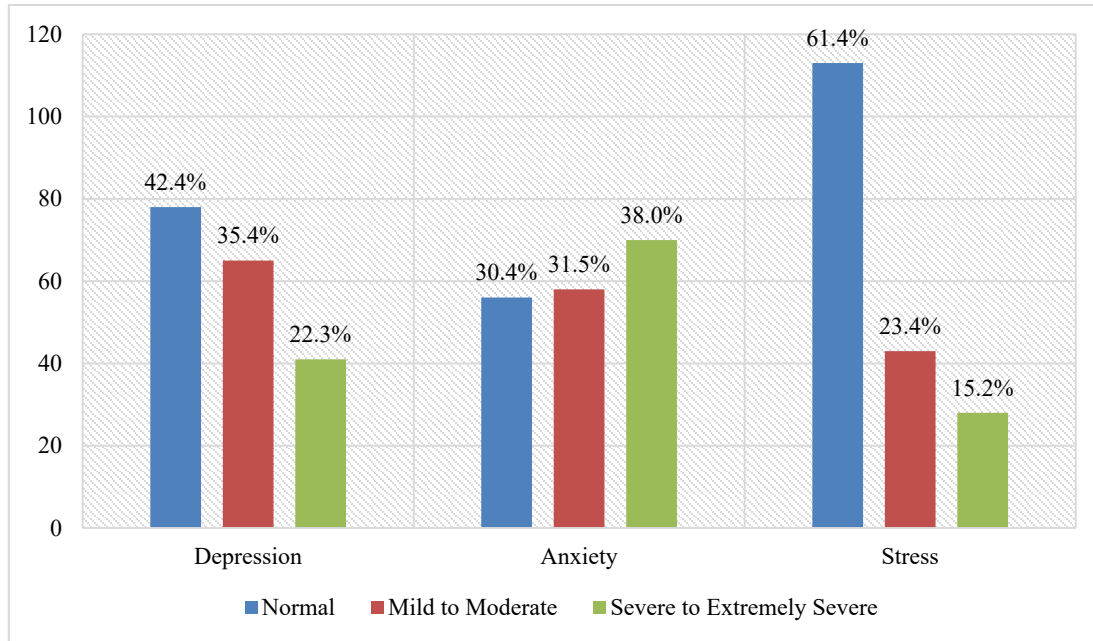
Figure 1. Classification of the mental health status of the university students

6.3. Contributing Factors According to Mental Health Status

6.3.1. Factors for Depression

Our data suggested that depression most commonly happens among the students who are age group (0.026), gender (0.010), and BMI (0.046). Our data suggested that the level of depression was significantly different according to age group (p-value 0.026), gender (p-value 0.010), and BMI (p-value 0.046). Students showing severe to extremely severe depression symptoms were detected among 20-29 years old, female, and obese I (Table 4). All the other factors are not significantly associated with depression (p>0.05). This indicates that younger, female and obese students experienced more depressive symptoms compared to another age group, male, and non-obese students. In line with our result, an earlier study done on Ethiopian University students showed that younger ages females (18 – 25 years) were also prone to depression symptoms (Simegn et al., 2021). A similar finding was also reported in China where more than 80% of the university students having positive anxiety and depression symptoms were between the age of 19 – 24 years (Zhang et al., 2021). To support our finding on obesity that also contributed to depression, a study conducted among university students in China showed that negative emotional eating associated with poor diet and obesity also contributed to greater depression and higher stress levels among university students (Sze et al., 2021).

Table 4. Demographic factors related to depression level

Contributing Factor	Normal	Mild to Moderate	Severe to Extremely Severe	*p*-value
Age (year old)				**0.026***
<20	13 (7.1%)	19 (10.3%)	14 (7.6%)	
20 - 29	50 (27.2%)	39 (21.2%)	27 (14.7%)	
30 - 39	12 (6.5%)	5 (2.7%)	0 (0.0%)	
40 - 49	3 (1.6%)	2 (1.1%)	0 (0.0%)	
Gender				**0.010***
Female	48 (26.1%)	38 (20.7%)	35 (19.0%)	
Male	30 (16.3%)	27 (14.7%)	6 (3.3%)	
BMI				**0.046***
<18.5 (underweight)	7 (3.8%)	9 (4.9%)	9 (4.9%)	
18.5 - 22.9 (normal)	48 (26.1%)	40 (21.7%)	13 (7.1%)	
23.0 - 24.9 (overweight)	12 (6.5%)	8 (4.3%)	9 (4.9%)	
25.0 - 29.9 (Obese I)	4 (2.2%)	6 (3.3%)	7 (3.8%)	
30.0 - 34.9 (Obese II)	4 (2.2%)	2 (1.1%)	2 (1.1%)	
>35.0 (Obese III)	3 (1.6%)	0 (0.0%)	1 (0.5%)	
Socio-economic status				0.844
B40	46 (25.0%)	36 (19.6%)	26 (14.1%)	
M40	26 (14.1%)	26 (14.1%)	13 (7.1%)	
T20	6 (3.3%)	3 (1.6%)	2 (1.1%)	
Geographical location				0.165
East Malaysia	10 (5.4%)	12 (6.5%)	11 (6.0%)	
West Malaysia	68 (37.0%)	53 (28.8%)	30 (16.3%)	
OTL location				0.084
City/urban	66 (35.9%)	58 (31.5%)	29 (15.8%)	
Rural	10 (5.4%)	7 (3.8%)	11 (6.0%)	
UNISEL hostel	2 (1.1%)	0 (0.0%)	1 (0.5%)	
Internet connectivity				0.055
Average	20 (10.9%)	23 (12.5%)	15 (8.2%)	
Excellent	21 (11.4%)	8 (4.3%)	7 (3.8%)	
Good	36 (19.6%)	33 (17.9%)	15 (8.2%)	
Poor	1 (0.5%)	1 (0.5%)	4 (2.2%)	

*p<0.05 indicating significant association with mental health status (Chi-X^2 test)

6.3.2. Factors for Anxiety

While for the anxiety group, the significant factors were identified from gender (*p*-value 0.007) and BMI (*p*-value 0.004). Students showing severe to extremely severe anxiety were detected also among females and obese I and overweight (Table 5). All the other factors are not significantly associated with anxiety (*p*>0.05). In line with our findings, an earlier study done on Ethiopian University students showed that younger ages females were also prone to anxiety symptoms (Simegn et al., 2021). A similar finding was also reported in China where between gender, females showed higher positive anxiety and depression symptoms compared to males (Zhang et al., 2021). To support our finding on

obesity that also contributed to anxiety, a study conducted among university students in United State showed that women with eating disorders and obesity have greater anxiety symptoms compared to those with a healthy diet (Balantekin et al., 2021). A study conducted in Bangladesh also reported that female gender and obesity were some of the key factors that contributed to anxiety (Das et al., 2021).

6.3.3. Factors for Stress

In addition, for the anxiety group, the significant factors that contribute to stress were age group (*p*-value 0.006), gender (*p*-value 0.045), and internet connectivity at their home (*p*-value 0.023). Students showing severe to extremely severe stress were detected among females, aged below 20 years old and with good to average internet connectivity in their homes (Table 6). All the other factors are not significantly associated with stress (*p*>0.05). A study conducted among university students in Ethiopia also showed that being a female and Insufficient uninterrupted internet access were the common risk factors for stress (Tesfahunegn & Gebremariam, 2019). Similar findings were also reported from recent studies conducted among university students in Oman and Serbia where female students of younger age showed higher symptoms of stress compared to male students (Kostić et al., 2021; Malik & Javed, 2021).

Table 5. Demographic Factors Related to Anxiety Level

Contributing Factor	Normal	Mild to Moderate	Severe to Extremely Severe	*p*-value
Age (year old)				0.057
<20	7 (3.8%)	16 (8.7%)	23 (12.5%)	
20 - 29	39 (21.2%)	34 (18.5%)	43 (23.4%)	
30 - 39	7 (3.8%)	7 (3.8%)	3 (1.6%)	
40 - 49	3 (1.6%)	1 (0.5%)	1 (0.5%)	
Gender				**0.007***
Female	29 (15.8%)	37 (20.1%)	55 (29.9%)	
Male	27 (14.7%)	21 (11.4%)	15 (8.2%)	
Level of Study				0.162
Degree	38 (20.7%)	32 (17.4%)	35 (19.0%)	
Diploma	12 (6.5%)	15 (8.2%)	26 (14.1%)	
Foundation	3 (1.6%)	9 (4.9%)	8 (4.3%)	
Postgraduate	3 (1.6%)	2 (1.1%)	1 (0.5%)	
BMI				**0.004***
<18.5 (underweight)	4 (2.2%)	5 (2.7%)	16 (8.7%)	
18.5 - 22.9 (normal)	33 (17.9%)	41 (22.3%)	27 (14.7%)	
23.0 - 24.9 (overweight)	10 (5.4%)	5 (2.7%)	14 (7.6%)	
25.0 - 29.9 (Obese I)	2 (1.1%)	6 (3.3%)	9 (4.9%)	
30.0 - 34.9 (Obese II)	4 (2.2%)	1 (0.5%)	3 (1.6%)	
>35.0 (Obese III)	3 (1.6%)	0 (0.0%)	1 (0.5%)	
Socio-economic status				0.952
B40	33 (17.9%)	34 (18.5%)	41 (22.3%)	
M40	19 (10.3%)	20 (10.9%)	26 (14.1%)	
T20	4 (2.2%)	4 (2.2%)	3 (1.6%)	

Geographical location				0.061
East Malaysia	5 (2.7%)	15 (8.2%)	13 (7.1%)	
West Malaysia	51 (27.7%)	43 (23.4%)	57 (31.0%)	
OTL location				0.537
City/urban	50 (27.2%)	46 (25.0%)	57 (31.0%)	
Rural	5 (2.7%)	11 (6.0%)	12 (6.5%)	
UNISEL hostel	1 (0.5%)	1 (0.5%)	1 (0.5%)	
Internet connectivity				0.259
Excellent	14 (7.6%)	12 (6.5%)	10 (5.4%)	
Good	27 (14.7%)	24 (13.0%)	33 (17.9%)	
Average	15 (8.2%)	21 (11.4%)	22 (12.0%)	
Poor	0 (0.0%)	1 (0.5%)	5 (2.7%)	

*$p<0.05$ indicating significant association with mental health status (Chi-X^2 test)

Table 6. Factors related to stress level

Contributing Factor	Normal	Mild to Moderate	Severe to Extremely Severe	*p*-value
Age (year old)				**0.006***
<20	20 (10.9%)	19 (10.3%)	7 (3.8%)	
20 - 29	73 (39.7%)	22 (12.0%)	21 (11.4%)	
30 - 39	15 (8.2%)	2 (1.1%)	0 (0.0%)	
40 - 49	5 (2.7%)	0 (0.0%)	0 (0.0%)	
Gender				**0.045***
Female	67 (36.4%)	31 (16.8%)	23 (12.5%)	
Male	46 (25.0%)	12 (6.5%)	5 (2.7%)	
Level of Study				0.096
Degree	72 (39.1%)	17 (9.2%)	16 (8.7%)	
Diploma	25 (13.6%)	19 (10.3%)	9 (4.9%)	
Foundation	11 (6.0%)	6 (3.3%)	3 (1.6%)	
Postgraduate	5 (2.7%)	1 (0.5%)	0 (0.0%)	
BMI				0.062
<18.5 (underweight)	9 (4.9%)	10 (5.4%)	6 (3.3%)	
18.5 - 22.9 (normal)	68 (37.0%)	23 (12.5%)	10 (5.4%)	
23.0 - 24.9 (overweight)	18 (9.8%)	7 (3.8%)	4 (2.2%)	
25.0 - 29.9 (Obese I)	9 (4.9%)	2 (1.1%)	6 (3.3%)	
30.0 - 34.9 (Obese II)	6 (3.3%)	1 (0.5%)	1 (0.5%)	
>35.0 (Obese III)	3 (1.6%)	0 (0.0%)	1 (0.5%)	
Socio-economic status				0.730
B40	68 (37.0%)	24 (13.0%)	16 (8.7%)	
M40	37 (20.1%)	18 (9.8%)	10 (5.4%)	
T20	8 (4.3%)	1 (0.5%)	2 (1.1%)	
Geographical location				0.219
East Malaysia	16 (8.7%)	11 (6.0%)	6 (3.3%)	
West Malaysia	97 (52.7%)	32 (17.4%)	22 (12.0%)	
OTL location				0.252
City/Urban	98 (53.3%)	34 (18.5%)	21 (11.4%)	

Rural	13 (7.1%)	9 (4.9%)	6 (3.3%)	
UNISEL hostel	2 (1.1%)	0 (0.0%)	1 (0.5%)	
Internet connectivity				**0.023***
Excellent	28 (15.2%)	5 (2.7%)	3 (1.6%)	
Good	55 (29.9%)	16 (8.7%)	13 (7.1%)	
Average	29 (15.8%)	19 (10.3%)	10 (5.4%)	
Poor	1 (0.5%)	3 (1.6%)	2 (1.1%)	

*$p<0.05$ indicating significant association with mental health status (Chi-X^2 test)

6.4. Impact of OTL Towards Mental Health Status

Remote learning done by OTL mode has been demonstrated to impact the mental health status of UNISEL students. Students' satisfaction with OTL showed a strong association with depression (*p*-value 0.000) and anxiety (*p*-value 0.000). The higher the level of satisfaction, the better the mental health status of the students. However, students with severe and extremely severe stress levels showed high OTL satisfaction (*p*-value 0.000), suggesting that other factors could contribute to stress conditions. Students who prefer to synchronize online lectures together with asynchronized sessions rewatched of the recorded lecture session contribute to the avoidance of depression (*p*-value 0.001), anxiety (*p*-value 0.030), and stress (*p*-value 0.036). In addition, UNISEL students who prefer the usage of the online web conferencing (OWC) platform as online conferencing showed normal conditions in the depression group (*p*-value 0.005) and stress (*p*-value 0.013). OWC is a platform developed by Pusat Pembelajaran Digital & Multimedia of UNISEL which offers a conducive environment mimicking the classroom. OWC is a platform based on BigBlueButton's open-source virtual classroom platform. This platform is developed with the classroom environment in mind and is not structured as other online conferencing application does. It was built by teachers for teachers, with several productivity features mimicking a classroom such as an interactive whiteboard, and quick polls which serve as quick feedback from students. It is supported on all platforms using HTML5 browsers and does not require students to have an account to join. There is also a collaborative notetaking and whiteboarding feature that promotes social learning. Teachers are also able to control all aspects of the virtual classroom such as creating breakout rooms to isolate students within their groups. From our benchmarking, we manage to track the amount of data usage for OWC, which is quite low compared to other popular platforms such as Google Meet, Microsoft Teams, etc. This observation proved that UNISEL is capable of handling OTL from the earlier phase of the COVID-19 pandemic compared to other universities.

Various recent studies also have shown that OTL due to Pandemic COVID-19 has been demonstrated to impact the mental health status among university students (Das et al., 2021; Kostić et al., 2021; Malik & Javed, 2021; Odriozola-González et al., 2020; Mohamad et al., 2021). If the students are perceiving continued to have unhealthy mental health conditions, it will affect their physical health as well. Hence, families and institutions must provide adequate attention, assistance, and support to them to improve their mental health conditions. Institutions should review their online courses and program delivery mechanisms, techniques, and practices to ensure that the students are not overworked, especially in terms of the number of assessments, academic workload, and technical difficulties they experience throughout their OTL.

7. Conclusion

Our study successfully reveals the impact of OTL due to the long practice of lockdown during COVID-19 pandemic which has given a tremendous effect on UNISEL students who came from all over Malaysia. Significant learning transformation through the adoption of new learning technologies and significant investment from universities need to be implemented especially in the volatile, uncertainty, complexity, and ambiguity (VUCA) of the post-pandemic era. We managed to observe an acceptable level of severe to extremely severe depression, anxiety, and stress in UNISEL students which is not much different from the pre-pandemic era. Considering the enormous pressure of lockdown and remote learning, this result is lower compared to other populations but comparable to the others. However, rapid and effective control measure needs to be implemented by the faculty members to help the students who are affected by OTL. We hope that these findings could contribute to a better understanding of young adult well-being and academic performance which aligned with Sustainable Development Goals and National Policy of Malaysian Mental Healthcare Performance 2016. Further study needs to be done to identify important biochemistry and molecular markers as a preventive measure in managing mental health among youth and adults.

Acknowledgments

References

Abdalqader, M. A., Baobaid, M. F., Ghazi, H. F., Hasan, T. N., Mohammed, M. F., Abdalrazak, H. A., Ramamurthy, K. A., Arasu, R. A., Muthusamy, S. A., Alsaigh, L. N., Ads, H. O., & Wei Jun, H. C. (2020). The Malaysian Movement Control Order (Mco) Impact and Its Relationship With Practices Towards Coronavirus Disease 2019 (Covid-19) Among a Private University Students in Selangor. *Malaysian Journal of Public Health Medicine*, *20*(2), 49–55. https://doi.org/10.37268/mjphm/vol.20/no.2/art.523

Aldholay, A. H., Abdullah, Z., Ramayah, T., Isaac, O., & Mutahar, A. M. (2018). Online learning usage and performance among students within public universities in Yemen. *International Journal Services and Standard*, *12*(2), 163–179. https://www.inderscienceonline.com/doi/abs/10.1504/IJSS.2018.091842

Balantekin K. N., Grammer A. C., Fitzsimmons-Craft E., Eichen D. E., Graham A. K., Monterubio G. E., Firebaugh M. L., Karam A. N., Sadeh-Sharvite S., Goelhi N. J., Flatt R. E., Trockele M. T., Taylore B., & Wilfley D. E.. (2021). Overweight and obesity are associated with increased eating disorder correlates and general psychopathology in university women with eating disorders. *Ecologycal and Sosial Psychology*, *41*. https://doi.org/10.1016/j.eatbeh.2021.101482

Barteit, S., Guzek, D., Jahn, A., Bärnighausen, T., Jorge, M. M., & Neuhann, F. (2020). Evaluation of e-learning for medical education in low- and middle-income countries: A systematic review. *Computers and Education*, *145*(October 2019), 1–18. https://doi.org/10.1016/j.compedu.2019.103726

Bestiantono, D. S., Agustina, P. Z. R., & Cheng, T.-H. (2020). Online learning amid the COVID-19 pandemic: Students' perspectives. *Studies in Learning and Teaching*, *1*(3), 133–139. https://doi.org/10.46627/silet.v1i3.46

Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, *287*(112934), 1–5. https://doi.org/10.1016/j.psychres.2020.112934

Chung, E., Subramaniam, G., & Dass, L. C. (2020). Online learning readiness among university students in Malaysia amidst COVID-19. *Asian Journal of University Education (AJUE)*, *16*(2), 46–58. https://doi.org/10.24191/ajue.v16i2.10294

Das, R., Hasan, M. R., Daria, S., & Islam, M. R. (2021). Impact of COVID-19 pandemic on mental health among general Bangladeshi population: A cross-sectional study. *BMJ Open*, *11*(4). https://doi.org/10.1136/bmjopen-2020-045727

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, *49*(1), 5–22. https://doi.org/10.1177/0047239520934018

Elmer, T., Mepham, K., & Stadtfeld, C. (2020). Students under lockdown: Comparisons of students' social networks and mental health before and during the COVID-19 crisis in Switzerland. *PLoS ONE*, *15*, 1–22. https://doi.org/10.1371/journal.pone.0236337

Esani, M. (2010). Moving from Face-to-Face to Online Teaching. *American Society for Clinical Laboratory Science 23*(3), 187–190. https://doi.org/10.29074/ascls.23.3.187

Hanafiah, A. N., & Van Bortel, T. (2015). A qualitative exploration of the perspectives of mental health professionals on stigma and discrimination of mental illness in Malaysia. *International Journal of Mental Health Systems*, *9*(10), 1–12. https://doi.org/10.1186/s13033-015-0002-1

Huckins, J. F., daSilva, A. W., Wang, W., Hedlund, E., Rogers, C., Nepal, S. K., Wu, J., Obuchi, M., Murphy, E. I., Meyer, M. L., Wagner, D. D., Holtzheimer, P. E., & Campbell, A. T. (2020). Mental Health and Behavior of College Students During the Early Phases of the COVID-19 Pandemic: Longitudinal Smartphone and Ecological Momentary Assessment Study. *Journal of Medical Internet Research*, *22*(6), e20185. https://doi.org/10.2196/20185

James, S. L., Abate, D., Abate, K. H., Abay, S. M., Abbafati, C., Abbasi, N., & Murray, C. J. L. (2018). Global, regional, and national incidence, prevalence, and years lived with disability for 354 Diseases and Injuries for 195 countries and territories, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, *392*(10159), 1789–1858. https://doi.org/10.1016/S0140-6736(18)32279-7

Kostić, J., Žikić, O., Đorđević, V., & Krivokapić, Ž. (2021). Perceived stress among university students in south-east Serbia during the COVID-19 outbreak. *Annals of General Psychiatry*, *20*(25). https://doi.org/10.1186/s12991-021-00346-2

Lan, H. T. Q., Long, N. T., & Van Hanh, N. (2020). Validation of depression, anxiety and stress scales (Dass-21): Immediate psychological responses of students in the e-learning environment. *International Journal of Higher Education*, *9*(5), 125–133. https://doi.org/10.5430/ijhe.v9n5p125

Liang, L., Ren, H., Cao, R., Hu, Y., Qin, Z., Li, C., & Mei, S. (2020). The Effect of COVID-19 on Youth Mental Health. *Psychiatric Quarterly*, *91*(3), 841–852. https://doi.org/10.1007/s11126-020-09744-3

Lischer, S., Safi, N., & Dickson, C. (2021). Remote learning and students' mental health during the Covid-19 pandemic: A mixed-method enquiry. *Prospects*, *0123456789*. https://doi.org/10.1007/s11125-020-09530-w

Lovibond, P. F., & Lovibond, S. H. (1995). *The structure of negative emotional states: Scales (DASS) with the beck depression and anxiety inventories*, *33*(3), 335–343. https://doi.org/10.1016/0005-7967(94)00075-u

Malaysian Healthcare Performance Unit (2016). Malaysian Mental Healthcare Performance: *Technical report 2016, Ministry of Health Malaysia*. Putrajaya.

Malik, M., & Javed, S. (2021). Perceived stress among university students in Oman during COVID-19-induced e-learning. *Middle East Current Psychiatry*, *28*(49). https://doi.org/10.1186/s43045-021-00131-7

Mohamad, N. E., Sidik, S. M., Akhtari-Zavare, M., & Gani, N. A. (2021). The prevalence risk of anxiety and its associated factors among university students in Malaysia: a national cross-sectional study. *BMC Public Health*, *21*(438), 1–20. https://doi.org/10.1186/s12889-021-10440-5

Mukhtar, F., & Hashim, H. A. (2010). Relationship among depression, self-efficacy, and quality of life among students in medical and allied health sciences. *Malaysian Journal of Medicine and Health Sciences*, *6*(2), 51–58.

Odriozola-González, P., Planchuelo-Gómez, Á., Irurtia, M. J., & de Luis-García, R. (2020). Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. *Psychiatry Research*, *290*. https://doi.org/10.1016/j.psychres.2020.113108

Osman, A., Wong, J. L., Bagge, C. L., Freedenthal, S., Gutierrez, P. M., & Lozano, G. (2012). The depression anxiety stress scales-21 (DASS-21): further examination of dimensions, scale reliability, and correlates. *Journal of Clinical Psychology*, *68*(12), 1322–1338. https://doi.org/10.1002/jclp.21908

Othman, N., Ahmad, F., El Morr, C., & Ritvo, P. (2019). Perceived impact of contextual determinants on depression, anxiety and stress: A survey with university students. *International Journal of Mental Health Systems*, *13*(17), 1–9. https://doi.org/10.1186/s13033-019-0275-x

Rajab, M. H., Gazal, A. M., & Alkattan, K. (2020). Challenges to online medical education during the COVID-19 pandemic. *Cureus*, *12*(7), 1–11. https://doi.org/10.7759/cureus.8966

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the COVID-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education*, *2*(3), 923–945. https://doi.org/10.1007/s42438-020-00155-y

Sahu, P. (2020). Closure of Universities Due to Coronavirus Disease 2019 (COVID-19): Impact on Education and Mental Health of Students and Academic Staff. *Cureus*, *12*(4), 4–9. https://doi.org/10.7759/cureus.7541

Schroeder, S. A., & Biddle, S. (2016). Physical activity and mental health : Evidence is growing. *World Psychiatry*, *15*(2), 176–177. https://doi.org/10.1002/wps.20331

Setuju, S., Setiadi, B. R., Ratnawati, D., Widowati, A., Wijayanti, A., Johan, A. B., Robiasih, H., & Nurdiyanto, H. (2018). Development e-learning to improve student activity with technological pedagogical and content knowledge. *International Journal of Engineering and Technology(UAE)*, *7*(2.5), 100–103.

Shamsuddin, K., Fadzil, F., Ismail, W. S. W., Shah, S. A., Omar, K., Muhammad, N. A., Jaffar, A., Ismail, A., & Mahadevan, R. (2013). Correlates of depression, anxiety and stress among Malaysian university students. *Asian Journal of Psychiatry*, *6*(4), 318–323. https://doi.org/10.1016/j.ajp.2013.01.014

Simegn, W., Dagnew, B., Yeshaw, Y., Yitayih, S., Woldegerima, B., & Dagne, H. (2021). Depression, anxiety, stress and their associated factors among Ethiopian University students during an early stage of COVID-19 pandemic: An online-based cross-sectional survey. In *PLoS ONE, 16*(5). Public Library of Science. https://doi.org/10.1371/journal.pone.0251670

Statista Research Department. (2019). Prevalence of mental health issues in Malaysia as of June 2019, by demography. https://www.statista.com/statistics/1019587/malaysia-prevalence-of-mental-health-issues-by-demography/

Szab, M., & Lovibond, P. F. (2006). Anxiety, depression, and tension/stress in children. *Journal of psychopathology and Behavioral Assessment*, *28*(3), 195–205. https://doi.org/10.1007/s10862-005-9008-3

Sze, K. Y.P., Lee, E. K. P., Chan, R. H. W., & Kim, J. H. (2021). Prevalence of negative emotional eating and its associated psychosocial factors among urban Chinese undergraduates in Hong Kong: a cross-sectional study. *BMC Public Health*, *21*(538). https://doi.org/10.1186/s12889-021-10531-3

Tang, K. H. D. (2020). Movement control as an effective measure against Covid-19 spread in Malaysia: an overview. *Journal of Public Health (Germany), 30*, 17–20. https://doi.org/10.1007/s10389-020-01316-w

Tesfahunegn, T. B., & Gebremariam, E. H. (2019). Mental distress and associated factors among Aksum University students, Ethiopia: A cross-sectional study. *BMC Psychiatry*, *19*(71), 1–8. https://doi.org/10.1186/s12888-019-2051-5

Wan Mohd Yunus, W. M. A., Badri, S. K. Z., Panatik, S. A., & Mukhtar, F. (2021). The Unprecedented Movement Control Order (Lockdown) and Factors Associated with the Negative Emotional Symptoms, Happiness, and Work-Life Balance of Malaysian University Students During the Coronavirus Disease (COVID-19) Pandemic. *Frontiers in Psychiatry*, *11*. https://doi.org/10.3389/fpsyt.2020.566221

World Health Organisation. (2021). *Suicide*. Retrieved on September 15, 2021, from https://www.who.int/news-room/fact-sheets/detail/suicide

Zhang, X., Shi, X., Wang, Y., Jing, H., Zhai, Q., Li, K., Zhao, D., Zhong, S., Song, Y., Zhang, F., & Bao, Y. (2021). Risk factors of psychological responses of Chinese university students during the COVID-19 outbreak: Cross-sectional web-based survey study. In *Journal of Medical Internet Research*, *23*(7). JMIR Publications Inc. https://doi.org/10.2196/29312

Zhu, M., Bonk, C. J., & Sari, A. R. (2018). Instructor experiences designing MOOCs in higher education: Pedagogical, resource, and logistical considerations and challenges. *Online Learning Journal*, *22*(4), 203–241. https://doi.org/10.24059/olj.v22i4.1495