ONLINE LEARNING DURING COVID-19 PANDEMIC: STUDENTS READINESS, DEPRESSION, ANXIETY AND ITS ASSOCIATED FACTORS AMONG MEDICAL STUDENTS IN UNIVERSITI SAINS MALAYSIA

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LIST OF SYMBOLS, ABBREVIATIONS OR NOMENCLATURES

USM	Universiti Sains Malaysia
OLRS-18	Online Learning Readiness Scale-18
DASS-21	Depression, Anxiety and Stress Scale-21
COVID-19	Coronavirus Disease
MENTARI	Community Mental Health Centre
HREC	Human Research Ethics Committee
MOHE	Ministry of Higher Education
SOPs	Standard Operating Procedures
WHO	World Health Organization

ABSTRACT

Background: Online learning can affect students' mental health. This study aimed to determine online learning readiness and associated factors of depression and anxiety during the Covid-19 pandemic among undergraduate medical students, Universiti Sains Malaysia. **Methods:** A cross-sectional study was conducted from February 2022 to June 2022 among 258, undergraduate preclinical medical students, by using an online Google form questionnaires which include sociodemographic profile, Online Learning Readiness Scale-18 items (OLRS-18) and Depression, Anxiety and Stress Scale-21 (DASS-21). Data was analysed using measure of frequency for depression and anxiety and measure of mean for level of readiness on online learning. Logistic regression analysis was conducted to examine factors associated with depression and anxiety. **Results:** The findings showed the mean scores for online learning readiness ranged between 3.45 and 4.31, indicating that the students demonstrate low to moderate levels of readiness for online education. The students had high computer/Internet self-efficacy, learning motivation, and self-directed learning while lacked online communication efficacy and learner control. The prevalence of depression and anxiety were 42.7% and 6.6% respectively. Poor and unstable internet access, as well as a wide range of online teaching approaches, were identified as associated factors for depression and anxiety. **Conclusions:** Undergraduate medical students at USM had a low to moderate level of online learning readiness, with lower scores on communication self-efficacy and learner control. This indicated that online communication self-efficacy and learner control should be emphasised to better prepare students for online learning. Poor and unstable internet connectivity and too many variations in online teaching methods were identified as associated factors for depression and anxiety. This meant that lecturers had to help students with problems connecting to the internet and come up with effective

ways to teach online. It also meant that the university had to train more academicians to improve online teaching. The government, telecommunications companies and universities should all help build a nationwide internet infrastructure because online learning has been hard without more investments in internet infrastructure.

Keywords: *Online learning, Anxiety, Depression, Learning readiness, Medical students*

ABSTRAK

Latar Belakang: Pembelajaran dalam talian boleh menjejaskan kesihatan mental pelajar. Kajian ini bertujuan untuk menentukan kesediaan pembelajaran dalam talian dan faktor berkaitan kemurungan dan kebimbangan semasa pandemik Covid-19 dalam kalangan pelajar perubatan sarjana muda, Universiti Sains Malaysia. **Kaedah:** Kajian keratan rentas telah dijalankan dari Februari 2022 hingga Jun 2022 di kalangan 258, pelajar perubatan praklinikal sarjana muda, dengan menggunakan soal selidik borang Google dalam talian yang merangkumi profil sosiodemografi, item Skala Kesediaan Pembelajaran Dalam Talian-18 (OLRS-18) dan Kemurungan, Skala Kebimbangan dan Tekanan-21 (DASS-21). Data dianalisis menggunakan ukuran kekerapan untuk kemurungan dan kebimbangan dan ukuran min untuk tahap kesediaan pembelajaran dalam talian. Analisis regresi logistik telah dijalankan untuk mengkaji faktor-faktor yang berkaitan dengan kemurungan dan kebimbangan. **Keputusan:** Penemuan menunjukkan skor min untuk kesediaan pembelajaran dalam talian berjulat antara 3.45 dan 4.31, menunjukkan bahawa pelajar biasanya menunjukkan tahap kesediaan yang rendah hingga sederhana untuk pendidikan dalam talian. Pelajar mempunyai efikasi kendiri komputer/Internet yang tinggi, motivasi pembelajaran dan pembelajaran terarah kendiri manakala kekurangan efikasi komunikasi dalam talian dan kawalan pelajar. Prevalens kemurungan dan kebimbangan adalah 42.7% dan 6.6% masing-masing. Akses internet yang lemah, serta pelbagai pendekatan pengajaran dalam talian, dikenal pasti sebagai faktor risiko untuk kemurungan dan kebimbangan. **Kesimpulan:** Pelajar sarjana perubatan di USM mempunyai tahap kesediaan pembelajaran dalam talian yang rendah hingga sederhana, dengan skor yang lebih rendah pada efikasi kendiri komunikasi dan kawalan pelajar. Ini menunjukkan bahawa efikasi kendiri komunikasi dalam talian dan kawalan pelajar perlu dititikberatkan untuk menyediakan pelajar

dengan lebih baik untuk pembelajaran dalam talian. Sambungan internet yang lemah dan tidak stabil serta terlalu banyak variasi dalam kaedah pengajaran dalam talian dikenal pasti sebagai faktor yang berkaitan dengan kemurungan dan kebimbangan. Ini bermakna pensyarah perlu membantu pelajar yang berdepan dengan masalah internet dan menghasilkan cara yang berkesan untuk mengajar secara dalam talian. Ini juga bermakna universiti perlu melatih lebih ramai ahli akademik untuk menambah baik pengajaran dalam talian. Kerajaan, syarikat telekomunikasi dan universiti harus bersama-sama membantu dalam membina infrastruktur internet di seluruh negara kerana pembelajaran dalam talian adalah sukar tanpa lebih banyak pelaburan dalam infrastruktur internet.

Kata kunci: *Pembelajaran dalam talian, Kebimbangan, Kemurungan, Kesediaan Belajar, Pelajar perubatan*

CHAPTER 1: INTRODUCTION

1.1 Introduction

A new corona virus, designated as COVID-19, which originated in Wuhan, China, has spread over the world and disrupted the daily lives of millions of people and slowed down the global economy and education. Institutions of higher learning have ground to a standstill in an effort to protect students from potential viral exposures, which is likely in a highly socialising student environment. Early in February of 2020, China and a few other countries closed their schools due to the spread of pollution. Yet by the middle of March, close to seventy-five countries including Malaysia had either halted all schooling or announced intentions to do so. About 20% of the world's students missed out on learning on March 10 due to pandemic-related school and institution closures. When April 2020 rolls around, 73.8% of all enrolled students have been impacted by the national closures that UNESCO predicts would have been implemented in 186 countries [1].

The first confirmed case of COVID-19, was reported on January 25, 2020, in Malaysia [2], and cases continue to rise [3]. Numerous universities cancelled campus events to reduce crowding and the spread of infectious diseases [4]. Universiti Sains Malaysia stated that they were also prepared for the possibility of their members being exposed to such risks and becoming infected with the virus. The situation surrounding the recent report of a community member suspected of contracting the virus was closely monitored by USM. On this issue, USM has worked closely with the State Health Department. As a result, all events posed a high risk of infection and should be avoided, including seminars, workshops, and large gatherings. To avoid jeopardising the reputation of Universiti Sains Malaysia, the University requested that all such plans be

postponed until a more appropriate time or cancelled for valid reasons. In light of the epidemic, the Pusat Sejahtera was required to be present at any gathering with more than 25 attendees. It was mandated that individuals be screened, and preventative measures were implemented. However, given the circumstances, it was determined that a virtual meeting would be the most effective option. Pusat Sejahtera USM, formerly known as Health Campus, was established in 1969. It provided medical and dental services to USM students and employees. Pusat Sejahtera was bolstered in 2015 through Pelan Transformasi Pusat Sejahtera, which emphasised prevention, treatment, rehabilitation, and resource management for the welfare of USM residents [5].

All on-campus lectures at all USM campuses were replaced by online learning on March 15, 2020. The University implemented a larger-scale shift in teaching and learning to an online method that minimised social interaction for all academic programmes with the assistance of the Centre for the Development of Academic Excellence (CDAE). These changes undoubtedly raised numerous concerns among educators and students. This change was made possible through direct communication between the deans of each school and all lecturers and students. They were advised to contact the CDAE to learn more about this change and alternative teaching and learning methods [6].

Even though lockdowns and social isolation were the only way to stop the spread of COVID-19 by breaking the chain of transmission, many students have been affected by the closure of schools. Since colleges and universities are closed for the foreseeable future, both universities and students were trying out different ways to finish their courses within the time frame set by the academic calendar. Now, medical students must learn exclusively online [7]. There's no doubt that these changes have made some

students unhappy, but they have also led to new ways to use technology to improve education.

Online education was a complex system with numerous components, such as technological equipment (physical readiness) and technical expertise (mental readiness). Most universities have gone online using Microsoft Teams, Zoom, or other online platforms to teach in synchronous or asynchronous contexts using phones, laptops, and other devices, allowing students to learn and interact from anywhere [8].

When compared to a traditional classroom setting, the online learning environment was very different in terms of how motivated, satisfied, and interactive its students were [9]. The disruption in traditional teaching–learning methods, has been reported to cause depression and anxiety in medical students [10]. This may be because some medical students favoured traditional education over online classes and struggled to adapt to online classes [11].

During the pandemic, majority of first-year USM students were back in their home states when the data for this study was collected, and the majority of second-year students were staying in dormitories, because of a movement control order. Therefore, concerns have been raised about depression and anxiety among medical students as they adjust to online learning. In light of this abrupt change in instructional method, the purpose of this study was to determine the online learning readiness of undergraduate medical students at Universiti Sains Malaysia, the prevalence of depression and anxiety, and its associated factors in the midst of the Covid-19 pandemic.

1.2 Literature Review

1.2.1 Impact of Covid-19 pandemic and education system in Malaysia

Humanity has seen many pandemics throughout history, each of which has had a profound impact on society and the global educational system [12]. On January 1, 2019, a coronavirus was discovered for the first time in Wuhan, China [13,14] In January 2020, the WHO declared COVID-19 a pandemic after it raced over Asia, Europe, and the Americas [15,16]. Lockdowns and home quarantines were being implemented to stop the disease's spread [17].

Institutions around the world have been closed for nearly a year, beginning April 8, 2020, to prevent the spread of a virus that affected 220 million students in 175 countries (13% of the world's student population) [1] and also affected medical education, particularly in terms of teaching delivery and assessment [18] due to limited case-based teaching and small group tutorials [19,20], examinations, the beginning of a new semester, and the potential of extending the academic year [21].

In Malaysia, the Malaysian Higher Education Ministry announced on May 27, 2020 that all teaching and learning activities in universities and other institutions of higher education must be conducted entirely online by December 31, 2020, pending a decision regarding 2021. However, beginning in February 2022, higher education gave institutions the option to conduct their teaching and learning sessions in a hybrid or online format, and beginning March 1, 2022, students were permitted to return to universities in phases [22]. Hybrid classes were permissible if institutions had the capacity to accommodate students who physically attend classes in accordance with standard operating procedures. Beginning in June 2022, institutions were permitted to select the appropriate period for the implementation of complete physical teaching and learning based on the capabilities of their particular campuses [23]. Despite instructors'

and students' lack of experience, facilities, and resources [24], online learning continued despite many obstacles. At least one-third of students were unable to participate in online learning due to connectivity and equipment issues [1].

1.2.2 Online learning readiness among university students during Covid-19 pandemic

Online learning in its broadest form was learning that took place via computer including web-based training and Internet-based learning [25]. In synchronous method, lecturers and students did not meet face-to-face in a classroom. Instead, instruction was delivered through live streaming lecture platforms such as Skype, Facetime, Microsoft Teams, Google Meet, Zoom, Cisco Webex, and Instant Messengers like WhatsApp and Telegram text and voice messages. Asynchronous methods, on the other hand, include pre-recorded lectures uploaded to YouTube and Google Classroom [25–27]. The materials can then be accessed at the convenience of the students.

USM started e-learning in 2002 when the School of Distance Learning established its own Learning Management System (LMS) to meet distance learning needs. Video conferencing, audio, and video streaming have joined multimedia courseware, learning objects, and online forum conversations [28]. The university chose Moodle in 2004. Moodle was USM's e-learning platform for each institution whereby each school has a server and network [28]. All schools and research institutions engaged in the 2009/2010 systemic transformation. A university-wide Moodle LMS, eLearn@USM, was then implemented. Faculty and students use eLearn@USM to obtain course information. It allowed lecturer to "single sign-on" by centralising the process. eLearn@USM's online tools like iTutorials, iWeblets, and iRadio have improved students' learning experiences. USM used blended learning to reach a bigger audience regardless of location [28]. Blended learning combined in-

person classes with online and offline resources [29].

Even though E-learning@USM began in 2009, USM lecturers and students rarely use the platform to create teaching and learning course materials. The pandemic necessitated a sudden transition to online classes, leaving USM lecturers and students unprepared for online learning [30]. Researchers at the local university found that students preferred face-to-face instruction but could adapt to online learning during a partial lockdown due to the pandemic. Pre-recorded lectures, practical session videos, and brief questions helped over 60% of students. Students were distracted by boredom, mental stress, and distractions. Poor internet connectivity and data limits exacerbated the issue [31].

Students must be prepared to learn online in order to completely realise the benefits of online learning. "Online learning readiness" referred to a student's ability to learn well in an online environment and to be mentally and physically ready for certain online learning experiences and actions [32], which required a higher level of fundamental computer skills than traditional classroom instruction [33]. Warner et al defined the first concept of online learning readiness in the Australian vocational education and training sector [34]. The concept has been adopted and verified in various dimensions by many researchers afterwards [35–37]. Hung et al. validated a questionnaire in which online learning readiness can be measured in five dimensions: self-directed learning (SDL), learner control, computer & internet efficacy, online communication self-efficacy, and motivation for learning [36]. Few local studies in Malaysia found that female students, enrolling in a degree programme rather than a diploma programme, having internet access, and understanding the course material were associated with online learning readiness [38]. Students in their second year demonstrated significantly increased computer and internet self-efficacy. This indicated that second-year students were more comfortable using technology for online learning.

Regarding the learner control dimension, third-year students demonstrated considerably greater readiness than second- and first-year students, indicated that students' age or level of maturity plays a significant role in determining learner control. Regarding the remaining three dimensions, namely self-directed learning, motivation for learning, and online communication self-efficacy, the year of study reveals no significant differences. This indicated that regardless of their year of study, students had the same level of preparedness for self-directed learning, motivation for online learning, and online communication self-efficacy [27,38,39].

Several preliminary studies indicate that students were prepared for the newly implemented COVID-19 online learning environment [27,38,40,41]. According to a local study conducted at Universiti Teknologi MARA (UiTM), Malaysian university students were prepared for online learning [38]. In addition, research on the online learning readiness of Junior High School Students in Denpasar, Indonesia revealed that, on average, the students were prepared for online learning; their total mean score of 3.71 exceeded the expected mean score of online learning readiness [42]. However, other experts also have argued that students' online learning readiness was inadequate [43]. Delhi high school students were found to have insufficient digital skills for online education [44]. Given that "preparation" for online learning may be defined differently depending on the institution, region, and researcher, a more pertinent topic was the effect of students' online learning readiness on their psychological distress during the COVID-19 outbreak.

1.2.3 Psychological distress among medical students

In general, several studies in Malaysia shared that the risk factors to depression and anxiety include academic requirements, non-academic, and cultural backgrounds [45–50]. The range of anxiety was from 41.1% to 56.7% and the prevalence of depression ranged between 12% and 30% [48]. One possible explanation for their higher depression and anxiety was that they have not yet developed skills to manage their studies and, as a result, were not better at dealing with stress [45].

A study of 506 students from four public universities in Klang Valley, Malaysia in 2012 revealed that 27.5% had moderate depression and 9.7% had severe or extremely severe depression; and 34% had moderate anxiety and 29% had severe or extremely severe anxiety on the DASS-21 inventory. Senior students had significantly higher rates of depression and anxiety [51]. This could be because seniors have more responsibilities than they used to. Depressive symptoms may also be more common in this older age group because they may be more worried about what the future holds as they get closer to graduation and the need to find work.

Furthermore, several studies conducted in Malaysia identified gender, group activity-related stressors, romantic relationships, and a lack of financial support as risk factors for depression and anxiety. Depression ranged from 24.4% to 60.2%, whereas anxiety ranged from 52.0% to 76.2% [49,50]. Indian students reported higher levels of anxiety [50], but further in-depth qualitative research into how ethnicity affects mental health is needed. Given that some Indians were more likely to have mental illnesses than Malays, Chinese, and Others, a policy output that improves mental health while reducing racial inequality is recommended. Financial assistance was discovered to protect against depression [50,52], possibly because those with higher incomes held higher positions at work and had better access to healthcare. This current study also examined whether sociodemographic profiles (ethnicity, financial assistance, and others) and depression

and anxiety in undergraduate medical students were related.

Medical students were at a higher risk of developing anxiety disorders [53] and were particularly vulnerable to depression [54]. The researcher hypothesised that the Covid-19 lockdown contributed to depressive symptoms by increasing stress and anxiety [55]. According to the findings of one study conducted in China during the pandemic, 24.9% of college students developed anxiety during the pandemic [56]. In a local study on the psychological impact of the pandemic on medical students in Sarawak and in Kuala Lumpur, Malaysia, the prevalence of depression was found to be in a range of 25.7% and 36.4%, while anxiety was in a range of 23.4% and 36.7% [57,58]. Students' mental health suffered from pandemic hyperarousal [57]. Frustration due to loss of daily routine and study disruption and pre-existing medical, depressive, and anxiety disorders were associated with higher depressive symptoms, while stigma, medicine-based courses and family support were associated with lower depressive and anxiety symptoms [58,59].

1.2.4 Online learning and psychological distress among university students

Since the pandemic, university students worldwide have encountered depression and anxiety as the method of learning has shifted to online learning [60]. For example, in Lebanon, a study of Lebanese students conducted during the pandemic quarantine found that online education was associated with moderate to severe depression in 15.5% and mild to moderate anxiety in 25.2%, and in Pakistan, 41% of Pakistani students reported severe psychological distress [61]. In Malaysia, few local studies have shown that the prevalence of depression and anxiety varies with range of depression between 29.4% and 63% and anxiety between 51.3% and 65% [62,63].

A study conducted in China on the mental health status and associated factors of medical students engaged in online learning at home revealed that the prevalence of

depression and anxiety symptoms among university medical students was 31.9 and 32.9 percent, respectively, which was linked to gender, grade, length of schooling, parent-child relationship, daily online learning time, and online learning satisfaction [60]. In another study, the rate of depression among Chinese medical students who were enrolled in online courses rose to 9.6%, which was associated with teaching–learning method and personal variables including resilience and coping styles [64]. However, data on the prevalence of depression and anxiety among Malaysian medical students adjusting to online learning remained limited. There was one local survey of the medical faculties of Malaysian public university students in Klang Valley, Penang, and Kelantan in the north revealed depression and anxiety prevalence rates of 36.4% and 36.7%, respectively [58]. Religious coping, more online class hours, and family and friend support were strongly associated with higher quality of life, while study disruption, living in COVID-19 endemic areas, and higher depressed and stress symptoms were strongly associated with lower quality of life [58].

1.3 Justification of study

The COVID-19 pandemic has disrupted traditional education systems worldwide, resulting in the rapid adoption of online learning as a primary mode of instruction. Medical education, in particular, has been heavily impacted, with students and educators having to adjust quickly to virtual learning environments. Medical students are required to have a high level of practical and clinical training, and the sudden shift to online learning presents unique challenges. Furthermore, the pandemic has brought about unprecedented levels of depression and anxiety, which can affect the mental health of medical students.

In Malaysia, the COVID-19 pandemic has necessitated the implementation of online learning to ensure the continuity of education. However, there is a need to

investigate how the shift to online learning has affected medical students in Universiti Sains Malaysia (USM). Specifically, this study aims to assess the readiness of medical students in USM for online learning, determine the prevalence of depression and anxiety among medical students, and identify associated factors that contribute to these mental health issues.

This research study is important as it will contribute to our understanding of how the COVID-19 pandemic has impacted medical education and the mental health of medical students. The findings of this study can help inform effective interventions and support for medical students during these challenging times. Furthermore, this study can provide insights into how medical education can be improved to better prepare students for online learning in the future.

In this research paper, we will present the methodology and results of the study on online learning during the COVID-19 pandemic among medical students in Universiti Sains Malaysia. The study's objectives, research questions, and hypotheses will be discussed, as well as the sampling strategy, data collection methods, and statistical analyses used. Finally, the paper will conclude with a discussion of the study's implications for medical education and recommendations for future research in this area.

1.4 Objectives

1.4.1 General objective

The objective of this research was to identify students' readiness on online learning, depression and anxiety and its associated factors among USM undergraduate medical students during the Covid-19 pandemic.

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1.4.2 Specific objectives

1. To determine the level of students' readiness on online learning among Universiti Sains Malaysia undergraduate medical students.
2. To determine prevalence of depression and anxiety during online learning among USM undergraduate medical students.
3. To determine associated factors of depression and anxiety on online learning among USM undergraduate medical students.

1.5 Methodology

A cross-sectional study was conducted from February 2022 until June 2022 in School of Medical Sciences, Health Campus, Universiti Sains Malaysia (USM) in Kubang Kerian, Kelantan. Convenience sampling method was used. A total of 258 Year 1 and Year 2 medical students participated in the study by completing a set of online Google form self-rated questionnaires consisting of sociodemographic profiles, the Online Learning Readiness Scale-18 (OLRS-18), and the Depression, Anxiety, and Stress Score-21 (DASS-21). In this study, Year 1 and 2 were chosen because students focused on basic medical science lectures, which included in-class theoretical lectures, seminars and problem-based learning tutorials. Before Covid-19, medical schools do not practice online learning. Preclinical phase students, who focused on basic medical sciences lectures, had a harder time maintaining preclinical teaching and learning quality than clinical phase students, who focused on hospital clinical rotations [65]. The data entry and analysis were performed by using Statistical Package for Social Study (SPSS) Version 26.0.

1.6 Dissertation organization

This dissertation is arranged according to the Format B: Manuscript ready format based on the guideline by Postgraduate Office, School of Medical Sciences (2016). The following chapter would be the study protocol that has been submitted for ethical approval. Chapter 3 is the manuscript of 'Online Learning During Covid-19 Pandemic: Students Readiness, Depression and Anxiety and Its Associated Factors Among Medical Students in Universiti Sains Malaysia' which is ready for submission to the International Journal of Environmental Research and Public Health (IJERPH) with the author

instruction. The raw data is included in the attached CD.