

Mental Health Issues Amongst University Students During The COVID-19 Pandemic

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ABSTRACT

Mental health issues amongst University students during the COVID-19 Pandemic. This study assessed the prevalence of and determined the factors associated with stress, anxiety, and depression (SAD) levels as well as academic performance among university students during the COVID-19 pandemic. In addition to this, the study determined the students' perception of online learning strategies. A cross-sectional study was performed at the Medical University in Ajman (Ajman, United Arab Emirates) which included 367 students, aged 18 and above, from several degree programmes; over the course of 6 months. A self-administered questionnaire was used. In addition, the depression, anxiety, and stress scale (DASS 21) was used. The study was approved by the IRB and informed consent was taken from all participants. Students above the age of 18 are more likely to experience severe depression. The highest prevalence of SAD was found in participants in their third year of study. The lowest prevalence of SAD was found in the fifth year of the study. There was no significant difference in the prevalence of SAD across the different sampled programmes. Anxiety was the most prevalent issue among all students. Online learning was reported to have a negative impact on the learning experience so in-person classes were preferred. There has been a decrease in productivity since the onset of the pandemic along with a decline in efficiency and academic performance. 4.8% of participants experienced extremely severe stress. 32.3% of participants experienced extremely severe anxiety. 14.8% of participants experienced extremely severe depression. Extremely severe depression was prevalent at 5.2% for those below the age of 20; and at 8.7% for those above the age of 20 ($P < 0.05$). Indeed, by this, it is recommended that students are provided with the necessary psychological support and aid; and strategies combating SAD should be implemented.

Keywords: stress; anxiety; depression; covid-19; academic performance.

1 INTRODUCTION

The COVID-19 pandemic began in late 2019 and has caused significant changes worldwide. One of the main changes is the incidence of mental health issues among university students. This is relevant due to the increasing concern about the effects of mental health on the general well-being of students. Currently, many studies have been conducted to assess the mental health issues of students and how it impacts their daily lives. School is a big part of a student's life with regard to social interactions and academic performance. The COVID-19 outbreak has had a significant impact on these aspects and has forced changes in mental health issues among university students. A study done in China reported that about 0.9% of college students were experiencing severe anxiety, while 21.3% with mild anxiety¹.

The COVID-19 pandemic and how it has brought about online learning and assessments

Due to the ongoing pandemic, schools and universities have had to adapt to the sudden closure that began in March 2020. Worldwide, over 1.2 billion students were out of the classroom. As a result, there has been a drastic change in education with the rise of online learning². The COVID-19 outbreak has forced learning institutions to adopt the traditional way of learning (face-to-face) to now include online learning platforms and assessments. Faculty and staff members are learning how to use these platforms to deliver quality education. The necessary move to online learning has been rapid, however, there have been successful transitions amongst several universities and schools³. Students who were residing in urban areas had enough financial stability, and living with parents was a protective factor for good mental health, while relatives or friends infected with COVID-19 were a risk factor¹.

COVID-19 pandemic and the mental health of the general population

Certainly, with its onset, the COVID-19 pandemic forced much of the population into a frenzy. With a lot of uncertainty, came a lot of distress. Many have lost their homes, employment, families, and normalities. It has placed every individual in a position in which they should question what could happen to their sense of well-being and mental health as the pandemic progresses. This public health emergency has resulted in emotional isolation and stigma, while also exerting disturbances in the security and stability of whole communities⁵.

Any outbreak of disease will result in a psychological reaction. It is this reaction that influences how the disease may spread and drives emotional distress and social disorder both during and after the widespread presence of the disease⁶. Studies have shown a high prevalence of post-traumatic stress syndrome (PTSS) among COVID-19 patients. In fact, those with pre-existing psychiatric disorders reported worsening symptoms. Among healthcare workers, psychiatric symptoms were reported to have increased, even in those who would claim to have had no disorder or symptoms in the past. Overall, the assessment of the general public indicated a significant reduction in psychological well-being⁷.

How has COVID-19 influenced the academic performance of students?

A student's experience on the university or school campus is fundamental to their success or well-being. Additionally, the relationships and experiences they form with their peers play a big role in this and form a sense of belonging- this sense of belonging vastly influences the academic, social, and psychological outcomes of these students⁸.

Studies have shown that poor mental and physical health is associated with a weak sense of belonging that leads to poor academic performances⁹. Due to the pandemic, many students now have more responsibilities, such as: taking care of children or siblings (due to school closures) or tending to sick family members. Students must also cope with the uncertainty about their collegiate experience moving forward. Students who have mental illnesses or those who are immunocompromised may need to change their plans significantly- this will affect their personal, academic, and professional performance¹⁰.

Rationale

Our study aims to conduct an assessment of how the COVID-19 pandemic has affected the mental health of university students. This research is necessary as it may provide further insight into the importance of mental health (especially among university students) during the time of this pandemic. The target population is students at Medical University in Ajman, aged 18 and above. This target population was chosen because of the recent increase in mental health issues among these students.

Mental health disorders not only influence the physical and physiological health of individuals; but also, their psychological well-being. This study may set a foundation for future research of similar structure or at the very least, provide data that can be inferred in other studies.

Research Question

What is the relationship between mental health issues among university students and the COVID-19 pandemic?

Objectives

1. To assess the prevalence of depression, anxiety, and stress levels among university students during COVID-19.
2. To assess sociodemographic and other factors that are associated with depression, anxiety, and stress among the students.
3. To assess the students' perception of online learning strategies during the pandemic.
4. To determine the association between academic performance and depression, anxiety, and stress among students during COVID-19.

2 LITERATURE REVIEW

The COVID-19 pandemic began in December 2019 and has caused drastic and sudden changes to university students worldwide¹¹. In order to protect students and staff members from COVID-19, universities had to close their campuses and transition to online learning. This had to be done on short notice and meant that students were made to leave their hostels and universities unexpectedly¹². Undoubtedly, these measures contributed to the significant mental health deterioration among students during the pandemic. This review will focus on the prevalence of depression, anxiety, and stress levels amongst university students since the onset of the pandemic, as well as the factors that contribute to these mental health changes. Lastly, the review will include prevention strategies that students can use to help reduce the deterioration of their mental health.

An empirical study, done in July 2020, suggested that social distancing and quarantine measures increased the social isolation of university students and affected their psychological well-being and mental health. In addition to this, there was added pressure to perform well academically, which resulted in further deterioration of their mental health¹². Hence, it can be noted that tertiary-level students are extremely vulnerable to the psychological effects of the COVID-19 pandemic, especially because this stage of their lives is considered a transition stage between their academic and professional lives, generally leading to higher levels of depression, stress, and anxiety¹³.

A study that focused on the impact of the pandemic on university students' mental health and wellness- reported that the rapid changes to the lives of these students had a negative effect on their general psychological well-being¹⁴.

This was due to the disruption of an already familiar routine, which created a loss of their sense of stability and coherence. It was concluded that the greater the disruption of COVID-19 to the daily lives of university students; the greater the negative psychological and emotional changes¹⁴.

The pandemic has affected more than just the mental health of university students. It has also caused significant changes to their academic performance. Due to the implementation of online learning, students had to adapt themselves to new technologies and surrounding environments, which were very different from their classrooms at university¹⁵. These sudden changes have played a major role in academic performance. Most studies show that the COVID-19 pandemic affected academic performance to varying degrees¹⁶. Some students found that they had more time to self-study, which improved their academic performance. However, many students reported a loss of interest and attention problems due to the long hours they spent behind a device, which in turn negatively impacted their academic performance¹⁶.

This study aims to further assess and report the mental health changes that university students experienced during the pandemic. It will also assess how online learning and COVID-19 have influenced the academic performance of students. This is important because this study will provide more data that can be inferred from other studies and contribute to the already existing research about the mental health and academic performance of university students since the onset of the pandemic.

Prevalence of the problem

When a group of Chinese researchers surveyed 821 218 students, of which 746 217 were viable for analysis, it was concluded that 45% of the participants experienced negative impacts on their mental health²⁷. Within the sample, the prevalence of probable acute stress; depressive, and anxiety symptoms were 34.9%, 21.1%, and 11.0% respectively. A major factor that influenced mental health negatively, derived from the pandemic, included having friends and relatives who were infected by the virus (adjusted odds ratio = 1.72 - 2.33). Students who were exposed to social media/media coverage of the virus and pandemic for more than 3 hours a day were shown to be 2.13 times more likely to have acute stress symptoms (compared to those who were exposed to less than 1 hour a day of social media/media coverage)²⁷. There existed a 4.84 - 5.98-fold increase in the likelihood of anxiety and depressive symptoms in those with low perceived social support compared to that of students with high perceived social support²⁷. Prior mental health issues were also associated with an increased likelihood of anxiety and/or depressive symptoms²⁷.

Of a random sample of 5611 (which consisted of 3423 Egyptians and 2188 Saudis); it was more than justifiable that the COVID-19 pandemic negatively impacted the mental health of its participants²⁸.

The study indicated that this is a result of an increase in psychological problems concurrent with the increase in the length of the pandemic; as well as varying socio-demographic factors^{25,28}.

A study quantifying the changes in mental health and movement during the initial lockdown in The UK reported that the changes initiated by a national lockdown impact mental health and movement behaviours negatively¹⁸. In this, 214 students were enrolled (longitudinal cohort study with a mean age of 20 years). Participants reported their mental health and other variables in a self-report twice before the lockdown, and twice during the lockdown. It was observed that mental wellbeing and physical activity depreciated over the first 5 weeks of the lockdown¹⁸. In this, it was also observed that perceived stress and time spent sedentary increased. As a result, a positive correlation and association was observed between perceived stress and sedentary behaviour¹⁸. Although mental health and well-being were impacted negatively by the lockdown and pandemic, there was no association identified between these two variables¹⁸.

A sample of 164 101 college students were surveyed during the first wave (T1) of the outbreak in China. Of these students, 68 685 (41.9%) completed a follow-up survey during remission (T2)¹⁷. From the follow-up survey, the prevalence of probable acute stress was shown to decrease with the course of the outbreak (T1: 34.6%; T2: 16.4%). Although this observation seems to counter most research, it is important to note that the symptoms of anxiety and depression still increased in this study. The prevalence of anxiety was shown to increase by 3.3% (T1: 11.4%; T2: 14.7%) and that of depression by 4.7% (T1: 21.6%; T2: 26.3%). Senior students were also observed to have an increased risk of developing mental health issues in at least one wave of the outbreak when subject to COVID-19-related worries and the state of suspected or confirmed cases in their respective communities (adjusted odds ratio > 1.20, $ps < 0.001$)¹⁷. Researchers were able to draw the conclusion that the presence of the pandemic increased the prevalence of mental health issues that were already present, before the pandemic, as well as increased the risk of onset of mental health issues during the pandemic (instantaneous and delayed symptoms). Overall, acute stress, anxiety, and depressive symptoms were increased due to the impact of the pandemic and social changes^{17,25,26}.

It is of interest to understand what changes the pandemic has induced in the mental state of university students worldwide. It is well understood that university students are subject to ranging psychological stressors in regard to their ability to learn, work, and balance their home, work, student, and social lives. Before the pandemic, 1 in 5 college students experienced at least one diagnosable mental health disorder globally¹⁹. From sound evidence, COVID-19 indeed affects the variables listed above.

The prevalence of mental health disorders in university students in 9 countries (Poland, Slovenia, Czechia, Ukraine, Russia, Germany, Turkey, "Israel" and Colombia) was elucidated in a socioeconomic context. Among 2349 students, the prevalence of high stress, depression, and generalized anxiety was 61.30%, 40.3%, and 30.00%, respectively²⁰. Of these students, 69% were female. Using the multilevel Bayesian model, it was observed that the female sex was a credible predictor of PSS-10 (Perceived Stress Scale), GAD-7 (Generalized Anxiety Disorder), and PHQ-8 (Patient Health Questionnaire) scores²⁰. Furthermore, the town of residence and level of education were risk factors for the PHQ-8. From this, it was concluded that the prevalence of mental health issues during and as a result of the pandemic is 'alarming' in the student population²⁰.

In the general population, the prevalence of depressive symptoms during the pandemic was observed to be 25% and that of high stress was 11% (evidence from 78 countries via cross-national research)²³. In the general sample, the prevalence of depressive disorders was 30.7%; with Czech students reporting lower levels than that of Emirati students, although these Czech students reported similar levels to that of American and Taiwanese students¹⁹. "Israeli" and Russian students showed a similar level of prevalence regarding depressive symptoms - with 45.3% and 46.4%, respectively. Among students in Poland, the prevalence of moderate and severe anxiety symptoms was 21% and 14%, respectively²⁰. Amongst these Polish students, the prevalence of high stress was 56% at the start of the pandemic. Regarding Bavarian universities, almost 40% of students reported an increase in psychological stress and burden while in contrast, 17.3% of Bavarian students reported reduced mental stress during the pandemic. It is important to note that the prevalence of such disorders, in regards to mental health, varies between countries as well as within a single country (regional variance) and these differences are subject to change throughout different periods of the pandemic and its progression²⁴.

Using a non-probability sampling technique, researchers were able to show that of a sample of 678 students, 50.9% displayed symptoms of anxiety; 57.4% displayed symptoms of stress, and 58.6% showed signs and symptoms of depression²¹. This reinstates the fact that the prevalence of mental health disorders is rising from the onset as well as the progression of the pandemic.

Regarding Post-Traumatic Stress Disorder (PTSD); of 2485 students from 6 universities in China, the prevalence of PTSD and depression was observed to be 2.0% and 9.0%, respectively²².

As per the Student Experience in the Research University (SERU) Consortium survey; in which 30 725 undergraduates and 15 346 graduates (including professional students) were surveyed; the prevalence of major depressive disorder was observed to be 35% in undergraduates and 32% in

graduates²³. Amongst both groups, the prevalence of generalized anxiety disorder was 39%. Comparing the years 2020 and 2019; the prevalence of major depressive disorder is two times higher in 2020 than in 2019, and that of generalized anxiety disorder is 1.5 times higher²³.

Sociodemographic factors

With the COVID-19 pandemic, students around the world are facing difficulties and mental health problems. Several factors contribute to adolescent well-being and mental health, such as age, gender, education, background, and household status. First, due to the dramatic nature of the international blockade, many students are stuck in college dormitories while facing uncertainty about the possibility of returning home to their loved ones. The result is a fear of isolation and despair over the lack of support from universities and government. In addition, teens who feel helpless or trapped at home have been reported to experience high levels of anxiety and frustration during the blockade. According to a survey conducted by YoungMinds 2020, 83% of participants said that the pandemic exacerbated their existing mental illness²⁹.

Many students, mainly undergraduates, are more at risk of stress and anxiety for reasons such as employment uncertainty in the future and the delay of the completion and quality of their degree³⁰. Furthermore, students at home during lockdown have been found to struggle with feelings of isolation and loneliness because of being disconnected from their peers; and those who found their university campus welcoming and homely were struggling with a riot of emotions while at home, like frustration, anger and depression. According to one study, college students often experience mental illness after school is closed³⁷.

Secondly, some studies have shown that being female has also become a risk factor in developing psychopathologies in the COVID-19 pandemic. It was seen that the incidence in females and the potential for mental health disorders is higher as compared to males. This is associated with a general increase in mental illness in women rather than men. This is most likely due to several socio-economic factors that affect their status, social position, or duties to fulfill during the pandemic.

Thirdly, demographic location and educational background have also been found to play a role in a student's mental health. In the United States, a cross-sectional study was conducted to assess the severity and degree of the mental health of college students. Of the 2031 subjects, 48.14% (n = 960) considered moderate to severe depression, 38.48% (n = 775) considered moderate to severe anxiety, and 18.04% (n = 366) considered suicide³¹. The majority of subjects (n = 1443, 71.26%) claimed that they were not able to cope with all the stress and anxiety caused by the pandemic and other related matters. This study included the student's age, gender, and educational background. In addition, a study conducted in France assessed the

effect of COVID-19 on the mental health of 8,004 French students and found that they had a high level of anxiety, depression, stress, and hopelessness³³. They found that the older the student is, the more likely it is for him/her to develop these mental illnesses. Gender also seemed to play a part, as females were found to have a higher prevalence than males. In addition, a significant number of students most likely needed psychological support during the pandemic, especially as high levels of stress indicated imprisonment and the virus itself affected the development of post-traumatic stress symptoms³⁸.

In addition, Chinese university students living internationally live with the fear that their families in China are at risk of contracting the COVID-19 infection³⁴. They have also reported that they face discrimination, isolation, and racism in certain countries because of being labeled as potential carriers of COVID-19. Additionally, the media has perpetuated stereotypes, used derogatory headlines, and spread hate, misinformation, alienation, and fear about Chinese people among the public. They are also subject to hate crimes and public discrimination. Consequently, there has been a significant decline in the mental health status of Chinese students during the COVID-19 pandemic. Based on a study conducted in Australia, where in the year 2020 and between the 3rd of April to the 3rd of May 1495 subjects reported a variety of psychological responses to the COVID-19 outbreak. The females have reported that they have suffered more severe psychological symptoms than males. A large portion of these subjects have reported at least 1 or more PTSD symptoms³⁹. When it comes to symptoms such as anxiety, stress, or depression most of the females in this study compared to only 20 percent have moderate to severe levels of depression; when it comes to stress levels, again the majority of females (27%) have reported moderate to severe levels of stress compared to the males (10%); and a high number of females and male also said they struggled with anxiety. Thoughts of suicide were seen to be in 17% of females and 14% of males.

Furthermore, university students have reported negative academic consequences as a result of the COVID-19 pandemic and have seen an immense decline in their grades, a negative effect on GPA and overall scores³⁵. As a result, academic stressors in addition to pre-existing stress of exams and performance lead to a further decline in mental health status. The pandemic has placed a burden and unprecedented mental stress on students, which requires further examination, research, and immediate intervention³⁶.

Clinical factors

From the onset of the pandemic, many patients who suffer from chronic illnesses or disabilities have had to self-manage their conditions due to the overload of COVID-19-infected patients and also the risk of acquiring the virus. Studies have shown patients who lack support and are isolated; show poor self-

management, such as lack of monitoring (checking blood pressure levels); lack of implementation of medication regimens; and not following diets⁵⁵. This has been shown to only add to a patient's distress and anxiety and in some cases, patients have developed major depression. Due to isolation, patients are at risk of developing or experiencing bouts of anxiety and depressive symptomatology, which can progressively make their illnesses worse or even start developing new conditions such as IBD⁵⁶.

In addition to this, several studies revealed that students who had members of their family impacted were the most disturbed students. In a few similar studies, nearly all of the student participants were terrified of such a circumstance; this worry may be due to the disease's lack of understanding, making it difficult to predict its development⁴⁰. Looking at another study, it was observed that healthcare students are affected and most likely to be impacted by the pandemic due to high stress levels generated by the complexity of their education; sleep difficulties due to the heavy workload; and constant being around different individuals, in distress, at the hospital⁴¹.

Another interesting point to note is the prevalence of vitamin D deficiencies and their effect on mental health. Inflammatory markers were found to be increased in those with COVID-19 and low vitamin D levels⁴². Vitamin D deficiency is also linked with greater risks of stress, and other depressive symptoms. Isolation and quarantine greatly reduce exposure to sunlight which diminishes vitamin D concentrations. There are very few studies discussing this particular relationship during COVID-19 yet, Mehta et al. (2021), discussed that vitamin D could potentially stimulate as well as sustain the psychiatric symptoms and could possibly heighten these particular manifestations in the pandemic⁵⁸.

Major depression is an increasingly growing disease around the world and it is predicted to be the leading cause of disease burden by 2030, and it is already the leading cause in women worldwide, according to the WHO. The prevalence of depression and anxiety is much higher in women than men; this is due to several factors including depression-related illnesses such as postpartum depression; postmenopausal depression and anxiety; and premenstrual dysphoric disorder. These conditions are normally associated with certain hormone imbalances that increase the prevalence. Scientists and researchers have yet to determine the underlying causes and mechanisms of why this happens; thus, proper treatment has yet to be developed⁵⁷.

Lifestyle factors

The COVID-19 pandemic has impacted individuals all around the world. The major prevention factor, quarantine has had a drastic effect on the lifestyle of us humans all over the globe. People who were highly affected include university students especially.

“Quarantining,” refers to isolating and limiting the mobility of people who have been exposed to an infectious illness to see if symptoms appear. Over the months, a large-scale quarantine had been put into place to decrease human interaction and avoid the further spread of the disease^{43,45}.

Here, we are going to discuss how lifestyle factors have been affected by university students during this outbreak period. Indeed, even before the COVID-19 pandemic, young people's mental health was already a global issue. In a 2016 nationwide poll of 18 875 French university students, 37 percent said they had a depressive episode in the previous year, and with the COVID-19 outbreak, the students suffered even more⁴⁴. Young adults (aged 16-24 years) have been demonstrated to be more vulnerable to mental health difficulties during prior lockdowns.

In another study, lifestyle changes were assessed during home confinement and the major findings show that during the global lockdown, emotional and behavioral symptoms significantly increased. This research also backs up prior findings that show a link between screen time and neuropsychiatric disorders. Long periods of screen usage were linked to the development of mental health problems during home confinement in practically all age groups. Although a variety of variables are likely to contribute to the beginning of these symptoms, limiting screen time is crucial for preserving mental health at any age⁴⁶. It is also concerning that increased screen time, sedentary lifestyle, and more hours spent doing nothing productive at home are all contributing to poor lifestyle choices among students and others; more studies are also showing how other factors contribute to poor lifestyle choices among students and others. According to one research, over one-third of participants expressed higher stress related to job and money concerns during the pandemic, while over half of the participants experienced greater stress related to family matters that has affected students in studies too. In addition, the study discovered that individuals with a high school or college education were more likely to have experienced more stress than those with a higher education.

On the plus side, individuals did not feel powerless throughout the pandemic, reporting that they paid more care to their mental health and spent more time relaxing and recuperating. Some individuals also reported receiving greater assistance from family members during the pandemic, as well as caring more about their loved ones' feelings⁴⁷.

Based on numerous studies, we can see how numerous students, due to a lack of outdoor breaks being trapped in the house due to lockdowns, are more likely to acquire further health problems related to issues like anxiety, depression, and even suicide. Although such students' behavioral and lifestyle habits may not be noticeable at first, the characteristics stated above tend to have a significant influence on the personal choices they make along the way⁴⁷.

Prevention strategies

According to the International Classification of Diseases (ICD-10), depression can be divided into mild, moderate, and severe depressive episodes⁴⁸. University students who experienced some type of depressive mood disorder, during the pandemic, would report symptoms of low moods, reduced energy, and extreme tiredness even after using minimum effort to complete school-related tasks⁴⁶. Students found that their sleep was disturbed and they had little to no appetite. This would often lead to lower levels of productivity and they would find themselves studying less, which in turn, caused feelings of guilt and worthlessness⁴⁹. Students who were diagnosed with depression before the pandemic would typically experience a heightened level of these feelings.

The pandemic is a distressing time filled with uncertainty. Hence, it can be said that the rapid changes that COVID-19 has brought about have left many university students feeling depressed. This is simply because of the social isolation and loneliness due to lockdown and distance learning. There is no easy fix to depression or depressive symptoms, however, university students can use several methods to try and prevent these feelings from developing or, in some cases, worsening. The first step is to try and change your focus⁴⁹. Depression can often put one in a cycle of negative thoughts and worries. A way of breaking this cycle and changing your focus would be through the method of distraction. Find something that will add meaning and purpose to your life (like a new skill or hobby) and make an effort to celebrate these small achievements. By focusing on one goal or project at a time, students can significantly reduce their negative thoughts⁴⁹.

Another way of reducing depressive symptoms and feelings would be through creating and maintaining a routine. Before the pandemic, many students already had a familiar daily routine, which included going to campus and attending classes; spending time with friends; and productively working or studying. Once the pandemic struck, students lost this sense of stability. Therefore, if students attempt to create and maintain a new routine, it will result in added structure to their daily lives⁴⁹. This can effectively prevent and reduce depressive feelings that usually feed off a chaotic routine.

Along with feelings of depression, several studies reported that students felt heightened levels of anxiety and stress due to the pandemic. This was mostly because of the transition to online learning and the major adjustments that students had to undergo in order to keep up with the content of their courses. In addition to this, the uncertainty that came with isolation mandates; displacement due to the closure of university hostels; and the uncertainty of their academic futures, further stressed university students and led to elevated levels of anxiety⁵⁰.

Many students found difficulty in managing this newfound stress and anxiety, which led to unhealthy coping mechanisms such as neglecting

personal care; sleeping all day; and skipping meals⁴⁷. There are some effective methods that students can make use of to help minimize and prevent feelings of stress and anxiety. Firstly, students should attempt to keep up with online classes by consistently planning and preparing for every class⁵¹. This will help them to reach their personal academic goals and avoid a significant drop in their grades. By improving academic performance, students will feel more at ease, which in turn, reduces their stress and anxiety.

Another major source of stress and anxiety among students during the pandemic is the loss of social interactions. Having a social life is especially important for young adults who are trying to navigate their way through university and their professional lives. Isolation and loneliness can heighten anxiety, stress, and depression, which can ultimately impact physical health⁵². In order to prevent the negative effects of social isolation, students should attempt to make it a priority to remain in touch with family and friends. This can easily be done through social media and phone or video calls. Social media can be used to connect students to the rest of their communities and the rest of the world. However, it can also exacerbate anxiety, so students should not be afraid to take necessary breaks from social media⁵².

Another important way to deal with stress and anxiety is finding ways to exercise and be physically active. Take regular breaks away from your laptop and cellphone screens by doing some stretches and exercises every day⁵¹. Furthermore, make an effort to eat healthy and maintain a normal sleeping pattern. This will help keep you energized and ensure that you will be able to complete the necessary tasks each day. Similarly, students should do their best to avoid mental burnout. Studying efficiently has been an extremely difficult thing to do throughout the pandemic. It is not ideal to spend the whole day completing university tasks or studying. Take breaks at regular intervals and do not feel guilty about it. Spend time doing the things you love, like watching a TV show or enjoying a hobby. This is essential to maintain a healthy mind and body⁵¹.

It is evident that the pandemic has brought about drastic changes to the daily lives of students. The only way to cope with these changes is to adapt and adjust to the "new normal." It is common to experience depression, anxiety, and stress during these trying times, you are not alone. Do not be afraid to seek help when it is needed. Prioritize and protect your mental health⁵³. Stay informed about new information that is circulating, but do not allow it to overwhelm you. Make use of positive coping mechanisms, similar to those mentioned above. Remember that this pandemic is a time of uncertainty for everyone and that you cannot always control what is happening around you. As a student, focus on the things that you can control. Make it a habit to control your thoughts, feelings, and behaviors⁵⁴. Positive coping mechanisms will have a positive impact on your mental and physical health, as well as your academic performance.

3 MATERIALS AND METHODS

Research design

A cross-sectional study was conducted.

Study population

Our study population included students of the Medical University in Ajman from the following programs: DMD, BHS, BPT, BSN, HME, and BBMS.

Inclusion criteria:

- Students aged 18 and above
- Both males and females
- Participants who gave informed consent

Exclusion criteria:

- Any student below the age of 18
- Any student who did not give informed consent

Sample size calculation

- Population: Students of Medical University in Ajman
- The sample size is calculated using the formula $4pq/L^2$
- A study conducted in China among college students reported the prevalence of anxiety during COVID-19 as 21.3%¹.
- Therefore, $p=0.213$, $q=1-p=0.787$, $L=20\%$ of $p=0.0426$
- Total sample size calculated = 373
- Accounting for 10% non-response, the total sample size will be 410

Study settings

Medical University in Ajman, Ajman UAE

Duration of study

The study took place over 6 months.

Study instrument and validation procedure

- A self-administered questionnaire was used for conducting the study, which included socio-demographic information, the perception of the students regarding online education, and other factors affecting mental health during COVID-19.
- In addition, the depression, anxiety, and stress scale (DASS 21) was used in the study. Each of the three DASS-21 scales contained 7 items divided into subscales with similar content.
- The depression scale assessed dysphoria, hopelessness, devaluation of life, self-deprecation, and lack of interest/involvement.
- The anxiety scale assessed autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious effects.
- The stress scale was sensitive to levels of chronic nonspecific arousal. It assessed difficulty relaxing, nervous arousal, and being easily upset and impatient.
- Scores for depression, anxiety, and stress were calculated by summing the scores for relevant items.

- The contents of the questionnaire were validated by three experts.
- A pilot study was done to ensure that the questionnaire was understandable and feasible.

Ethical issues

- Approval for this study was obtained from the IRB.
- Ethical issues such as breach of anonymity, privacy, and confidentiality; making use of vulnerable subjects; and not providing enough information to the participants were carefully avoided.
- We did not include anyone under the age of 18 in our study.
- All participants of the standardized questionnaire remained anonymous.
- The consent form included all the necessary details of the study and it explained our objectives, procedures, potential benefits and harms, as well as the rights to refuse participation in the study.

Methodology

- Once approval was obtained from the IRB, consent from the Deans of different colleges was obtained.

- The final questionnaire was validated by three experts in the field and all suggestions were incorporated.
- A pilot study was conducted among 5 students to make sure the questionnaire was understandable.
- The target participants were approached, and data was collected once the informed consent was obtained.

Details of data storage

The data collected in this study was stored at GMU's Department of Community Medicine and will continue to be stored for 3 years as per the policy of GMU.

Data analysis

- The data was recorded as tables and figures through the use of Microsoft Excel and SPSS Statistics Version 27.
- The data was analyzed using the chi-square test for association.
- A P-value that was less than 0.05 was considered statistically significant.

RESULTS

Sociodemographics

TABLE 1: Sociodemographic factors of the participants.

Sociodemographic factors		Frequency	Percent (%)	Total Frequency	Total Percent (%)
Age	<20	187	51.0	367	100.0
	>20	180	49.0		
Gender	Male	75	21.4	351	100.0
	Female	276	78.6		
Program	DMD	93	25.5	364	100.0
	BHS	41	11.3		
	BPT	79	21.7		
	BSN	46	12.6		
	HME	18	4.9		
	BBMS	87	23.9		
Year of Study	1	92	25.6	359	100.0
	2	147	40.9		
	3	72	20.1		
	4	42	11.7		
	5	6	1.7		
Living situation	Alone	56	16.2	345	100.0
	With parents	262	75.9		
	With roommate	27	7.8		

367 participants were sampled (367 of 410 expected outcomes). Of these, 51% were less than 20 years of age (187 participants); and 49% were above 20 years of age (180 participants). Of the total sample, males represented 21.4% (75 participants), and females represented 78.6% (276 participants). The distribution of students across the sampled programmes was as follows: DMD (25.5%/93

participants); BHS (11.3%/41 participants); BPT (21.7%/79 participants); BSN (12.6%/46 participants); HME (4.9%/18 participants) and BBMS (23.9%/87 participants). DMD and BBMS students made up most of the participants. Most participants were in YoS 2 (40.9%/147 participants) and the fewest students were in YoS 5 (1.7%/6 participants).

In regards to their living situation; the majority of the participants lived with their parents (75.9%/262 participants), whereas the latter lived

alone (16.2%/56 participants) or with a roommate (7.8%/27 participants).

TABLE 2: Stress, Anxiety, and Depression (SAD) prevalence among different age groups.

Age group		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Below 20	Severe	6.4	4.2	6.4
	Extremely severe	0.9	15.0	5.2
20 and above	Severe	8.4	4.2	5.8
	Extremely severe	3.5	16.7	8.7
P-value		0.056	0.907	0.023

Amongst those sampled, extremely severe depression was prevalent at 5.2% for those below the age of 20; and at 8.7% for those above the age of 20 ($P < 0.05$). It was thus 3.5% more likely to experience extremely severe depression above the

age of 20 than below the age of 20. No difference was observed between Stress or Anxiety prevalence between both groups ($P > 0.05$). Hence, both stress and anxiety prevalence do not differ between both age groups.

TABLE 3: Stress, Anxiety, and Depression (SAD) prevalence among male and female participants.

Gender		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Male	Severe	3.3	3.3	2.7
	Extremely severe	0.6	5.3	3.6
Female	Severe	11.5	5.0	9.1
	Extremely severe	3.9	27.0	11.6
P-value		0.0582	0.041	0.929

Amongst those sampled, extremely severe anxiety was prevalent at 5.3% for males; and at 27.0% for females ($P < 0.05$). It was thus 14.7% more likely to experience extremely severe anxiety for females

than males. No difference was observed between Stress or Depression prevalence between both groups ($P > 0.05$). Hence, both stress and depression prevalence do not differ between both genders.

TABLE 4: Stress, Anxiety, and Depression (SAD) prevalence among different programs of study.

Program		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
DMD	Severe	4.7	1.4	3.5
	Extremely severe	0.6	8.9	4.4
BHS	Severe	0.9	1.7	1.5
	Extremely severe	0.6	4.6	2.1
BPT	Severe	3.8	2.0	2.6
	Extremely severe	0.6	5.7	1.8
BSN	Severe	1.2	0.9	0.9
	Extremely severe	1.5	3.4	2.4
HME	Severe	0.0	0.9	1.2
	Extremely severe	0.3	2.3	0.0
BBMS	Severe	4.7	1.7	2.6
	Extremely severe	1.2	7.7	4.1
P-value		0.061	0.081	0.156

No association was observed between Stress, Anxiety, or Depression prevalence across all sampled study programmes ($P > 0.05$).

Hence, SAD prevalence does not differ by programme or course studied.

TABLE 5: Stress, Anxiety, and Depression (SAD) prevalence among different years of study.

Year of Study		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
1	Severe	3.3	1.4	2.4
	Extremely severe	0.6	7.5	3.0
2	Severe	5.6	4.6	6.5
	Extremely severe	0.9	12.5	3.9
3	Severe	3.9	1.4	0.9
	Extremely severe	1.8	7.2	4.8
4	Severe	1.8	1.2	2.1
	Extremely severe	1.2	3.8	2.7
5	Severe	0.6	0.0	0.0
	Extremely severe	0.0	1.2	0.6
P-value		0.169	0.687	0.032

Amongst those sampled, extremely severe depression was prevalent at 3% for the first year whereas the second year was 3.9%, the third year 4.8%, the fourth year 2.7%, fifth year 0.6% ($P < 0.05$). The lowest prevalence was in the fifth year and the

highest was in the third year with a difference in prevalence of 4.2%. No association was observed between Stress and Anxiety prevalence across all sampled years of study ($P > 0.05$). Hence, stress and anxiety prevalence does not differ by year of study.

TABLE 6: Stress, Anxiety, and Depression (SAD) prevalence among different living situations.

Living situation		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Alone	Severe	2.8	1.2	2.8
	Extremely severe	0.9	6.0	2/8
With parents	Severe	10.8	6.0	7.4
	Extremely severe	2.5	22.3	10.5
With roommate	Severe	1.2	0.3	1.2
	Extremely severe	0.6	3.6	1.2
P-value		0.325	0.299	0.608

No association was observed between Stress, Anxiety, or Depression prevalence across all sampled living situations ($P > 0.05$). Hence, SAD prevalence does not differ between living situations.

Objective 1: To assess the prevalence of depression, anxiety, and stress levels among students during COVID-19.

TABLE 7: Prevalence of depression, anxiety, and stress among participants.

Prevalence of		Frequency	Percent (%)	Total Frequency	Total Percent (%)
Stress	Normal	190	53.7	354	100.0
	Mild	50	14.1		
	Moderate	45	12.7		
	Severe	52	14.7		
	Extremely severe	17	4.8		

Prevalence of		Frequency	Percent (%)	Total Frequency	Total Percent (%)
Anxiety	Normal	108	29.8	362	100.0
	Mild	26	7.2		
	Moderate	81	22.4		
	Severe	30	7.8		
	Extremely severe	117	32.3		
Depression	Normal	131	37.2	352	100.0
	Mild	45	12.8		
	Moderate	81	23.0		
	Severe	43	12.2		
	Extremely severe	52	14.8		

4.8% of participants (17) were observed to have extremely severe stress. 53.7% of participants (190) reported to be normal in regards to stress. 32.3% of participants (117) reported that they have extremely severe anxiety. 29.8% of participants (190) reported to have no anxiety.

14.8% of participants (52) reported that they have extremely severe depression. 37.2% of participants (131) reported to have no depression. Anxiety was the most prevalent of all 3 measured variables; followed by depression and stress.

Objective 2: To assess other factors that are associated with depression, anxiety, and stress among the students.

TABLE 8: Frequency of factors associated with depression, anxiety, and stress of participants.

			Frequency	Percent (%)	Total Frequency	Total percent (%)
The balance between the university and social life	Before the pandemic	Yes	262	70.6	371	100.0
		No	109	29.4		
	Since the onset of the pandemic	Yes	219	58.7	373	100.0
		No	154	41.3		
Prevalence of hobbies	Before the pandemic	Yes	237	63.4	374	100.0
		No	137	36.6		
	Since the onset of the pandemic	Yes	264	71.0	372	100.0
		No	108	29.0		
Regular exercise	Before the pandemic	Yes	229	61.1	375	100.0
		No	146	38.9		
	Since the onset of the pandemic	Yes	195	52.3	373	100.0
		No	178	47.7		

70.6%(262) of participants have reported having a good balance between their university and social lives before the pandemic, however, this balance has seen a decline to 58.7%(216) since the onset of the pandemic. 63.4%(237) of participants have reported having some sort of hobby(s) before the

pandemic, this prevalence of hobbies has seen an incline to 71.0%(264) since the onset of the pandemic. 61.1%(229) of participants have reported having exercised regularly before the pandemic, however, since the onset of the pandemic, it has declined to 52.3%(195).

TABLE 9: Stress, Anxiety, and Depression (SAD) prevalence related to balance between university and social life.

Balance between the university and social life		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Before the pandemic	Yes	2.8	20.2	8.9
	No	9.8	11.8	6.1
P-value		0.085	0.102	0.309
Since the onset of the pandemic	Yes	2.0	17.7	8.0
	No	6.8	14.4	6.8
P-value		0.017	0.355	0.054

There is no association observed between stress, anxiety, and depression prevalence with balancing university and social life before the pandemic ($P > 0.05$). Hence, SAD prevalence does not differ with balancing university and social life before the pandemic.

However, since the onset of the pandemic, we have observed a significant stress prevalence in the

balance between university and social life ($P < 0.05$). There is a 2.0% stress prevalence since the onset of the pandemic. No association was observed between anxiety and depression prevalence in the balance between university and social life since the onset of the pandemic ($P > 0.05$). Hence, anxiety and depression prevalence in the balance between university and social life has not differed since the onset of the pandemic.

TABLE 10: Stress, Anxiety, and Depression (SAD) prevalence related to hobbies.

Hobbies		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Before the pandemic	Yes	4.3	26.7	12.0
	No	0.6	5.3	2.9
P-value		0.401	0.533	0.183
Since the onset of the pandemic	Yes	3.4	25.0	10.3
	No	1.4	7.5	4.6
P-value		0.565	0.261	0.679

There is no association observed between stress, anxiety, and depression prevalence with hobbies before the pandemic ($P > 0.05$). There is no association observed between stress, anxiety, and

depression prevalence with hobbies since the onset of the pandemic ($P > 0.05$). Hence, SAD prevalence does not differ with hobbies before and after the onset of the pandemic.

TABLE 11: Stress, Anxiety, and Depression (SAD) prevalence related to regular exercise.

Regular exercise		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Before the pandemic	Yes	2.8	21.3	10.5
	No	2.0	10.8	4.3
P-value		0.119	0.259	0.349
Since the onset of the pandemic	Yes	2.8	16.1	8.2
	No	2.0	16.1	6.5
P-value		0.128	0.644	0.236

There is no association observed between stress, anxiety, and depression prevalence with exercising regularly before the pandemic ($P > 0.05$). There is no association observed between stress, anxiety, and

depression prevalence with exercising regularly since the onset of the pandemic ($P > 0.05$). Hence, SAD prevalence does not differ with exercising regularly before and after the onset of the pandemic.

Objective 3: To assess the students' perception of online learning strategies during the pandemic.

TABLE 12: Frequency of learning strategy preferences and the negative impact of online classes on the learning experience.

		Frequency	Percent (%)	Total Frequency	Total Percent (%)
Negative impact of online classes on learning experience	Yes	236	62.9	375	100.0
	No	139	37.1		
Preference of in-person classes	Yes	290	78.8	368	100.0
	No	78	21.1		
Preference of online classes	Yes	124	36.0	344	100.0
	No	220	64.0		
Preference of blended learning	Yes	221	60.4	366	100.0
	No	145	39.6		

Online classes were reported to have negatively impacted the learning experience of 62.9% of participants (236). In-person classes were preferred by 78.8% of students (290).

Online classes were disliked by 64.0% of students (220). Despite the above contrast, 60.4% of students (220) reported to prefer a combination of both forms of classes.

TABLE 13: Stress, Anxiety, and Depression (SAD) prevalence related to the negative impact of online learning experience and learning strategy preferences.

		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Negative impact of online learning experience	Yes	2.5	22.4	8.8
	No	2.3	9.9	6.0
P-value		0.282	0.114	0.068
Preference of in-person classes	Yes	3.2	25.6	10.7
	No	1.7	7.0	4.0
P-value		0.276	0.568	0.361
Preference of online classes	Yes	2.5	12.3	6.8
	No	2.5	19.9	8.3
P-value		0.609	0.621	0.575
Preference of blended learning	Yes	3.2	21.2	9.0
	No	1.7	11.0	6.1
P-value		0.949	0.215	0.769

There is no association observed between stress anxiety and depression prevalence with online learning experience ($P > 0.05$). Hence, SAD prevalence does not differ from the negative impact of the online learning experience. There is no association observed between stress anxiety and depression prevalence in in-person classes ($P > 0.05$). Hence, SAD prevalence does not differ from in-

person classes. There is no association observed between stress anxiety and depression prevalence with online classes ($P > 0.05$). Hence, SAD prevalence does not differ with online classes. There is no association observed between stress anxiety and depression prevalence with blended classes ($P > 0.05$). Hence, SAD prevalence does not differ with blended classes.

Objective 4: To determine the association between academic performance and depression, anxiety, and stress among students during COVID-19.

TABLE 14: Frequency of productivity; efficient and effective studying; and positive academic performance prevalence among students.

		Frequency	Percent (%)	Total Frequency	Total percent (%)	
Productivity on a daily basis	Before the pandemic	Yes	237	63.4	374	100.0
		No	137	36.6		
	Since the onset of the pandemic	Yes	168	45.5	369	100.0
		No	201	54.5		
Efficient and effective studying	Before the pandemic	Yes	296	79.1	374	100.0
		No	78	20.9		
	Since the onset of the pandemic	Yes	223	59.8	373	100.0
		No	150	40.2		
Positive academic performance prevalence	Before the pandemic	Yes	271	73.0	371	100.0
		No	100	27.0		
	Since the onset of the pandemic	Yes	218	58.4	373	100.0
		No	155	41.6		

63.4% (237) of the participants reported having been productive on a daily basis before the pandemic, however, productivity after the onset of the pandemic has seen a decrease to 45.5% (168). 79.1% (296) of participants have reported having been studying efficiently and effectively before the pandemic, however, both efficiency and effectiveness have seen a decrease to 59.8% (223)

since the onset of the pandemic. 73.0% (271) of participants have reported having a positive academic performance before the pandemic, however, academic performance has had a decline to 58.4% (218) since the onset of the pandemic. The pandemic has seen to have a negative impact throughout all 3 categories.

TABLE 15: Stress, Anxiety, and Depression (SAD) related to productivity.

Productivity		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Before the pandemic	Yes	2.3	19.4	9.7
	No	2.6	12.8	5.1
P-value		0.492	0.415	0.507
Since the onset of the pandemic	Yes	2.6	15.1	7.2
	No	2.3	17.4	7.8
P-value		0.015	0.955	0.489

There is no association observed between stress anxiety and depression prevalence in productivity before the pandemic ($P > 0.05$). Hence, SAD prevalence does not differ in productivity before the pandemic.

However, since the onset of the pandemic, we have observed a significant stress prevalence in productivity ($P < 0.05$). There has been a 2.6% stress prevalence since the onset of the pandemic. No association was observed between anxiety and depression prevalence in productivity since the onset of the pandemic ($P > 0.05$). Hence, anxiety and depression prevalence in productivity has not differed since the onset of the pandemic.

TABLE 16: Stress, Anxiety, and Depression (SAD) prevalence related to efficient and effective studying.

Efficient and effective studying		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Before the pandemic	Yes	3.7	24.4	13.3
	No	1.1	7.8	4.3
P-value		0.078	0.363	0.181
Since the onset of the pandemic	Yes	2.3	17.5	7.1
	No	2.5	15.0	7.7
P-value		0.003	0.303	0.049

There is no association observed between stress anxiety and depression prevalence in effectiveness in studies before the pandemic ($P > 0.05$). Hence, SAD prevalence does not differ in effectiveness in studies before the pandemic. However, since the onset of the pandemic, we have observed a significant stress and depression prevalence in effectiveness in studies ($P < 0.05$).

There is a 2.3% stress prevalence and 7.1% depression prevalence since the onset of the pandemic. No association was observed between anxiety prevalence in effectiveness in studies since the onset of the pandemic ($P > 0.05$). Hence, anxiety prevalence in effectiveness in studies has not differed since the onset of the pandemic.

TABLE 17: Stress, Anxiety, and Depression (SAD) prevalence related to positive academic performance.

Positive academic performance		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Before the pandemic	Yes	3.4	22.6	10.7
	No	1.4	9.5	4.3
P-value		0.610	0.275	0.504
Since the onset of the pandemic	Yes	2.3	18.5	7.7
	No	2.5	13.8	6.8
P-value		0.012	0.954	0.204

Since the onset of the pandemic, there existed a 2.3% prevalence of stress ($P < 0.05$) amongst students who experienced a positive academic performance. There existed a 2.5% prevalence of stress ($P < 0.05$) amongst those who did not experience a positive academic performance. There was no significant

prevalence of SAD associated with positive or non-positive academic performance before the pandemic ($P > 0.05$). There is no significant prevalence of anxiety or depression associated with positive or non-positive academic performance since the onset of the pandemic ($P > 0.05$).

TABLE 18: Frequency of attendance of lectures and difficulty in focusing during lectures.

			Frequency	Percent (%)	Total Frequency	Total percent (%)
Attendance of lectures	Before the pandemic	Yes	296	79.1	374	100.0
		No	78	20.9		
	Since the onset of the pandemic	Yes	215	57.5	374	100.0
		No	159	42.5		
Difficulty in focusing during lectures	Before the pandemic	Yes	126	33.5	376	100.0
		No	250	66.5		
	Since the onset of the pandemic	Yes	254	67.7	375	100.0
		No	121	32.3		

79.1% (296) of participants have reported to have been attending lectures before the pandemic, however since the onset of the pandemic attendance amongst participants has declined to 57.5% (215).

33.5% (126) of participants have reported having some difficulty focusing during lectures before the pandemic, however, since the onset of the pandemic, the difficulty focusing has risen to a staggering 67.7% (254).

TABLE 19: Stress, Anxiety, and Depression (SAD) prevalence related to attendance of lectures.

Attendance of lectures		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Before the pandemic	Yes	3.7	27.5	13.1
	No	0.9	4.4	1.7
P-value		0.932	0.012	0.040
Since the onset of the pandemic	Yes	3.4	18.8	9.1
	No	1.4	13.6	5.7
P-value		0.270	0.399	0.339

From the study, we observe a significant anxiety and depression prevalence while attending lectures before the pandemic ($P < 0.05$). With an anxiety prevalence of 27.5% and a depression prevalence of 13.1%. There is no association observed between stress prevalence while attending before the pandemic ($P > 0.05$). Hence, stress prevalence does not differ while attending the lectures before the pandemic.

However, since the onset of the pandemic, there has been no association observed between stress anxiety and depression prevalence while attending before the pandemic ($P > 0.05$). Hence, SAD prevalence does not differ while attending lectures since the onset of the pandemic.

TABLE 20: Stress, Anxiety, and Depression (SAD) prevalence related to focus during lectures.

Difficulty in focusing during lectures		Stress prevalence (%)	Anxiety prevalence (%)	Depression prevalence (%)
Before the pandemic	Yes	2.8	13.5	6.5
	No	2.0	18.8	8.2
P-value		0.020	0.088	0.007
Since the onset of the pandemic	Yes	4.0	24.6	11.4
	No	0.8	7.7	3.4
P-value		0.016	0.233	0.035

From the study, we observe a significant stress and depression prevalence among those having difficulty focusing during lectures before the pandemic ($P < 0.05$). With a stress prevalence of 2.8% and a depression prevalence of 6.5%. There is no association observed between anxiety prevalence having difficulty in focusing during lectures before the pandemic ($P > 0.05$). Hence, anxiety prevalence does not differ in a student focusing during lectures before the pandemic.

Since the onset of the pandemic, we have observed a significant stress and depression prevalence in effectiveness in studies ($P < 0.05$). There is a 4.0% stress prevalence and 11.4% depression prevalence since the onset of the pandemic. No association was observed between anxiety prevalence in students' focus during lectures since the onset of the pandemic ($P > 0.05$). Hence, anxiety prevalence in students' focus has not differed since the onset of the pandemic.

Frequency vs. Age

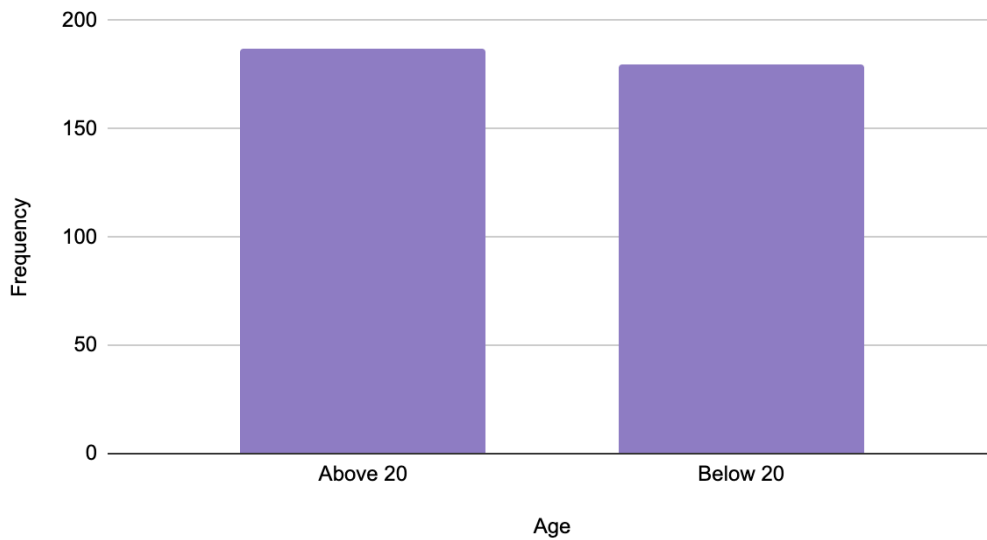


FIGURE 1: Frequency distribution of age.

Frequency vs. Gender

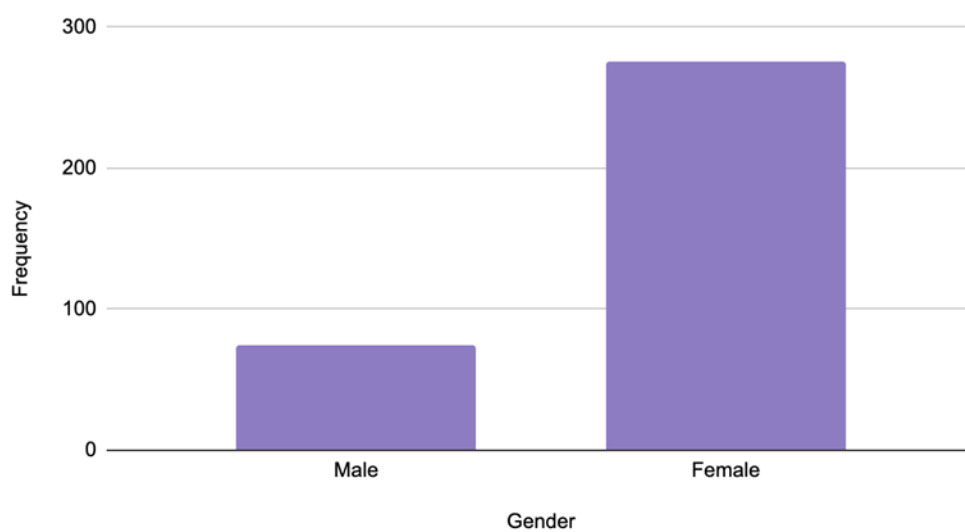


FIGURE 2: Frequency distribution of gender.

Frequency vs. Program

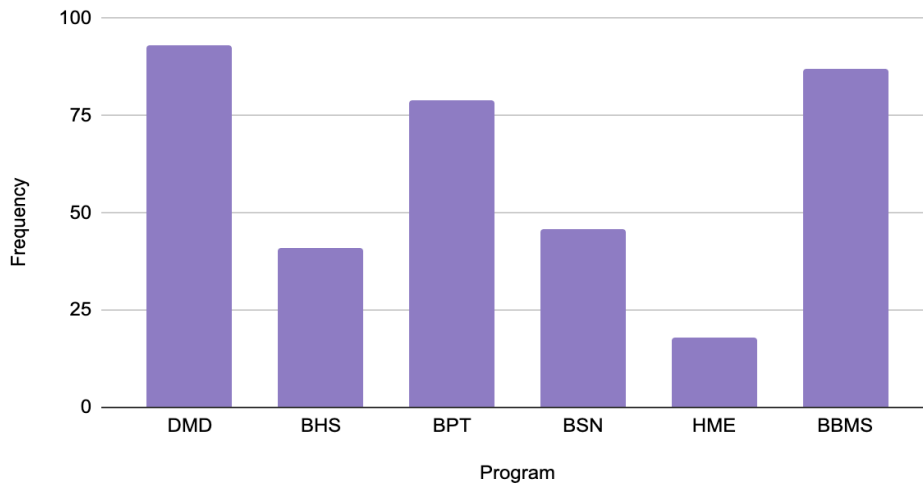


FIGURE 3: Frequency distribution of the program.

Frequency vs. Year of study

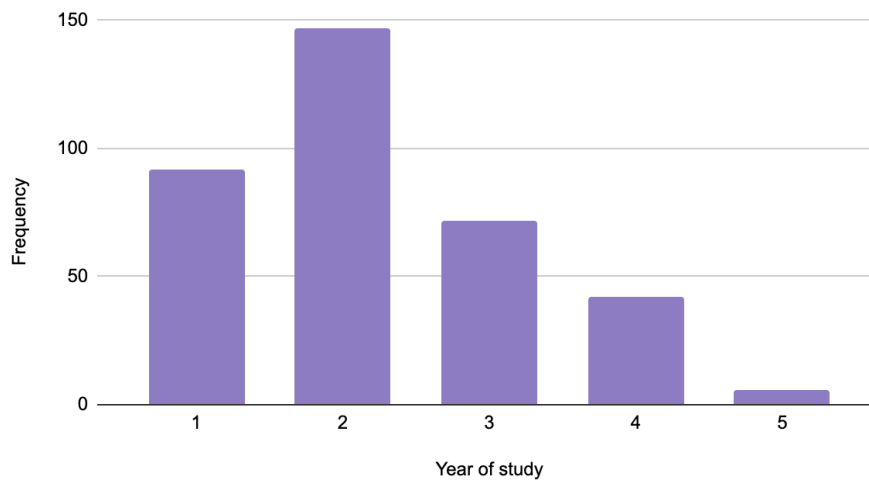


FIGURE 4: Frequency distribution of year of study.

Frequency vs. Living situation

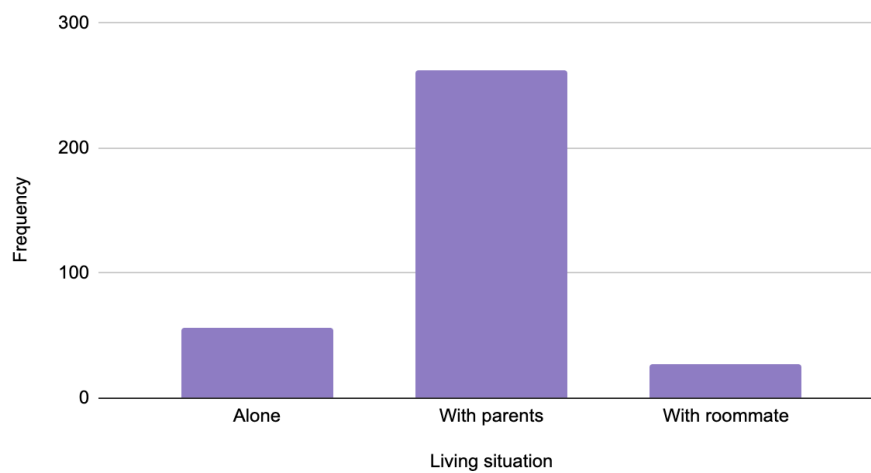


FIGURE 5: Frequency distribution of living situation.

Stress

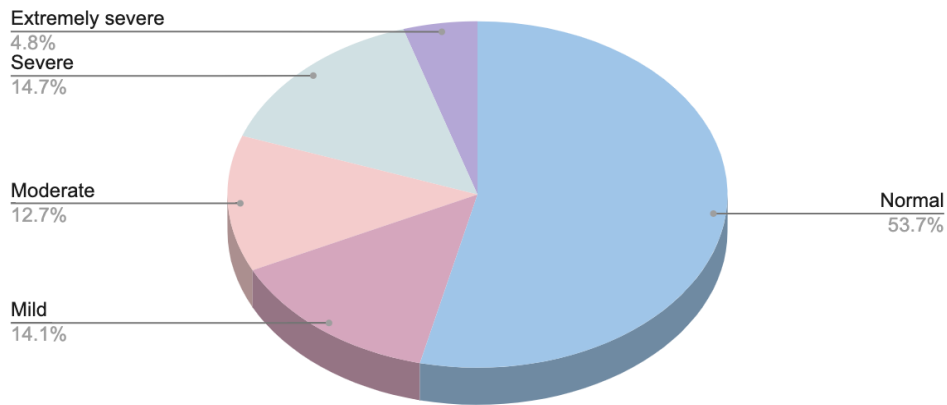


FIGURE 6: Prevalence of stress.

Anxiety

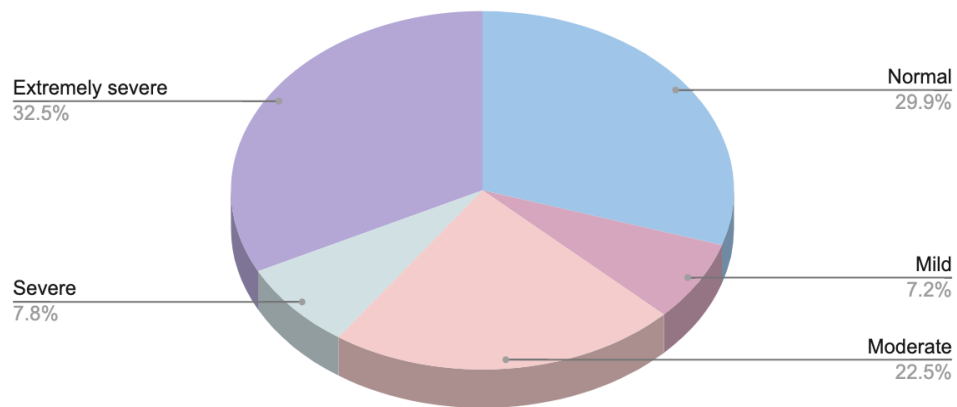


FIGURE 7: Prevalence of anxiety.

Depression

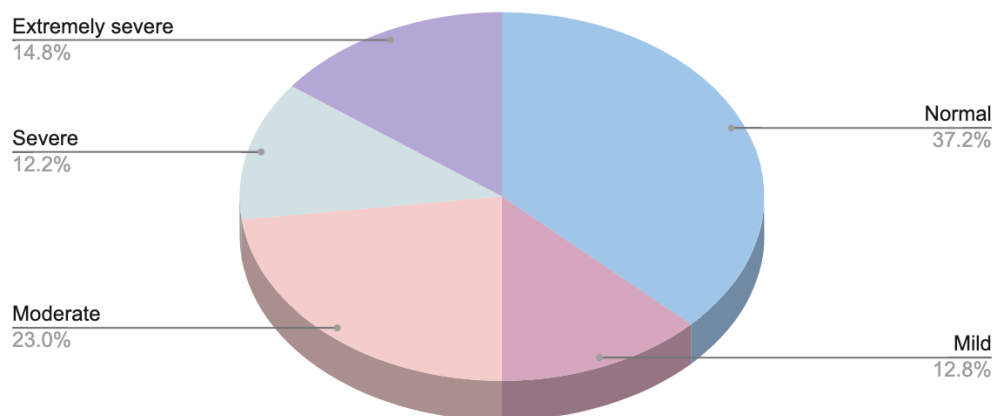


FIGURE 8: Prevalence of depression.

4 DISCUSSION AND LIMITATIONS

University students experience various levels of depression, anxiety, and stress throughout their university careers. Since the beginning of the pandemic, there has been an increase in the prevalence of these mental health issues. Our study assessed the prevalence of depression, anxiety, and stress among university students before the pandemic and since the onset of the pandemic. The data suggests that the prevalence of these mental health disorders increased, which is consistent with the results of previous studies. In addition to this, other factors associated with depression, anxiety, and stress (balance between university life and social life, hobbies, and regular exercise) were also assessed. Lastly, the effect of the pandemic on academic performance was assessed. Students had a notable decrease in their balance between university life and social life. Students also found that their academic performance changed significantly. While some students did report having a better academic performance since the onset of the pandemic, most students reported that they were not meeting their personal academic goals and hence, their performance decreased. The focus of this study is to identify significant changes in the mental health of university students, as well as the impact that the pandemic has had on students and their mental health.

The sociodemographic factors that were focused on in this study are age, gender, program of study, year of study, and living situation. 367 individuals took part in the study, of which most were female (78.6%). Extremely severe anxiety was found to be more prevalent in the female population. Additionally, stress and depression were found to be higher in the female population, although this was not a significant difference ($P > 0.05$). The results of our study are consistent with previous studies, which suggest that female university students are more likely to experience stress, depression, and anxiety in general. Since the onset of the pandemic, the levels of these mental health disorders have only increased, possibly due to the additional caring and household responsibilities that tend to fall on women (especially during lockdown and distance learning)^{59,60}.

Participants above the age of 20 were found to have a higher significant prevalence of extremely severe depression than the participants below the age of 20. Once again, this is possibly due to the added responsibilities that older participants faced during lockdown, for example, having to look after family members and younger siblings. One surprising association was found in the year of study. The highest prevalence of depression, anxiety, and stress was found in participants in their third year of study, while the lowest was found in participants in their fifth year of study. This was an unexpected finding because one would expect that as student progresses in their level of study, the prevalence of mental health disorders would increase⁶⁰. However, the results from our study could be due to the workload that students tend to face during their

third year as well as the added pressure of their third year being the most important year before clinical practice. Lastly, it is interesting to note that there was no significant difference in the prevalence of depression, anxiety, and stress across the different sampled programmes. Similarly, there was no significant difference between the different living situations.

In order to assess the prevalence of depression, anxiety, and stress among university students, we made use of the DASS questionnaire. The questionnaire assessed depression, anxiety, and stress at 5 levels (normal, mild, moderate, severe, and extremely severe). Our study showed that anxiety was the most prevalent (254 out of 367 participants experienced some level of anxiety). Extremely severe anxiety was reported in 32.3% of participants; extremely severe depression was reported in 14.8% of participants; and extremely severe stress was reported in 4.8% of participants. These results are consistent with previous studies that have set out to assess the mental health of university students during the pandemic. Similar to the results from our study, the previous studies identify high levels of anxiety and depression in undergraduate students. These high levels of depression and anxiety are most likely due to a combination of stressors that are pandemic-related, especially the limited access that students had to positive coping mechanisms such as socializing and a normal university experience due to countrywide lockdowns and social distancing⁶¹.

Our study went on further to assess other factors that are associated with depression, anxiety, and stress. Participants were questioned about the balance between their university and social lives; the prevalence of hobbies; and regular exercise before and during the pandemic. The results show that participants had a better balance between their university and social lives before the pandemic-70.6% of participants reported having a good balance, while this number decreased to 58.7% since the onset of the pandemic. This result can be attributed to several factors such as a lack of time management due to the sudden change to distance learning; a change in sleeping patterns; and changes to concentration levels. It is important to note that since the onset of the pandemic, students who reported not having a balance between their university and social lives, also had a significant stress prevalence ($P < 0.05$). A study done on the impact of COVID-19 on student wellbeing reported that students had felt a lower level of self-efficacy, socialization, and sense of belonging to the university, which ultimately had a negative impact on the balance between university and social life⁶². This shows that our results are consistent with previous studies. When assessing the prevalence of hobbies and regular exercise, we found that there was an increase in the prevalence of hobbies (from 63.4% before the pandemic to 71% since the pandemic), and a decrease in regular exercise (from 61.1% before the pandemic to 52.3% since the pandemic).

The increase in hobbies was expected and could be due to the greater amount of leisure time that students had due to distance learning. The decrease in regular exercise can be attributed to the effects of lockdown (no outdoor exercise/activities and closed gyms). Additionally, many students found themselves feeling unmotivated, which could also cause lower levels of regular exercise. Once again, our results are consistent with a previous study that reported higher levels of depression, anxiety, and stress among students who lacked outdoor breaks and activities due to lockdown⁶³.

Our next aim was to assess the perception that students had about online learning strategies. The data indicated that 62.9% of participants reported that online learning had a negative impact on their learning experience, and 78.8% of participants reported that they preferred in-person classes. Interestingly, 60.4% of participants reported that they preferred blended learning (a mix of both in-person and online classes), while this result is not higher than the preference for in-person classes, it is a significantly high number. These results are consistent with other studies, which indicated that students, in general, have preferred in-person classes due to the direct face-to-face engagement and lack of distractions around them. Additionally, this preference can be associated with the lack of social engagement and interaction that students have experienced during the pandemic, resulting in students wanting to get back to traditional or blended learning to reclaim their educational and social relations.

Our final objective was to determine the association between academic performance and depression, anxiety, and stress during the pandemic. The reported data indicated a drop in productivity since the onset of the pandemic; along with declines in efficient and effective studying as well as a decrease in positive academic performance. There was no observed correlation between stress, anxiety, and depression and productivity before the pandemic ($P > 0.05$) - productivity was independent of stress, anxiety, and depression. Since the onset of the pandemic, stress was shown to correlate with productivity at a prevalence rate of 2.6% ($P < 0.05$) and no productivity at a prevalence rate of 2.3% ($P < 0.05$) - those who were productive were subject to higher rates of stress than those who were not productive. This suggests that individuals who experienced higher rates of stress were more productive.

Since the onset of the pandemic, no correlation between anxiety depression, and productivity was observed. There was no observed correlation between stress, anxiety, and depression and efficient and effective studying before the pandemic ($P > 0.05$) - efficient and effective studying was independent of stress, anxiety, and depression. Since the onset of the pandemic, stress and depression have been shown to correlate with efficient and effective studying at prevalence rates of 2.6% ($P < 0.05$) and 7.2% ($P < 0.05$), respectively. Stress and

depression also correlated with the inability to study efficiently and effectively, at prevalence rates of 2.3% ($P < 0.05$) and 7.8% ($P < 0.05$) respectively. These values indicate that those who are able to study well, are subject to higher rates of stress and lower rates of depression; while those who are unable to do so are subject to lower rates of stress and higher rates of depression.

There was no observed correlation between stress, anxiety, and depression and positive or non-positive academic performance before the pandemic ($P > 0.05$). Since the onset of the pandemic, stress prevalence rates showed a correlation for positive (2.3%) and non-positive (2.5%) academic performance; anxiety and depression showed no correlation ($P > 0.05$). This indicates that, since the onset of the pandemic, those with a non-positive academic performance are subject to higher levels of stress than those with a positive performance.

Stress is a powerful motivator, and tends to prepare an individual for some kind of event whereby they need to be ready for action. This is suggestive that increased stress rates prompt an individual for action, whereby productivity, efficient and effective studying, and academic performance are at a greater likelihood of being improved since individuals are more mentally and physiologically primed to act on tasks. In contrast, some students experienced no benefit from stress, such that their academic performance was not improved or was observed to be non-positive - this could be argued over two reasons. The first, and more obvious reason, is that the stress prevalence may be a result of a non-positive performance; and the second, is that stress may have driven students away from their academic duties, which resulted in a non-positive performance.

Depressive moods and feelings tend to maintain or promote feelings of unenthusiasm, disregard, and lethargy. The above provides reasoning as to why it was observed that efficient and effective studying was associated with lower rates of depression and its converse, was associated with higher rates of depression.

The above reiterates the results of numerous studies, but in particular, that of the University of Alexandria. Similar results have developed here, and as such, we suggest the same - the compounding effects of the pandemic; and increased pressure and duties brought on by online learning; as well as degree completion and fear of failure, have resulted in increased prevalence of stress, anxiety, and depression amongst university students⁶⁴.

Limitations

- The study was limited to Medical University in Ajman, therefore the results cannot be generalized.
- Recall bias- participants may have had difficulty recalling past feelings prior to the pandemic.
- Response participants could have responded incorrectly and falsely to the survey questions.

5 CONCLUSION & RECOMMENDATIONS

Conclusion

4.8% of participants experienced extremely severe stress. 32.3% of participants experienced extremely severe anxiety. 14.8% of participants experienced extremely severe depression. Extremely severe depression was prevalent at 5.2% for those below the age of 20; and at 8.7% for those above the age of 20 ($P < 0.05$). Extremely severe anxiety was prevalent at 5.3% for males, and at 27.0% for females ($P < 0.05$). Extremely severe depression was prevalent at 3% for the first year of study, whereas the second year was 3.9%, third year- 4.8%, fourth year- 2.7%, fifth year- 0.6% ($P < 0.05$).

Since the onset of the pandemic, there has been a significant stress prevalence (2.0%) in a balance between university and social life ($P < 0.05$). There was no association observed between stress, anxiety, and depression prevalence with hobbies before the pandemic and since the onset of the pandemic ($P > 0.05$). There was no association observed between stress, anxiety, and depression prevalence with regular exercise before the pandemic and since the onset of the pandemic ($P > 0.05$). There was no association observed between stress, anxiety, and depression prevalence with online learning strategies ($P > 0.05$). Since the onset of the pandemic, there has been a significant stress prevalence (2.6%) in productivity ($P < 0.05$).

No association was observed between anxiety and depression prevalence in productivity since the onset of the pandemic ($P > 0.05$). Since the onset of the pandemic, there has been a significant stress (2.3%) and depression (7.1%) prevalence in effectiveness in studies ($P < 0.05$). Since the onset of the pandemic, there existed a 2.3% prevalence of stress ($P < 0.05$) amongst students who experienced a positive academic performance. There existed a 2.5% prevalence of stress ($P < 0.05$) amongst those who did not experience a positive academic performance. There was no significant prevalence of anxiety or depression associated with positive or non-positive academic performance since the onset of the pandemic ($P > 0.05$).

Recommendations

- Students should seek counseling or therapy if required
- Increase mental health awareness
- Develop strategies to combat SAD as per the individual
- Develop self-awareness
- Improve student-to-student communication
- Improve student-to-faculty communication

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