

Is it Just About Physical Health? An Internet-Based Cross-Sectional Study Exploring the Psychological Impacts of COVID-19 Pandemic on University Students in Jordan Using Kessler Psychological Distress Scale

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ABSTRACT

Background Since the spread of COVID-19 on a global scale, most of efforts at the local, national, and international levels were directed primarily to mitigate the spread of the disease. However, the psychological impacts of COVID-19 on global mental health were not thoroughly investigated yet, and studies that report the mental health risks of COVID-19 are still scarce.

Objectives This study aimed to assess the level of psychological distress among university students in Jordan during the COVID-19 pandemic and the associated national measures.

Methods A cross-sectional study was conducted using an online self-administered questionnaire. The survey comprised of questions about (i) sociodemographic information, (ii) the 10-item Kessler Psychological Distress Scale (K10), (iii) coping activities, and (iv) the students' most serious concern during the COVID-19 pandemic.

Results A total of 381 completed questionnaires were included in the analysis. Female participants slightly predominated the sample ($n=199$, 52.2%). The respondents aged 18-38 years (mean 22.6 years, SD: 3.16). The total K10 distress scores had a mean of 34.2 (SD:9.4). However, the mean of total K10 distress scores had no significant association with gender ($P=0.57$). Age was negatively associated with total K10 distress scores ($P=0.0013$). Concerning severity, most of the respondents were regarded as having severe psychological distress ($n=265$, 69.5%), and females were found to have a statistically significant higher percentage in mild and severe psychological distress ($P=0.035$), ($P=0.016$); respectively. 209 students (54.9%) reported that they had *no motivation* for distance learning. There was a statistically significant inverse relationship between severe psychological distress and motivation for distance learning ($P<0.0001$). The most common coping strategy among students was *Spending more time on social media* ($n=269$, 70.6%). Besides, 49 students (12.9%) reported the use of medications to cope with COVID-10 related distress, and 209 students (54.9%) reported *distance learning* was their most serious concern.

Conclusion The COVID-19 control measures resulted in a severe disruption of various human life activities, and this could impact the mental health of individuals, including students. A nationwide psychological support program should be incorporated into Jordan's response strategy in combating the COVID-19, considering students and other vulnerable groups in Jordan.

Keywords: COVID-19, Jordan, University, Students, Psychological, Pandemic, Impacts, Kessler.

1.INTRODUCTION

COVID-19 is a highly transmissible respiratory disease caused by a new type of human coronaviruses; SARS-CoV-2 (1). Since its discovery in late December 2019, the disease has spread widely across many countries and territories on a global scale. As of May 12, 2020, 2:00 CEST, 4 098 018 confirmed cases, and 283 271 confirmed deaths in around 215 countries and territories were attributed to COVID-19 (2).

Epidemics and outbreaks can pose profound impacts on physical health, mental health as well as the global economy resulting in disruptions of humans' daily life (3). The containment measures that were adopted by many countries worldwide in combating the COVID-19 such as quarantine, countries' lockdown, physical distancing, social isolation as well as restrictions on individuals' mobility can lead to a significant burden on mental health causing emotional and behavioral changes (4–8).

In addition, the psychological impacts of outbreaks are considered a threat not only on individuals with pre-existing psychiatric illness but also on those who are free of any psychiatric condition (9). The fear of an epidemic can afflict individuals irrespective of their gender, age, race, or socioeconomic status. Anxiety, insomnia, anger, loneliness, fear, helplessness, blame, guilt, shame, and stigma were all found to be present during infectious diseases' outbreaks (9,10). Different psychiatric conditions like depression, panic attacks, Post Traumatic Stress Disorder (PTSD), and suicidality were also reported to be associated with outbreaks, especially in younger age groups (9).

In epidemics, certain societal components such as older people, children, health care workers, infected patients, and students are at a greater risk of suffering from a high degree of psychological pressure and stress compared to other individuals (9). It is nontrivial to gather high-quality information regarding the effects of the COVID-19 pandemic on the mental health of the general population and specific groups, which will help in finding interventions that would mitigate such pandemic adverse effects (8). Since the beginning of the COVID-19 pandemic, most of the global efforts act on the biological and physical aspects of the pandemic in order to limit its spread within communities. However, much less attention is paid to the mental health risks of COVID-19.

2. STUDY OBJECTIVE

One of Jordan's public health response strategies to retard the spread of COVID-19 in the country was declaring the closure of all academic institutions and shifting to remote teaching activities since the middle of March 2020 until further notice (1,11–13). The COVID-19 pandemic with implementing the new distance learning strategy has put the students in a new academic experience with unknown impacts. In response to that, this study aimed to assess the level of psychological distress among university students in Jordan during the COVID-19 pandemic and the associated strict national preventive measures, especially the distance learning strategy.

3. MATERIALS AND METHODS

3.1 *Study design and participants*

A cross-sectional study was conducted in May 2020, using an Internet-based self-administered questionnaire of closed-ended questions. The participants in our study were recruited through social media (Facebook and WhatsApp). The questionnaire was distributed across seven randomly chosen Facebook groups of university students in Jordan and academic groups on WhatsApp messenger for a one-day period. These social media groups were created by students as a tool for general and academic communication within the students' community and involved students who are currently enrolled in different study programs and levels at various academic institutions in Jordan. The students who were available and willing to be involved in the study could open a link to get an information letter about the study, eligibility criteria, and informed consent as a pre-request to proceed in participation. The authors decided to carry out this study using an internet-based survey due to the current national strict measures on the face to face communication coupled with the closure of all academic institutions in Jordan as per the national response strategy to mitigate the COVID-19 spread, and in response to that, all educational activities have been shifted to online learning platforms since March 15, 2020 (1). In addition, using the internet and social media for recruitment and sampling procedures in this study has shown to be an effective and time-efficient method to reach inaccessible potential participants from different Jordanian regions by eliminating the geographical boundaries. A recent systematic review of 109 published articles that aimed at evaluating the use of social media such as Facebook for recruitment of research

participants in various psychological and medical studies came into evidence, which supported the effectiveness and efficiency of this strategy (14).

For a student to be able to participate in this study all the following eligibility criteria were implemented:

- 1- Age \geq 18 years
- 2- Residing in Jordan
- 3- Active enrollment in an undergraduate or postgraduate study at a Jordanian University.

3.2 Instruments and Measures

The online questionnaire was created using the technology of *Google Forms* provided by Google™ and was constructed in the Arabic language. The questionnaire consisted of three sections, with a total of 24 questions. The first section comprised of seven questions about sociodemographic information including age, gender, the region of residence, study level, type of academic institution, marital status, and smoking status along with two questions about the history of pre-existing psychiatric conditions and related medication use. The second section included an Arabic version of the 10-item Kessler Psychological Distress Scale (K10). This Arabic version was translated from the original English version by a team of linguistic experts from multiple Arab countries (Egypt, Libya, Lebanon, and Tunisia) in addition to Arab experts in Psychology in the United States. The Arabic version is provided by Harvard Medical School on the webpage of the National Comorbidity Survey (15).

The 10-item Kessler Psychological Distress Scale (K10) is an internationally validated tool for simple and rapid assessment of non-specific psychological distress in which 10 questions with 5-point Likert scale responses are present (16–19). On a sample of Arabs, the Arabic version of the 10-item Kessler Psychological Distress Scale (K10) has shown strong psychometric properties with high internal consistency and reliability (Cronbach's $\alpha = 0.88$) (19).

The questions of the 10-item Kessler Psychological Distress Scale (K10) are:

Q1. ‘During the last 30 days, about how often did you feel tired out for no good reason?’

Q2. ‘During the last 30 days, about how often did you feel nervous?’

Q3. ‘During the last 30 days, about how often did you feel so nervous that nothing could calm you down?’

Q4. ‘During the last 30 days, about how often did you feel hopeless?’

Q5. ‘During the last 30 days, about how often did you feel restless or fidgety?’

Q6. ‘During the last 30 days, about how often did you feel so restless you could not sit still?’

Q7. ‘During the last 30 days, about how often did you feel depressed?’

Q8. ‘During the last 30 days, about how often did you feel that everything was an effort?’

Q9. ‘During the last 30 days, about how often did you feel so sad that nothing could cheer you up?’

Q10. ‘During the last 30 days, about how often did you feel worthless?’

The response choices with their correspondence score weights are *None of the time* (1 point), *A little of the time* (2 points), *Some of the time* (3 points), *Most of the time* (4 points), and *All the of time* (5 points). With having 10 questions and five weighted responses as previously described, the total minimum and maximum scores for the Kessler distress scale (K10) are 10 and 50, respectively. As per the scale’s guide, **Q3** and **Q6** were not asked in our study and were automatically scored as one point if the preceding questions **Q2** and **Q5** were answered as *None of the time*. The severity of psychological distress is categorized as the following based on the total K10 distress score for each participant: 10-19 = no psychological distress, 20-24 = mild psychological distress, 25-29 = moderate psychological distress, and 30-50 = severe psychological distress (16).

The third section included five questions about the following topics: *coping activities during COVID-19 pandemic and the nationwide curfew in Jordan, the use of medications to cope with COVID-19 related distress, the students’ motivation for online distance learning, and lastly, the issue with the greatest concern during COVID-19 pandemic as perceived by the students.*

The questionnaire was piloted on 10 students who were approached by the first author to test phrasing, suitability, and understandability of the questions. The responses from these 10 students as well as incomplete questionnaires, were excluded from the analysis.

3.3 Data Management and Analysis

Completed questionnaires were extracted from Google Forms as an Excel sheet and were then incorporated into Statistical Package for Social Sciences (SPSS) version 23.0 (SPSS Inc., Chicago, IL, USA) for the analysis. Descriptive analysis and summary statistics were used in which numerical variables were described as mean and standard deviation, while categorical variables were described as a percentage. In addition, non-parametric tests were used and included the Wilcoxon Rank-Sum test to compare the mean of total K10 distress score between males and females while Spearman's rank correlation to test the relationship between age and total K10 distress scores. Besides, multinomial logistic regression was employed to test the association between psychological distress severity and both , motivation for distance learning and gender. A P -value < 0.05 was considered statistically significant.

3.4 Ethical considerations

The study was conducted according to the *Declaration of Helsinki*. Ethical approval was granted by the Institutional Review Board at Al-Zaytoonah University of Jordan. Besides, the questionnaire ensured the privacy and confidentiality of participants by not asking any questions about names, phone numbers, physical addresses, or emails; thus, all participants were anonymous. Also, an information letter was incorporated into the first page of the questionnaire and included explicit information about the researchers and their affiliations, the study description and objectives, eligibility criteria for participation, benefits and risks, privacy and confidentiality aspects, data handling, as well as the contact details for any inquiry. Furthermore, at the end of the information letter, electronic informed consent was sought from participants as a pre-request before being able to join the survey.

4 RESULTS

4.1 Respondents' characteristics

A total of 397 questionnaires were received, and 16 were excluded due to incompleteness. So, the remaining 381 were included in the analysis. There was a slight predomination of female participants (n=199, 52.2%) compared to male participants (n=182, 47.8%). The mean age was 22.6 years (SD=3.16) and ranged between 18-38 years. The vast majority of participants were single (n=347, 91.1%), undergraduates (n=323, 84.8%), studying at governmental universities or colleges (n=209, 54.9%), living in the central region of Jordan (n=302, 79.3%), currently non-smokers (n=267, 70.1%) as well as with no history of pre-existing psychological or mental illness (n=366, 96.1%). More details about the sociodemographic characteristics of respondents are provided in **Table 1**.

Table 1. Sociodemographic characteristics of Respondents

Variables	Results
Number of respondents	n = 381
Sex	
Male	n=182 (47.8%)
Female	n=199 (52.2%)
Age (Mean, SD)	22.6 , 3.16
18-22	n= 208 (54.59%)
23-27	n=142 (37.27%)
28-32	n=22 (5.77%)
33-38	n=9 (2.36%)
Marital Status	
Single	n=347 (91.1%)
Married	n=29 (7.6%)
Divorced/Separated/Widowed	n= 5 (1.3%)
Region	
Northern governorates	n=60 (15.7%)
Central governorates	n=302 (79.3%)
Southern governorates	n=19 (5.0%)
Smoking Status	
Combustible Tobacco (cigarettes, Argeleh)	n=103 (27.0%)
Electronic cigarette only	n=5 (1.3%)
Combustible tobacco and electronic cigarette (dual user)	n=6 (1.6%)
Currently non-smoker	n=267 (70.1%)
Academic Institution	
Governmental university/college	n=209 (54.9%)
Private university/college	n= 172 (45.1%)
Study Level	
Undergraduate	n=323 (84.8%)
Postgraduate	n=58 (15.2%)
History of pre-existing psychiatric conditions	
Yes	n=15 (3.9%)
No	n=366 (96.1%)
Current use of medications among the 15 students who reported a history of pre-existing psychiatric conditions	
Yes	n=8
No	n=7

4.2 Kessler Psychological Distress Scale (K10) results

The total K10 distress scores had a mean of 34.2 (SD=9.4). The mean K10 distress score was slightly higher among females (mean=34.7, SD=8.56) compared to males (mean=33.7, SD=10.3); however, the Wilcoxon Rank-Sum test showed that this difference is statistically insignificant ($P=0.57$). Concerning age, Spearman's rank correlation test revealed that there is a statistically significant inverse relationship between age and total K10 distress score ($Rho= -0.1645$, $P=0.0013$), which indicates that younger age groups are likely to have higher total K10 distress scores.

Figure 1

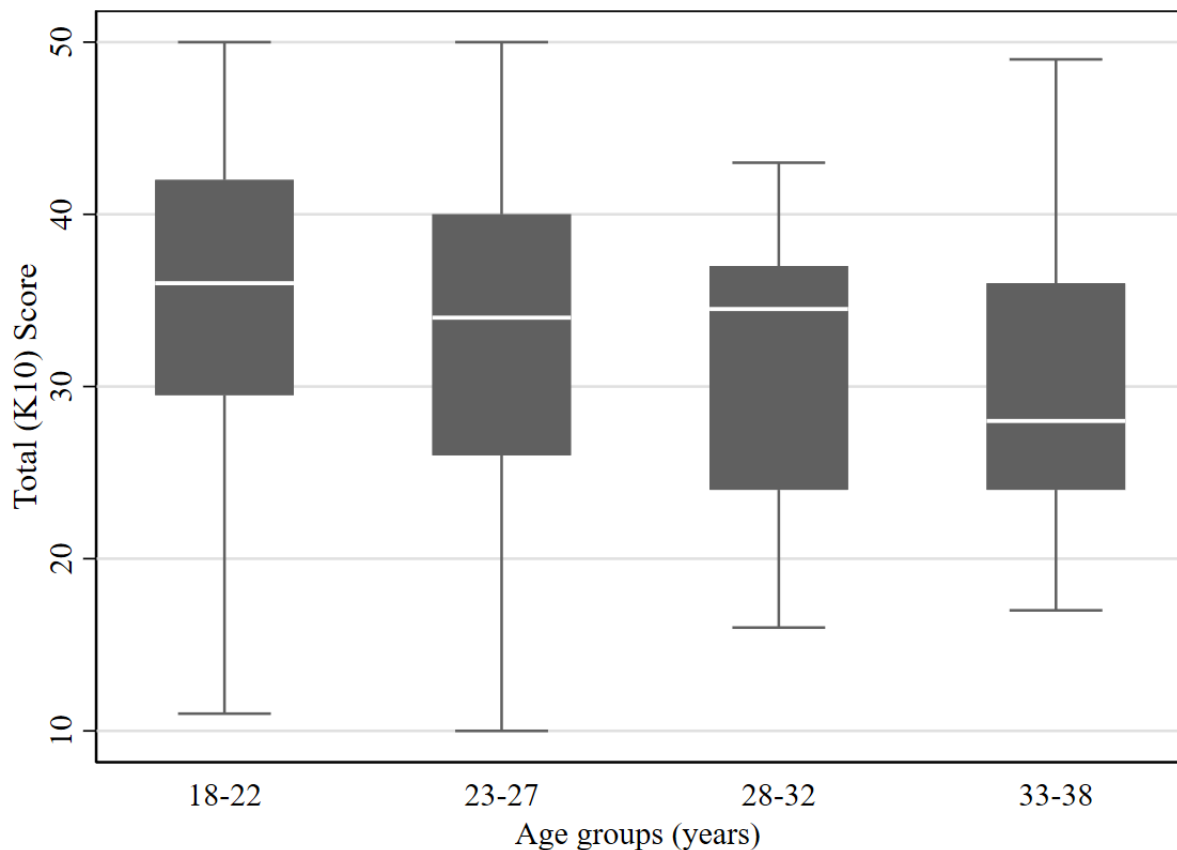


Figure 1. The levels of total K10 distress scores among different age groups of the respondents.

Among the five response choices on the K10 distress questions, the choice with the highest percentage of responses in **Q1-Q7** and **Q9** was *Most of the time*, which scores four points in the K10 distress scale, while *Some of the time* which scores three points, received the highest percentage in **Q8**. *None of the time*, which scores one point received the highest percentage of responses in **Q10**. More details about the response percentages for each question and answer are demonstrated in **Table 2**.

Table 2. The percentages of responses for each answer among the questions included in the K10 Distress Scale.

Question	None of the time (1 point)	A little if the time (2 points)	Some of the time (3 points)	Most of the time (4 points)	All of the time (5 points)
Q1	3.9	7.9	28.1	37.8	22.3
Q2	2.9	7.1	22.3	36.5	31.2
Q3	13.3	22.1	24.5	26.3	13.8
Q4	11.8	12.1	23.6	29.1	23.4
Q5	2.6	5.5	20.7	39.9	31.2
Q6	9.8	16.7	24.7	30.0	18.8
Q7	7.6	8.9	28.3	31.8	23.4
Q8	20.7	16.3	26.0	24.7	12.3
Q9	4.7	9.4	24.4	33.6	27.8
Q10	23.9	15.2	23.4	21.3	16.3

Regarding psychological distress severity categorization, most of respondents were regarded as having severe psychological distress (n=265, 69.5%), followed by moderate psychological distress (n=48, 12.6%), mild psychological distress (n=41, 10.8%), and no psychological distress (n=27, 7.1%). **Tables 3** and **4** show the results of the K10 psychological distress scale by severity and gender, respectively.

Table 3. The K10 scale's categorization by severity level among respondents.

K10 Psychological Distress Category	Total K10 Score range	Frequency (n)	Percentage (%)
No Distress	10-19	27	7.1
Mild Distress	20-24	41	10.8
Moderate Distress	25-29	48	12.6
Severe Distress	30-50	265	69.5
Total		381	100

Table 4. The K10 scale's categorization by severity level and gender.

K10 Psychological Distress Category	Male		Female	
	N	%	N	%
No Distress	19	10.4	8	4.0
Mild Distress	18	9.9	23	11.55
Moderate Distress	25	13.7	23	11.55
Severe Distress	120	65.9	145	72.9
	182	100	199	100

By running the multinomial logistic regression, with a reference category (*No distress*), females had a statistically significant higher percentage in mild and high psychological distress (OR=0.33, P= 0.035, 95% CI : 0.12-0.92) , (OR= 0.35 , P=0.016, 95% CI: 0.15-0.82); respectively. On the contrary, no statistically significant difference was found in the moderate distress category between males and females (OR= 0.46, P=0.13, 95% CI: 0.17-1.24). The detailed results are shown in **Table 5**

4.3 Motivation for Distance Learning

The students were asked about the degree of their motivation for the current strategy of online distance learning using a single-answer item. The response choices were four and included: *no motivation at all*, *low motivation*, *moderate motivation*, *high or strong motivation*. Surprisingly, a significant proportion of students responded with *no motivation at all* (n=209, 54.9%), of which 163 students were also categorized within the Severe psychological distress category. The multinomial logistic regression revealed that there was a statistically significant inverse relationship between severe psychological distress and motivation for distance learning (OR=0.45, P<0.0001, 95% CI: 0.28-0.7). Hence, students with lower motivation were likely to have higher psychological distress levels. See **Tables 5, 6, 7, and figure 2** for more details.

Table 5. The degree of motivation for online distance learning among respondents.

Degree of Motivation	Frequency (N)	Percentage (%)
No Motivation	209	54.9
Low Motivation	98	25.7
Moderate Motivation	69	18.1
Strong Motivation	5	1.3
Total	381	100

Table 6. The degree of motivation for online distance learning among respondents categorized by the level of psychological distress.

	K10 Psychological Distress Category				Total N (%)
	No Distress	Low Distress	Moderate Distress	High Distress	
No Motivation	9	14	23	163	209 (54.9)
Low Motivation	10	14	11	63	98 (25.7)
Moderate Motivation	4	13	13	39	69 (18.1)
Strong Motivation	4	0	1	0	5 (1.3)
Total	27	41	48	265	381 (100)

Table 7. Results of Multinomial Logistic Regression for the association of psychological distress severity with gender and motivation for distance learning (* Reference Category)

Variables		OR	P-value	95% CI
Gender	No Distress*	-----	-----	-----
	Mild Distress	0.33	0.035	0.12-0.92
	Moderate Distress	0.46	0.126	0.17-1.24
	Severe Distress	0.35	0.016	0.15-0.82
Motivation for Distance Learning	No Distress*	-----	-----	-----
	Mild Distress	0.85	0.544	0.49-1.45
	Moderate Distress	0.70	0.195	0.41-1.19
	Severe Distress	0.45	<0.0001	0.28-0.70

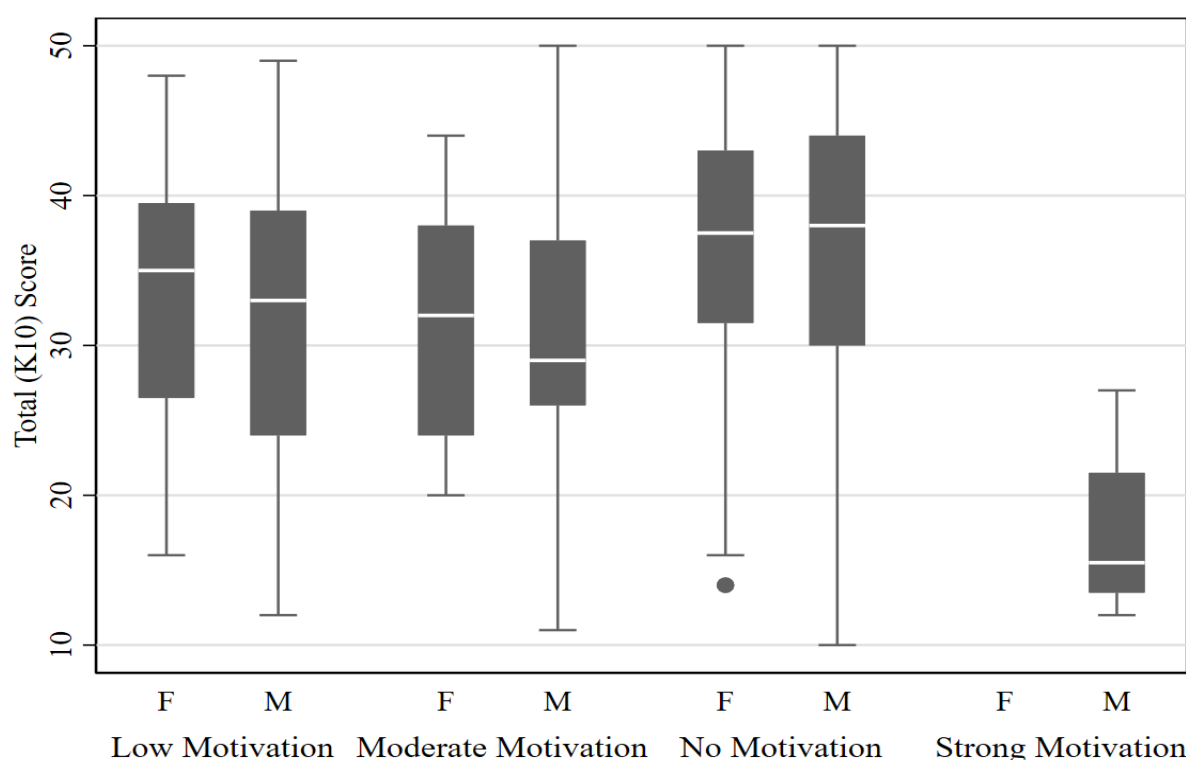


Figure 2. The levels of total K10 distress scores for each category of *motivation for distance learning* among different genders (F: Females, M: Males). Students with strong motivation for distance learning had lower total K10 distress scores compared to other students.

4.4 Coping Activities and Concerns during the COVID-19 Pandemic

This topic included four questions; one question about the most common activities that students performed in order to cope with the nationwide curfew in Jordan during COVID-19 pandemic, Two questions about the use of medications to assist self-coping strategies, and one question about the single most serious concern during COVID-19 pandemic as perceived by the students. The question about coping activities was a checklist with 14 possible choices, and the students could check all that applies to their situation. Interestingly, the responses with highest percentages were *spending more time on social networking platforms like Facebook and Instagram* (n=269, 70.6%), *talking to friends on mobile phones and internet* (n=217, 57%), *watching television and movies* (n=210, 55.1%), *more engagement with the family* (n=202, 53%), and *listening to music* (n=162, 42.5%). More details are provided in **Table 8**.

Table 8. Coping activities during the COVID-19 pandemic and the nationwide curfew in Jordan among the respondents.

Coping Activity	Frequency (n)	Percentage (%)
Spending more time on social networking platforms like Facebook and Instagram	269	70.6
Talking to friends on mobile phones and internet	217	57
Watching television and movies	210	55.1
More engagement with the family	202	53
Listening to music	162	42.5
Practicing sports at home	113	29.7
Studying and preparing for exams	102	26.8
Increase smoking	69	18.1
Reading Books / Novels	68	17.8
Meditation	58	15.2
Herbal drinks	57	15
Practicing Yoga	6	1.6
Talking to a psychological counsellor	6	1.6
Others	33	8.7

In addition, among the 381 respondents, 332 students (87.1%) reported no use of any medications during the last 30 days for coping with the distress accompanied COVID-19 pandemic and the nationwide curfew, while 49 students (12.9%) reported the use of various types of medications at different frequencies with occasionally (1-2 times in a month) as the most common frequency. Sedative hypnotics (38%) reported being on the top of the used medications followed by others (28%), which included over-the-counter medications like Paracetamol and other simple analgesics. More details are demonstrated in **Figures 3, 4, and Table 9**.

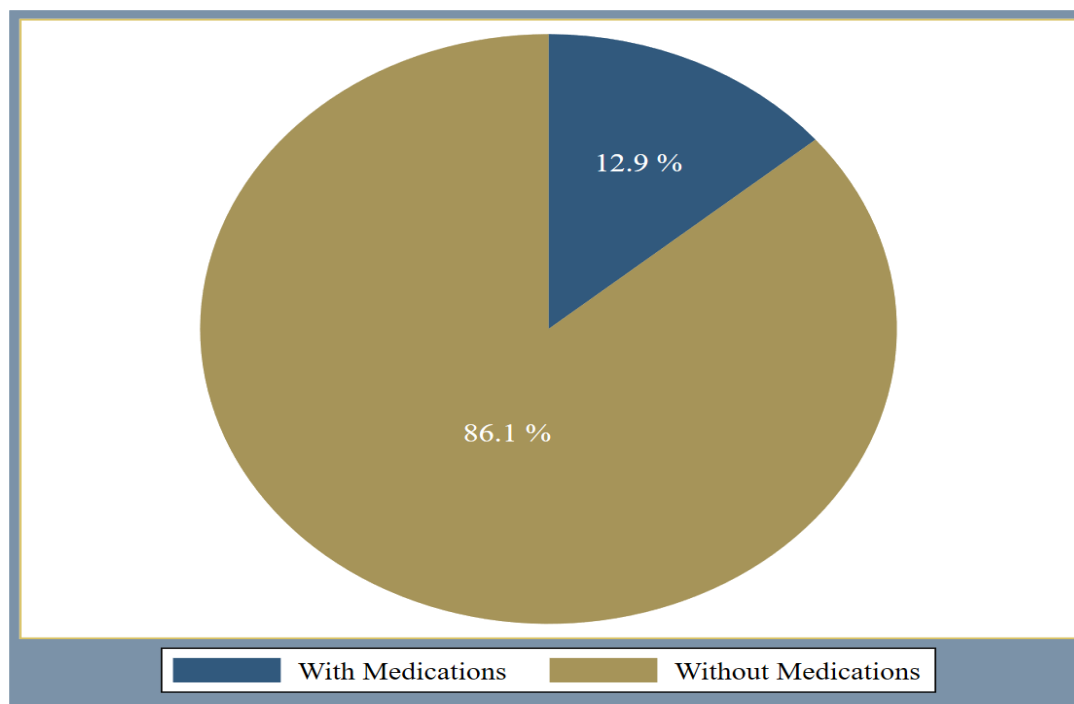


Figure 3. Reported medication use for coping with the COVID-19 related psychological distress among respondents (percentage)

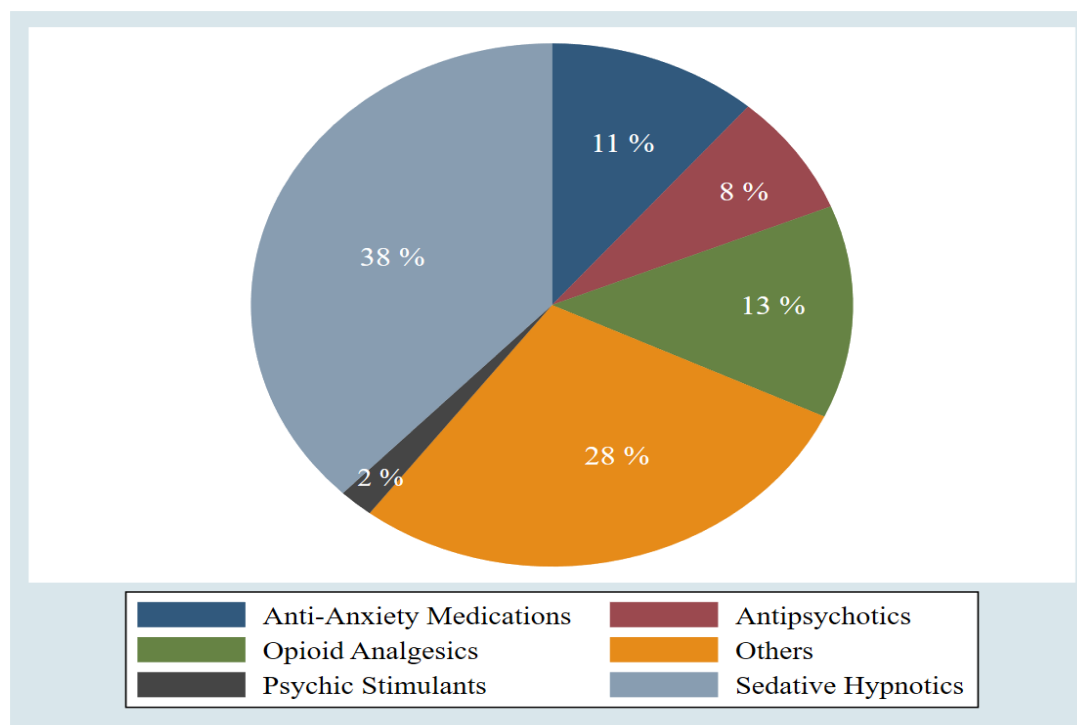


Figure 4. Types of medications that were used by 49 students for coping with COVID-19 related psychological distress among respondents.

Table 9. Medicines' usage frequency among the 49 students who reported the use of different medications during the COVID-19 self-coping strategies.

Frequency of usage	Number of students	Percentage (%)
1-2 times in a month	17	34.7
1-2 times in a week	13	26.5
3-4 times in a week	10	20.4
Everyday	9	18.4
Total	49	100

The last item included in this survey was a question about the issue that possessed the highest level of concern as perceived by the students. It was a single-answer question with five response choices: online distance learning, curfew and societal isolation, being infected with COVID-19, the economic impacts of the COVID-19 pandemic or other concerns. Surprisingly, among the 381 students, 209 students (54.9%) reported that *online distance learning* was the highest and most serious issue of concern, followed by 75 students (19.7%) who reported *curfew and societal isolation* as their highest issue of concern. Unexpectedly, only 53 students (13.9%) reported *being infected with COVID-19* as their most serious concern. **Figure 5** for illustration.

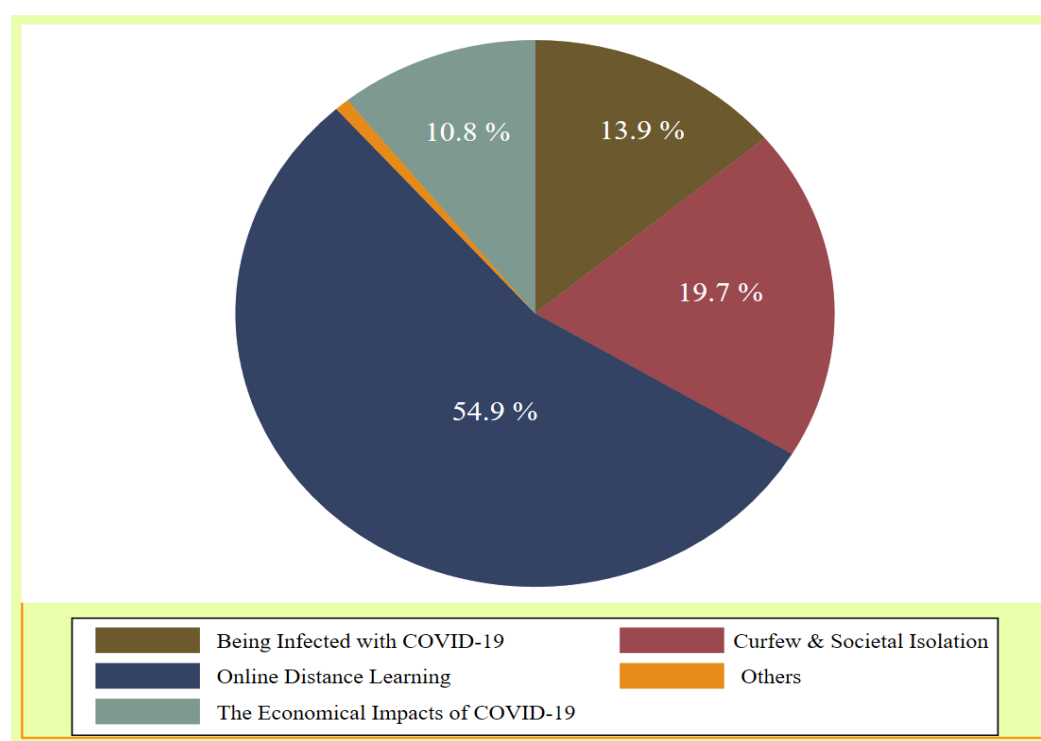


Figure 5. The issue of the highest concern as perceived by the 381 students (percentages)

5.DISCUSSION

Since the spread of COVID-19 on a global scale, most of the efforts and decisions at the local, national, and international levels were directed primarily to mitigate the spread of the disease (10,20). However, the psychological impacts of the COVID-19 on global mental health have not thoroughly investigated yet. Despite the current scarcity of published original researches about the COVID-19 impacts on mental health, lessons can be learned from the previous coronaviruses outbreaks (10,21,22). Research has addressed that outbreaks and epidemics are associated with psychological pressure on different societal components, including older adults, healthcare staff, patients, students as well as children (4,6,7,9,10,23,24). Currently, most of the published papers have reported the impact of COVID-19 pandemic on the mental health of the general population and healthcare workers, especially in countries of high COVID-19 cases (22,25–28). Other published papers addressed the mental health risks of the COVID-19 pandemic among vulnerable groups, including patients with pre-existing psychiatric illness (7,22,29–32). On the other hand, articles that report the mental health risks of COVID-19 on students are currently scarce.

The main goal of our study was to assess the psychological impact of COVID-19 pandemic on university students in Jordan. Like many countries, the fear of the pandemic itself, along with the national response strategy in Jordan, which included a total country lockdown, nationwide curfew, and other strict measures, all could impact the population's mental health especially vulnerable groups (1). This unprecedented emerging threat and the strict public health measures that were implemented in Jordan have collectively obliged numerous changes and disruptions in society's lifestyles, including the students' life. As of March 15, 2020, closure of all universities and schools was declared by the national defense law until further notice with shifting toward online distance learning (1).

In our study, the majority of the students (92.9%) suffered from different degrees of psychological distress ranging from mild to severe levels during the COVID-19 pandemic, as demonstrated by the Kessler distress scale (K10). Interestingly, spending time on social media platforms to compensate for societal isolation during the curfew was the most reported coping mechanism, followed by phone/internet calls with friends, and being engaged with the family. Around 12.9% of the students reported the use of CNS-related medications with sedative-hypnotics being the most common type to assist self-coping strategies.

The students in our study reported that they have concerns related to different life perspectives such as daily life activities within the society, academic activities as well as economic aspects during this pandemic which also have paralleled the fear of infection. Surprisingly, the single most serious concern as perceived by students was online distance learning. In fact, students with high levels of psychological distress had the least motivation to distance learning. Consequently, these pandemic-related concerns could possess detrimental impacts on the psychological status of students. Looking at the fact that original researches that report the psychological impacts of COVID-19 on university students are scarce, we considered in our discussion the currently available studies of the mental health impact of COVID-19 pandemic on students, healthcare workers, and the general public.

A recent study which was conducted by Cao et al. (2020) in China and aimed at exploring the psychological impact of COVID-19 on college students using the 7-item Generalized Anxiety Disorder Scale (GAD-7) has revealed that 24.9% of students suffered from anxiety during this pandemic with a positive association of the level of anxiety with different economic and academic stressors (6). Similar to Cao et al. (2020) study, our study found that there was no significant difference in the total psychological distress scores between males and females. In addition, the Chinese study found that social support was negatively associated with anxiety status among students, and we have that as one of our most reported coping mechanisms, i.e., socialization through social networking sites. Nevertheless, in our study, age was statistically and significantly associated with distress severity; thus, a younger student had more psychological distress. The difference in distress proportions between our study (92.9%) and the Chinese study (24.9 %) could be attributed to the use of different scales, i.e. GAD-7 vs. K10 as well as the sample size. In addition, we carried out the survey in a period close to final examinations, which might have had an additional negative impact on students' psychological status.

Another online-based cross-sectional study was carried out in China at an early stage of the COVID-19 pandemic and included 1210 participants from 194 Chinese cities, found that 53.8 % of participants have reported the psychological impact of COVID-19 as moderate to severe degrees. In addition, the study found a statistically significant association between female gender and higher degrees of psychological impact during the outbreak and we have that as one of our findings too (33).

A study by Zhang et al. (2020) assessed the psychological distress using the Chinese version 9-item General Health Questionnaire (GHQ-9) and GAD-7 in COVID-19 patients, quarantined students, and the general public. While depression was more dominant in infected patients, anxiety was similar among all groups. This distress was correlated with several factors such as age, social media, the extent to media exposure, and length of quarantine (24). In our study, the length of quarantine is the same for all Jordanians, so we could not assess that as a covariate.

In another study, psychologic status was assessed in about 2400 medical workforce, composed of mainly medical staff as well as administrative staff, using Hamilton Anxiety Scale (HAMA) and Hamilton Depression Scale (HAMD) (25). Expectedly, greater anxiety and depression were unfolded amongst medical staff, especially those working in respiratory, infectious disease, emergency, and intensive care departments. Still, the levels were much under those reported by our study, and this could be because students are more vulnerable to experience anxiety and stress, and of course, due to the different populations studied. No covariate analysis was done in the later study to assess the relationship of anxiety and depression to various economic or health stressors. Moreover, Similar results were observed in 500 medical health workers in Singapore (26), in which anxiety and depression were reported in 14.5% and 8.9%, respectively. Again, a much lower percentage than that reported in our study, which also could be attributed to the different populations under investigation.

Lastly, a nationwide large study in China assessed the psychological stress in more than 52,000 individuals distributed over 36 provinces (27). Mild to moderate stress was observed in 29.29% of the respondents, and severe stress in 5.14% of respondents. In agreement with our study, stress score was associated with the respondents' gender and age. Female respondents had shown significantly higher psychological distress than male respondents. Besides, younger people had higher stress scores, which confirms the findings of our study, probably because young people are more likely to obtain much pandemic-related information from social media, which can easily trigger psychological distress (34).

To the best of our knowledge, this is the first study in Jordan to assess the psychological distress among university students using the 10-item Kessler Psychological Distress Scale (K10) during the COVID-19 pandemic. In addition, this study is the first to highlight the stress brought about by online distance learning on college students in Jordan. Still, there are some limitations that

should be taken into consideration when interpreting the results and include (i) using a non-probabilistic convenience sampling which limits the generalizability of our results. However, this sampling strategy was believed to fit in lieu of the current circumstances of the nationwide curfew, and closure of all universities and colleges in the country and shifting to online platforms (ii) the majority of respondents were undergraduates; we could have seen different results if our sample had more postgraduate students, and (iii) the low number of respondents which could be attributed to the limited period of data collection. Nevertheless, findings from our study showed that college students are very prone to experience psychological distress during the current pandemic, and they could be considered as a vulnerable group. Also, the findings encourage further research on this topic, especially on a large scale.

The results of this study provide new insights to direct policymakers in the fields of higher education, as well as mental health. More attention and monitoring of college students' mental health should be sought. Since distance learning was the highest reported concern among students, faculty members should implement effective methods to make distance learning more interactive and students friendly. Psychological interventions should be implemented by psychologists and psychiatrists to provide guidance, psychoeducation, and mental health counselling to university students. There should be more active involvement with students' psychological health, coupled with educating them on how to deal with psychological distress during unprecedented situations like the current pandemic.

At the current circumstances of COVID-19 preventive measures (curfew and social distancing), psychological support could be provided to university students through publicly available online videos, television programs, and online/phone consultations. Also, mental health support could be provided through a hotline service to provide students with instructions about dealing with their academic stressors and other related mental health issues during this pandemic.

Moreover, efforts should be made to improve communications with college students' and guide them on how to access only evidence-based information from reliable resources about the pandemic. A comprehensive nationwide psychological support program should be developed and incorporated into Jordan's response strategy in combating the COVID-19. Future studies should assess the effect of implementing these suggested interventions on students' mental health. Furthermore, as the levels of psychological distress are expected to be dynamic over the upcoming

period, it is wise to monitor and assess the impact of easing up the governmental restrictions, i.e. ending the curfew and returning to on-campus teaching, on the levels of psychological distress and anxiety among university students.

6.CONCLUSION

The control and preventive measures that are implemented during the COVID-19 pandemic resulted in a severe disruption of various human life activities. The fear of the infection itself, along with the strict public health measures could impact the mental health of individuals. Our study highlighted a significant psychological impact on university students in Jordan due to the COVID-19 pandemic. These students were afflicted by high levels of psychological distress during the pandemic and the associated societal isolation. A significant proportion of the students were highly concerned about and distressed by the distance learning strategy; thus, prompt actions should be taken to improve the distance learning experience and solve any associated technostress. In addition, a nationwide psychological support program should be incorporated into the Jordanian COVID-19 response strategy and preparedness plan, considering students and other vulnerable groups in the community.

Authors contribution

AB conceptualized the study, designed, and prepared the questionnaire with inputs from AA and LA. Data collection and statistical analysis were carried out by AB and AA. LA wrote the introduction. AB wrote the methods, materials, and results sections. AA wrote the discussion section. All authors have read, revised, and approved the manuscript for publication.

Conflict of Interests

The authors declare that this article was produced in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Data Availability Statement

The dataset generated and analyzed for this study are available from the corresponding author on a reasonable request

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