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Healthcare students' mental and physical well-being during the COVID-19 lockdown and distance learning

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Abstract.
BACKGROUND: The sudden shift into distance learning during the coronavirus (COVID-19) lockdown might have impacted university students' well-being.
OBJECTIVE: This study aimed to investigate undergraduate healthcare university students' health-related quality of life (HRQoL) and its predictors during COVID-19.
METHODS: A cross-sectional study used an online self-administered questionnaire. The study targeted undergraduate medical, dental, pharmacy, and nursing students at Jordanian universities. Data collected included demographics,12-item Short Form health survey (SF-12), students' evaluation of distance learning, Neck Disability Index (NDI), Depression Anxiety Stress Scale (DASS21), and the International Physical Activity Questionnaire (IPAQ). Descriptive analyses were conducted to summarize primary outcome measures data. Predictors of HRQoL were determined using a multiple variable regression analysis.

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RESULTS: In total, 485 university students successfully completed this study with a mean age of 20.6 (±2.0). Participants' HRQoL level measured by SF-12 mean scores were 66.5 (±20.2) for physical health component and 44.8 (±21.2) for mental health component. The regression model explained 65.5% of the variation (r2 = 0.655, $F = 127.8$, $P < 0.001$) in participants' HRQoL. Factors significantly associated with HRQoL included depression, neck disability index score, stress, health self-evaluation, average of satisfaction with distance learning, IPAQ score, and weekly studying hours.
CONCLUSIONS: This study showed that healthcare students had a relatively low level of HRQoL during COVID-19 pandemic in Jordan. Academic and non-academic factors associated with HRQoL were identified and should be considered by healthcare educational institutions for better academic planning in future similar pandemics.

Keywords: Health-related quality of life, mental health, stress, healthcare students, online teaching

1. Introduction

University students of all majors are exposed to significant levels of stressors, that are thought to be associated with their academic load [1–4]. Healthcare students are a very important student subgroup that might face unique kinds of stressors related to their academic and clinical activities, financial responsibilities, and social commitments. These stressors might hinder healthcare students' health-related quality of life (HRQoL) and academic progress [5–9]. Psychological distress like depression, anxiety, and stress were also statistically linked with poor levels of HRQoL among healthcare students [7, 8, 10–12]. These challenges are commonly reported in the literature among healthcare students and to a higher extent among females [1, 2, 8, 13, 14]. Previous studies have reported that healthcare students in Jordan have poor lifestyle habits and challenging levels of musculoskeletal, mental health stressors and low levels of HRQoL [15, 16].

The coronavirus (COVID-19) pandemic have increased the importance of adopting online teaching [16]. Very strict governmental procedures were enforced on all societal and educational sectors. These procedures included quarantines, social distancing, and working from home in many countries worldwide including Jordan [17, 18]. Such strict procedures might be associated with increased levels of stress, confusion, anger, boredom, and financial stress [19].

Distance learning is not new in academia [20]. In fact, distance teaching has been adopted many years prior to COVID-19 in Jordan with an effectiveness level similar to traditional teaching [21]. General speaking, utilizing information and communication technology (ICT) is considered cost-efficient and effective worldwide [22–25]. However, the academic world has never been through such an outbreak required sudden full conversion into distance learning. Most universities worldwide started applying distance teaching as precautions of COVID-19 [26–28]. Given these new circumstances, it appears worthwhile to evaluate the wellbeing of a homogenous student group consisted of healthcare students and to describe their health and lifestyle parameters during the COVID-19 pandemic.

To our knowledge, there are no previous studies evaluated Jordanian healthcare students level of HRQol and its associated factors during COVID-19 in Jordan. This project aimed to examine the level of HRQoL and its academic and non-academic associated factors among healthcare undergraduate students in Jordan during COVID-19 pandemic. Studying the link between students' satisfaction with distance learning and health-related factors during COVID-19 appears to be well needed. Such studies might help in better understanding academia under extraordinary stressful situations enhance future academic emergency planning.

2. Methods

2.1. Study design

A cross-sectional survey using self-administered questionnaire study was conducted.

2.2. Sample

This study targeted healthcare students at Jordanian universities. We targeted undergraduate medical, dentistry, pharmacy, and nursing students at multiple Jordanian universities. Attempting to get a homogenous student group in terms of physical and mental health and lifestyle habits, part-time students, who cannot communicate in Arabic, or who are older

than 30 years were excluded. Power analyses calculations using G-power software revealed that minimum sample of 172 participants (with an average of 10 predictors and effect size of 0.15) was needed to get a statistical power of 95% [29].

2.3. Outcome measures

The researchers have developed a self-administered questionnaire consisting of the following sections: consent form, demographic information, evaluation of online teaching, HRQoL, mental health status, musculoskeletal neck pain, and physical activity level. All questionnaires were validated in Arabic using a pilot study and an expert panel discussion.

The level of HRQoL was evaluated by Medical Outcomes Study Short Form (SF-12) [30–32]. The level of satisfaction with online teaching activities was examined using 12 Likert-scale statements (ranged from 1 = strongly disagree to 5 = strongly agree) displayed in Table 4. Depression Anxiety Stress Scale (DASS 21) was used to measure the level mental health symptoms [33, 34]. The participants' physical activity was also assessed using the International Physical Activity Questionnaire –short form (IPAQ-SF) which is a valid measure for physical activity level categorizing it into high, moderate, and low [35, 36]. Finally, the study utilized the Neck Disability Index (NDI) which is a valid condition-specific questionnaire used to assess the effect of neck pain on limitations in performance of daily activities [37].

The study survey was discussed by an expert panel and was piloted on 10 students to evaluate its clarity. The average time needed to complete the survey was reported by the pilot study participants as about 15 minutes. All feedback about the survey was positive and there were no reported difficulties in understanding the survey questions.

2.4. Procedures

The questionnaire was sent to participants online using Google forms. The link to the questionnaire was also posted on various social media applications and popular webpages at Jordanian universities. All study procedures were approved by the Jordan University of Science and Technology Institutional Review Board (IRB) under approval # 68/132/2020. Students signed an electronic consent form approved by the IRB of the Jordan University of Science and Technology. Then participants filled in the anonymous questionnaire. Study data were coded and blogged into Microsoft Excel sheets in preparation for statistical analyses.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

2.5. Statistical analyses

Descriptive statistics including standard deviations and means or frequencies and proportions were calculated to describe primary data. Binary correlations between each HRQoL and collected factors data were conducted. When a correlation p-value was < 0.2 with a factor, this factor was used in the corresponding regression analysis as a potential predictor [38]. Level of HRQoL associations with collected variables was evaluated using a multiple linear regression with stepwise feature. A p-value < 0.05 was considered significant for all statistical analyses. Data were analyzed using IBM SPSS statistics version 23 (SPSS, Inc., Chicago, IL, USA).

3. Results

In total, 485 university students completed the study: 342 (70.5%) of them were females with a mean of 20.6 ($\pm$2.0). About 276 (56.9%) participants were studying medicine. Table 1 provides general characteristics of the study participants.

Students demonstrated a relatively low level of HRQoL during the pandemic as the total SF-12 mean score was 53.4 ($\pm$18.1). The mean score of physical component score of SF-12 was 66.5 ($\pm$20.2), while the mean score was 44.8 ($\pm$21.2) for the mental health component. The mean scores of depression, anxiety, and stress indicated moderate level of depression 17.8 ($\pm$11.8), moderate level of anxiety 9.4 ($\pm$10.0), and mild level of stress 17.1 ($\pm$11.8) as measured by DASS 21. Table 2 shows health outcome measures scores of the participants.

Students' demonstrated an increase in the number of their online courses and reported that their daily life activities balance was changed during the pandemic. The effects of COVID-19 on students' study are demonstrated in Table 3.

The study 12-item Likert scale used to evaluate the online teaching process during the pandemic had a high Cronbach's alpha coefficient (0.831) suggesting that the scale is internally consistent and valid.

Table 1
General characteristics of participants

Characteristics	Mean (SD) or *n* (%)
Age (years)	20.6 (2.0)
Gender:	Male: 143 (29.5%)
	Female: 342 (70.5%)
Academic Major	Medicine: 276 (56.9%)
	Dentistry: 145 (29.9%)
	Pharmacy: 29 (6.0%)
	Nursing: 35 (7.2%)
Study difficulty self-evaluation	Difficult: 237 (48.9%)
	Usual: 238 (49.1%)
	Easy: 10 (2.1%)
Diet self-evaluation	Unhealthy: 86 (17.7%)
	Sort of healthy: 366 (75.5%)
	Healthy: 33 (6.8%)
Sleep self-evaluation	Tiring or irregular: 261 (53.8%)
	Comfortable: 224 (46.2%)
Smartphone checking	Every half hour: 335 (69.4%)
	Every hour: 109 (22.6%)
	Every tow hour or more: 39 (8.1%)
Cigarette smoking	No: 441 (90.9%)
	Yes: 44 (9.1%)

N: number, SD: Standard deviation.

Table 2
Health characteristics of participants

Characteristics	Mean (SD) or *n* (%)
DASS Depression score	17.8 (11.8)
DASS Anxiety score	9.4 (10.0)
DASS Stress score	17.1 (11.8)
SF12 Total score	53.4 (18.1)
SF12 PCS Score	66.5 (20.2)
SF12 MCS Score	44.8 (21.2)
IPAQ Total score	1201.1 (2879.7)
IPAQ category	Low: 299 (61.6%)
	Moderate: 141 (29.1%)
	High: 45 (9.3%)
NDI	8.7 (7.3)

N: number, SD: Standard deviation, SF-12:12-item short form health survey, PCS: Physical Component Summary, MCS: Mental Component Summary, DASS: Depression Anxiety Stress Scale, and IPAQ: International Physical Activity Questionnaire, NDI: Neck Disability Index.

Table 3
Participants' average response for each statement of effects of COVID-19

Characteristics	Mean (SD) or *n* (%)
COVID affected my daily activities balance	Strongly disagree: 6 (1.2%)
	Disagree: 35 (7.2%)
	Neutral: 54 (11.1%)
	Agree: 187 (38.6%)
	Strongly agree: 203 (41.9%)
How many online courses prior to COVID	1.6 (1.6)
How many online courses during COVID	3.8 (2.6)
Weekly studying hours	12.3 (14.5)

N: number, SD: Standard deviation.

Table 4
Participants' average response for each statement of evaluating online teaching activities using a 5-point Likert scale (1 = strongly disagree, 2 disagree, 3 = neutral, 4 = agree, 5 = strongly agree)

Characteristics	Mean (SD) or *n* (%)
Our Online teaching is of high quality	2.1 (1.0)
Online teaching is as beneficial as traditional	2.0 (1.1)
Online teaching is beneficial for theoretical courses	3.0 (1.2)
Online teaching is beneficial for laboratory courses	1.6 (0.8)
Online teaching is beneficial for clinical training courses	1.5 (0.8)
Professors put enough efforts in online teaching	2.7 (1.1)
Professors communicate enough and regularly with students	2.6 (1.1)
Internet quality is good enough for online teaching	2.7 (1.3)
Online teaching assessment system is clear and fair	1.9 (1.0)
I can easily understand my online courses instructions	2.7 (1.2)
Online courses require less efforts than traditional	2.4 (1.3)
I wish to adopt online teaching in more future courses after COVID	2.5 (1.4)
Average satisfaction with online teaching	2.3 (0.6)

N: number, SD: Standard deviation.

Overall, students were not satisfied with their online teaching experience as their average response was 2.3 (±0.6) on the 12-statement Likert scale evaluation. Table 4 lists the participants' average response for each statement evaluating their online teaching experience during the pandemic.

Regarding factors significantly associated with HRQoL, the study multiple variable linear regression model was powerful as it explained 65.5% of the variance in students' HRQol (r2 = 0.655, $F = 127.8$, $P < 0.001$). As demonstrated in Table 5, depression (β = –0.51 [95%CI –0.64 to –0.36], $P < 0.001$), neck disability index scale (β = –0.44 [95%CI –0.60 to –0.27], $P < 0.001$), and stress (β = –0.44 [95%CI –0.57 to –0.29], $P < 0.001$) were significant negative predictors of HRQol. While health self-evaluation (β = 3.80 [95%CI 1.85 to 5.73], $P < 0.001$), average of satisfaction with online teaching (β = 2.87 [95%CI 1.30 to 4.45], $P < 0.001$), IPAQ (β = 1.81 [95%CI 0.32 to 3.30], $P < 0.05$), and weekly studying hours (β = 0.07 [95%CI 0.00 to 0.13], $P < 0.05$) were significant positive predictors of HRQoL.

4. Discussion

The main goal of this study was to examine t healthcare students level HRQoL and identify its predictors during COVID-19 pandemic and home-based distance learning. Healthcare students demonstrated a

Table 5
Multivariable linear regression analyses of factors associated with Health-related quality of life measured by SF-12

Factor	β coefficient	95% Confidence interval		*P*-value
DASS Depression score	–0.51	–0.64	–0.36	P < 0.001
NDI	–0.44	–0.60	–0.27	P < 0.001
DASS Stress Score	–0.44	–0.57	–0.29	P < 0.001
Health self-evaluation: Bad Vs Excellent	3.80	1.85	5.73	P < 0.001
Average satisfaction with online teaching	2.87	1.30	4.45	P < 0.001
IPAQ category: Low Vs High	1.81	0.32	3.30	P < 0.05
Weekly studying hours	0.07	0.00	0.13	P < 0.05

N: number, SD: Standard deviation, SF-12:12-item short form health survey, DASS: Depression Anxiety Stress Scale, and IPAQ: International Physical Activity Questionnaire.

relatively low level of HRQoL, high levels of mental health symptoms, and low satisfaction level with online teaching activities. The study identified factors that were significantly associated with HRQoL including depression, stress, neck pain, satisfaction with online teaching, weekly study hours, physical activity level, and health self-evaluation. This study might help enhancing our understanding of academia under extraordinary stressful situations to enhance future academic emergency planning.

As far as we know, this is the first study to investigate the relation between mental health symptoms and students' HRQoL during COVID-19 in Jordan. The results showed that the lower levels of students HRQoL, are associated with higher depression and stress mean scores. These results might be explained by the strict procedures been imposed by the Jordanian government during the pandemic [17, 19], as mental health symptoms are known to be more likely arise in the absence of socializing [39, 40]. Furthermore, this result might be understood by considering the potential impacts of COVID-19 on students' education and future employment [41, 42].

Similar studies conducted around the world during COVID-19 suggested that significant portion of undergraduate university students demonstrated very low level of well-being and high level of mental health symptoms. Gender, socioeconomic status, coping abilities, personal resilience, and health behaviors significantly predicted students' levels of students' well-being during the pandemic. Interestingly, as found in our study, students' level of well-being was predicted by satisfaction with online teaching activities [43–46]. However, our current study remains unique as it evaluated students much more comprehensively than other studies incorporating more pandemic-related variables such as musculoskeletal health and physical activity level.

University students usually use smartphones more than other populations [47]. Using smartphones can lead their users to be in awkward postures, which can cause neck pain [48]. In addition, neck pain is common among university students [49]. About 22.9% of our participants are using smartphones for online studying and 62.0% o reported using laptop, 15.9% preferred to take their online courses in living room without a table, and 31.1% preferred studding in bed or on floor, which are not healthy posture particularly if sustained for long time. The appropriateness of ergonomics during any task might have influence on the individuals health and well-being and it could have influenced our participants' HRQoL [50].

Previous studies showed that playing sports and maintain good physical activity level in young people have a significant role in developing their cognitive, physical, moral, and social terms, as well as, having positive impacts on mental health and well-being [51–55]. The results of this current study indicated that a better level of HRQoL was associated with a higher level of physical activity which is consistent with previous studies [56, 57].

Studies also showed that positive emotions can strengthen immune system and lower the impact of stress which improves peoples' health [58, 59]. Therefore, university students who were more satisfied with online teaching might have a better HRQoL. Furthermore, we found in this current study that increased weekly study hours had a positive association with participants' HRQoL level.

The keystone rationale of this study was to test the level of students HRQoL and its associated factors under the unique situation of COVID-19 and its related quarantine and sudden adoption of online teaching. Healthcare students are susceptible to high levels of mental stress and poor quality of life [60–63]. Previous studies showed that healthcare

students in Jordan were susceptible to high levels of mental and physical stress along with low levels of HRQoL [15, 16]. However, comparing the results of this current study with previous ones is not possible due to differences in recruited sample and used methodology. We have also expected to have a link between healthcare students quality of life and their satisfaction with online teaching experience they were receiving during the pandemic [62, 63].

Poor levels of healthcare students HRQoL might have negative impacts on their learning and wellbeing and should seriously be considered by their academic institutions administrations, particularly when planning for future emergencies entitling full adoption of distance teaching [64–66].

5. Limitations and future directions

The first limitation of the study was the use of an online survey which required a good internet access by participants and being followers of social media pages. Additionally, the study design did not enable having a conclusion related to the specific effects of COVID-19 on participants' wellbeing or to compare with data prior to the pandemic. This study was also limited by adopting and online survey which could have limited its participation by those with good internet access and followers of social media pages. Another limitation is failure to have equal representation across genders and participants' academic majors particularly for nursing and pharmacy. Future studies should adopt more official survey methods impeded within different universities academic portals, however, due to the quarantine policies, we were not able to conduct the survey through our official academic portals. It is recommended to conduct future research projects aiming at finding proper interventions for improving healthcare students' mental health and quality of life and improving students' satisfaction with distance learning.

6. Conclusions

Jordanian healthcare students had relatively low level of HRQoL and low level of satisfaction with their online teaching activities during COVID-19 pandemic. Depression, stress, and neck pain were significantly and negatively associated with these students HRQoL level. Physical activity level, health self-evaluation, satisfaction with online teaching, and weekly study hours were significantly and positively associated with HRQoL level. Medical teaching institutions should take level of HRQoL and its predictors into consideration as planning for their online teaching activities during COVID-19 and future similar pandemics.

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Author contributions

All authors contributed to the conceptual foundation of the study in terms of its rationale, design, data collection, analyses, discussion, and interpretation. All authors read and approved the final manuscript.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that they have no competing interests.

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