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Physical activity to ameliorate the negative mental health effects of COVID-19-induced confinement

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ABSTRACT

Mental health is strongly affected by physical (PA) and sedentary (SA) activity. In the current study, the relationships of PA and sedentary activity (SA) with mental status amid confinement caused by COVID-19 were examined. The study is self-reporting, survey-based, and cross-sectional in design. The study was conducted in Jordan and included 1744 participants (≥18 years old). The participants' mental status was obtained using the Depression-Anxiety-Stress Scale (DASS). The results showed involvement in both PA and SA during COVID-19-induced confinement. The involvement includes walking (77.2%), running (70.3%), cycling (84.9%), swimming (83.1%), sports (82.9%), weightlifting (86.4%), watching TV (79.4%), using electronics (86.3%), and logging to social media (85.1%). Lower DASS scores were associated ($p < 0.05$) with lower walking, running, and weightlifting but not ($p > 0.05$) with cycling and swimming PA. Additionally, DASS scores ($p < 0.05$) were associated with changes in television viewing but not ($p > 0.05$) with electronics and social media use during confinement. In conclusion, individuals who experienced higher levels of stress, anxiety, and depression were more likely to turn to more PA and less SA. These findings are important and suggest that individuals during confinement find PA a useful strategy to mitigate the negative mental effects of the pandemic.

1. Introduction

In December 2019, coronavirus disease (COVID19) was first reported in Wuhan, China [1]. The disease has subsequently spiraled throughout the globe resulting in a massive number of morbidity and mortality, coupled with unbearable strains on the health systems across the globe [2]. Accordingly, the World Health Organization has declared the disease a pandemic in March 2020, calling for an international public health emergency. As of April 2022, the total COVID-19 confirmed cases is over 513 million cases including more than 6.62 million casualties. As of April 2022, over 11 billion vaccine doses have been administered, around the world.

COVID19 is a single-stranded RNA virus with a nucleoprotein within a capsid comprised of matrix protein [3], that belongs to the genus Beta coronavirus and is extremely pathogenic [4,5]. It assaults the epithelial layers of the respiratory system causing a significant inflammatory response, acute respiratory distress, and possible death [6,7]. The symptoms include fever, cough, shortness of breath, sore throat, headache, vomiting, and diarrhea [8,9]. The disease is also associated with depression symptoms [10], and cognitive and olfactory impairment [11,12].

The disease spreads in a fast rhythm and is transmitted among humans by respiratory droplets, fomites, direct contact, nosocomial, and in exceptional nonrepetitive cases with airborne [4,13]. Governments took special precautions to restrain the spread of COVID19. These precautions include physical distancing, remote working, home quarantine, lock-down, and the closure of schools, universities, gyms, airports, commerce, and workplaces. Additionally mandating medical masks in public places, such as malls, universities, workplaces, markets, and parks. These procedures are associated with negative mental impact. Studies have reported increased anxiety, depression, and stress with mask use [14], physical distancing [15], and lockdowns [16] in many

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countries.

Mental health is pivotal for overall wellbeing. Positive mental status is associated with improved activities of daily living, quality of life, and reduced incidences of diseases, hospitalization, and fatality [17,18]. Confinement has several mental-related impacts, including neurocognitive and psychological changes, sleep disorders, increased stress hormones, and immune-modulatory disturbance [19–21]. Similarly, individuals under COVID19-induced confinement reported adverse mental changes such as stress, anxiety, sleep issues, mood swings, appetite loss/increase, depression, panic attacks, anger, suicidal thoughts, and violent incidents [22–24].

Maintaining regular participation in physical activity (PA) and avoiding sedentary activity (SA) is essential for health [25]. Governmental procedures to curb the COVID19 spread, however, have altered many aspects of people's lifestyles including a reduction in PA while SA increased [26,27]. These changes in PA and SA can be potentially detrimental to health, including an increased risk of developing the most devastating diseases such as cardiovascular [28], respiratory [29], metabolic [30], and immune [31] diseases. Importantly, these changes are associated with mental symptoms including stress, anxiety [32], depression [33], mood disturbance, and feelings of fear [34], worry [35], and loneliness [36,37]. Conversely, regular participation in PA reduces symptoms of depression and anxiety in individuals with psychological disorders [38]. However, few studies examined the effect of changes in PA and SA on psychological health during COVID-19-induced confinements [39,40], especially from developing countries.

Therefore, the current study examined the relationship of PA and SA with mental status amid COVID19-induced confinement. Given previous studies [39,40], changes in PA and SA will be related to psychological status. The results will help determine the mental change during confinement due to disease breakouts. Additionally, the study will verify the potential role of regular participation in PA to endure confinement-induced mental effects. Subsequently, consider these results while designing programs and implementing plans for the management of mental changes during disease-induced confinement.

2. Materials and methods

The study was descriptive cross-sectional to evaluate the relationship of PA and SA with mental health during COVID19 confinement. A convenience sampling approach was adopted. The study included Jordanians aged 18 years and above who could speak, understand, and write Arabic. Individuals not able to comprehend and answer the questions and not residing in Jordan were excluded from the study. The protocol of this study was approved by the Institutional Review Board of Jordan University of Science and Technology, Irbid, Jordan. A survey was deployed online using Google Forms to collect data for the current study. The survey link was shared with potential participants across Jordan through social media platforms. Informed consent was also collected electronically. Aim of the study, the voluntariness of participation, length of the survey, the confidentiality of the collected data, and potential benefits and risks were provided to the participants in the informed consent. An "agree" response was required to proceed further into the study questionnaire pages. The study data was collected in April–July 2020.

The data was collected in three parts, sociodemographic, PA and SA, and mental health status. The sociodemographic data included age, gender, level of education, income, and job sector. Additionally, participants' perceived likelihood of getting infected. Moreover, participant's body weight and height were collected. In the second part, PA and SA data were obtained including walking, running, cycling, swimming, and weightlifting as well as watching TV, use of electronic devices, and logging on to social media. The participants choose either "increase", "decrease", and "no change" to these questions. Mental health was measured using the Depression Anxiety Stress Scales (DASS-21) tool, a reliable and valid measure of stress, anxiety, and depressive symptoms [41,42].

2.1. Statistical analysis

SPSS package (version 22.0; Chicago, IL) was used for all statistical analyses. Initially, the data was sorted using descending/ascending features to find unrealistic data values. Subsequently, boxplots were used to visually identify outliers. Unrealistic values and outliers are then revised and amended according to the original data collection sheets. When data entry is found correct, the outliers are removed from the data statistical analysis. Data are expressed as means ± SD or percentage (%). ANOVA was used to examine the relationship of changes in PA and SA with negative emotional symptoms indices. Subsequent LSD Posthoc tests were used to compare emotional symptoms between the participants who reported a "decrease", "no-change", versus an "increase" in PA and SA. The negative emotional indices include stress, anxiety, depression, and total scores. α was prior at $p < 0.05$.

3. Results

3.1. Participants

As presented in Table 1, 1744 participants volunteered to partake in the study. The participant characteristics including age, weight, and height ranges were 18–72 years, 38–144 kg, and 120–198 cm. The majority of the participants were women, with a bachelor degree, receiving middle income, and who are unemployed. Table 1 also shows that a few participants were worried about getting infected and knowing a person who is infected. Additionally, the majority of the participants reported a range of confinement practices and advisories, including self-quarantine (93.7%), social distancing (96.8%), lockdown (98.2%), school closure (99.0%), and event banning (97.0%).

3.2. Physical and sedentary activities during COVID19

The reported participation in walking (77.2%), running (70.3%), cycling (84.9%), swimming (83.1%), sports (82.9%), and weightlifting

Table 1
The participant demographic (n = 1744).

Age (yrs, mean ± SD)		33.6 ± 11.3
Weight (kg, mean ± SD)		72.5 ± 16.3
Height (cm, mean ± SD)		166.3 ± 9.7
BMI (kg/m^2, mean ± SD)		26.1 ± 5.0
Gender (%; women)		69.3
BMI Classifications		
	Underweight (%)	9.1
	Normal weight (%)	37.0
	Overweight (%)	34.7
	Obese (%)	14.8
	Overly obese (%)	4.3
Level of Education (%)		
	High school and less	19.2
	Associate degree	14.0
	Bachelor degree	51.6
	Graduate degree	15.2
Income (%)		
	Low	15.8
	Middle	76.8
	High	7.4
Job sector (%)		
	Unemployed/retired	51.9
	Government	23.7
	Private	24.5
DASS scores (mean ± SD)		
	Stress	13.4 ± 10.8
	Anxiety	7.8 ± 8.2
	Depression	12.11 ± 9.9
	Total	33.3 ± 26.8

(86.4%). Additionally, the majority of the subjects were involved in SA including watching TV (79.4%), using electronics (86.3%), and logging to social media (85.1%).

3.3. Emotional status according to changes in physical activities

Table 2 shows negative emotional status according to changes in PA during COVID19. The ANOVA shows that a reduction in walking, running, and weightlifting PA was associated ($p < 0.05$) with lower scores on the DASS scales. No differences ($p > 0.05$) in DASS scores were shown between decrease, no-change, versus increase in cycling and swimming PA.

3.4. Emotional status according to changes in sedentary activities

Table 3 shows negative emotional status according to changes in SA during COVID19. The ANOVA shows greater ($p < 0.05$) DASS scores among the individuals who experienced no-change, versus a decrease and an increase, in watching TV. No differences ($p > 0.05$) in DASS scores were found according to the change, decrease, no-change, versus increase, no-change, versus increase, in electronic and social media use.

4. Discussion

As COVID19 quickly swept across the globe with devastating effects, governments were compelled to adopt a range of tactics to restrain the spread of the disease. During the study data collection period (April–July 2020), Jordanians experienced dreadful confinement procedures that affected many aspects of their lives. These procedures included physical distancing, closure of schools and universities, and banning public gatherings, inbound and outbound transportation, as well as international travel [43]. Eventually, these tactics are known to be associated with altered mental, PA, and SA status. These alterations include increased stress, depression, and anxiety [23,39] as well as reduced PA and increased SA [27]. The majority of the studies examining the relationship of mental health with PA and SA are from developed countries [44,45]. For example, studies from Spain [40] and the US [37] have reported that PA is beneficial for mental health including reducing anxiety, depression, and negative mood. However, the effect of mental health changes on PA and SA during disease-induced confinement is still scarce in developing countries, especially the Middle East. Therefore, the current study examined the relationship of changes in PA and SA with mental status during COVID19-induced confinement in Jordan, a developing country from the Middle East.

Table 2
Negative emotional status according to changes in physical activities during COVID19.

Mode of PA	Emotional Status	Decrease	No change	Increase
Walking	Stress	12.2 ± 10.5	14.4 ± 11.1*	14.2 ± 11.2*
	Anxiety	6.8 ± 7.3	8.7 ± 8.7*	8.1 ± 8.2
	Depression	10.7 ± 9.5	13.2 ± 10.4*	12.9 ± 10.0*
	Total	29.9 ± 25.1	36.3 ± 28.0*	35.2 ± 27.6*
Running	Stress	9.4 ± 9.0	13.9 ± 10.7*	13.8 ± 11.0*
	Anxiety	6.7 ± 6.4	8.7 ± 8.7	7.8 ± 8.3
	Depression	9.1 ± 8.5	12.1 ± 9.7*	12.4 ± 10.1*
	Total	25.0 ± 22.6	34.5 ± 27.5*	34.0 ± 27.2*
Cycling	Stress	12.2 ± 11.7	13.4 ± 10.4	13.8 ± 11.0
	Anxiety	10.0 ± 9.6	7.9 ± 8.0	7.8 ± 8.3
	Depression	11.5 ± 11.9	12.2 ± 9.4	12.4 ± 10.1
	Total	32.8 ± 31.8	34.0 ± 25.8	33.8 ± 27.3
Swimming	Stress	12.9 ± 12.1	13.2 ± 10.0	14.0 ± 12.0
	Anxiety	7.9 ± 8.4	7.9 ± 8.4	8.0 ± 8.4
	Depression	12.0 ± 11.0	11.8 ± 9.2	12.6 ± 10.1
	Total	32.9 ± 30.2	32.8 ± 25.4	34.6 ± 27.3
Weightlifting	Stress	10.5 ± 10.7	14.0 ± 10.5*	14.0 ± 11.0*
	Anxiety	7.0 ± 8.1	9.0 ± 9.0	7.8 ± 8.2
	Depression	9.2 ± 9.4	13.1 ± 9.9*	12.4 ± 10.1*
	Total	27.0 ± 26.9	36.1 ± 27.2*	32.2 ± 27.2*

Values are in mean ± SD. *$p < 0.05$ versus decrease.

Table 3
Negative emotional status according to changes in sedentary activities during COVID19.

Mode of SA	Emotional Status	Decrease	No change	Increase
Watching TV	Stress	13.4 ± 10.5	16.1 ± 10.8*	14.4 ± 11.5
	Anxiety	7.6 ± 7.7	10.6 ± 7.63*	8.7 ± 8.8
	Depression	12.2 ± 9.7	14.5 ± 9.9*	13.9 ± 10.8
	Total	33.0 ± 25.8	41.7 ± 26.0*	37.0 ± 28.4
Use of Electronic Devices	Stress	13.8 ± 11.0	12.3 ± 10.2	11.0 ± 9.7
	Anxiety	8.0 ± 8.3	8.4 ± 8.8	8.5 ± 8.3
	Depression	12.6 ± 10.2	11.2 ± 9.2	11.4 ± 9.3
	Total	34.5 ± 27.3	31.5 ± 26.7	31.0 ± 26.5
Logging to Social Media	Stress	13.8 ± 11.0	12.8 ± 10.0	10.8 ± 8.7
	Anxiety	8.0 ± 8.4	9.0 ± 8.0	8.6 ± 9.0
	Depression	12.6 ± 10.1	12.2 ± 9.8	10.8 ± 9.3
	Total	34.4 ± 27.4	32.9 ± 25.7	30.1 ± 25.5

Values are in mean ± SD. *$p < 0.05$ versus decrease.

According to the analyses, the adults who experienced the greatest stress, anxiety, and depression reported an increase/no change in walking, running, and weightlifting, while the ones who experienced the least stress, anxiety, and depression reported a decrease and increase in watching TV. These data are important and suggest that the individuals who experienced elevated levels of negative emotions resorted to increase/no change in PA, while the ones with less negative emotions opted to decrease involvement in PA. Additionally, the individuals with the least negative emotions, opted to either decrease or increase SA. Conversely, no change in SA was reported by individuals with greater negative emotions. These results help understand the changes in mental, PA, and SA status during COVID19 in developing countries. Additionally, the findings indicate that individuals with the greatest negative emotions find PA a coping strategy to endure mental stress, anxiety, and depression. Subsequently, the study results can be used to design plans and implement tactics to cope with mental problems during times of compulsory confinements, such as disease outbreaks.

Several studies have reported changes in mental status during COVID19. These changes include increased negative emotions [23,46], stress, anxiety [32,47], depression [33], and feelings of fear [34], worry [46], and loneliness [36]. These mental changes might lead to compulsive behaviors such as the tendency to commit suicide [48], violence toward self and others [49,50], and alcohol and drug abuse [51]. Similarly, the participants in the current study experienced increased stress, anxiety, and depression [23]. As per previous studies, the participants in the current study have also reported reduced PA and increased SA [27]. These mental, PA, and SA changes have been attributed to the disease-induced confinement, including curfews, online schooling and working, banning of social gatherings, and prohibiting outdoor activities.

Fewer studies, however, examined the effect of mental status changes on participation in PAs and SAs, especially in the Middle East and none in Jordan. In the current study, the individuals who

experienced greater mental symptoms during COVID19 confinement resorted to participating in more PA and less SA. Previous studies have shown that PA can diminish mental symptoms in non-clinical populations [52]. Similarly, a study in ~3000 US adults showed that participation in PA and reduced SA can help ameliorate mental symptoms during COVID19 confinement [37,53]. These findings were further confirmed in a systematic review that suggests participating in PA is an effective strategy to endure the mental effects of the COVID19 pandemic. Subsequently, it should be incorporated in plans designed to reduce the negative mental effects of pandemic-induced confinements [39]. The findings of these studies may explain the current findings. Greater participation in PA might be a coping strategy to mitigate the negative mental effects of the pandemic-induced condiment [37,39,53]. However, more studies are needed to confirm these findings and speculations.

5. Implication

The individuals reporting greater mental symptoms during COVID19 confinement participated in more PA and less SA. The results further advocate PA to endure mental symptoms. Exposure to nature has also been shown to play a beneficial role for mental health and well-being [54,55]. Therefore, PA and enhanced interactions with surrounding environments should be incorporated into plans designed to mitigate the adverse mental effects of COVID-19-induced confinement [56].

6. Conclusions

The results revealed a relationship of mental health with PA and SA. According to the analysis, the individuals who experienced the greatest level of stress, anxiety, and depression were the most to resort to more PA and less SA. These results are important and suggest that people during confinement find PA a helpful coping strategy during disease-induced confinement. Therefore, planes designed to mitigate the negative mental effects of disease-induced confinements should include PA. However, more studies are warranted to confirm the current findings and speculations.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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