

## Mental status and Physical Activity during COVID 19 Pandemic Confinement: A Study on Adult Kuwaiti

Ahmad R. Al-Haifi<sup>1</sup>, Mo'ath F. Bataineh<sup>2</sup>, Ali M. Al-Nawaiseh<sup>2</sup>, Nayef Y. Bumaryoum<sup>1</sup>, Rasha H. Ashkanani<sup>3</sup>, and Hashem A. Kilani<sup>4</sup>

<sup>1</sup>Department of Food and Nutrition Science, Collage of Health Sciences, PAAET, Showaikh, Kuwait.

<sup>2</sup>Department of Sport Rehabilitation, College of Physical Education and Sport Science, The Hashemite University, Jordan.

<sup>3</sup>Department Of Home Economics, Basic Education Collage, PAAET, Showaikh, Kuwait.

<sup>4</sup>Kinesiology and Training Department. School of Sport Sciences, The University of Jordan, Jordan.

### \*Correspondence:

Hashem A. Kilani, Kinesiology and Training Department. School of Sport Sciences, The University of Jordan, Jordan.

**Received:** 12 September 2021; **Accepted:** 05 November 2021

**Citation:** Al-Haifi AR, Bataineh MF, Al-Nawaiseh AM. Mental status and Physical Activity during COVID 19 Pandemic Confinement: A Study on Adult Kuwaiti. Cancer Sci Res. 2021; 4(4): 1-7.

### ABSTRACT

**Background:** Due to the novel COVID 19 pandemic and its associated social distancing and confinement procedures, the lifestyle of the individuals and their daily routine were affected and hence, their health. This study aims to find if physical activity level of the Kuwaiti adults during COVID 19 pandemic confinement have an influence on their mental status. Moreover, this study is investigating whether there are significant differences in the lifestyle behaviors, health and mental status attributed to the gender variable.

**Methods:** in this study, a self-reported across-sectional survey was distributed online on a sample of (357) Kuwaiti adults. The demographic data were collected through a self-completed DCI. Body mass index (BMI) was calculated from self-reported weight (kg) and height (cm). Mental status was assessed by WHO-5 and the Physical Activity (PA) level was assessed using IPAQ. The variables were presented in the form of means, frequencies and percentages. One –way Chi-square test was used to compare between the groups and Chi-Square test for categorical variables. Moreover, the relationships between physical activity and mental status were examined using Pearson correlation analysis.

**Results:** The results of this study revealed on a low level of physical activity (62.5%), excellent health status (79.3%), weak sleep quality (68.9%) and good mental status (64.4%). The results showed also that the previous variables are different according to the gender variable.

**Conclusion:** This study found that there is a significant relationship between the mental status and the level of daily physical activity, and it was found that the mental status scores better the higher the level of physical activity.

### Keywords

Physical activity, Mental status, Lifestyle behaviors, COVID 19, Kuwait.

### Introduction

Since the COVID-19 pandemic extensively swept the world, there have been more than 100 million confirmed COVID-19 cases,

including more than 2.5 million deaths globally and more than 150,000 confirmed COVID-19 cases, including more than one thousand deaths in Kuwait as of March 1, 2021 [1]. Accordingly, the measures of social distancing that were applied to slow the COVID-19 transmission, alongside with fear of infection with the COVID-19, indirectly impacted dietary quality, food

availability, access to recreational public settings, normal daily activities, financial security and social activities work [2]. Such factors evolved over time to change the lifestyle-related behaviors radically, particularly daily eating, sleep and activity behaviors, which are known independent risk factors associated with metabolic complications including diabetes, obesity as well as cardiovascular disorders [3-5].

Staying at home for long times can decrease the levels of physical activity, which might lead to mental health problems [6]. On the other hand, physical activity at home could play a vital role in helping individuals to keep protecting their mental health in home-quarantine. For instance, [7] argued that maintaining the regular physical activity level could help individuals recover from mental health problems during quarantine [7]. Moreover, the World Health Organization (WHO) has established guidance, with practical advice, for people in self-quarantine on the way to stay active physically and decrease inactive behavior at home [8].

Despite the rich empirical evidence that focused on evaluating the relationship between the physical activity and mental health during quarantine in many countries including China [9,10], Spain [11], Austria [12], Italy [13], USA [14,15], UK [16], France and Switzerland [17], North America [18], Australia [19], Brazil [20], there is no evidence of such efforts in the Middle East Region where a different culture and routine is governing the area.

The related studies were conducted in the countries where "full" confinement was applied, while in countries like Kuwait "partial" confinement was applied like most of the gulf countries. However, with the second wave and new mutated strains of COVID 19, such procedures are more likely to be followed. Therefore, and in order to address such gap, in this study, the relationship between the physical activity and mental status of the Kuwaiti adults during COVID 19 pandemic confinement will be investigated.

## Methods

### Design

A cross-sectional design was adopted in this study where an online survey was administrated online via email, WhatsApp, Facebook, Twitter and LinkedIn. The survey was anonymous and it included a description of the study aim. A declaration of anonymity was also included at the beginning of the survey. An online Arabic questionnaire was sent to universities in Kuwait. Consenting adults aged 18 to 65 years who complying with government guidelines of home confinement and isolation were recruited electronically. The questionnaire was designed using an online Google form to collect information about demographic, dietary, physical activity, sleep, and mental wellbeing variables.

Participants were informed about the study objectives, and only participants who provided informed consent form (online) have completed the questionnaire (which lasted 10 min on average) and submitted it online. The questionnaire did not seek personal information (name, email, date of birth) that could be used

to identify the participant; therefore, their identity remained anonymous. No compensation was offered to the participants who completed the questionnaire. Ethical approval conforming to the Declaration of Helsinki was obtained from the Human Research Ethics Committees of the University of Jordan and the Hashemite University. All consented participants filled the online questionnaire. The study questionnaire was tested on 63 pilot participants who completed the survey on two occasions separated by a period ranging from one to two weeks to test for internal and external reliability and the clarity of the questions. The data from the pilot group was not included in the final analysis. The study questionnaire showed an adequate internal reliability (Cronbach  $\alpha > 0.70$ ) and an external reliability (Intraclass Correlation Coefficient  $> 0.70$ ) for total and all the individual scales.

### Participants

A total of (357) Kuwaiti adult completed the online survey over a period of 30 days (from mid of April to mid of May 2020) during COVID-19 COVID 19 pandemic confinements in Kuwait. To minimize the impact of errors, a cleaning process was adopted in order to remove ineligible cases identify meaningless data, representing invalid questionnaire responses due to the unwillingness of the participant to provide a valid response. Then, the sample comprised (357) Kuwaiti adults, 218 (61.1%) females and 139 (38.9%) males, was included in the study.

### Questionnaire

The online questionnaire consisting of several validated metrics approved for use by the Arab population. The questionnaire's subscales included demographic and cultural information (DCI), the World Health Organization's Five Well-being Index (WHO-5) [21] and a short form on International Physical Activity Questionnaire (IPAQ) [22].

Demographic data (age, weight, height, gender, educational level, social status, health status, smoking status, residence, and presence of chronic diseases) were collected through a self-completed DCI. Body mass index (BMI) was calculated from self-reported weight (kg) and height (cm). BMI values were used to classify participants into underweight, normal-weight, overweight, or obese categories [23]. Mental status was assessed by WHO-5 that consists of five elements, which are recorded as described previously [21]. Scores were collected from items to generate a maximum score of 25 points. Participants with a WHO-5 score  $> 13$  were recognized as being in good health [21].

The PA level of each participant was assessed using data obtained from the completed short form IPAQ. The IPAQ abbreviated form consists of seven items that provide information about walking, medium PA, and high PA that is conveyed as metabolic equivalent (MET) minutes per week. The MET minutes per week was used to rate participants' PA into low, moderate, or high PA. The PA level of each participant was assessed using data obtained from the completed short form IPAQ.

## Statistical analysis

The statistical analysis was conducted using SPSS Statistics Edition 23 (IBM, Chicago, IL, USA). The variables were presented in the form of means, frequencies and percentages. Analysis of variance one-way Chi-square test was used to compare between the groups and Chi-Square test for categorical variables. P-values of less than 0.05 were considered statistically significant. Data are presented as the Mean  $\pm$  SEM. The relationships between physical activity and mental status were examined using Pearson correlation analysis.

## Results

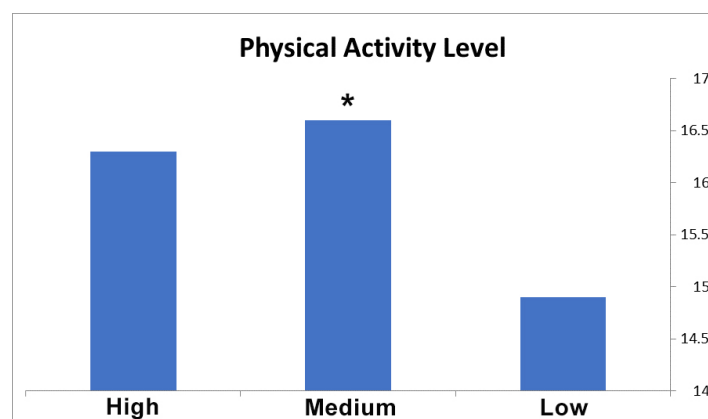
The Baseline characteristics of Kuwait participants including the age, BMI, sleep scale, physical and mental activity are presented in Table 1 below where the significant differences were found using the independent samples of the t-test. It can be noticed that there are statistically significant differences attributed to the gender in the BMI, sleep scale and physical activity.

The Chi-square test results for the differences in the demographic variables of the participants attributed to the gender, as in Table (2) below. The results show that the majority of the respondents (72.5%) are either over-weighted (40.6%) or obese (31.9%); however, there were no statistically significant differences in the BMI between the two genders. The results show also that most of the respondents (62.5%) report a low level of physical activity. There were statistically significant differences ( $P=0.001$ ) in PA levels between the two genders where males showed higher PA levels compared with females. Only one quarter of the respondents are smokers and, as expected, there were apparent significant differences ( $P<0.0001$ ) between males and females in favor of males in smoking. Only (20.4%) of the respondents have chronic diseases with no statistically significant differences ( $P=0.688$ ) attributed to the gender. The results showed also that the health status of the respondents was mainly excellent (79.3%) with no statistically significant differences ( $P=0.148$ ) attributed to the gender, while (2.8%) have a weak health status. Most of the respondents (68.9%) suffers from weak sleep quality with statistically significant differences ( $P=0.039$ ) attributed to the gender variable in favor of the females. Finally, nearly one-third of the respondents (64.4%) reported a good mental status with statistically significant differences ( $P=0.032$ ) attributed to the gender variable in favor of the males.

The results of Chi-square analysis of variance test are shown in Figure (1), where it was found that there are significant differences

in the mental status index attributed to the level of physical activity ( $F(2,354) = 3.606$ ;  $P = 0.028$ ). While there was no difference between the level of mental status in the medium level of physical activity ( $16.6 \pm 5.7$ ) compared to the high level of physical activity ( $16.3 \pm 5.6$ ;  $P=0.972$ ), the analysis showed a significant difference in the mental status in the low level of physical activity ( $14.9 \pm 5.8$ ) compared to the medium physical activity level ( $P = 0.028$ ). The analysis also showed no difference between high and low physical activity levels ( $P = 0.443$ ).

Pearson correlation coefficient analysis showed that there is a significant relationship between the mental status and the level of daily physical activity ( $r = 0.105$ ;  $P = 0.048$ ), as it was found that the mental status scores better the higher the level of physical activity.



**Figure 1:** The results of Chi-square analysis of variance test to find the differences in the mental status index attributed to the level of physical activity

\* Refers to the statistically significant values ( $P<0.05$ )

In addition, The Chi-square analysis results show a significant association between demographics, sleep quality, physical activity, and mental status with gender.

## Discussion

Since the first cases of novel Coronavirus disease appearance in China, the world has witnessed changes at many levels. In this regard, many countries applied preventive measures, like free movement restrictions including quarantine or confinement [24]. Such measures involved several physical [25,26] and mental negative effects [27]. On the other hand, the gradual return to normal life and the safety and preventive measures have contributed also

**Table 1:** Baseline characteristics of Kuwait participants stratified according to the gender.

Variable	Total (357)	Female (218)	Male (139)	t value	Statistical significance level
Age (year)	32.9 $\pm$ 9.6	32.4 $\pm$ 9.2	33.5 $\pm$ 10.2	- 1.018	0.309
BMI	28.1 $\pm$ 5.2	27.6 $\pm$ 4.8	29.0 $\pm$ 5.6	- 2.476	0.014
Sleep Scale (Score) **	6.3 $\pm$ 3.2	6.8 $\pm$ 3.4	5.6 $\pm$ 2.7	3.582	0.0001>
Physical Activity Scale (MET min / day)	127.1 $\pm$ 232.3	97.9 $\pm$ 183.4	173.2 $\pm$ 287.9	- 3.011	0.003
Mental Scale (score) *	15.5 $\pm$ 5.8	15.3 $\pm$ 5.9	15.7 $\pm$ 5.7	- 0.685	0.494

\*\* Higher score is at risk.

\* Lower means higher quality

**Table 2:** The demographic characteristics of the participants.

Variable	Gender			Chi-square	Statistical significance level
	Total	Female	Male		
	n (percentage)	n (percentage)	n (percentage)		
Sample members	357 (100%)	218 (61.1%)	139 (38.9%)		
BMI					
Underweight	7 (2.0%)	4 (1.8%)	3 (2.2%)	4.157	0.070
Normal	91 (25.5%)	62 (28.4%)	29 (20.9%)		
Over-weight	145 (40.6%)	90 (41.3%)	55 (39.6%)		
Obesity	114 (31.9%)	62 (28.4%)	52 (37.4%)		
Age					
18-22	65 (18.2%)	40 (18.3%)	25 (18.0%)	8.199	0.042
23-31	103 (28.9%)	58 (26.6%)	45 (32.4%)		
32-41	124 (34.7%)	87 (39.9%)	37 (26.6%)		
More than 42	65 (18.2%)	33 (15.1%)	32 (23.0%)		
Educational level					
School	17 (4.8%)	14 (6.4)	3 (2.2%)	14.660	0.005
High School	60 (16.8%)	38 (17.4%)	22 (15.8%)		
College	79 (22.1%)	58 (26.6%)	21 (15.0%)		
Bachelor	151 (42.3%)	85 (39.0%)	66 (47.5%)		
Postgraduate	50 (15.0%)	23 (10.6%)	27 (19.4%)		
Physical activity level					
Low	223 (62.5%)	153 (70.2%)	70 (50.4%)	14.302	0.001
Medium	108 (30.3%)	53 (24.3%)	55 (39.6%)		
High	26 (7.3%)	12 (5.5%)	14 (10.1%)		
Residence					
City	350 (98.0%)	215 (98.6%)	135 (97.1%)	0.996	0.438
Other (village or Badia)	7 (2.0%)	3 (1.4%)	4 (2.9%)		
Smoking					
Yes	92 (25.8%)	16 (7.3%)	76 (54.7%)	99.427	<0.0001
No	265 (74.2%)	2.2 (92.7%)	63 (45.3%)		
Chronic diseases					
Yes	73 (20.4%)	43 (19.7%)	30 (21.6%)	0.180	0.688
No	284 (79.6%)	175 (80.3%)	109 (78.4%)		
Health status assessment					
Weak	10 (2.8%)	9 (4.1%)	1 (0.7%)	3.816	0.148
Good	64 (17.9%)	37 (17.0%)	27 (19.4%)		
Excellent	283 (79.3%)	172 (78.9%)	111 (79.9%)		
Social status					
Single	128 (35.9%)	76 (34.9%)	52 (37.4%)	7.015	0.071
Married	203 (56.9%)	120 (55.0%)	83 (59.7%)		
Divorced	22 (6.2%)	18 (8.3%)	4 (2.9%)		
Widow	4 (1.1%)	4 (1.8%)	0 (0.0%)		
Sleep quality					
Weak	246 (68.9%)	159 (72.9%)	87 (62.6%)	4.240	0.039
Good	111 (31.1%)	59 (27.1%)	52 (37.4%)		
Mental Status					
Weak	127 (35.6%)	87 (39.9%)	40 (28.8%)	4.589	0.032
Good	230 (64.4%)	131 (60.1%)	99 (71.2%)		

on negative feelings [28]. Moreover, some countries, including Kuwait, are experiencing now a second wave of COVID 19 that came with new challenges. Mainly, the consequences on the mental health may arise from our need to adapt to this new reality and this study is trying to highlight the vital role of physical activity on the mental health.

The results of this study revealed on a large percentage of overweighted or obese Kuwaiti adults. Despite the fact that the sudden

appearance of the pandemic did not open the door to comparison between the data before and after the quarantine, the risk of overweight is associated with lower levels of physical activity that was proved to be lower during quarantine times [29,30]. Most of the studies referred such increase in the weight to the changes in the nutrition habits, long watching hours for the TV, changes in the work conditions and work from home, sitting for long hours and loss the motivation to move around [29,31,32,].



Although the current study revealed on a low level of smoking among the participants, some of the empirical evidence shows that COVID-19 pandemic quarantine has contributed on increasing the number of smoked cigarettes due to the leisure hours [33]. However, other studies revealed that the quarantine contributed on decreasing the number of smoked cigarettes due to the health problems and the smokers' fear of this respiratory disease [34].

This study also showed that most of the respondents suffer from weak sleep quality, which can be attributed to many factors including the changes in the sleep patterns [35]. Moreover, anxiety and fear of the disease could be other reasons [36]. Therefore, it is vital to understand such changes better as a consequence of associated concerns and fears with the pandemic [28]. Future studies in this regard should include objective measures based on validated technologies [37].

The results of this study showed that there is a significant relationship between the mental status and the level of daily physical activity. Physical activity has an essential role, particularly when taking into consideration that daily routines changes might cause an increase in inactive behaviors and increase the anxiety levels [7]. Moreover, the results of the current study showed that the mental status scores better the higher the level of physical activity where many studies showed the benefits of moderate physical activity in reducing the anxiety levels [38, 39, 40]. Physical activity could decrease the anxiety/depressive symptoms by biological and psychosocial mechanisms, including increasing neurotrophic factor (BDNF) and endogenous opioids (endorphins), improving the immune system, or promoting self-esteem [41]. Researchers [42,43] showed that physical activity was the best predictor of mental health, followed by health status. Therefore, a moderate or high physical activity level can reduce the consequences and symptoms of quarantine-induced anxiety/depression by powerful and complex systemic neuroprotective effects [44].

Finally, the results showed that there are statistically significant differences in the various variables attributed to the gender, where female participants were more affected by the quarantine compared with males. Such result can be attributed to the fact that women are more vulnerable to stress than men [45]. Gender-differences in mental status were reported during COVID-19 pandemic. Actually, studies showed that anxiety was two to three-fold higher in women compared with men during the COVID-19 pandemic [46-48].

### Limitations and future research

This study has some limitations including its dependence on the cross-sectional data where causal relationships between physical activity and mental status cannot be elaborated in a comprehensive way. Therefore, such causal relationships should be validated in the future research by applying a longitudinal design. This study was also limited by the absence of data on the variables under study before the quarantine and hence we could not compare them to find the effect of the quarantine on the variables. Future research should work on procuring previous samples or collecting data from

medical records to make this comparison possible.

Another limitation of this study is the data bias that could result from the self-report survey where future studies could apply objective methods to collect the primary data. The sample of this study was excluded to adults with 18 years old and above where adolescents and children were excluded. Future research should be focused on such samples that are more vulnerable to be mentally affected by the decrease of their social and physical activity.

### Conclusion and Recommendations

The results of this study showed that the majority of the respondents were over-weighted or obese with no statistically significant differences in the BMI between males and females. The results show also that most of the respondents report a low level of physical activity with statistically significant differences in PA levels attributed to the gender variable in favor of the males. Most of the respondents were not smokers with statistically significant differences between males and females in favor of males. The results showed also that the health status of the respondents was mainly excellent with no statistically significant differences attributed to the gender. Most of the respondents suffer from weak sleep quality with statistically significant differences attributed to the gender variable in favor of the females. The results revealed that most of the respondents reported a good mental status with statistically significant differences attributed to the gender variable in favor of the males. Finally, this study found that there is a significant relationship between the mental status and the level of daily physical activity, and it was found that the mental status scores better the higher the level of physical activity.

This study recommends making efforts toward identifying strategies to prevent mental health associated problems. Such efforts should be complied with formal declaration from the World Health Organization to declare the normal basic life style behaviors. Moreover, countries should find new solutions to open recreational facilities with minimum number of occupants assuring the social distancing policy. In this regard, awareness campaigns should be centralized for highlighting the role of exercising normal physical activity on the mental status with precautions of the negative consequences of physical inactivity.

### Acknowledgements

We would like to thank the ethics committee of the Institutional Review Board (IRB) at both the university of Jordan and Hashemite university for their approval. Besides, we appreciate Dr Laila F. Kilani for helping in the manuscript writing style and references.

### References

1. [https://www.worldometers.info/coronavirus/?utm\\_campaign=homeAdvegas1?](https://www.worldometers.info/coronavirus/?utm_campaign=homeAdvegas1?)
2. Mattioli AV, Pinti M, Farinetti A, et al. Obesity risk during collective quarantine for the COVID-19 epidemic. *Obesity Medicine*. 2020; 20: 100263.
3. Górnicka M, Drywień ME, Zielinska MA, et al. Dietary

- and lifestyle changes during COVID-19 and the subsequent lockdowns among Polish adults A Cross-sectional online survey PLifeCOVID-19 study. *Nutrients*. 2020; 12: 2324.
4. Hallal PC, Andersen LB, Bull FC, et al. Global physical activity levels surveillance progress pitfalls and prospects. *The lancet*. 2012; 380: 247-257.
  5. Lu C, Chi X, Liang K, et al. Moving More and Sitting Less as Healthy Lifestyle Behaviors are Protective Factors for Insomnia Depression and Anxiety Among Adolescents During the COVID-19 Pandemic. *Psychology research and behavior management*. 2020; 13: 1223.
  6. Hemphill NM, Kuan MT, Harris KC. Reduced physical activity during COVID-19 pandemic in children with congenital heart disease. *Canadian Journal of Cardiology*. 2020; 36: 1130-1134.
  7. Chen P, Mao L, Nassis GP, et al. Returning Chinese school-aged children and adolescents to physical activity in the wake of COVID-19 Actions and precautions. *Journal of sport and health science*. 2020; 9: 322-324.
  8. Organization WH. Stay physically active during self-quarantine. Regional office for Europe. 2020.
  9. Cao W, Fang Z, Hou G, et al. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry research*. 2020; 287: 112934.
  10. Tang W, Hu T, Hu B, et al. Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined Chinese university students. *Journal of affective disorders*. 2020; 274: 1-7.
  11. Odriozola-González P, Planchuelo-Gómez Á, Irurtia MJ, et al. Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. *Psychiatry research*. 2020; 290: 113108.
  12. Pieh C, Budimir S, Probst T. The effect of age gender income work and physical activity on mental health during coronavirus disease COVID-19 lockdown in Austria. *Journal of psychosomatic research*. 2020; 136: 110186.
  13. Maugeri G, Castrogiovanni P, Battaglia G, et al. The impact of physical activity on psychological health during Covid-19 pandemic in Italy. *Heliyon*. 2020; 6: e04315.
  14. Duncan GE, Avery AR, Seto E, et al. Perceived change in physical activity levels and mental health during COVID-19 Findings among adult twin pairs. *PloS one*. 2020; 15: e0237695.
  15. Meyer J, McDowell C, Lansing J, et al. Changes in physical activity and sedentary behavior in response to COVID-19 and their associations with mental health in 3052 US adults. *International journal of environmental research and public health*. 2020; 17.
  16. Jacob L, Tully MA, Barnett Y, et al. The relationship between physical activity and mental health in a sample of the UK public A cross-sectional study during the implementation of COVID-19 social distancing measures. *Mental health and physical activity*. 2020; 19: 100345.
  17. Cheval B, Sivaramakrishnan H, Maltagliati S, et al. Relationships between changes in self-reported physical activity sedentary behaviour and health during the coronavirus COVID-19 pandemic in France and Switzerland. *Journal of sports sciences*. 2020; 1-6.
  18. Callow DD, Arnold-Nedimala NA, Jordan LS, et al. The mental health benefits of physical activity in older adults survive the COVID-19 pandemic. *The American Journal of Geriatric Psychiatry*. 2020; 28: 1046-1057.
  19. Stanton R, To QG, Khalesi S, et al. Depression anxiety and stress during COVID-19 associations with changes in physical activity sleep tobacco and alcohol use in Australian adults. *International journal of environmental research and public health*. 2020; 17: 4065.
  20. Schuch FB, Bulzing RA, Meyer J, et al. Associations of moderate to vigorous physical activity and sedentary behavior with depressive and anxiety symptoms in self-isolating people during the COVID-19 pandemic A cross-sectional survey in Brazil. *Psychiatry research*. 2020; 292: 113339.
  21. Schaefer C, Kunz D, Bes, F. Melatonin effects in REM sleep behavior disorder associated with obstructive sleep apnea syndrome a case series. *Current Alzheimer Research*. 2017; 14: 1084-1089.
  22. Al-Hazzaa HM, Musaiger AO. Physical activity patterns and eating habits of adolescents living in major Arab cities. *The Arab Teens Lifestyle Study*. *Saudi Medical Journal*. 2010; 31: 210-211.
  23. Husby SR, Carlsson J, Mathilde Scotte Jensen A, et al. Prevention of trauma-related mental health problems among refugees A mixed-methods evaluation of the MindSpring group programme in Denmark. *Journal of community psychology*. 2020; 48: 1028-1039.
  24. WHO. Critical preparedness readiness and response actions for COVID-19 25- interim guidance. World Health Organization. 2020.
  25. Chan JFW, Yuan S, Kok KH, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission a study of a family cluster. *The lancet*. 2020; 395: 514-523.
  26. Sharma A, Pillai DR, Lu M, et al. Impact of isolation precautions on quality of life a meta-analysis. *Journal of Hospital Infection*. 2020; 105: 35-42.
  27. Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it rapid review of the evidence. *The lancet*. 2020; 395: 912-920.
  28. Morin CM, Carrier J. The acute effects of the COVID-19 pandemic on insomnia and psychological symptoms. *Sleep medicine*. 2021; 77: 346-347.
  29. Mattioli AV, Sciomer S, Cocchi C, et al. Quarantine during COVID-19 outbreak Changes in diet and physical activity increase the risk of cardiovascular disease. *Nutrition Metabolism and Cardiovascular Diseases*. 2020; 30: 1409-1417.

30. Shahidi SH, Stewart Williams J, Hassani F. Physical activity during COVID-19 quarantine. *Acta Paediatrica*. 2020; 109: 2147-2148.
31. Goethals L, Barth N, Guyot J, et al. Impact of home quarantine on physical activity among older adults living at home during the COVID-19 pandemic qualitative interview study. *JMIR aging*. 2020; 3: e19007.
32. López-Sánchez GF, López-Bueno R, Gil-Salmerón A, et al. Comparison of physical activity levels in Spanish adults with chronic conditions before and during COVID-19 quarantine. *European journal of public health*. 2021; 31: 161-166.
33. Odone A, Lugo A, Amerio A, et al. COVID-19 lockdown impact on lifestyle habits of Italian adults. *Acta Biomed*. 2020; 91: 87-89.
34. Brake SJ, Barnsley K, Lu W, et al. Smoking upregulates angiotensin-converting enzyme-2 receptor a potential adhesion site for novel coronavirus SARS-CoV-2 Covid-19 Multidisciplinary Digital Publishing Institute. 2020.
35. Becker PM. Sleep during times of coronavirus: early Chinese experience. *Sleep medicine*. 2020.
36. Di Santo SG, Franchini F, Filiputti B, et al. The effects of COVID-19 and quarantine measures on the lifestyles and mental health of people over 60 at increased risk of dementia. *Frontiers in Psychiatry*. 2020; 11.
37. Obayashi K, Kodate N, Masuyama S. Can connected technologies improve sleep quality and safety of older adults and care-givers. An evaluation study of sleep monitors and communicative robots at a residential care home in Japan. *Technology in Society*. 2020; 62: 101318.
38. Anderson EH, Shivakumar G. Effects of exercise and physical activity on anxiety. *Frontiers in Psychiatry*. 2013; 4: 27.
39. Stubbs B, Koyanagi A, Hallgren M, et al. Physical activity and anxiety A perspective from the World Health Survey. *Journal of affective disorders*. 2017; 208: 545-552.
40. Stubbs B, Vancampfort D, Rosenbaum S, et al. An examination of the anxiolytic effects of exercise for people with anxiety and stress-related disorders a meta-analysis. *Psychiatry research*. 2017; 249: 102-108.
41. Balchin R, Linde J, Blackhurst D, et al. Sweating away depression The impact of intensive exercise on depression. *Journal of affective disorders*. 2016; 200: 218-221.
42. Kilani HA, Bataineh MF, Al-Nawayseh A, et al. Healthy lifestyle behaviors are major predictors of mental wellbeing during COVID-19 pandemic confinement A study on adult Arabs in higher educational institutions. *PloS one*. 2020; 15: e0243524.
43. Al-Nawaiseh A, Kilani H, Bataineh M, et al. The relationship of the level of physical activity nutritional status and sleep quality with the mental state of citizens during the home quarantine period resulting from the Covid-19 pandemic in Jordan. Accepted for publication in *Dirasat Human and Social Sciences* accepted for publication on. 2021.
44. Xiang MQ, Tan XM, Sun J, et al. Relationship of physical activity with anxiety and depression symptoms in Chinese college students during the COVID-19 outbreak. *Frontiers in psychology*. 2020; 11.
45. Sfindla A, Hadrya F. Factors associated with psychological distress and physical activity during the COVID-19 pandemic. *Health security*. 2020; 18: 444-453.
46. Casagrande M, Favieri F, Tambelli R, et al. The enemy who sealed the world Effects quarantine due to the COVID-19 on sleep quality anxiety and psychological distress in the Italian population. *Sleep medicine*. 2020; 75: 12-20.
47. Özdin S, Bayrak Özdin Ş. Levels and predictors of anxiety depression and health anxiety during COVID-19 pandemic in Turkish society The importance of gender. *International Journal of Social Psychiatry*. 2020; 66: 504-511.
48. Wang C, Zhao H. The Impact of COVID-19 on Anxiety in Chinese University Students. *Front Psychol*. 2020; 11: 1168.
49. Di Renzo L, Gualtieri P, Pivari F, et al. Eating habits and lifestyle changes during COVID-19 lockdown an Italian survey. *Journal of translational medicine*. 2020; 18: 1-15.