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Research Article / Araştırma Makalesi

Effects of COVID-19 on physical activity and mood in the middle-aged people: Concerns and strategies

Orta yaşlı kişilerde COVID-19'un fiziksel aktivite ve duyguduruma etkisi: Endişeler ve stratejiler

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ABSTRACT

Objective: To assess the impact of coronavirus on the physical activity levels before and during self-quarantine, and the effect of self-isolation on the total mood status of Iranian citizens during the covid-19 pandemic.

Material and Methods: A national sample of 2359 middle-aged (M age=42.8±5.3 years, n=1183,50.1%, male; n=1148, 48.7% female) Iranian completed an online questionnaire that assessed changes in daily physical activity behavior and mood status from March 20th to April 20th, 2020. The questionnaire implemented to collect the total duration, intensity, and frequency of physical activity and their psychological mood condition via the BRUMS Mood Scale.

Results: There were significant differences between physical activity frequency, duration, and intensity before and during the coronavirus pandemic. There was no significant difference between the total mood conditions between the sex categories. The main key finding of the current study is that the total physical activity participation behavior of our middle-aged populations has decreased meaningfully.

Conclusion: The present study has provided important approaches that should be implemented to promote the engagement of middle-aged adults in physical activity. Therefore, based on scientific evidence, maintaining a regular physical activity routine regarding world health organization guidelines is a key strategy for physical health.

Keywords: *Physical activity, health protection, psychological mood, COVID-19*

ÖZ

Amaç: COVID-19 salgını sürecinin karantina öncesi ve sırasında fiziksel aktivite düzeyleri üzerindeki ve kişisel izolasyonun İran vatandaşlarının duygudurumları üzerindeki etkisini değerlendirmektir.

Gereç ve Yöntem: 2359 orta yaşlı İranlı ulusal bir örneklem (Ortalama yaş = 42,8 ± 5,3 yıl, n = 1183, %50,1, erkek; n = 1148, %48,7 kadın), günlük fiziksel aktivite davranışındaki ve ruh hali durumu değişikliklerini değerlendiren çevrimiçi bir anketi 20 Mart-20 Nisan 2020 arasında tamamladı. Anket, fiziksel aktivitenin toplam süresi, yoğunluğu, sıklığı ve "BRUMS Mood Scale" ile duygudurumlarını değerlendirmek üzere uygulandı.

Bulgular: COVID-19 pandemisi öncesinde ve sırasında fiziksel aktivite sıklığı, süresi ve yoğunluğu arasında önemli farklılıklar vardı. Ayrıca, cinsiyet kategorileri arasında duygudurum açısından anlamlı bir fark yoktu. Bu çalışmanın ana bulgusu, orta yaşlı popülasyonun toplam fiziksel aktiviteye katılımının anlamlı bir şekilde azalmasıdır.

Sonuç: Bu çalışma, orta yaşlı yetişkinlerin fiziksel aktiviteye katılımını teşvik etmek için uygulanması gereken önemli yaklaşımlar sağlamıştır. Bu nedenle, bilimsel kanıtlara dayalı olarak, dünya sağlık örgütü yönergelerine göre düzenli bir fiziksel aktivite rutini sürdürmek, fiziksel sağlık için çok önemli bir stratejidir.

Anahtar Sözcükler: *Fiziksel aktivite, psikolojik duygudurum, sağlığın korunması, COVID-19*

INTRODUCTION

The novel coronavirus disease 2019 (COVID-19) was diagnosed in December 2019 in the city of Wuhan, China, and it has swept across the world (1). COVID-19 is an infectious disease caused by acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and was classified as a global pandemic by the World Health Organization (WHO) (2). This has led to initiate the closing of most non-essential business services and nationwide lockdowns in countries all over the world

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(3). In addition, people were requested to obey social distancing, which is described as maintaining a distance of at least 1 m between with other people, avoiding crowded places and non-essential gatherings of more than 10 people, and restricting to meet older people or those in poor health (4-6). Consequently, changes in national behavioral patterns and closings of usual day-to-day functioning have occurred. Therefore, COVID-19 pandemic has already built unique challenges all over the world in terms of economy, social interactions, and individual lifestyles that require further investigation (7).

This dramatic change in lifestyle is characterized by physical inactivity, and sedentary behavior that are related to poor physical and mental health as well as increased all-cause mortality risk (3, 8-10). In the context of the COVID-19 pandemic, unwitting consequences may be a reduction in habitual physical activity and an increase in sedentary lifestyle behavior, owing to self-isolation and quarantine conditions that have reduced opportunities to remain physically active (11). The coronavirus pandemic acts as a considerable challenge to human health, particularly to exposed elderly people. The death rate in the patients over 60 years old was higher than other age groups (12). The benefits of physical activity and exercise have been demonstrated over the lifespan, human body works better when consistently physically active (3, 8, 9). Physical activity is defined as any bodily movement performed by skeletal muscles that demand energy expenditure (9, 13). WHO recommends that adults aged 18-64yrs should do at least 150 minutes of moderate-intensity aerobic physical activity or at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate and vigorous intensity activity (14). Physical activity includes walking, dancing, gardening, hiking, sports, and cycling in the context of daily, family, and community activities (13) . Regular physical activity is a key health behavior from a public health perspective, as it has a remarkable impact on the level of cardiorespiratory and muscular fitness, as well as mental health, specifically reduced anxiety (15). Hence, remaining physically active during the COVID-19 pandemic seems to be vital for physical and mental health since it can improve wellbeing and mood levels by helping to reduce stress, anxiety and depression (16). In addition, physical activity is related to mood and previous research has shown that moderate exercise can improve mood or help maintaining it at high level. 30 minutes of moderate or 15 minutes of moderate-vigorous physical activity per day was associated with a lower probability of depression and anxiety among Brazilian adults during COVID-19 pandemic (17).

Therefore, the present study aimed to investigate the effects of COVID-19 pandemic on daily physical activity behavior and total mood disturbance in Iran.

MATERIALS AND METHODS

Design and participation

This study has been designed as a descriptive cross-sectional online survey questionnaire (Figure 1). In order to be involved in the study, participants had to be over the age of 35, and were recruited through snowball sampling. The online survey was delivered through social media such as Instagram as well as regular media communications including stories in national and local media. Furthermore, via WhatsApp and e-mails, it was shared with the personal contacts of the research group members and the university students. This study was conducted from March 20th to April 20th, 2020. This survey evaluated several self-reported domains of their behavior and emotions towards the confinement period of COVID-19. All subjects engaging in the online questionnaire gave their informed consent before participation and they were informed that they could withdraw from the study at any time. This study received approval from the human research ethics board at the SSRI (IR.SSRC.REC.1399.070).

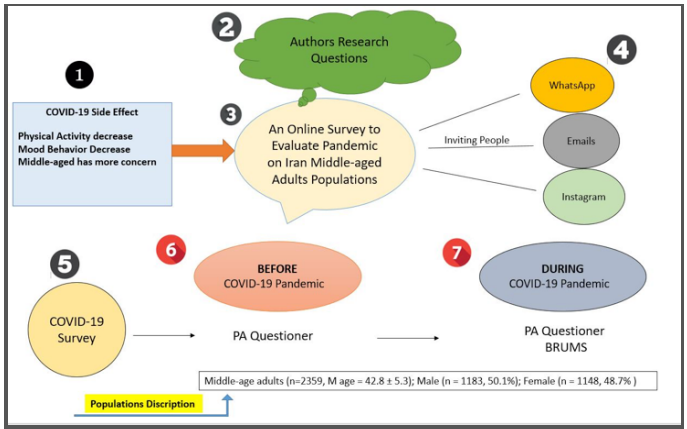

Figure 1. Research method and collecting data study design

Subjects were selected by convenience sample method by constructing a group of people who volunteered to participate. A total of 2359 Iranian of different social, city, culture classes and levels of education completed the online form questionnaire over a period the 30 days during COVID-19 emergency (Table 1). 1183 men, 50.1% (43.1 ± 5.3 years old), and 1148 women, representing 48.7% (42.3 ± 5.3 years old) of the total sample were involved.

The online questionnaire included three groups of questions: a) questions regarding demographic and socioeconomic data, b) questions regarding physical activity level and

c) questions regarding mood through the Brunel Mood Scale (BRUMS).

Table 1. The COVID-19 cases reported from provinces of Iran from 15 February 2020 to 22 March 2020

Number	Province	Population	Number of coronavirus cases	Number of Participations
1	Alborz	2,712,400	1196	28
2	Ardabil	1,270,420	287	19
3	Bushehr	1,163,400	60	4
4	Central Khorasan	6,434,501	880	78
5	Charmahal va Bakhtiari	947,763	70	100
6	East Azarbaijan	3,909,652	810	86
7	Esfahan	5,120,850	1976	51
8	Fars	4,851,274	500	19
9	Golestan	1,868,619	400	56
10	Guilan	2,530,696	1187	54
11	Hamedan	1,758,268	240	52
12	Hormozgan	1,776,415	118	53
13	Ilam	580,158	180	12
14	Kerman	3,164,718	170	128
15	Kermanshah	1,952,434	180	274
16	Khuzestan	4,710,509	450	195
17	Kohgilouyeh va Bouirahmad	713,052	70	84
18	Lorestan	1,760,649	480	80
19	Markazi	1,429,475	880	115
20	Mazandaran	3,283,582	1700	50
21	North Khorasan	863,092	170	173
22	Qazvin	1,273,761	670	20
23	Qom	1,292,283	1176	45
24	Sanandaj	1,603,011	240	89
25	Semnan	702,360	630	25
26	Sistan va Balouchestan	2,775,014	127	66
27	South Khorasan	768,898	178	53
28	Tehran	13,267,637	5100	163
29	West Azarbaijan	3,265,219	397	14
30	Yazd	1,138,533	719	75
31	Zanjan	1,057,461	397	57

Physical activity behavior

Physical activity questionnaire developed based on the study of Aghababa et al (18). The questions allow estimation of physical activity variables by duration (min), frequency (time/week), and intensity (low/high) of physical activity before COVID-19 pandemic and in the last four weeks during pandemic. Exercise behavior before or during the pandemic was measured with the question "How often have you exercised?" This included purposefully undertaken walks, fitness training, workouts indoor, badminton outside, football, swimming, hiking. Answers were given by marking one of the responses: "never", "once in a while", "once a week", "two days per week", "three days per week", "four days per week", "five days per week" "six days per week", or "every day". Subjects were also asked about their exercise intensity whether their exercise sessions were of low, moderate, high or very high intensity (19). Further, subjects stated the duration of physical activity during work, transportation and leisure time. Subjects were required to state activities less than 10 minutes or more than 10 minutes. The reliability and validity of this tool have been confirmed by Cho (20).

Mood status

A modified 16-item Brunel Mood Scale (BRUMS) questionnaire (short version) was used to evaluate level of positive mood (4-item) and negative mood (12-item) states (21). All subjects were asked to "describe how you felt in the last few days (under COVID-19)?" It consists a 5 items Likert scale. The total mood score was calculated from the sum of the 12 negative mood items (Angry, Worn-out, Uncertain about things, Grouchy, Hopeless, Fatigued, Annoyed, Discouraged, Exhausted, Gloomy, Weary, and Furious) and four positive (Lively, Alert, Active, Vigorous) items with a total mood score range of 0 to 64. We have used the total mood states, positive mood and negative mood scores in our analysis as an aggregated index of total mood disturbance. The BRUMS questionnaire was used because of its high validity, feasibility and it is a reliable common psychometric tool to assess an individual's mood (Cronbach's alpha: 0.90)(22). Also, the BRUMS questionnaire has validity and reliability in Iran (23).

Statistical analysis

Statistical analysis was performed using SPSS version 25 (SPSS, v.25, Armonk, NY, USA) for all analyses and the level of significance was set a priori at alpha = 0.05. Demographic characteristics have split by sex and summarized using descriptive statistics [Number (N), Means (M), Percentage (%), and Standard Deviations (SD)]. Normality of the variables was determined through the Shapiro-Wilk test, and for variables that were not normally distributed, non-parametric test was used to compare physical activity and total mood states. Wilcoxon Signed-rank test was used to assess statistical difference in the prevalence of insufficient physical activity before and during COVID-19 pandemic. The measurement of effect size r is calculated as Z statistic divided by square root of the sample size "$r = Z/(\sqrt{N})$". The magnitude of the effect sizes was judged according to the following criteria: $r = 0.10 - < 0.30$ was considered a 'small' effect size; $0.30 - < 0.50$ represented a 'medium' effect size; and ≥ 0.50 indicated a 'large' effect size and the range is between 0 to 1. Mann-Whitney-U non-parametric test was used to compare BRUMS scores between genders. Further, to assess possible correlations between total score for habitual physical activity behavior with total mood states domains during the COVID-19 pandemic, we used the Spearman's rank correlation coefficient test.

RESULTS

Descriptive statistics for subject characteristics are provided in Table 2.

Table 2. Descriptive characteristic (n = 2359)

Characteristics	
Age, mean (SD)	42.8 (5.3)
Gender Male, n (%)	1183 (50.1)
Gender Female, n (%)	1148 (48.7)
Other, n (%)	28 (1.2)
Marital Status, n (%)	
Married	1399 (59.3)
Single	180 (7.6)
Divorced	37 (1.6)
Other	743 (31.5)
Professional Education, n (%)	
Less than high school	193 (8.2)
High school	357 (15.1)
some vocational school	271 (11.5)
complete college	65 (2.8)
some graduate school	413 (17.5)
Master degree	783 (33.2)
Doctoral degree	237 (10)
Other	40 (1.7)
Employment Status, Are you currently...?	
(Before COVID-19), n (%)	
Full-time	1191 (50.5)
Part-time	234 (9.9)
Unemployed	106 (4.5)
Retired	100 (4.2)
Homemaker	373 (15.8)
Unable to work	12 (0.5)
Other	343 (14.6)
Have you lost your job recently due to pandemic?, n (%)	
No change	
Laid off	1911 (81)
Other	448 (19)
How is your living environment?, n (%)	
Urban	2125 (90.1)
Suburban	134 (5.7)
Rural	100 (4.2)
Monthly Family Income, n (%)	
High	249 (10.6)
Moderate	1224 (51.9)
Low	596 (25.2)
Not mentioned	290 (12.3)
Coronavirus Test, n (%)	
Positive	47 (2)
Negative	1449 (61.4)
Not applied	863 (36.6)
Quarantine Restrictions, n (%)	
Follow all the rules	1010 (42.8)
Do not follow the rules	16 (0.7)
Do not care about the rules	96 (4.1)
Do the best but on rare occasion deviated from them	891 (37.8)
Do the best but on rare occasion deviated from them	346 (14.7)
Are outdoor sports facilities currently closed? n (%)	
Yes	2136 (90.5)
No	223 (9.5)
Are parks currently closed where you live? n (%)	
Yes	836 (35.4)
No	1523 (64.6)

Summaries of physical activity behaviors before and during coronavirus are illustrated in Table 3. There was a significant difference between physical activity frequency (Z = -3.178, P < 0.001), physical activity duration (Z= -12.78, P < 0.001), and physical activity intensity (Z = -26.54, P < 0.001) before and during COVID-19 pandemic as shown in Table 4.

Table 3. Physical activity characteristics before and during QOVID-19 pandemic

Questiones *Variables*	Physical Activity Before Coronavirus n (%)	Physical Activity During Coronavirus n (%)
"How often did you go for a walk, for a run, play sports, exercise at home, train in a gym/club, go for a bicycle ride (etc.)?"		
Never	144 (6.1)	348 (14.8)
Once in a while	389 (16.5)	741 (31.4)
Once a week	170 (7.2)	190 (8.1)
Two times a week	296 (12.5)	242 (10.3)
three times a week	571 (24.2)	312 (13.2)
Four times a week	228 (9.7)	137 (5.8)
Five times a week	157 (6.7)	107 (4.5)
Six times a week	139 (5.9)	55 (2.3)
Every day	265 (11.2)	227 (8.6)
"How long did it take for each of these exercise sessions?"		
Less than 10 minutes	241 (10.2)	481 (20.4)
More than 10 minutes	2031 (86.1)	1688 (71.6)
"What would you say about the intensity of exercise you did?"		
Low intensity	322 (13.6)	848 (35.9)
Moderate intensity	1005 (42.6)	1092(46.3)
High intensity	840 (35.6)	210 (8.9)
Very high intensity	111 (4.7)	37 (1.6)

Table 4. Comparison of physical activity behavior before and during COVID-19 pandemic

Variables		Mean ± SD	Z score	P-value	r
Frequency	**Before**	4.2 ± 2.5	-3.178	0.001	-0.06
	During	4.4 ± 3.0			
Duration	**Before**	1.8 ± 0.3	-12.78	0.001	-0.2
	During	1.7 ± 0.4			
Intensity	**Before**	2.3 ± 0.7	-26.54	0.001	-0.5
	During	1.7± 0.6			

Note. The measurement of effect size r was calculated as a Z statistic divided by square root of the sample size "r = Z/(√N)". The magnitude of the effect sizes was judged according to the following criteria: r = 0.10 – < 0.30 was considered a 'small' effect size; 0.30 – < 0.50 represented a 'medium' effect size; and ≥ 0.50 indicated a 'large' effect size and the range is between 0 to 1.

Also, it was found that subjects who felt obliged to strictly follow the quarantine rules and recommendations have increased their physical activity frequency (Before COVID-19, mean ± SD, 4.3 ± 2; During COVID-19, mean ± SD, 4.6 ± 3.0; Z = -2.768, P < 0.001, r = -0.08) compared to subjects who didn't really care about the quarantine rules and recommendations (Before COVID-19, mean ± SD, 4.05 ± 2.7; During COVID-19, mean ± SD, 3.7 ± 3.2; Z = -0.763, P = 0.445, r = -0.07) during COVID-19 pandemic. Further, we found that, the subjects who completely followed the quarantine rules and guidelines had higher education levels (PhD, N =

103, 10.2%, Master, N = 322, 31.9%) than the subject who didn't care about the government restrictions (PhD, N = 5, 5.2%, Master, N = 29, 30.2%). Additionally, as shown in Table 5, we analyzed the condition of total mood status, positive mood, and negative mood during the COVID-19 pandemic (Total mood status; Men, 41.8 ± 11.7, M ± SD; Female, 41.1 ± 12.3, M ± SD). The analysis of total mood status shows that there is no significant difference in total mood (U = 64, P = 0.68, two-tailed), positive mood (U = 63, P = 0.48, two-tailed), and negative mood (U = 64, P = 0.75, two-tailed) disturbance between men and female during COVID-19 pandemic.

Table 5. BRUMS scores between men and female during QOVID-19 pandemic

Variables/Gender	Male (n = 1183)		Female (n = 1148)	
	n	Mean ± SD	n	Mean ± SD
Total Mood Disturbance	1158	41.2 ± 11.91	1124	40.8 ± 12.31
Positive Mood	1158	7.71 ± 3.37	1124	7.5 ± 3.48
Negative Mood	1158	33.5 ± 10.52	1124	33.2 ± 10.89
Angry	1158	2.7 ± 1.05	1124	2.6 ± 1.10
Worn out	1102	2.3 ± 1.14	1077	2.2 ± 1.22
Lively	1102	1.7 ± 1.06	1077	1.6 ± 1.08
Uncertain about things	1099	2.7 ± 1.10	1077	2.7 ± 1.12
Hopeless	1157	2.9 ± 1.15	1124	2.9 ± 1.19
Grouchy	1158	2.8 ± 1.06	1124	2.8 ± 1.06
Fatigued	1157	2.6 ± 1.10	1124	2.6 ± 1.17
Annoyed	1157	2.7 ± 1.17	1124	2.7 ± 1.24
Discouraged	1101	2.9 ± 1.14	1077	2.9 ± 1.18
Exhausted	1158	3.1 ± 1.09	1123	3.0 ± 1.13
Gloomy	1158	3.0 ± 1.10	1123	3.0 ± 1.16
Weary	1158	2.7 ± 1.09	1124	2.6 ± 1.10
Alert	1158	2.0 ± 1.10	1124	2.0 ± 1.14
Furious	1158	2.9 ± 1.08	1124	3.0 ± 1.08
Active	1158	2.0 ± 1.07	1124	2.0 ± 1.13
Vigorous	1158	2.0 ± 1.06	1124	1.9 ± 1.13

Finally, Spearman's correlation analysis showed a significant positive correlation between total mood states and physical activity duration (r = 0.09, P < 0.001), and total mood states with physical activity intensity (r = .09, P < 0.001) during COVID-19 pandemic. (Table 6.)

DISCUSSION

The COVID-19 pandemic and quarantine lead to increased sedentary behaviors, reducing regular physical activity, consequently, lead to an increased risk for physical and mental health conditions. Therefore, the limitations of access to gym and clubs (e.g., closure of indoor and outdoor sporting facilities) and side effect stress of coronavirus have reduced overall physical activity intensity and duration.

We found that subjects followed quarantine rules and government restriction guidelines had better physical activity levels compared to subjects who didn't care about the COVID-19 rules and restrictions. The subjects who followed the rules had higher education levels, as well.

Total mood states, positive mood and negative mood profile scores of female subjects were lower than men during the COVID-19 pandemic. The present study demonstrated that there were significant positive correlations between total mood states with physical activity duration and physical activity intensity during COVID-19 pandemic. It implies that having a better total mood states score can directly drive the goal of improving daily physical activity behavior (2, 7). Our results demonstrated that physical activity behavior can be related to the psychological mood status. Previous research supported the opinion that people who engaged in physical activity are happier, have greater life satisfaction, and live longer than those who do not (24).

Table 6. Correlation between physical activity variables, total mood states, and data related to living conditions during COVID-19 pandemic

Spearman's rho	1	2	3	4	5	6	7
1 Physical Activity Intensity							
2 Physical Activity Frequency	-0.04						
3 Physical Activity Duration	0.429**	0.04					
4 Employment Status	-0.078**	0.01	-0.048*				
5 Monthly Family Income	-0.03	-0.02	-0.059**	-0.279**			
6 Total Mood Disturbance	0.099**	0.01	0.094**	0	-0.074**		
7 Following Quarantine Restriction	-0.02	-0.03	0	0.02	-0.03	-0.069**	

* Correlation is significant at the 0.05 level (two-tailed).

** Correlation is significant at the 0.01 level (two-tailed).

For a large number of individuals, exercising indoors without any equipment and limited space can still be challenging (25). Therefore, there should be other options to be more physically active during lockdown. For instance, doing housework, climbing stairs, yoga, Pilates and participating exercise sessions via digital platforms and social media (3). These kind of activities are friendly and easily accessible while they do not require any expensive equipment. Previous findings indicated that reduction of daily physical activity behavior is strongly related to worse psychological mood status (11, 25-29).

The findings indicate the necessity of regular physical activity guidelines during the lockdown periods. During the COVID-19 pandemic, middle-aged adults developed greater concerns about their physical and mental health profile.

Therefore, promoting physical activity programs can be very helpful.

This study has several limitations. Because of the limited resources available and the rapid onset of the COVID-19 outbreak, the snowball sampling procedure was selected. Although our respondents were not nationwide representative of Iranian middle-aged adults, we tried to utilize the social platforms to ensure the diversity and demographic representativeness of participants. Secondly, we had no data related the total mood states before COIVID-19 pandemic to compare the total mood profile before and during the pandemic.

CONCLUSION

Quarantine in Iran caused a significant reduction in physical activity intensity and duration of middle-aged adult groups. Physical activity behaviors seem to offer protective advantages in total mood states and wellbeing.

Ethics Committee Approval / Etik Komite Onayı

The approval for this study was obtained from Sport Sciences Research Istitute, Iran (Decision no: IR.SSRC.REC.1399.070 Date: 19.08.2020).

Conflict of Interest / Çıkar Çatışması

The authors declared no conflicts of interest with respect to authorship and/or publication of the article.

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Author Contributions / Yazar Katkıları

Concept: AA, HR, MN, AB; Methodology: HR, AA,, SHS; Formal analysis, interpretation: SHS, HR; Writing original draft preparation: SHS, AT, JDK; Revising the work critically for important intellectual content: SHS, JDK,AT.

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