

*Özgün araştırma*

## **COVID-19 Pandemisi Döneminde Sağlıklı Bireylerde Fiziksel Aktivite Seviyesini Etkileyen Faktörler**

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### **Öz**

**Amaç:** Bu çalışmanın amacı; Koronavirüs-19 pandemisi sırasında 18-65 yaş arası bireylerin fiziksel aktivite seviyelerini ve bu seviyeleri etkileyen faktörleri incelemektir.

**Gereç ve Yöntemler:** Çalışmaya 18-65 yaş arası bireyler dâhil edildi. Bireyleri değerlendirmek için Uluslararası Fiziksel Aktivite Anketi kısa formu, Korona Virüs-19 Fobisi Ölçeği ve Fiziksel Aktivite Engelleri Ölçeği kullanıldı. Değişkenlerin toplam fiziksel aktivite puanını nasıl açıkladığını analiz etmek için Ki-Kare Otomatik Etkileşim Algılama Yöntemi kullanılarak yapılan bir karar ağacı modeli kullanıldı.

**Bulgular:** Yaş ortalamaları  $26,71 \pm 9,67$  olan 267 birey (199 kadın %74,53, 68 erkek %25,47) bu çalışmaya dâhil edildi. Bireylerin % 77,15'inin yeterli fiziksel aktivite seviyesine sahip olmadığı görüldü. Karar ağacı analizine göre total fiziksel aktivite skorunu en çok ayırıştırıcı faktör cinsiyetti ( $p < 0,001$ ). Erkeklerin fiziksel aktivite seviyeleri kadınlara oranla daha yüksekti. Kadın bireylerin fiziksel aktivite seviyelerinin Fiziksel Aktivite Engelleri Ölçeği Kişisel alt ölçeğine göre ayrıştığı görüldü ( $p = 0,002$ ). Kadınlar arasında daha fazla kişisel bariyer bildirenlerin fiziksel aktivite seviyeleri daha düşüktü.

**Sonuç:** Çalışmamızın sonucunda bireylerin büyük kısmının yetersiz fiziksel aktivite seviyelerine sahip olduğu, fiziksel aktivite açısından cinsiyet ve kişisel bariyerlerin en önemli belirleyiciler olduğu tespit edildi. Çalışmamız, sağlıklı bireylerin fiziksel aktivite düzeyini artırmak için iç motivasyonla ilgili faktörlere odaklanılması gerektiğini ortaya koymaktadır.

**Anahtar Kelimeler:** *Aktivite, Fobi, Pandemi, Sağlık, Sedater Yaşam.*

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*Original Research*

## **Factors Affecting Physical Activity Level in Healthy Individuals During the COVID-19 Pandemic Period**

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### **Abstract**

**Objective:** The aim of this study was to investigate the physical activity levels of healthy individuals and the factors affecting these levels during the Coronavirus-19 pandemic period.

**Materials and Methods:** Individuals between the ages of 18 and 65 were included in the study. The International Physical Activity Questionnaire–Short Form, the Coronavirus-19 Phobia Scale, and the Physical Activity Barriers Questionnaire were used to assess the individuals. A decision tree model made using the Chi-Squared Automatic Interaction Detection Method was used to analyze how the variables explain the total physical activity score.

**Results:** In this study, 267 individuals (199 females 74.53%, 68 males 25.47%) with a mean age of 26.71±9.67 were included. It was observed that 77.15% of the individuals did not have sufficient levels of physical activity. According to the decision tree analysis, gender was the factor that most differentiated the total physical activity scores of the participants ( $p<0.001$ ). Physical activity levels of men were found to be higher than women. It was observed that the physical activity levels of women differed in accordance with the Personal subscale of the Physical Activity Barriers Questionnaire ( $p=0.002$ ). Those who reported more personal barriers among women had lower physical activity levels.

**Conclusions:** It was determined that most individuals had insufficient levels of physical activity, and gender and personal barriers were the most important determinants. Our study reveals that to increase the physical activity level of healthy individuals, it is necessary to focus on factors related to internal motivation.

**Key Words:** Activity; Phobia; Pandemics, Health; Sedentary Behavior

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## **Introduction**

The first cases of Coronavirus-19 disease (COVID-19), a viral disease, were seen in People's Republic of China in December 2019 (Dwyer et al., 2020). World Health Organization announced that COVID-19 is a global pandemic on March 11, 2020 (Organization, 2020). Various countries-imposed sanctions ranging from non-mandatory recommendations to quarantine and closing workplaces in an effort to prevent the spread of the disease. Such isolation strategies and changes in daily routines may help reduce the rate of infection, while limiting access to physical activity and exercise opportunities, causing adverse health effects (Shahidi et al., 2020).

Physical inactivity (or sedentary lifestyle) is a public health problem that occurs as a result of not having adequate physical activity and causes adverse health effects (American College of Sports Medicine, 2013). Long-term physical inactivity can reduce the immune function of individuals (Brolinson & Elliott, 2007). This indicates that physical inactivity can worsen the effects of pandemics (Hall et al., 2020). On the other hand, considering the changes in daily life, it is thought that the pandemic has the potential to further affect and accelerate the inadequacy of physical activity (Hall et al., 2020).

Increases in stress and depression levels of the individuals have been reported following the measures taken to maintain social distance during previous coronavirus outbreaks (Hawryluck et al., 2004). Individuals' fear of contracting the disease, quarantine practices, stigma and having misinformation can cause chronic stress (Gao et al., 2020). Chronic stress is known to be a major immune modular and therefore directly affects the likelihood of infection (Morey et al., 2015). Chronic stress can also reduce the motivation for physical activity (Stults-Kolehmainen & Sinha, 2014). Maintaining physical activity levels during the COVID-19 pandemic can be beneficial for its positive contribution to immunity and stress management in terms of reducing incompatible health conditions (Kaushal et al., 2020).

It has been reported that the number of daily steps of individuals worldwide decreased in the period after the declaration of COVID-19 as a global pandemic (Tison et al., 2020). In the general population, the most common barriers to physical activity are indicated as insufficient time, health concerns or limitations, insufficient energy and insufficient motivation (Caviness et al., 2013). However, the factors affecting the physical activity levels during the pandemic have not been adequately studied yet. The aim of this study was to investigate the physical activity levels of Turkish adults during the COVID-19 pandemic period and determine

the relationship between environmental, social, and personal factors and physical activity levels of individuals.

### **Materials and Methods**

The universe of this cross-sectional study was created from living in various cities of Turkey between 18-65 years of age. Individuals with (a) any disease affecting the musculoskeletal system, (b) walking problems or neurological diseases that affect balance, (c) cardiovascular, orthopedic, rheumatic diseases, or any additional problem that may prevent them from doing physical activity, (d) pregnant women, (e) individuals who had Coronavirus infection, (f) individuals with a body mass index of 35 kg/m<sup>2</sup> and above and (g) individuals who did not want to participate in the study were not included in the study. For the study to be carried out, approval was received from Sivas Cumhuriyet University Non-Interventional Clinical Research Ethics Committee (Decision Number: 2020-07/08, Date: 08.07.2020). Permission has been obtained from the Ministry of Health to conduct the study. This study was performed in line with the principles of the Declaration of Helsinki.

Demographic information of individuals (age, gender, height, body mass, background) were questioned. The Turkish adaptation of the International Physical Activity Questionnaire–Short Form (IPAQ-SF) was used to determine the physical activity levels of individuals (Craig et al., 2003; Saglam et al., 2010). The Short Form consists of four sections and seven questions that question the last seven days. The form asks questions about the period of time spent during sitting, walking, moderate and vigorous activities and their frequency of these activities performed in the last seven days. Physical activity levels were categorized as those not physically active (less than 600 MET-minutes in a week), those with low physical activity level (600-3000 MET-minutes in a week) and those with adequate physical activity level (more than 3000 MET-minutes in a week). IPAQ-SF has sufficient test-retest reliability and criterion validity in healthy adults (Craig et al., 2003).

Individuals' fears associated with the COVID-19 pandemic were evaluated using the Coronavirus-19 Phobia Scale (The C19P-S) (Arpaci et al., 2020). The C19P-S is a 5-point Likert-type self-assessment scale developed for measuring the phobia that can develop against the coronavirus infection. The scale consists of 20 items that are evaluated between 1 “Strongly Disagree” and 5 “Strongly Agree”. The tool consists of four subscales as Psychological Subscale, Psycho-somatic Subscale, Social Subscale, and Economic Subscale. Subscale, scores are calculated by adding the points of the answers given to the items of that subscale, while the

total C19P-S score is calculated by adding the points of the subscale scores and ranges between 20 and 100 points. Higher scores indicate higher subscales and general corona-phobia. The tool has preliminary evidence of validity and reliability (Arpaci et al., 2020).

The barriers of individuals related to physical activity were assessed with the Turkish version of the Physical Activity Barriers Questionnaire (PABQ) (Yurtçiçek & Şahin, 2018). This questionnaire was created to identify situations that are seen as a barrier to physical activity. These items are divided into three areas as Personal, social environment, and physical environment. Personal contains 15 items, while social environment contains 4 items, and physical environment contains 5 items respectively. It is a 5-point Likert-type scale (1 to 5 between strongly disagree and strongly agree) and comprises 24 items originally. As a result of the item analysis in the Turkish adaptation study, item 8 and item 22, which showed a low correlation with the whole questionnaire, were removed from the questionnaire. The questionnaire consists of 22 questions. In our study, we used the Turkish version of the questionnaire consisting of 22 items (Personal:14 items, Social environment: 3 items, Physical environment: 5 items). All items in the questionnaire are positive statements, and high scores mean they are likely to create barriers. It has been reported that the questionnaire is a valid and reliable questionnaire for evaluating situations that prevent physical activity (Yurtçiçek & Şahin, 2018).

A web-based online inquiry form containing the above-mentioned questionnaires was created for the study. As it may be difficult to reach the participants during the pandemic period, online form was preferred instead of hard copy. Online form was preferred also because it is easy to apply, cost-effective, minimum time consuming, easily accessible by the participants and environmentally friendly. Simple random sampling was performed in the study, the study data was collected by announcing the link of the prepared online form via social media channels, e-mail, and WhatsApp groups. The survey took justly about 20-25 minutes to be finished. Only the data of the volunteers, who approved the written informed consent form detailed at the beginning of the inquiry form, were used in the study. The data were collected from July to August 2020.

### **Statistical Analysis**

The statistical analyses were performed using the Statistical Package for Social Sciences (IBM SPSS Statistics for Windows Version 22.0, IBM Corp, Armonk, NY, USA) software. The normality of the variables was examined using the Kolmogorov-Smirnov Test. In descriptive analyzes of continuous variables median and interquartile range (IQR) were used.

The Spearman Rank Correlation Coefficient was used to determine the relationship between the COVID-19 pandemic-related fear, physical activity barriers and physical activity levels. The error level was taken as 0.05.

The total physical activity scores of the individuals were taken as dependent variables and independent variables that could explain the total physical activity scores were analyzed. Independent variables that can affect the dependent variable were determined as age, gender, education level, marital status, working status, population of the home, smoking habit, body mass index, physical activity barriers and coronavirus phobia.

A decision tree model made using the Chi-Squared Automatic Interaction Detection (CHAID) Growing Method was used to better analyze how the variables explain the Total Physical Activity Score (Milanović & Stamenković, 2016). The CHAID analysis is a technique that specifies the relation between the variables and shows the results in the shape of a tree. This analysis separates the data into homogeneous sub-groups that describe the dependent variable in the best way. The analyze begins with choosing the predictor that best specifies the dependent variable and then divides the data set into the nodes (parent node). Afterward, the system divides the new nodes into child nodes. When finding out if the grouping of the variables is accurate or not, the analysis uses the Bonferroni adjusted p value. All variables included in the study were inserted into this model. The level of significance was set to  $\alpha=0.05$  for all analyzes. The number of parent nodes was set as 50 and, children nodes was set as 10.

## **Results**

There were 302 responses to the online evaluation form prepared for this study. However, individuals who completed the questionnaire multiple times (n=18), had deficiencies in their data (n=11) and had a disease that would prevent them from doing physical activity (n=6) were removed from the study. Two hundred and sixty-seven individuals (68 men, 199 women) were included in the study. Individuals aged between 18-65 years were at the mean age of  $26.71\pm 9.67$  years. Only 22.84% of the participants included in the study were showing sufficient level of physical activity. 49.81% of the cases had a low level of physical activity, while 27.34% of them were not physically active. Table 1 shows the sociodemographic characteristics of the individuals participated in the study. Descriptive statistics about physical activity level, the Coronavirus-19 Phobia and Physical Activity Barriers presented in Table 2.

**Table 1.** Sociodemographic characteristics of the participants and study variables

		<b>Frequency</b>	<b>Percentage</b>
<b>Gender</b>	Female	199	74.53
	Male	68	25.46
<b>Marital Status</b>	Single	195	73.03
	Married	72	27.96
<b>Education level</b>	Primary/secondary	7	2.62
	High School Graduate	116	43.44
	Some Collage Graduate	19	7.11
	Bachelor	97	36.32
	Postgraduate education (Master / Doctorate)	28	10.48
<b>Working Status</b>	Working	88	32.95
	Not Working	179	67.04
<b>Smoking Habit</b>	Yes	37	13.85
	No	230	86.14
<b>Number of people in the household</b>	1 (individual lives alone)	53	19.85
	2	51	19.10
	3	83	31.08
	4	54	20.22
	5 or more	26	9.73
<b>Physical Activity Level</b>	Not physically active	73	27.34
	Low physical activity	133	49.81
	Adequate physical activity	61	22.84

**Table 2.** Descriptive statistics about physical activity level, the Coronavirus-19 Phobia and Physical Activity Barriers.

	<b>Median</b>	<b>Quartile 1 (25%)</b>	<b>Quartile 3 (75%)</b>
<b>IPAQ-SF Total Physical Activity Score</b>	1236.00	534.00	2715.75
<b>2. PABQ Personal Subscale</b>	31.50	26.00	36.00
<b>3. PABQ Social Environment Subscale</b>	8.00	6.00	9.00
<b>4. PABQ Physical Environment Subscale</b>	12.00	10.00	16.00
<b>5. PABQ Total Score</b>	52.00	44.75	58.00
<b>6. The C19P-S Psychological Subscale</b>	19.00	15.00	24.00
<b>7. The C19P-S Psycho-somatic Subscale</b>	7.00	5.00	10.25
<b>8. The C19P-S Social Subscale</b>	13.00	10.00	16.00
<b>9. The C19P-S Economic Subscale</b>	7.00	5.00	9.00
<b>10. The C19P-S Total Score</b>	46.00	38.00	59.00

IPAQ-SF: The International Physical Activity Questionnaire – Short Form, The C19P-S: Coronavirus-19 Phobia Scale, PABQ: Physical Activity Barriers Questionnaire.

A negatively weak correlation was found between the total physical activity score and the PABQ Personal subscale ( $r=-0.329$ ) and the PABQ Social Environment subscale ( $r=-0.135$ ).

No relationship was found between the total physical activity level and coronavirus phobia. The results are presented in Table 3.

According to the decision tree analysis, gender ( $p<0.001$ ) was the factor that differentiated the total physical activity score the most. Physical activity levels of men were higher than women.

No other factor was detected that differentiated the physical activity levels of male individuals. It was observed that the physical activity levels of women were differentiated according to the PABQ Personal subscale ( $p=0.002$ ). Those who reported more personal barriers among women had lower levels of physical activity. It was found that the physical activity levels of women, who experienced fewer personal barriers, differed according to the number of individuals living together at home ( $p=0.014$ ). The physical activity levels of women living in the same house with three or less people were lower than those living in the same house with more than three individuals. The decision tree, in which the factors affecting the physical activity level were analyzed, is given in Figure 1.

### **Discussion**

In this study, which was designed to examine the physical activity levels of Turkish adults during the COVID-19 pandemic, it was observed that the frequency of individuals with sufficient physical activity level was low, and the main determinant for the level of physical activity was gender. The level of physical activity in male participants was higher than in female participants. The most important factor related to the physical activity levels of female participants was the PABQ Personal subscale. For individuals, who reported fewer personal barriers to physical activity, the number of people living in the same house was an important determinant of physical activity. Physical activity levels were higher in women living with more than three people in the same house.

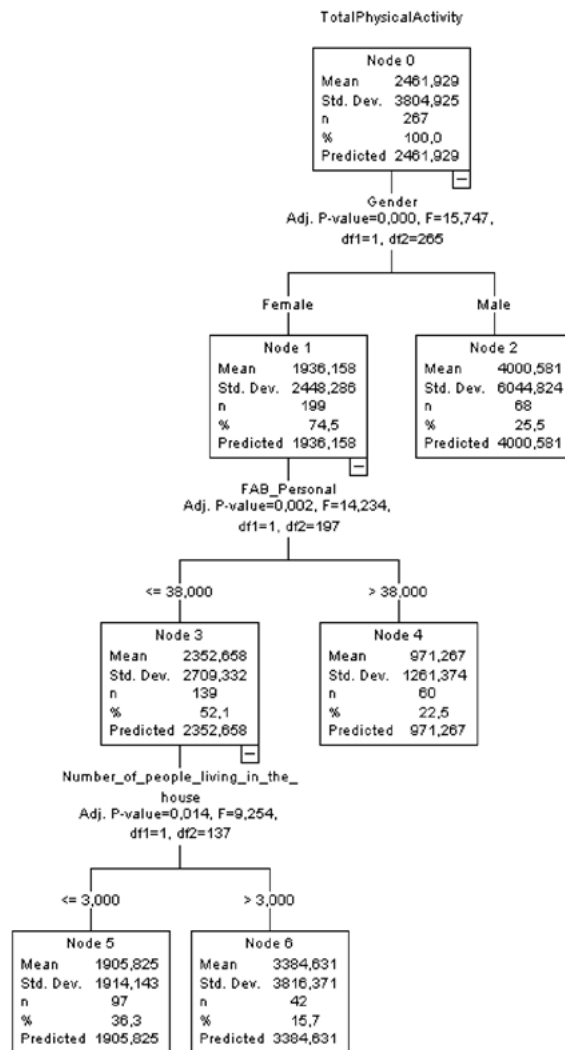
In the literature, there is varied evidence indicating that routine physical activity reduces the risk of premature death and is an effective preventive strategy for at least 25 chronic medical conditions (Warburton & Bredin, 2017). Long-term self-quarantine has been reported to pose a significant challenge to staying physically active and can adversely affect people's quality of life (Dwyer et al., 2020).



**Table 3.** Correlations between physical activity level, the Coronavirus-19 Phobia and Physical Activity Barriers.

<b>Dimensions</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>1. IPAQ-SF Total Physical Activity Score</b>									
<b>2. PABQ Personal Subscale</b>	-0.329**								
<b>3. PABQ Social Environment Subscale</b>	-0.135*	0.310**							
<b>4. PABQ Physical Environment Subscale</b>	-0.047	0.222**	0.284**						
<b>5. PABQ Total Score</b>	-0.293**	0.889**	0.567**	0.550**					
<b>6. The C19P-S Psychological Subscale</b>	-0.111	0.117	-0.028	0.055	0.109				
<b>7. The C19P-S Psycho-somatic Subscale</b>	-0.064	0.158**	0.092	0.066	0.174**	0.530**			
<b>8. The C19P-S Social Subscale</b>	-0.099	0.101	0.035	0.090	0.124*	0.751**	0.614**		
<b>9. The C19P-S Economic Subscale</b>	-0.075	0.097	0.016	0.076	0.106	0.492**	0.668**	0.575**	
<b>10. The C19P-S Total Score</b>	-0.097	0.127*	0.034	0.086	0.144*	0.876**	0.786**	0.898**	0.743**

IPAQ-SF: The International Physical Activity Questionnaire – Short Form, The C19P-S: Coronavirus-19 Phobia Scale, PABQ: Physical Activity Barriers Questionnaire.  
\*p<0.05, \*\*p<0.001



**Figure 1:** Decision Tree Model

In a study involving participants from Asia, Europe, and Africa, it was determined that COVID-19 home quarantine had a negative effect on all levels of physical and increased the daily sitting time of individuals by over 28% (Ammar et al., 2020). A study conducted in Spain reported significant decreases in both moderate and severe physical activity during COVID-19 quarantine in Spaniards with chronic diseases (López-Sánchez et al., 2020). In their study of physiotherapy professionals and students, Srivastav et al. (Srivastav et al., 2020) reported that physical activity decreased by 48% and energy expenditure decreased by 49% during the lock-down period compared to the period before the lock-down. There are no pre-pandemic data in our study. In this respect, it is not possible to compare the direct effect of the pandemic, but it is observed that cases with sufficient levels of physical activity constitute only 22.84% of all cases in our sample. Although our study was conducted at a time when compulsory home

quarantine was not applied and individuals took their own precautions, physical activity participation could be achieved more easily, the low physical activity levels of the participants seem similar to the studies in the literature. In many countries; sports facilities and recreational facilities such as gyms, swimming pools and playgrounds have been closed or rearranged to serve a small number of individuals in order to ensure social distance and hygiene conditions (Hammami et al., 2020; Parnell et al., 2020). In other words, even though there was no mandatory quarantine, the pandemic is likely to have negative effects on physical activity levels of individuals.

According to the research conducted before the pandemic, physical activity is influenced by a complex demographic interaction. In a study conducted on individuals between the ages of 18-69 in Colombia, factors such as socioeconomic status, marital status, education status and self-health perception were determined as predictors of barriers to physical activity (Herazo-Beltrán et al., 2017). On the other hand, Sharifi et al. (Sharifi et al., 2013) reported that the most important barrier to physical activity are the lack of time, which is among the external barrier, and the lack of motivation, which is among the internal ones.

The internal and external barriers have been defined in many studies. Internal barriers are related to the personal motivates of individuals as opposed to external barriers that refer to construction in regions and communities (Lovell et al., 2010; Pan et al., 2009). It was reported that motivational internal barriers are dominant in developed countries, while barriers to physical activity are associated with environmental factors in developing countries (Sharifi et al., 2013). Furthermore, Herazo-Beltrán et al. (Herazo-Beltrán et al., 2017) concluded that the lack of motivation and lack of time are identified as the most common barriers to physical activity in adults. It has been revealed that the enjoyment from physical activity in healthy adults also affects the individuals' ability to participate in physical activity (Lewis et al., 2016).

When the variables analyzed with the decision tree in our study, it was seen that the factor that caused the most difference in terms of physical activity during the pandemic period was gender and that men were more active than women. In many studies conducted before the pandemic, it is reported that the physical activity levels of men are higher than women (Numanoğlu-Akbaş et al., 2020, Hamrick et al, 2013, Bassett et al., 2010). It has been discussed that the difference between the physical activity levels of men and women may be a result of social gender norms and lifestyle.

The determination of the PABQ Personal subscale as the most important determinant after gender shows that personal factors have a greater effect on the level of physical activity

than external factors during the Covid-19 pandemic period. Furthermore, in our study, it was observed that women living in the same house with more than three people had higher levels of physical activity than those living with less people. This may be related to the fact that women in traditional Turkish family structure take a greater role in cooking, housekeeping and caring for other family members.

People often experience feelings such as fear and panic during pandemics. Severe Acute Respiratory Syndrome, Middle East Respiratory Syndrome, Zika and Ebola had severe adverse effects and that pandemics caused fear and anxiety disorders, and increased stress levels of individuals (Arpaci et al., 2020). This may be another source of limitation of physical activity. Fear of infection can create an environment that reduces the level of physical activity (Pinto et al., 2020). In this study, we hypothesized that the fear of infected by coronavirus during the pandemic period may influence physical activity levels and negatively affect participation in physical activity. However, in the present study, it was found that coronavirus phobia was not one of the factors affecting the total physical activity level. This may be because very few participants were infected during the process of collecting the data. Only 1.1% of the cases in our sample stated that they or individuals living in the same house had the infection, and 27.34% of them were those who had Coronavirus infection in their extended family members or friends. The fact that the disease is not experienced in a concrete way may cause the individuals not to reflect on their behaviors. Furthermore, the fact that the individuals have adapted to the situation because 4 months have passed since the beginning of the pandemic and the absence of mandatory quarantine in our country at the time of the data collection may explain the absence of a relationship between coronavirus phobia and physical activity levels.

As in pre-pandemic periods, it has been observed that physical activity barriers are related to personal factors. In this sense, it is necessary to develop methods that can be used to gain the habit of physical activity and to ensure its continuity in future studies and to reduce the personal physical activity barriers of individuals with remote access.

### **Limitations**

In this study, since it is difficult to reach individuals one-to-one under pandemic conditions, the data related to the level of physical activity were questioned with online self-report questionnaires, which could potentially affect the accuracy of the data or cause a self-reporting bias. In future studies, it will be useful to evaluate physical activity more objectively with tools such as phone applications and accelerometers. Furthermore, the analyses were

cross-sectional and therefore it was not possible to find out the changes in physical activity over the entire pandemic period.

As a result of our study, it was determined that the majority of individuals between the ages of 18-65 had insufficient levels of physical activity during the COVID-19 pandemic. Gender and personal barriers were found to be the most important determinants in terms of physical activity. Therefore, it is necessary to investigate more behavioral change methods that can be used to minimize personal barriers and to reach more individuals with online applications in a short time.

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### **Conflicts of interest**

The authors report no conflict of interest.

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None.

### **Ethics approval**

Approval was received from Sivas Cumhuriyet University Non-Interventional Clinical Research Ethics Committee (Decision Number: 2020-07/08, Date: 08.07.2020).

### **Declaration of Author Contribution**

Concept –Concept – A.N.A., S.S.K.; Design – A.N.A., S.S.K.; Supervision – A.N.A., S.S.K.; Resources – A.N.A., S.S.K.; Materials – A.N.A., S.S.K.; Data Collection and/or Processing – A.N.A., S.S.K.; Analysis and/or Interpretation – A.N.A.; Literature Search – A.N.A., S.S.K.; Writing Manuscript – A.N.A., S.S.K.; Critical Review – A.N.A., S.S.K.

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