

Original Research

Effect of the COVID-19 pandemic on barriers to middle-aged adults' participation in physical activity in Turkey: a cross-sectional study

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Submitted: 1 October 2021 Accepted: 15 November 2021 Published: 1 March 2022

Abstract

Background: Physical inactivity is one of the greatest problems facing the world today. The purpose of this study was to examine the level of barriers to physical activity for middle-aged adults during the COVID-19. **Methods:** Using an online survey, a sample of the Turkish population (n = 432: 48.6% female, 51.4% male; mean age 57.3 years) answered questions about sociodemographic characteristics as well as barriers to participation in physical activity during COVID-19 process. A scale of barriers to physical activity was used to determine the barriers to physical activity faced by the participants COVID-19 process. Since the data were homogeneously distributed across binary groups, independent *t*-tests and ANOVAs were performed for groups of three or more. In addition, if there were significant differences in the results of the ANOVA, Tukey's post hoc test was also applied. The data were analyzed using SPSS Version 22.0. (IBM Corp., Armonk, NY, USA). **Results:** According to the findings of this study, barriers to physical activity increase significantly as perceived health status decreases, and women's barriers to physical activity, participation are greater than those of men, and increase with age. At the same time, the strongest relationship was found for environmental factors. In addition, important results were found for the personal and social environment dimensions, and we also found that barriers to physical activity increase significantly with age. **Conclusions:** Finally, we determined that the barriers to physical activity for individuals with COVID-19 were significantly greater at the personal level compared to those who did not have COVID-19. That is the COVID-19 process negatively affected participation in physical activity.

Keywords: Adults; Community; Health promotion; Pandemic; Physical activity; Social isolation

1. Introduction

Inadequate physical activity is linked to nearly 3 million deaths per year, and to 6%–10% of the incidence of significant non-communicable diseases [1]. Inadequate levels of physical activity are correlated with the risk of developing numerous chronic diseases [2,3]. In addition to classical risk factors such as hypertension, smoking, diabetes, and hypercholesterolemia, physical inactivity has been identified as an independent factor in the development of coronary artery disease (CAD) [4,5]. Conversely, regular physical activity appears to be effective in primary prevention of CAD through modulation of classical risk factors and maintenance of endothelial function [6]. Regular physical activity is important for healthy aging, contribute to positive mental health [7], and can help retard, prevent, or manage many of the pricy and challenging many chronic diseases faced by adults [8]. Greater PA is inversely associated with coronary heart disease (CHD), stroke, and total cardiovascular disease (CVD); even in subjects >75 years of age, walking pace and exercise intensity are associated with lower risk [9]. Marquez *et al.* [10] emphasized that physical activity is effective in preventing obesity, type 2 diabetes, and heart and respiratory problems in men and women, showing why physical activity is a healthy behavior. It may also reduce the risk of moderate or severe functional

limitation and premature death in older adults [11,12]. A sedentary lifestyle is perhaps the primary cause of CVDs, which are the leading cause of death globally [13]. Studies shown that regular physical activity can reduce deaths and increase life expectancy due to its reducing effect on the risk of cardiovascular and respiratory diseases [14]. Similarly, cardiorespiratory fitness levels were inversely related to mortality, even in the presence of other determinants of cardiovascular mortality, such as hypertension, hyperlipidemia, and smoking [15].

Physical inactivity levels are increasing globally, with serious implications for increases in the prevalence of non-communicable diseases and the general health of the global population [16]. With the outbreak of coronavirus disease 2019 (COVID-19), participation in physical activity (PA) has been indirectly negatively affected all over the world [17]. COVID-19, which the World Health Organization (WHO) declared as a pandemic in 2020, has had a global effect, forcing countless individuals to stay at home. This has led to millions of people leading sedentary lives worldwide [18–20]. Older adults have more inactive lifestyles, spending an average of more than 9.4 h engaged in sedentary activities every day [21]. Approximately 20% of adults around the world lead physically inactive lifestyles in comparison to their normal daily routines before the pandemic



[22]. After weighting for the total population of every country, the global prevalence of physical inactivity is 17.4% [22]. When we look at the status of participation in physical activity in Turkey, according to the data of the Ministry of Health, the rate of sedentary lifestyles between the ages of 50 and 74 is 72.2%, while over the age of 75 it is 83.7% [23]. In addition, according to research on the risk factors for chronic diseases, 87% of women and 77% of men in Turkey do not engage in sufficient physical activity [23].

After the COVID-19 pandemic began to spread, it was affected by many factors, including an increased likelihood of serious complications, a higher mortality rate, more interruptions in their daily lives, and increased difficulties in accessing care, especially among older adults [24–27]. At the same time, when the first case of COVID-19 was seen in Turkey, social restrictions began to be implemented. The group most affected by these social restrictions has been the elderly; social isolation precautions especially for older adults who are not very involved in business life have negatively affected these individuals in many areas. Adult populations categorized as middle-aged individuals aged 50–64 and older adults aged 65–70 years [28]. PA plays an important role in adult [29]. Several reviews examining health promotion and interventions for adults [30,31]. For the purpose of behavior preventive lifestyle campaigns, it is important to identify motivators and barriers for adults to participate in PA [32]. In a study by Robinson *et al.* [33], a large number of participants reported negative changes to their physical activity behavior during the COVID-19 lockdown. Overall, age-related decrease in rates of physical activity and sedentary life among adults are alarming, given that physical activity reduces the risk of death as well as many chronic diseases. Physical activity is defined as activities that can be done at different intensities in our daily life, which include energy expenditure by using our muscles and joints, increase heart and respiratory rate, and result in fatigue [34]. Additionally PA is associated with beneficial effects on functional limitations, disability [35], and quality of life in older adults [36,37], and represents a primary component of healthy and successful aging. Participation in PA is a complex and dynamic process, affected by various factors. In fact, it is conceivable that the motivators and barriers for physical activity would be different for elderly participants and younger participants due to their specific needs. For younger (18–30 years old), entertainment, weight management and social interaction were the main reasons for participation in physical activity, while for middle-aged adults (30–60 years), a sense of accomplishment, health benefits, enjoyment were identified as motivating [32]. For adults aged 60 and over, social support, health benefits, and entertainment were identified [32]. The major barriers to physical activity were inadequate guidance and lack of role models, high costs, access to sports facilities and unsafe environments [38].

Social isolation of older adults as part of COVID-19 measures has led to many of them leading sedentary lives. In addition, the restrictions for the middle-aged and older population in Turkey were carried out more than the young population, the long-term closure of the gyms only exposed the older population to more social restrictions. In addition to functional limitations in adults, there are various factors that affect participation in physical activity. In this context, it is of great importance to determine what will increase participation in physical activity in the future in order to reduce the barriers to participation in physical activity and improve the quality of life of older individuals. In a study conducted by Booth *et al.* [39] in Australia, the most frequently expressed barriers to participation in physical activity among older adults were the same, while percentage differences were found. The same study found that there were changes in the percentages of barriers to participation in physical activity depending on age. Therefore, although the oldest age group examined in the literature on disability is predominantly defined as “70 years and older”, it seems reasonable to examine disability by both sex and age group [39,40].

According to our literature review, there are very few international studies [41] and no studies in Turkey investigating the factors that prevent physical activity in adults over 50 years of age separately by age and sex group, especially in the wake of the COVID-19 lockdown. We hypothesize that the physical activity participation barriers to middle-aged adults’ during the COVID-19 process increased significantly. In this context, the purpose of this study is to examine barriers to physical activity faced by middle-aged adults following the COVID-19 lockdown.

2. Materials and methods

2.1 Study design

A quantitative methodology was used in the research, comprising a descriptive scanning model, which is a generalized scanning design, in line with the purpose described in [42]. A simple random sampling method was used in the data collection process. After all participants reading the information form about the research, the volunteers filled out an online survey.

2.2 Participants

The research group of this study consisted of 432 middle aged adult individuals in Turkey. Eligibility criteria were: aged 50 years or above, fluent in Turkish, current TR resident, and not having any mental or chronic illness that prevents engagement in physical activity. Participants were recruited via online advertisements (e.g., social media) targeted at retirement associations and e-mailing lists. After reading the information form about the research, the volunteers filled out an online survey. Participants who wanted to withdraw from the study could do so without completing the survey.

2.3 Data collection method

The data collection method consisted of two parts: The first part was the personal information form, which consisted of questions about sex, age, COVID-19 status, self-perception of health status before COVID-19, self-perception of health status at present (during the COVID-19 pandemic), and the frequency of physical activity.

In the second part, a 5-point Likert-type scale consisting of 3 dimensions and 22 items developed by Yurtçiçek *et al.* [43] was used; the scale's subdimensions were personal (14 items), social environment (3 items), and physical environment (5 items). In the personal dimension of the measurement tool, the item "I am too lazy to do physical activities" had the highest score. In the social environment dimension, the item with the highest score was "I don't have friends with whom I can do physical activities". In the physical environment subdimension, the item with the highest score was "hot or rainy days prevent me from doing physical activity". Cronbach's alpha was used to ascertain the reliability level of the scale. While the Cronbach's alpha reliability coefficient was 0.90 for the total scale, this value was calculated as 0.83 for the "Personal" dimension, 0.90 for the "social environment" dimension, and 0.86 for the "physical environment" dimension. Cronbach's alpha results between 0.80 and 0.91 can be considered reliable.

2.4 Statistical analysis

A descriptive survey model was used in this study. Cronbach's alpha analysis was performed to ascertain the reliability of the study. Since the data were homogeneously distributed across binary groups, independent *t*-tests and ANOVAs for groups of three or more were analyzed using SPSS 22 Version 22.0. (IBM Corp., Armonk, NY, USA). In addition, if there was a significant difference in the results of the ANOVA, Tukey's post hoc test was also applied.

2.5 Ethics

The study approved by the Kirikkale University Social and Human Sciences Research Ethics Committee in accordance with the Declaration of Helsinki. Informed consent was obtained from all of the participants before they enrolled in the study (protocol code 27/107 and date of approval 2021).

3. Results

In order to control the homogeneity of the sample group in the research findings, the results of kurtosis and skewness were examined. Since these results are in the range of $-2 + 2$ in adults' attitudes towards barriers to physical activity and their subdimensions, we can conclude that our data are distributed homogeneously.

Table 1 lists participant demographics by sex. Of the participants, the largest groups were men (51.4%), those aged 50–54 (41.2%), those without COVID-19 (75.7%), those who perceived their health status to have been moderate during the COVID-19 lockdown (39.8%), those who perceived their health as being moderate after the COVID-19 lockdown (41.9%), and those whose frequency of participation in physical activity was occasional (49.5%).

erate during the COVID-19 lockdown (39.8%), those who perceived their health as being moderate after the COVID-19 lockdown (41.9%), and those whose frequency of participation in physical activity was occasional (49.5%).

Table 2 presents the results of the independent *t*-test carried out on the answers given by the participants to the Likert-type scale described in Section 2.3, according to which it was determined that there was a significant difference in the sex variable. Considering the average scores, it was concluded that women face more barriers to physical activity than men in all three subdimensions ($p < 0.05$).

To explore intergroup differences based on age, a series of Tukey's post hoc tests were conducted whenever a significant intergroup difference was found. Table 3 shows that a significant difference was found in the personal and social environment subdimensions. According to the results of this difference, in the personal and social environment subdimensions, it was determined that the participants over the age of 60 faced more barriers to physical activity than the individuals between the ages of 50 and 59. In addition, in the personal and social environment subdimensions, it was concluded that the participants over the age of 65 faced more barriers to physical activity than the participants between the ages of 60 and 64. In the physical environment subdimension, it was concluded that the age variable did not affect the barriers to physical activity.

Table 4 presents the results of independent *t*-tests on COVID-19 status. When the results were examined, it was determined that having COVID-19 had a significant effect on the personal subdimension of the barriers to physical activity scale. When the personal subdimension results were examined, it was determined that the barriers to physical activity faced by the participants who had COVID-19 were higher. In the social environment and physical environment subdimensions, it was concluded that catching COVID-19 did not have a significant effect on barriers to physical activity.

To explore intergroup differences based on participants' self-perceived health status during the COVID-19 lockdown period, a series of Tukey's post hoc tests were conducted whenever a significant intergroup difference was found. Table 5 shows that there were significant differences in all three subdimensions, wherein it was determined that individuals with poor self-perceived health status during the COVID-19 closure period faced more barriers to physical activity than individuals with moderate and good self-perceived health status. In addition, it was concluded that, in all subdimensions, individuals with moderate self-perceived health status during the COVID-19 closure period faced more barriers to physical activity than individuals with good self-perceived health status.

To explore intergroup differences based on participants' self-perceived health status after the COVID-19 lockdown, a series of Tukey's post hoc tests were conducted whenever a significant intergroup difference was

Table 1. Distribution of the participants according to their answers to the questions in the personal information form.

Variable	Group	N	%	Total
Sex	Women	210	48.6	432
	Men	222	51.4	
Age	50–54 years	178	41.2	432
	55–59 years	128	29.6	
	60–64 years	56	13.0	
	65 years and older	70	16.2	
COVID-19 status	Positive	105	24.3	432
	Negative	327	75.7	
Perceived health during the COVID-19 lockdown period	Good	90	20.8	432
	Moderate	172	39.8	
	Poor	170	39.4	
Perceived health after COVID-19 closure	Good	135	31.3	432
	Moderate	181	41.9	
	Poor	116	26.9	
Frequency of physical activity	Often	72	16.7	432
	Occasional	214	49.5	
	None	146	33.8	

Table 2. T-test analysis of subdimensions of barriers to physical activity, by sex.

Scale	Sex	N	\bar{x}	SS	<i>p</i>
Personal	Women	210	2.89	0.48	0.000
	Men	222	2.60	0.55	
Social environment	Women	210	3.68	0.50	0.000
	Men	222	3.08	0.45	
Physical environment	Women	210	3.44	0.34	0.000

found. Table 6 shows that there were significant differences in all three subdimensions, wherein it was determined that individuals with poor self-perceived health status after the COVID-19 closure faced more barriers to physical activity than individuals with moderate and good self-perceived health status. In addition, it was concluded that, in all subdimensions, individuals with moderate self-perceived health status after the COVID-19 lockdown faced more barriers to physical activity than individuals with good self-perceived health status.

4. Discussion

The purpose of this study was to examine the extent of barriers to physical activity faced by middle-aged adults in the wake of the COVID-19 lockdown. The findings of this study showed a positive correlation with all subdimensions in the correlation analysis for barriers to physical activity. However, it was concluded that the strongest relationship was in the environmental dimension. According to the findings of this study, it was concluded that those in our participant group faced barriers to participation in physical

activity that increased with age. In addition, it was determined that women’s barriers to physical activity were significantly greater than men’s in all subdimensions. When the self-perceived health status of the participants after the COVID-19 lockdown is examined, barriers to physical activity increase significantly in all sub-dimensions (personal, social environment, and physical environment) as the self-perceived health status decreases. In the personal subdimension, it was determined that those with COVID-19 face significantly greater barriers to participation in physical activity than those without COVID-19. No significant differences were found in the social environment and physical environment subdimensions.

Some of the study’s results revealed that common perceived barriers to participation in physical activity included lack of time, interest, and pleasure, and some participants identified social isolation (no one to exercise with), self-esteem (lack of confidence), and fatigue as barriers to activity [44,45]. In the present study, barriers to participation in physical activity were found to increase with age, and it was determined that women’s barriers to physical activity were significantly greater than men’s in all subdimensions.

Dumith *et al.* [22] found that women and elderly people led more sedentary lives. In another study, Portale-Pino *et al.* [46] observed that as age increases, so too does the rate of physical activity especially in women; these results are similar to our findings. In another study, it was stated that women’s participation in physical activity has positive effects on their quality of life [36]. Eliminating barriers to participation in physical activity is of great importance. In our findings, the increase in the barriers to participation in physical activity with age may possibly be a result of

Table 3. ANOVA test results for subdimensions of barriers to physical activity, by age.

Variable	Years	N	\bar{x}	ANOVA	
				<i>p</i>	Tukey's test
Personal	50–54 years (1)	178	2.93	0.000	4 > 3 > 1, 2
	55–59 years (2)	128	2.98		
	60–64 years (3)	56	3.26		
	65 years and older (4)	70	3.45		
Social environment	50–54 years (1)	178	3.03	0.000	4 > 3 > 1, 2
	55–59 years (2)	128	3.08		
	60–64 years (3)	56	3.35		
	65 years and older (4)	70	3.57		
Physical environment	50–54 years (1)	178	3.23	0.842	-
	55–59 years (2)	128	3.22		
	60–64 years and older (3)	56	3.26		
	65 years and older (4)	70	3.27		

Table 4. T-test analysis for subdimensions of barriers to physical activity, by COVID-19 status.

Scale	COVID-19 status	N	\bar{x}	SS	<i>p</i>
Personal	Positive	105	3.15	0.38	0.000
	Negative	327	2.80	0.78	
Social environment	Positive	105	3.01	0.52	0.128
	Negative	327	2.99	0.49	
Physical environment	Positive	105	3.02	0.32	0.096
	Negative	327	2.96	0.47	

age-related decrease in mobility, or of the lack of environmental areas for physical activity with increasing urbanization. In a study of the benefits of and barriers to exercise in teens, in terms of benefits, participants agreed at least that “exercising increases my acceptance by others”, and most agreed that “exercising increases my level of physical fitness”. In terms of barriers, the participants mostly stated that “the places to exercise are too far” and “exercise makes me tired”, followed by “exercise is hard work for me”; conversely, the strongest disagreement was with statements such as “exercise takes too much time out of family relationships”, “my family members do not encourage me to exercise”, and “I am too embarrassed to exercise” [47]. Another study revealed that fatigue is the greatest barrier to participation in physical activity for low-income women [45]; this may be due to the long working hours and hard work of women living in low-income cities/countries. The findings of another study revealed that the most frequently reported barrier to participation in physical activity is lack of time [48]. In the findings of our study, the fact that women face more barriers to participation in physical activity may indicate that they have difficulties in finding an environment in which they can comfortably engage in physical activity, possibly due to cultural differences. As a matter of fact, in one study, it was found that sociocultural

factors pose important barriers to recommended levels of physical activity [49].

When the self-perceived health status of the participants after the COVID-19 lockdown is examined, barriers to physical activity increase significantly as the self-perceived health status decreases in all subdimensions of barriers to physical activity (Personal, Social Environment, and Physical Environment). Poor health was the most mentioned barrier in different cohorts of older adults in international studies [41,45,50–54]. Similarly, in a study by Moschny *et al.* [55], the most frequently mentioned barrier was poor health (57.7%). In addition, self-perceived poor health and low perceived physical abilities were strongly correlated with lower physical activity among older adults [56,57]. In addition to these findings, in a study conducted, it was determined that the strongest barrier to regular physical activity in adults with type 1 diabetes was the fear of hypoglycemia, and therefore it is important to provide information and support regarding hypoglycemia management [58]. In a study by Hoebeker *et al.* [45], individuals with chronic conditions such as hypertension, diabetes, obesity, or asthma, who would benefit the most from physical activity, were the least active; the women in the study expressed their belief that physical activity is tiring, hard work, and causes discomfort such as shortness of breath and heart palpitations [45]. These results may be due to misconceptions about physical activity and the lack of societal awareness about its benefits. Meanwhile, analyzes by age group found that poor health was seen as a greater barrier to physical activity for individuals over 80 years of age compared to younger age groups (71.1% vs 51.5%) [55]; this age-dependent difference was significant regardless of the participants’ sex. At the same time, in the present study, reluctance was seen as an obstacle. In another study, it was found that the rate of families directing their children to physical activity decreases with the decrease in their level of educa-

Table 5. ANOVA test results for subdimensions of barriers to physical activity, by self-perceived health status of the participants during the COVID-19 lockdown period.

Variable	Status	N	\bar{x}	ANOVA	
				<i>p</i>	Tukey's test
Personal	Good (1)	90	2.96	0.000	3 > 2 > 1
	Moderate (2)	172	3.25		
	Poor (3)	170	3.80		
Social environment	Good (1)	90	2.99	0.000	3 > 2 > 1
	Moderate (2)	172	3.45		
	Poor (3)	170	4.02		
Physical environment	Good (1)	90	3.01	0.000	3 > 2 > 1
	Moderate (2)	172	3.60		
	Poor (3)	170	3.97		

Table 6. ANOVA test results for subdimensions of barriers to physical activity, by participants' self-perceived health status after the COVID-19 lockdown.

Variable	Status	N	\bar{x}	ANOVA	
				<i>p</i>	Tukey's test
Personal	Good (1)	90	2.20	0.000	3 > 2 > 1
	Moderate (2)	172	2.81		
	Poor (3)	170	3.65		
Social environment	Good (1)	90	2.13	0.000	3 > 2 > 1
	Moderate (2)	172	2.66		
	Poor (3)	170	3.02		
Physical environment	Good (1)	135	2.01	0.000	3 > 2 > 1
	Moderate (2)	181	2.65		
	Poor (3)	116	3.26		

tion [59]. Some perceived barriers to participation in physical activity include poor self-perception of health, lack of energy for exercise, and the feeling that physical activity is hard work [45,60]. In our study, the increase in the barriers to participation in physical activity as the self-perceived health status decreases may be because the benefits of physical activity are not adequately explained. In addition, the perception that physical activity will worsen existing health problems may be one of the reasons that keep people away from physical activity.

In the personal subdimension, it was determined that those with COVID-19 face significantly greater barriers to participation in physical activity than those without COVID-19; no significant differences were found in the social environment and physical environment subdimensions. A study with similar findings to ours proved a significant decrease in moderate–vigorous PA in both male and female young adults, demonstrating that social restrictions equally affect the physical activity levels of both sexes [61]. In another study on the COVID-19 outbreak and public health restrictions, a greater proportion of inactive participants reported less physical activity, and a greater proportion of active participants reported more physical activity participation since COVID-19 [62]. In a study on the advantage of

physical activity, both the mental health scores of the physically active participants were higher and the anxiety levels of those who did physical activity in the open air were found to be lower [62]. In a study by Giustino *et al.* [63], the highest and lowest PA levels were reported by the young and the elderly, respectively, both before and during quarantine, and the overweight group showed the lowest PA levels during quarantine; that is, the authors determined that the quarantine adversely affected PA engagement, with greater effects among males and overweight participants; these results differ from our own. Regarding different age groups, children, young adults, and adults were more affected than older adults and seniors [63]. In our study, barriers to participation in PA increased with age and, in this respect, it differs from the study of Giustino *et al.* [63]. Reducing restrictions on sport and recreation significantly contributed to overall PA levels [64]. Findings from a study of the Spanish adult population showed that as a result of COVID-19 restrictions, weekly PA time was reduced by 20% [65]. This result shows that COVID-19 has exacerbated an already poor situation, given that 20% of adults worldwide already led a physically sedentary lifestyle before the pandemic [22].

Results regarding sex-related differences in the literature are inconsistent [39,41,52]. In the present study, women's barriers to participation in physical activity were greater than men's. On the other hand, cross-sectional studies consistently found that health status became an important barrier to participation in physical activity with age [39,55]. In the study of Moschny *et al.* [55], the most frequently mentioned barriers were poor health (57.7%), lack of friends (43.0%), and lack of interest (36.7%); these results are similar to those of the present study.

A key limitation of this study is that only a survey method was used. Results were obtained regarding the barriers to physical activity faced by participants; however, future intervention opportunities might have arisen if participants had been asked to identify strategies for overcoming those barriers. It would also support this study if we could evaluate the anthropometric characteristics and physical activity status of the participants.

5. Conclusions

This study provided information on barriers to physical activity faced by a large sample of middle-aged Turkish adults, representing a large population based on demographics. The purpose of this study was to critically evaluate barriers to physical activity, with the goal of discovering how to most effectively maximize physical activity in the community. Revealing significant differences between men and women and age groups, this study has implications for increasing the physical activity levels of middle-aged adults. Barriers should be taken into account and regulations should be introduced to encourage physical activity by middle-aged adults and reduce restrictions on their participation in it. With regard to environmental barriers, governments can establish facilities close to living spaces that provide easier access to physical activities. In addition, governments can develop policies to encourage physical activity in the home environment through television or digital media in extraordinary situations such as the COVID-19 lockdown period. The findings of this study also suggest that gender-specific messages may be appropriate in promoting physical activity to achieve national goals, especially given the national burden of disease associated with physical inactivity after the COVID-19 quarantine period. Barriers to participation in physical activity were identified in this study, but motivators for physical activity were not identified, and few studies on motivators have been reported in the literature; future research may aim to raise awareness of such benefits. While this study was limited an online scale methodology, it provided valuable information about middle-aged Turkish adults' perceptions of current barriers to physical activity. The results of this research will help to stop the increase in sedentary behavior and reduce the decline in physical activity levels, ensuring that the environmental, social and individual determinants of physical inactivity are addressed in practice. It will also contribute

to policy development for the removal of physical activity barriers faced by adults. For this purpose, barriers to participation in physical activity should be taken into account by physical activity professionals and managers. Critically, physical activity needs to be adapted to the characteristics and circumstances of adults. In this way, physical activity professionals will be positioned to be more effective in promoting physical activity and reducing barriers to participation in physical activity.

Abbreviations

CHD, coronary heart disease; PA, physical activity; PI, physical inactivity; WHO, world health organization; COVID-19, coronavirus disease.

Author contributions

MG and EA conceived and designed the experiments; MG performed the experiments; EA analyzed the data; MG and EA contributed reagents and materials; MG and EA wrote the paper.

Ethics approval and consent to participate

The participants have voluntarily participated in this study. The study was conducted in accordance with the guidelines of the Declaration of Helsinki, and approved by the Kırıkkale University Social and Human Sciences Research Ethics Committee (protocol code 27/107 and date of approval 2021).

Acknowledgment

We express our sincere thanks to all participants for following collected to data during the study.

Funding

This research received no external funding.

Conflict of interest

The authors declare no conflict of interest.

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