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Analysis of Physical Activity Levels of Physical Education Teachers during the COVID-19 Pandemic

Mert Aydođmuş¹, Yılmaz Yüksel², Serkan Revan³

^{1,2} Hasan Dođan School of Physical Education and Sports, Karabük University, Karabük, Turkey

³ Faculty of Sport Sciences, Selçuk University, Konya, Turkey

Correspondence: Mert Aydođmuş, Hasan Dođan School of Physical Education and Sports, Karabük University, Karabük, Turkey. E-mail: mertaydogmus@karabuk.edu.tr

Abstract

The coronavirus (COVID -19) pandemic has brought unprecedented restrictions to people's physical activities and routines. The COVID-19 pandemic may have reduced physical activity levels and increased inactivity for various reasons (e.g., closure of gyms, family time constraints, and reduced outdoor mobility). The aim of this study is to examine physical education teachers' physical activity levels during the COVID-19 pandemic period. 417 physical education teachers participated in the research, which was reached by convenience sampling. Personal information form and International Physical Activity Questionnaire (IPAQ) short form were used for data collection in the study. Mann Whitney U and Kruskal-Wallis and Spearman's correlation tests were used in the analysis of the data. When the distribution of physical education teachers participating in the study according to their physical activity (PA) levels was examined, it was found that 26.1% had low PA levels, 37.6% had medium and 36.2% had high. While 27.5% of men were in the low category, 35.3% were in the medium category and 37.3% were in the high category, it was found to be 24.9%, 39.9% and 35.2% in women, respectively. When the PA levels of the teachers were analysed according to age, years of service and body mass index (BMI) variables, there was a significant difference, but no significant difference was found in terms of gender. While there was a negative and significant correlation between total PA and years of service and age, a positive and significant correlation was found between experience and BMI and age. As a result, it can be concluded that physical education teachers continue their active lives despite the restrictions during the COVID-19 pandemic period.

Keywords: Physical Education, Teacher, Physical Activity, COVID -19

1. Introduction

Physical inactivity is a major risk factor for chronic diseases, including cardiovascular diseases, diabetes, obesity, osteoporosis, and some types of cancer (Goran et al., 2003; Haslam & James, 2005; Sowers, 2003). Lack of physical activity is also linked to premature death and shortened healthy lifespan (Katzmarzyk et al., 2003). Physical activity can be defined as all bodily movements made with skeletal muscles and expending more energy than at rest (Bouchard et al., 2012). In its simplest definition, it is the movement of the body to expend energy (Halk Sađlıđı Genel Müdürlüğü, 2019a). The American College of Sports Medicine (ACSM) and the

American Heart Association (AHA) recommend that healthy adults aged 18–65 do moderate-intensity 30 minutes of physical activity 5 days/week or vigorous-intensity 20 minutes 3 days/week, or a combination of both (Haskell et al., 2007). In highly industrialized countries, physical activity rates are decreasing rather than increasing (Brownson et al., 2005), and the emerging COVID-19 pandemic also plays a role in this. COVID-19, one of the most important epidemics in human history and the most widespread epidemic on a global scale, disrupted daily life for people living in the affected areas and affected almost every sector including health, education, workforce, transportation, finance, and cultural activities. The Covid-19 outbreak was declared a pandemic by the World Health Organization in March 2020. On March 15, 2022, 456.797.217 confirmed cases were diagnosed and 6.043.094 people died (World Health Organization, 2022). In Turkey, the total number of cases was reported as 14.565.234, and the total loss of life was 96.594 (T.C. Cumhurbaşkanlığı Dijital Dönüşüm Ofisi, 2022).

To minimize the transmission rate of COVID-19, some restrictions such as social distancing and curfew have been applied. In the first months of 2020, the COVID-19 pandemic reached its peak in many countries and almost all countries in the world implemented restrictions in March-April. Quarantine implementations have changed from country to country and city to city. In Turkey, the restrictions applied throughout the country on certain dates were later applied as weekend curfews in provinces with high number of cases. In Turkey, a 3-week full closure was implemented between 29.04 - 17.05.2021. These restrictions have affected individuals' work, education, travel, physical activity and sedentary behaviour levels (Hossain et al., 2020). Restrictions that may affect exercise behaviour include the closure of gyms and fitness clubs, as well as limited access to parks and open spaces. As a result, it has been reported that the restrictions applied with the COVID-19 pandemic seriously reduce the possibility of participating in physical activity, which may cause a decrease in the level of physical activity (Jacob et al., 2020; Schuch et al., 2020).

Physical education teaching is a special profession group with a heavy workload (Sandmark et al., 1999). It is among the occupations with optimal physical condition, especially aerobic capacity. It is also a profession that helps public health to reduce sedentary lifestyles (Webster et al., 2015). From this point of view, the aim of this study is to examine the physical activity levels of physical education teachers, who set an example for individuals and encourage physical activity participation, during the COVID-19 pandemic period.

2. Method

In this study, which aimed to evaluate the physical activity levels of physical education teachers in terms of various variables during the Covid-19 pandemic period, the screening model was used. 417 physical education teachers working in different regions participated in the research voluntarily. The data were collected through an online questionnaire. The questionnaire was distributed through social media groups (Facebook, WhatsApp). A link was sent to the participants who wanted to participate in the study. The data were collected between 15.06 - 20.06.2021. Permission was obtained from Karabük University Social and Human Sciences Research Ethics Committee for the research (E.121804).

2.1 Data Collection Tool

In the research, a data collection tool consisting of 2 parts, the personal information part and the "International Physical Activity Questionnaire," was used. In the personal information section of the data collection tool, questions about gender, age, professional experience, height and body weight were included. "International Physical Activity Questionnaire (IPAQ)" short form created by Craig et al (Craig et al., 2003) was used to determine the physical activity levels of teachers. A validity and reliability study was conducted in Turkey for both the short and long forms of the IPAQ (Öztürk, 2005; Saglam et al., 2010). The questionnaire provides information about the time spent sitting, walking, moderately vigorous activities, and in vigorous activities. Calculation of the total score includes the sum of time (minutes) and frequency (days) of walking, moderately vigorous activity, and vigorous activity. The sitting score (level of sedentary behaviour) is calculated separately. In the evaluation of all activities, the criterion is that each activity is done for at least 10 minutes at a time. A score is obtained as "MET-minutes/week" by multiplying the minutes, days and MET values. When calculating

the total score, 3.3 METs for walking, 4 METs for moderately vigorous activity, and 8 METs for vigorous activity are taken. Physical activity levels are categorized as “those who are not physically active” (<600 MET-min/week), “low physical activity level” (600-3000 MET-min/week), and “adequate physical activity level (beneficial for health)” (>3000 MET-minutes). min/week), (Craig et al., 2003).

The height and body weights of the participants were noted based on their own statements. Body Mass Indexes (BMI) were calculated and according to the criteria published by the World Health Organization, those with a BMI below 18.5 were considered underweight, between 18.5-24.99 normal, between 25-29.99 overweight, and 30 and over, obese (Halk Sağlığı Genel Müdürlüğü, 2019b; World Health Organization, 2019).

2.2 Analysis of Data

In the analysis of the data, descriptive statistics (arithmetic mean, percentage) and Mann Whitney U and Kruskal-Wallis tests were used. Due to the large standard deviations of the data obtained in the physical activity questionnaire applications, it is generally not possible to meet the parametric test assumptions and it is recommended to use non-parametric tests (Craig et al., 2003). In this study, non-parametric statistical methods were preferred both because the assumptions were not fulfilled and in line with the literature's recommendation. The Mann-Whitney U test was used to compare two independent groups. Kruskal Wallis test was used in the comparison of more than two independent groups. Pairwise comparisons were made with the Dwass-Steel-Critchlow-Fligner test to determine the differences between the groups. The Spearman-Rho Correlation Coefficient was used to examine the relationships between PA level, age, and experience. The Jamovi (R Core Team, 2021; The Jamovi Project, 2021) program was used to analyse the data. In statistical analysis, the level of significance was considered as 0.05.

3. Results

The gender, age, professional experience, and BMI values of the teachers participating in the research are presented in Table 1.

Table 1: Distribution of teachers according to gender, age, year experience and BMI

Gender	n	%
Female	213	51,1
Male	204	48,9
Age		
20-30	291	69,8
31-40	78	18,7
41+	48	11,5
Experience		
1-5 years	259	62,1
6-10 years	70	16,8
11-15 years	35	8,4
16 and above years	53	12,7
BMI		
Underweight	27	6,5
Normal	282	67,6
Overweight	95	22,8
Obese	13	3,1

When the PA levels of the teachers participating in the research were examined, it was found that 26.1% had low PA levels, 37.6% had medium and 36.2% had high PA levels. While 27.5% of men were in the low category, 35.3% were in the medium category and 37.3% were in the high category, it was found to be 24.9%, 39.9% and 35.2% in women, respectively. There was no significant correlation between the gender variable and the PA category $\chi^2(2) = 0,972, p = 0,615$.

Table 2: Comparison of teachers' physical activity scores according to their gender

	Gender	Mean	Median (Q1, Q3)	Test	p
Total PA (MET-min/week)	Male	2721	1584 (743, 3577)	21185	.660
	Female	2568	1686 (693, 3468)		
	General	2643	1653 (735, 3546)		
Vigorous PA (MET-min/week)	Male	1089	0 (0, 1440)	20812	.413
	Female	917	0 (0, 1200)		
	General	1001	0 (0, 1440)		
Moderate PA (MET-min/week)	Male	473	120 (0, 630)	20953	.508
	Female	519	180 (0, 720)		
	General	496	120 (0, 720)		
Walking (MET-min/week)	Male	1159	792 (396, 1386)	19853	.127
	Female	1132	693 (297, 1386)		
	General	1145	792 (346.5, 1386)		
Sitting time (min)	Male	307	300 (180, 480)	19333	.050
	Female	272	300 (0, 420)		
	General	289	300 (60, 480)		

The findings regarding the PA scores of the teachers are presented in Table 2. Total PA average of the teachers participating in the research is 2643 MET- min/week, Vigorous PA average 1001 MET- min/week, Moderate PA 496 MET- min/week, Walking 1145 MET- min/week, and Sitting time is 289 min. According to gender variable, when the teachers' Total PA ($U = 21185$, $p = .660$), Vigorous PA ($U = 20812$, $p = .413$), Moderate PA ($U = 20953$, $p = .508$), Walking ($U = 19853$, $p = .127$), Sitting ($U = 19333$, $p = .050$) were compared with the Mann Whitney U test, no statistically significant difference was found.

Table 3: Comparison of teachers' physical activity scores by age groups

	Age	Mean	Median (Q1, Q3)	Test	p	Significance
Total PA (MET-min/week)	20-30	3087	2232 (904.5, 4266)	26.39	.001	20-30 – 31-40 20-30 – 41+
	31-40	1691	990 (658.8, 2295)			
	41 and above	1494	792 (519.8, 1870.5)			
Vigorous PA (MET-min/week)	20-30	1226	360 (0, 1920)	25.66	.001	20-30 – 31-40 20-30 – 41+
	31-40	447	0 (0, 90)			
	41 and above	537	0 (0, 80)			
Moderate PA (MET-min/week)	20-30	602	240 (0, 760)	15.83	.001	20-30 – 41+
	31-40	307	0 (0, 480)			
	41 and above	165	0 (0, 240)			
Walking (MET-min/week)	20-30	1259	792 (330, 1980)	3.03	.220	
	31-40	937	693 (396, 990)			
	41 and above	793	693 (396, 990)			
Sitting time (min)	20-30	278	300 (30, 420)	8.06	.018	20-30 – 31-40

The findings regarding the PA scores of the teachers by age groups are presented in Table 3. As a result of the Kruskal-Wallis test, there was a significant difference in Total PA ($H = 26.39$, $p = .001$), Vigorous PA ($H = 25.66$, $p = .001$), Moderate PA ($H = 15.83$, $p = .001$), and Sitting ($H(2) = 8.06$, $p = .001$) dimension, while there was no significant difference in Walking ($H(2) = 3.03$, $p = .220$) dimension. As a result of pairwise comparisons, a significant difference was found between the 20-30 and 31-40 age groups and between the 20-30 and 41 years and over age groups in total PA level ($p < .001$). A significant difference in the Vigorous PA

level was found between the 20-30 and 31-40 age groups ($p < .001$) and between the 20-30 and 41 years and older groups ($p = 0.002$). A significant difference was found between the 20-30 and 41 years and older groups at the Moderate PA level ($p = 0.001$). A significant difference was found between the 20-30 and 31-40 age groups in terms of sitting time ($p = 0.016$).

Table 4: Comparison of teachers' physical activity scores by years of experience

	Experience	Mean	Median (Q1, Q3)	Test	p	Significance
Total PA (MET-min/week)	1-5 years	3105	2460 (921, 4266)	22.24	.001	1-5 – 6-10 1-5 – 16+
	6-10 years	1955	1128 (705, 2135)			
	11-15 years	2023	990 (627, 2826)			
	16 years & above	1701	876 (532, 2220)			
Vigorous PA (MET-min/week)	1-5 years	1192	200 (0, 1800)	11.10	.011	
	6-10 years	663	0 (0, 960)			
	11-15 years	814	0 (0, 440)			
	16 years & above	638	0 (0, 480)			
Moderate PA (MET-min/week)	1-5 years	601	240 (0, 760)	20.23	.001	1-5 – 16+
	6-10 years	465	0 (0, 480)			
	11-15 years	252	0 (0, 480)			
	16 years & above	188	0 (0, 240)			
Walking (MET-min/week)	1-5 years	1311	924 (346.5, 2030)	8.34	.040	
	6-10 years	827	594 (297, 990)			
	11-15 years	957	660 (470.3, 1089)			
	16 years & above	875	693 (396, 1155)			
Sitting (min)	1-5 years	277	300 (30, 420)	5.49	.139	
	6-10 years	286	300 (135, 420)			
	11-15 years	345	420 (210, 480)			
	16 years & above	315	360 (120, 480)			

The findings regarding the PA activity scores of the teachers according to the variables of the years of service are presented in Table 4. As a result of the Kruskal-Wallis test performed to examine the PA levels of teachers according to the variable of years of service, there was a statistically significant difference in Total PA ($H = 22.34$, $p = .001$), Vigorous PA ($H = 11.10$, $p = .011$), Moderate PA ($H = 20.23$, $p = .001$) and Walking ($H = 8.34$, $p = .040$), while there was no significant difference in Sitting ($H = 5.49$, $p = .139$). Significant differences were found between 1-5 years and 6-10 years ($p = 0.007$) and between 1-5 years and 16 years and above ($p = 0.001$) in total PA level. A significant difference was found between 1-5 years and 16 years and above ($p = 0.001$) and between 1-5 years and 11-15 years ($p = 0.047$) in moderate PA level. There is no difference between pairwise comparisons in Vigorous PA and Walking levels.

Table 5: Comparison of teachers' physical activity scores according to BMI groups

	BMI	Mean	Median (Q1, Q3)	Test	p	Significance
Total PA (MET-min/week)	Underweight	2439.6	1794 (890, 3616)	5.12	.163	
	Normal	2772.4	1698 (792, 3587)			
	Overweight	2513.8	1386 (644, 3411)			

	Obese	1190.7	990 (248, 2079)			
Vigorous PA (MET-min/week)	Underweight	795.6	0 (0, 960)	3.04	.385	
	Normal	1040.3	0 (0, 1440)			
	Overweight	1042.9	0 (0, 1360)			
	Obese	273.8	0 (0, 0)			
Moderate PA (MET-min/week)	Underweight	353.3	180 (0, 540)	11.47	.009	Normal – Obese
	Normal	568.9	240 (0, 720)			
	Overweight	379.8	0 (0, 480)			
	Obese	75.4	0 (0, 0)			
Walking (MET-min/week)	Underweight	1290.7	792 (264, 1683)	1.61	.657	
	Normal	1163.1	718 (396, 1386)			
	Overweight	1091.1	792 (421, 1386)			
	Obese	841.5	396 (132, 1386)			
Sitting (min)	Underweight	251.1	300 (0, 420)	1.55	.672	
	Normal	297.2	300 (120, 480)			
	Overweight	277.9	300 (0, 480)			
	Obese	276.9	240 (180, 360)			

The findings regarding the PA levels of the teachers according to the BMI variable are presented in Table 5. As a result of the Kruskal-Wallis test performed to compare the PA levels of the teachers according to the BMI variable, there was a statistically significant difference in the Moderate PA level ($H = 11.47$, $p = 0.009$), while there was no statistically significant difference in Total PA ($H = 5.12$, $p = 0.163$), Vigorous PA ($H = 0.009$, $p = 3.04$, $p = .0.85$), Walking ($H = 1.61$, $p = 0.657$) and Sitting ($H = 1.55$, $p = 0.672$) levels. A significant difference was found between the normal and obese groups in the moderate PA level ($p = 0.034$).

Table 6: Correlation between teachers' total PA levels, year experience, BMI and age

	Total PA		Experience		BMI		Age
Total PA	—						
Experience	-0.229	***	—				
BMI	-0.080		0.223	***	—		
Age	-0.252	***	0.765	***	0.235	***	—

*** $p < .001$

When Table 6 is examined, it is seen that there is a negative and significant relationship between Total PA and years of service, and between Total PA and age, and there is a positive and significant relationship between experience and BMI, and between BMI and Age.

4. Discussion

This study was conducted to examine whether PA levels of physical education teachers during the Covid-19 pandemic process differ according to gender, age, years of service, and BMI variables. When the distribution of physical education teachers participating in the study according to their physical activity (PA) levels was examined, it was found that 26.1% had low PA level, 37.6% had medium and 36.2% had high. In addition, it was determined that the PA scores of the teachers did not differ according to the gender variable, but differed according to the age, years of service and BMI variables.

In studies conducted in “normal life” before COVID-19, there are studies indicating that almost half of the population is not active (Al-Hazzaa, 2007; Hallal et al., 2012; Hallal et al., 2003). According to the United States of America Center for Disease Control and Prevention report, the prevalence of physical inactivity among adults in the United States is 25.3 (Center for Disease Control and Prevention, 2022). As a result of research conducted in Brazil, 41.1% of adults were found to be physically inactive (Hallal et al., 2003). In a study conducted with Saudi adults, the rate of physical inactivity was found to be 43% (Al-Hazzaa, 2007). As a result of the study examining the PA level of adults from 122 countries and adolescents from 105 countries, it was reported that 31% of adults worldwide were not physically active (Hallal et al., 2012). Another research shows, of the university students participating in the study, 46,5% were determined to be active at high level, 48,4% at moderate level, and 5,2% at low level (Arıkan & Revan, 2019). In a different study, it was seen that 27.8% of university students were not physically active, 38.2% had moderate physical activity level and 34% had adequate physical activity level (Yüksel et al., 2021). It has been found that 41% of the teachers and administrators working in different branches of primary and secondary education institutions in the city of Adana, Turkey are inactive, 46% are minimally active, and 13% are very active (Akyol, 2021). It was seen that 17.1% of the teachers in various branches were not physically active, 63.9% had low physical activity level and 19% had physical activity level sufficient to maintain their health (Şanlı & Atalay Güzel, 2009). In a different study on physical education teachers, it was stated that 41.6% of the participants were sedentary, 21.2% of male teachers and 20% of female teachers did not engage in physical activity, and the physical activity levels of teachers were insufficient (Arabacı & Çankaya, 2007).

Although it is well known that regular physical activity has a strong effect on the immune system and fights many of the chronic diseases that increase the risk of death from COVID-19 (Clemente-Suarez et al., 2022), restrictions imposed to prevent the spread of the virus, stay-at-home restrictions, parks, closure of gyms and fitness centres and public health recommendations have led to a decrease in daily physical activity (Kenyon, 2020). Studies report decreases in physical activity level during the COVID-19 pandemic among adults in the USA (Meyer et al., 2020; Yang & Koenigstorfer, 2020), Australian (Gallo et al., 2020), Italy (Franco et al., 2021; Galle et al., 2020; Luciano et al., 2021), Spain (Martinez-de-Quel et al., 2021), Israel (Dor-Haim et al., 2021), Türkiye (Girgin & Okudan, 2021; Tural, 2020), the UK (Hamrouni et al., 2021), Russia (Smirnova et al., 2021), Korea (Lee et al., 2021), Canada (Bertrand et al., 2021; Lesser & Nienhuis, 2020) and Iran (Amini et al., 2020). Walking activity times, high and moderate physical activity decreased for all participants in Korea after social distancing due to COVID-19, the pattern of change in physical activities differed according to spouses, education levels and economic activities (Lee et al., 2021). Similarly, while COVID-19 quarantine had a negative effect on vigorous PA level and walking, it was determined that it had no effect on moderate PA level. Additionally, daily time spent sitting during the COVID-19 quarantine increased by more than 12% (Franco et al., 2021). In the study, while total walking time decreased during the pandemic, the proportion of moderate-to-vigorous physical activity comprised of brisk walking remained consistent from 2018 to Summer 2020 (Rees-Punia et al., 2021). In the study examining the physical activity, stress, sleep and quality of life levels of university students during the COVID-19 pandemic period, it was determined that 95.2% of the participants had insufficient physical activity level (Timurtaş et al., 2022). In a study examining the PA levels of Mexican physical education teachers before and during the pandemic, it was found that during the restriction period, teachers' PA levels dropped significantly, and approximately 50% of the teachers participating in the study were in the low activity group. It has been stated that this inactivity during the COVID-19 epidemic is unacceptable, since physical education teachers are considered a professional group that contributes to public health by reducing the sedentary lifestyle in the society (Hall-López, 2020). It has been stated that despite the pandemic restrictions, physical inactivity rate of physical education teachers is below global levels, and that advice from scientists and experts can positively affect teachers' PA behaviour (Chen et al., 2020). In our current study, it was found that approximately 74% of the teachers were physically active and 26% were inactive. It can be deduced that this rate is high for physical education teachers and despite the restrictions, most of the teachers who participated in the study maintained their mobility.

While the amount of high-intensity physical activity decreased in all age groups after the epidemic, only adult and older men showed a statistically significant difference. Meanwhile, moderate-intensity physical activity was significantly reduced in all groups. On the other hand, while adult men and women did not show a significant

difference in walking activity, a significant decrease was found in walking activity in older men and a significant increase in elderly women (Lee et al., 2021). Despite different determinants of physical inactivity in adolescents during Covid-19 restrictions in Europe and Latin America, a high percentage of physical inactivity was observed in the population before and during the Covid-19 pandemic (Ruiz-Roso et al., 2020). According to research on young adults, the COVID-19 crisis and subsequent quarantine measures have resulted in reduced physical activity and increased sitting and sleeping time (Luciano et al., 2021). Similarly, in the pandemic setting, 80% of young adults do not have adequate levels of physical activity, and in many cases this is due to the restrictive measures of the COVID-19 pandemic (Ovdii et al., 2021). The level of PA in the elderly population has decreased during the quarantine period of COVID-19 worldwide. Increase in sitting time, decrease in MET amount and decrease in number of steps were important factors in decreasing PA levels (Oliveira et al., 2022). In a different study, in a Southern Italian population, COVID-19 quarantine changed PA behaviours, with a negative impact on both sexes, especially on young adults and adult groups (Franco et al., 2021). During the pandemic process, the physical activity levels of individuals between the ages of 18-65 do not differ significantly according to the age variable (Özdemir Görgü et al., 2021). In the current study, while teachers' total PA, vigorous PA, moderate PA and sitting scores differed according to age groups, there was no significant difference in walking scores according to age groups. It is observed that the total PA level decreases with increasing age.

In a study of Australian university students, only women had ~20% higher energy intake during the pandemic, and the frequency of snacking and the energy density of consumed snacks also increased compared to pre-pandemic. In addition, energy intake increased in female students and physical activity levels decreased in both male and female students compared to the previous two years (Gallo et al., 2020). Moderate and vigorous activity scores of male university students were significantly higher than female students. There was no significant difference between the genders in the walking score (Şahbaz Piriñçi et al., 2020). Yıldırım et al. (2019) found that the PA levels of healthcare workers were statistically significant according to gender, marital status, income level and BMI groups. In a different study conducted on healthy adults who were in home quarantine due to the COVID-19 pandemic, no significant difference was found in PA levels according to gender, but a significant difference was found according to age group and BMI value (Tural, 2020). In our study, no significant difference was found between teachers' PA scores and gender. While a significant difference was found between the teachers' years of service variables, total PA, vigorous PA, moderate PA and walking scores, no significant difference was found between sitting time. A significant difference was detected between the BMI variable of the teachers and only moderate PA. It is seen that there is a negative significant correlation between total PA and years of service and age groups, a positive significant correlation between years of service and BMI and age groups, and a positive significant correlation between BMI and age groups.

There are some limitations to this research. One of these limitations is that the data of teachers' physical activity levels before the COVID-19 pandemic period is not known. Another is that the data collection tool is a self-report questionnaire. Therefore, the subjective evaluations of the participants may affect the results. Lastly, the number of the sample group is relatively low.

As a result, it can be concluded that the majority of physical education teachers participating in the study continue their active lives despite the restrictions of the COVID-19 pandemic. In addition, it can be deduced that while some variables of physical activity scores differ according to age groups, years of service and BMI groups; it does not differ according to gender.

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