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Investigation of Physical Activity Levels in Adolescents

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ABSTRACT

Background: The aim of this study was to examine the physical activity levels of adolescents.

Methods: A total of 1279 secondary school students, 678 female and 601 male, aged between 10-12 years, studying in Kirikkale province, constitute the research group. The questionnaire method was used to collect data. The Physical Activity Questionnaire for Older Children (PAQ-C) was used to collect data. Data analysis was performed using SPSS 25.0 software. The means of gender, anthropometric characteristics, and physical activity levels were calculated, and group comparisons were performed by an independent sample t-test. The ANOVA test was used to determine the difference between group means.

Result: When anthropometric measurements and physical activity levels were analyzed, there were significant differences between female and male in height and body weight values, while in-school, out-of-school, and total physical activity levels were higher in male than in female.

Conclusions: It was concluded that the physical activity levels of male adolescents were higher than those of female adolescents, it is thought that increasing physical activity opportunities for adolescents and encouraging practices may be beneficial in this regard.

Keywords: Youth, children, physical inactivity, sedantary life, BMI

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INTRODUCTION

Physical activity is associated with tension in muscle tissue from body movements and the energy expended during this activity (Friedenreich et al., 2021; Pedersen, 2019). This process is defined as body movements that occur by increasing the lowest energy level (Sigal et al., 2018; Shahidi et al., 2020). With children and adolescents increasingly walking shorter distances and decreasing interest in outdoor activities, it is becoming common to adopt a sedentary lifestyle, which makes sedentary life a habit (Monteiro et al., 2019). The habit of sedentary life draws attention as a serious problem in human life (Dunton et al., 2020).

Factors such as physical inactivity, which is a common problem of our age, and the time spent with technological tools bring many problems, including obesity and various cardiovascular diseases (Lippi et al., 2020; Lacombe et al., 2019). Therefore, it is of great importance for individuals to make efforts to develop regular physical activity habits in their youth years in order to prevent health problems that may arise in later ages (Hagger, 2019; Margaritis et al., 2020). In particular, children and adolescents who are physically active, thanks to the advantages of engaging in regular physical activity, remain passive in the possibility of encountering health problems and negativities while having a significantly lower risk compared to children who do not engage in physical activity (Braksiek et al., 2022; Calcaterra et al., 2022). According to a 2011 study conducted in the United States of America, only 28.7% of children and young people aged 10–24 years have the habit of doing 60 minutes of physical activity every day (Friedman et al., 2011). When European countries were analyzed, it was reported that one-third of school-age children follow the recommended physical activity recommendations (Kahlmeier et al., 2015; Brazendale et al., 2021). Information on children's physical activity levels in Turkey is based on the results of the "Turkey Nutrition and Health Survey" conducted in 2010 (Breda et al., 2021). This study revealed that 57.8% of young people aged 15–18 years, 56.2% of children aged 12–14 years, 52.7% of children aged 9–11 years, and 65.8% of children aged 6–8 years did not participate in physical activities (Breda et al., 2021; Fouad et al., 2022). Adherence to the 2016 WHO recommendation of at least one hour of physical activity per day is less than a quarter (81%) among young people aged 11–17 years (WHO, 2016; Kracht et al., 2020). It is emphasized that physical inactivity is 84% in female and 77.6% in male (Robbins et al., 2016).

Regular physical activity positively affects the development of the immune system and has an effect on the respiratory system (Maugeri & Müzeci, 2021; Da Silveira et al., 2021). It supports optimal development and plays an extremely effective role in terms of ensuring proper posture, spine development, and muscle strength (Beck et al., 2017). Participation in physical activity in adolescents is observed to increase inner self-confidence, improve self-expression, and nurture the gentlemanly spirit (Amatriain-Fernández et al., 2020). It is also thought to play a supportive role in improving achievement and social communication skills and reducing mental fatigue and tension (Warburton & Bredin, 2017; Warburto & Bredin, 2019). When the studies conducted in this direction are examined, it is seen that physical activity not only has

physiological effects but also positively affects individuals in sociological and psychological terms (Ohrnberger et al., 2017; Chekroud et al., 2018; Biddle et al., 2019). Today, while the physical activity levels of children and young individuals are decreasing, sedentary lifestyles are increasing rapidly. In this context, it is essential to teach healthy lifestyle habits to the adolescent age group. The aim of our study is to determine the physical activity level of adolescence.

MATERIALS AND METHODS

Research Model

The research was conducted with a quantitative approach. In this study, the survey model was used, and it was conducted on a sample group representing a large group of participants. The survey model is a research approach that aims to objectively describe the current situation and also makes generalizations through a sample group selected from the population (Zellner et al., 2021). This method allows for rapid data collection while keeping costs low (Orpana et al., 2019).

Research Group

The research group of this study consisted of a total of 1279 secondary school students, 678 female and 601 male, aged between 10-12 years, studying in Kirikkale province. The families of the students participating in the study were informed that the confidentiality of their personal information would be protected and would be used only for scientific research purposes, and a signed consent form was obtained.

Data Collection

The questionnaire method was used to collect the data. The Physical Activity Questionnaire for secondary Children (PAQ-C), developed by Kowalski et al. (2004) and adapted into Turkish by Erdim et al. It consists of ten items, nine of which are used to determine the individual's physical activity scores. The tenth item assesses whether the child can continue with normal daily life, i.e., it takes into account the presence of illness or other disabilities, but this item is not included in the calculation of the physical activity score. The first question of the questionnaire is a checklist listing 22 common leisure and sports activities included in the PAQ-C. There is also an "Other" category. The answers to this question are evaluated on a 5-point scale, where 1 means no activity and 5 reflects the highest level of physical activity. By calculating the average score, higher scores indicate a more active lifestyle. The purpose of the remaining eight questions was to assess participants' activities during specific time periods (e.g., physical education classes, recess breaks, lunches, after-school hours, evenings, and weekends). These questions are also assessed on a 5-point scale, with higher scores indicating greater levels of physical activity.

The The overall PAQ-C score is the sum of the scores from items 1 to 9. In addition, the final PAQ-C Activity Summary Score is calculated by averaging the scores for these nine items.

Statistical Analysis

The normality test conducted using the Kolmogorov-Smirnov test determined that the quantitative data met the normality assumption ($p > 0.05$). Therefore, the mean and standard deviation were preferred in summarizing this data. For group comparisons, in-dependent sample t-tests and one-way ANOVA were utilized. Post-hoc analyses were per-formed using the Tukey test. In reporting the obtained results, the American Psychological Association (APA) 6.0 style was adopted (Yağin et al., 2021). Cohen's d values between the groups were calculated, and when they fell between 0.20 and 0.50, the effect was consid-ered small, between 0.50 and 0.80, the effect was deemed moderate, and above 0.80, the effect was interpreted as large (Cook et al., 2018). All analyses were conducted using IBM SPSS version 25 for Windows.

RESULTS

The group, frequency and percentage values of the demographic characteristics of the participants are given in Table 1. According to BMI values, 472 of these participants were underweight, 518 were normal, 145 were overweight and 144 were obese (Table 1).

Table 1. Frequency And Percentage Distributions Of Demographic Characteristics Of Adolescents

Variables	Groups	N	%
Total number of participants		1279	100
Age (years)	10	311	24.3
	11	461	36.0
	12	507	39.6
Gender	Male	601	47.0
	Female	678	53.0
BMI (CDC)	Weak	472	36.9
	Normal	518	40.5
	Overweight	145	11.3
	Obese	144	11.3

BMI: Body Mass Index.

In Table 2, an examination of the Anthropometric Characteristics and Physical Activity variables by gender groups is evident. According to the data in this table, no significant difference has been observed in the mean ages between male and female participants ($p > 0.05$). However, in the "Anthropometric Characteristics" and "Physical Activity" variables, the mean values for males are statistically significantly higher than those for females ($p < 0.05$).

Table 2. Distribution And T Test Results Of The Mean Scores Of Adolescents In Anthropometric And Physical Activity Levels According To Gender

Gender	Female (N=678)	Male (N=601)	t	p	Cohen's d

Anthropometric Characteristics					
Age	11.83 ± 0.79	11.89 ± 0.75	-1.411	0.159	0.078
Boy	151.3 ± 9.3	152.9 ± 10.9	-2.798	**0.005***	0.158
Body Weight (kg)	45.8 ± 11.2	48.4 ± 12.8	-3.767	**0.001***	0.217
BMI	19.85 ± 3.7	20.43 ± 4.2	-2.591	0.010	0.147
Physical Activity					
Physical activity outside school	2.7 ± 0.8	2.9 ± 0.7	-9.518	**0.001***	0.267
Physical activity in school	3.1 ± 0.8	3.6 ± 0.9	-8.448	**0.001***	0.588
Physical activity level total	2.8 ± 0.7	3.2 ± 0.6	-6.105	**0.001***	0.614

*p<0.05

When examining "Physical Activity" across age groups, it was determined that there was no significant difference in the mean value of in-school physical activity among the age groups ($p > 0.05$, Table 3). However, concerning out-of-school physical activity and total physical activity, it was observed that the 10-year-old age group had a statistically significantly lower mean compared to the other age groups ($p < 0.05$, Table 3).

Table 3. Comparison of Physical Activity Scores of Adolescents by Grade

Variables	**10 Years (n=311)**	**11 Years (n=461)**	**12 Years (n=507)**	**F**	**p**	**Tukey**
Physical Activity						
Physical activity outside school	2.7 ± 0.8	2.9 ± 0.8	2.9 ± 0.7	6.049	**0.005***	10<11=12
Physical activity in school	3.3 ± 0.9	3.4 ± 0.9	3.3 ± 0.9	1.369	0.255	
Total physical activity	2.9 ± 0.7	3.1 ± 0.7	3.0 ± 0.7	4.689	**0.005***	10<11=12

*p<0.05

In the analysis of BMI categories (Table 4), it was evident that across all three levels of physical activity, statistically significant higher means were consistently associated with the "Weak" group ($p < 0.05$). As expected, as the BMI category approached "Obese," the average levels of physical activity decreased. Table 4 illustrates that the "Obese" group statistically significantly ($p < 0.05$) exhibited the lowest mean in all three levels of physical activity.

Table 4. ANOVA Test Results Of Physical Activity Scores Of Adolescents According To BMI (CDC)

Variables	**BMI (CDC)**	**mean±std.dev.**	**N**	**F**	**p**	**Tukey**

Physical Activity						
Physical activity outside school	Weak [1]	2.9 ± 0.8	472	3.865	**0.005***	1=2=3>4
	Normal[2]	2.8 ± 0.7	518			
	Overweight[3]	2.7 ± 0.8	145			
	Obese[4]	2.5 ± 0.6	144			
Physical activity in school	Weak [1]	3.4 ± 0.9	472	2.908	**0.005***	1=2>3>4
	Normal[2]	3.4 ± 0.8	518			
	Overweight[3]	3.3 ± 0.9	145			
	Obese[4]	3.1 ± 0.8	144			
Total physical activity	Weak [1]	3.1 ± 0.7	472	4.477	**0.005***	1>2>3>4
	Normal[2]	3.0 ± 0.6	518			
	Overweight[3]	2.9 ± 0.7	145			
	Obese[4]	2.8 ± 0.5	144			

*p<0.05

DISCUSSION

The aim of this study was to examine the physical activity levels of adolescents. A total of 1279 people, 678 female and 601 male, participated in the study. According to the gender variable, it was determined that female participants were in the majority (53.0%). 311 of the participants were 10 years old, 461 were 11 years old, and 507 were 12 years old. When the highest value between age groups is analyzed, 39.6% of the participants were 12 years old. According to BMI values, 472 of these participants were underweight, 518 were normal, 145 were overweight, and 144 were obese. It was determined that the normal participants had the highest value of the BMI variable at 40.5%.

When the results obtained from the study were examined, the anthro-metric measurements and physical activity levels were examined according to the gender variable, and there were significant differences between female and male in height and body weight values. In addition, in-school, out-of-school, and total physical activity levels were significantly higher in male compared to female. When we analyzed the physical activity scores of adolescents according to the age factor, it was observed that in-school physical activity levels did not show a significant difference between age groups. However, out-of-school physical activity and total physical activity values differed between the groups in the 10–11 age range. Depending on the physical activity variable, when the Anova test results of in-school physical activity, out-of-school physical activity, and total physical activity values according to BMI (CDC) categories were analyzed, it was seen that the out-of-school physical activity variable showed significant differences in BMI (CDC) underweight and obese categories. Similarly, in-school and total physical activity variables showed significant differences in terms of BMI (CDC) values in the underweight, overweight, and obese categories. In different studies conducted in other countries around the world, it has been found that male have higher physical activity levels than female (Steene-Johannessen et al., 2020). According to similar research results in the literature, in the study conducted by López-Gil et al. (2022) on 214 healthy adolescents of Spanish origin between the ages of 10 and 16, it was observed that the physical activity levels of male adolescents

were moderate and the levels of vigorous physical activity were significantly higher than those of female adolescents, in line with our findings. A study conducted by Tate et al. (2015) on 145 African-American adolescents showed that gender affects physical activity levels. In this study, it is stated that the physical activity level of female is lower than that of male adolescents. Among the reasons for this difference, it is thought that the social roles of female adolescents in our society are stricter than those of male adolescents, and the difference in some physical characteristics such as body fat percentage may be effective.

In another study, adolescents with a high fat percentage were found to have lower physical activity levels (Tornberg et al., 2019). It was also found that these adolescents spent less time on vigorous exercise (Lee et al., 2021). These findings also support the results of the research on gender differences. Fan and Cao (2017) conducted a study on 90,712 Chinese students and found that male had higher levels of moderate and vigorous physical activity than female. Armstrong et al. (2018) found that the physical activity status of male adolescents and young adults was higher than that of female, and the physical activity attendance of female was lower than that of male. In addition, it was concluded that this situation leads to an increase in the prevalence of obesity and a significant risk. Adolescents' physical activity may cause them to develop positive attitudes towards physical activity in their later years, and their positive attitudes towards physical activity will ensure their voluntary participation in various physical activities in the future (Logan et al., 2019). Therefore, by determining physical activity status, the effort to create regular physical activity habits is of great importance in terms of determining the factors that encourage physical activity among adolescents (Hu et al., 2021). Looking at physical activity levels by gender, it is observed that males are generally more active and adopt a less sedentary lifestyle than females. This is due to the fact that male are more prone to physical activity. Similarly, research shows that male have higher physical activity levels than female (Xu et al., 2018; Gilic et al., 2020). The results of the research on comparisons in the literature support the current research findings.

CONCLUSIONS

In conclusion, based on the data of this study conducted to determine the physical activity levels of adolescents, it was concluded that the physical activity levels of male adolescents were higher than those of female adolescents. In accordance with previous studies, the results of this study show that the physical activity levels of adolescent male are better than those of adolescent female. Therefore, determining the physical activity levels of adolescents and actively participating in these activities is recommended to promote a healthy lifestyle until adulthood. In addition, starting physical activity at an early age is of great importance for the future health of children and adolescents and for solving major problems such as obesity risk. Comparing the results of the studies with the studies in the field, adolescent female should be encouraged to focus on activities that will enable them to be more active in their daily lives. In this way, it is thought that increasing physical activity opportunities for adolescents and encouraging practices can be beneficial in this regard.

Author Contributions

Conceptualization, D.U. and H.Y.; methodology, H.Y.; formal analysis, H.Y.; investigation, H.Y.; data curation, D.U.; writing—original draft preparation, D.U., H.Y., B.E., O.G., S.A., A.Y., A.S., N.S., A.A.D.; writing—review and editing, D.U., H.Y., B.E., O.G., S.A., A.Y., A.S., N.S., A.A.D.

Informed Consent Statement:

Participants took part in the research voluntarily and the research was conducted in line with the Declaration of Helsinki.

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Conflicts of Interest:

The authors declare that no conflicts interest.

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