

MODERATE VIGOROUS PHYSICAL ACTIVITY LEVELS OF PRIMARY SCHOOL STUDENTS: BREAK TIME AND PHYSICAL EDUCATION LESSON

İLKOKUL ÖĞRENCİLERİNİN ORTA-ŞİDDETLİ FİZİKSEL AKTİVİTE DÜZEYLERİ: TENEFFÜS VE BEDEN EĞİTİMİ DERSİ

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Ahmet TEMEL

T.C. Milli Eğitim Bakanlığı, Eski 75. Yıl Anadolu Lisesi, Aksaray, Türkiye

Orcid: 0000-0001-9215-6106

Arzu Nur TEMEL

T.C. Milli Eğitim Bakanlığı, Yüksek İlkokulu, Aksaray, Türkiye

Orcid: 0009-0002-1564-2324

* Sorumlu Yazar: Ahmet TEMEL, T.C. Milli Eğitim Bakanlığı, Eski 75. Yıl Anadolu Lisesi, Aksaray. E-mail: dr.ahmettemel@gmail.com

Moderate Vigorous Physical Activity Levels of Primary School Students: Break Time and Physical Education Lesson

ABSTRACT

This study was carried out to examine the moderate to vigorous physical activity (MVPA) levels of primary school students during break time (BT) and physical education lessons (PEL). The survey model, one of the quantitative research methods, was used in the research. The sample of the study consisted of 4 students attending the 4th grade of primary school in Aksaray/Eskil in the 2022-2023 academic year. The data were collected through the behavioral observation method, using the "System for Observing Fitness Instruction Time (SOFIT)". Students' BT activities during the day and PEL activities of one lesson were observed 3 times with an interval of 4 weeks. Friedman, Wilcoxon and Mann-Whitney-U test were used in the analysis of the data. The MVPA level of the students was measured below the value recommended by the WHO (50%). Three measurements taken at different times for the BT and PEL were examined and no significant difference was observed in the MVPA levels of the students. PEL and BT MVPA were examined and no significant difference was found. It was observed that the MVPA levels of boy and girl students were close. As a result of the research, the MVPA levels of the students during the BT and PEL were similar and slightly below expectations. It can be suggested to include content that will increase the level of movement of students in PEL, to plan playgrounds that will allow playing games during BT, and to increase the BT.

Anahtar Kelimeler: Break time, physical education, moderate to vigorous physical activity, sofit

İlkokul Öğrencilerinin Orta-Şiddetli Fiziksel Aktivite Düzeyleri: Teneffüs ve Beden Eğitimi Dersi

ÖZ

Bu çalışma, ilkokul öğrencilerinin teneffüs ve beden eğitimi (BE) dersindeki orta-şiddetli fiziksel aktivite (OŞFA) düzeylerini incelemek amacıyla yapılmıştır. Araştırmada nicel araştırma yöntemlerinden tarama modeli kullanılmıştır. Araştırmanın örneklemini, 2022-2023 eğitim öğretim yılında Aksaray/Eskil'de ilkokul 4. sınıfa devam eden 4 öğrenci oluşturmuştur. Veriler davranışsal gözlem metodu aracılığıyla, "Fitness Eğitimi Gözlem Formu" kullanılarak toplanmıştır. Öğrencilerin gün boyu teneffüs aktiviteleri ve bir ders uzunluğundaki BE ders aktiviteleri 4 hafta ara ile 3 kez gözlemlenmiştir. Verilerin analizinde tanımlayıcı istatistikler, Friedman, Wilcoxon ve Mann Whitney U testi yapılmıştır. Araştırma bulguları incelendiğinde; teneffüs ve BE dersinde öğrencilerin en fazla ayakta durma davranışı gösterdiği tespit edilmiştir. Öğrencilerin OŞFA düzeyi Dünya Sağlık Örgütü'nün tavsiye ettiği değerin (%50) altında ölçülmüştür. Teneffüs ve BE dersi için farklı zamanlarda alınan 3 ölçüm friedman analizi ile incelenmiş ve öğrencilerin OŞFA düzeylerinde anlamlı farklılık görülmemiştir. BE dersi ve teneffüs OŞFA ölçümleri Mann Whitney U testi ile incelenmiş ve anlamlı farklılığa rastlanmamıştır. Kız ve erkek öğrencilerin OŞFA düzeylerinin yakın olduğu görülmüştür. Araştırmanın sonucunda; öğrencilerin teneffüs ve BE dersinde OŞFA düzeylerinin benzer olduğu ve beklenenin biraz altında kaldığı gözlemlenmiştir. Araştırma sonuçlarından hareketle; BE derslerinde öğrencilerin hareket düzeyini artıracak içeriklere yer verilmesi, teneffüslerde oyun oynamaya imkân verecek çeşitlilikte oyun alanları planlanmalı ve teneffüs sürelerinin artırılması önerilebilir.

Keywords: Beden eğitimi, orta-şiddetli fiziksel aktivite, sofit, teneffüs

INTRODUCTION

Physical activity (PA) is bodily movement produced by skeletal muscles that results in energy expenditure above the resting level¹. PA; By affecting the bone and muscle development of children in the developmental age, lower body fat provides an increase in academic performance with the prevention of chronic diseases, and improvement of attention and perception^{2,3}. In case of insufficient PA, individuals decrease in muscle ratio and increase in fat ratio. Increasing fat rate causes obesity in school-age children⁴. Inadequate PA deprivation does not only threaten our children with obesity. In addition, many chronic diseases such as heart disease, diabetes, rheumatoid arthritis, hypertension, cancer, depression, and anxiety affect our children⁵.

Children who make physical activity (PA) by participating in physical education lessons (PEL), games, and free time activities at school gain physical fitness by improving their health and skills^{6,7}. To improve the physical fitness of school-age children, international standards have been determined for PA, which should be done daily. The World Health Organization (WHO) recommends that children aged 5-17 engage in at least 60 minutes of moderate-to-vigorous physical activity (MVPA) per day⁸. While low-intensity physical activities (LPA) contribute little to the individual, MVPA has many benefits increasing muscle strength and endurance, building healthy bones, and improving mental health⁹.

In line with international standards, it is recommended that children attend MVPA for at least 50% of the PEL time. The MVPA percentage value is obtained by dividing the time spent by the students in MVPA by the total course time¹⁰. MVPA includes movements that require more energy such as running, jumping, and shooting, as well as walking or equivalent movements¹¹.

PA patterns become a habit from childhood and continue into adulthood¹². Primary school children, who are just at the beginning of their education life, exhibit PA behaviors better than secondary and high school students¹³. Schools give children the opportunity to make PA through break time (BT) and PEL¹⁴. Primary school PEL are an ideal educational environment that allows MVPA to improve the child's basic movement skills and health¹⁵. The BT hours of the students in the school garden during the BT provide the opportunity to do MVPA¹⁶. When teachers encourage school-age children to do PA¹⁷, when they give feedback to students on their current mobility¹⁸ when the lesson plan is made in a way that allows for active learning¹⁹, and when fun lesson content is created²⁰ the time students spend in MVPA increases. Playgrounds at school outside of PEL provide a strong incentive for children to be physically active. In particular, creative and colorful playground markings are a low-cost strategy for meeting PA guidelines for children in school settings. These signs include lines, circles, hopscotch, and ladders to encourage children to perform locomotor skills²¹.

Most of the studies in the literature show that our children do not meet the MVPA requirements starting from primary school age²²⁻²⁴. Abdulla et al. (2022)²⁵, found that teachers' lack of sufficient knowledge about games, students' unwillingness, lack of playground, lack of materials, insufficient time and training in crowded classrooms negatively affect MVPA. In addition to these findings, the PEL is not given the necessary value or is considered insignificant¹³, disadvantaged groups with very limited access to playgrounds²⁶, the time spent in PA students with poor motor skills²⁷ is quite low. As a result of the examinations, it has been reported that intervention

approaches aiming to increase PA in the PEL in schools increase the MVPA level of students²⁸. Successful results were obtained when the PEL was held outdoors and planned with high and low-effort content according to the quality of the students²⁹. Primary school students spent more time at the MVPA as they had the opportunity to play in the playgrounds in the school garden during BT³⁰. When traditional games are used in PEL and during BT, children's PA levels increase is occurring³¹.

As a result of the examinations made at the primary school level, it was found that the highest PA was measured at the 4th-grade level³². The PA requirements of 4th-grade students participating in traditional games are met³³. Children are more active in outdoor activities and games³⁴. Primary school 4th-grade students are superior in understanding PA guidelines, applying game rules, and developing team strategies³⁵. During the PEL and BT³⁶ or later in the day, students' PA levels may be different³⁷. In the study, it was aimed to learn the MVPA levels of the 4th-grade students by taking the PEL and BT activities into evaluation. Since the need for teacher supervision in the sustainability of the game is less in the 4th-grade of primary school, this grade level was preferred. In previous studies, no significant PA change was observed in consecutive measurements³⁸. For this reason, data were collected with an interval of 4 weeks in order to reach reliable data. All BT were monitored and recorded to learn about student activities at different times of the day.

MATERIAL AND METHODS

Research Model

In this study, the descriptive method was used to explain the current situation. The behavioral observation method was used to determine and analyze student behaviors. Behavioral observations are made by observing individuals with the help of a measurement tool determined to record behavior and checking the points on the scale that reflect the behaviors^{39,40}. Students' PA behaviors during PEL and BT were observed and recorded in the measurement tool.

Research Group

The sample of the study consisted of primary school 4th-grade students continuing their education in Aksaray Eskişehir. Since the sample group was chosen purposefully, it allowed for in-depth analysis³⁹. Upon the guidance of the course teacher, 4 students were included in the study so that students with high and low levels of movement were equal. In studies where data were collected with the System for Observing Fitness Instruction Time (SOFIT), it was predicted that it would be acceptable to have 4 students for each observation¹¹. It is difficult to recruit more students for the study because students' physical activity behaviors are monitored and recorded by 2 researchers every 10 seconds and the process continues throughout the day. Since students' behaviors during lessons and break activities cannot be recorded with a video camera due to privacy principles, this sample is considered sufficient by many researchers.

Table 1. Demographic Characteristics of Primary School Students Participating in the Research

Variable	Subcategories	f	%	Total
Gender	Boy	2	50,0	4
	Girl	2	50,0	
Movement Level	High	2	50,0	
	Low	2	50,0	

Break Time Physical Activity

The duration of a lesson in primary school institutions is determined as 40 minutes. Allocating a total of 4 break time periods, consisting of at least 15 minutes, for the purpose of resting, playing, and meeting the needs of the students between classes, is specified in detail in the regulation. In primary schools that provide full-time education, 40 minutes of rest and nutrition are also allocated during the lunch break⁴¹. Students are having a pleasant time playing during BT in the playgrounds prepared for them in the school garden. The school where the research was conducted has a game park and playgrounds for students (Photograph 1). Playgrounds have been determined for corner snatch, drop the handkerchief, hopscotch, castled dodgeball game, and tombik (nine stone). Students use these areas effectively during BT. The types of movements were recorded by observing the 7-minute period between the students coming to the garden with the BT bell and going to the classes with the ringing of the lesson bell. Recordings continued throughout the day.

Physical Education and Game Lesson

Physical education and game lessons in the 4th grade of primary school are carried out as 2 lessons per week. Since the lessons are carried out according to the curriculum, the acquisitions in which displacement, balancing, and object control can be made effectively are prioritized in terms of motor skills⁴². Primary school teachers mostly use traditional games to demonstrate these skills effectively³⁵. Traditional games allow for versatile development with their content⁴³. The primary school teacher acted by the general introduction, warm-up, main phase, and evaluation sections while transferring the PEL contents. The meeting for the lesson and the evaluation of the lesson by the teacher were not recorded, and similar coding was used with the BT. Therefore, the students were subjected to 28 minutes of observation. Thus, it was possible to make comparisons with BT. Considering the active participation of 10 students in the lessons and the suitability of the number of students, the tombik (nine stone) game was played under the supervision of the teacher. The game of tombik (nine stone) is a strategy-based game that aims to stack 9 stones in a 360 cm circle by attacking, while the other team defends and aims to eliminate the attacking team with the help of the ball⁴⁴. The PA behaviors of the students selected during the lesson were observed and coded.



Photograph 1. School Playgrounds

Photograph 2. Tombik (nine stone) Game

Data Collection Tool

System for Observing Fitness Instruction Time (SOFIT)

There are 5 different activity examples in the observation form used (1. lying down, 2. sitting, 3. standing, 4. walking, 5. very active, which corresponds to running, or activity with higher energy expenditure). Behaviors of students during BT and PEL are observed every 10 seconds and appropriate PA is recorded. If the student changes from a slow PA to a fast one during observation, the fast PA option is selected. For example, if the student started running while standing (3), the running option (5) is selected for the student. After 28 minutes of observation, students' average PA scores are calculated. Evaluation is made by calculating the percentages of the coding in 5 different activity types in the total activity. If the total time spent by students in walking and running activities is more than 50%, it is assumed that the MVPA is at the desired level⁴⁵. This measurement tool is an effective data collection tool that is frequently used to learn the PA status of students⁴⁶.

Reliability

Two different observers evaluated the reliability of the observation form. Inter-observer reliability was determined according to the formula $[(\text{Number of agreeing} / \text{Total number of opinions}) * 100]$ and consistent results above 80% were sought⁴⁵. As a result of the analysis $[(3813 / 4032) * 100]$, a reliable value of 94.56% was obtained among the observers.

Ethical Approval Statement

Ethical permission from Necmettin Erbakan University Social and Human Sciences Scientific Research Ethics Committee (10.02.2023 and KARAR-2023/84); and the study started with the permission of the Aksaray Governorship (dated 01.03.2023 and numbered E-76490249-605.01-71351952).

Collection of Data

Before data collection, students who agreed to participate in the research and their parents were informed about the research. A parental consent form was obtained for each participant. In the second semester of the 2022-2023 academic year, the students were recorded by 2 researchers at 3 different times with 4-week intervals, according to the principle of instant observation. The first measurement was taken on 08.03.2023, the second measurement was taken on 05.04.2023 and the third measurement was taken on 03.05.2023.

Data Analysis

The data were obtained as a result of the observations of 2 researchers doing research in the field of sports sciences. After the observers' scores were 94.56% consistent, their PA scores were determined by averaging the observers' scores. The data were expressed as mean and standard deviation scores and the error level was considered as .05. The students' 3 measurements taken separately for the BT and PEL were examined using Friedman analysis, one of the non-parametric tests. The weekly BT and PEL conjugate MVPA percentages of the students were examined with the Wilcoxon test. For gender comparison, Mann-Whitney U test was used.

RESULTS

The MVPA levels of primary school students during BT and PEL were examined using the "SOFIT" measurement tool.

Table 2. Sofit Scores of Students

Date of Measurement	Sofit	1. Break Time		2. Break Time		3. Break Time		4. Break Time		Mean of Break Time		Physical Education	
		\bar{x}	\pm	\bar{x}	\pm	\bar{x}	\pm	\bar{x}	\pm	\bar{x}	\pm	\bar{x}	\pm
08.03.2023	Lying down	.50	,57	.00	,00	.00	,00	2.75	3,20	3.25	3,20	.75	,95
	Sitting	2.75	1,25	.00	,00	2.25	4,50	.25	,50	5.25	3,30	9.25	9,32
	Standing	24.25	2,06	24.00	2,44	21.50	5,80	19.00	6,58	88.75	11,92	89.75	21,17
	Walking	10.25	1,25	10.00	4,54	10.25	5,18	14.25	4,85	44.75	11,87	42.75	17,07
	Very active	4.25	1,89	8.00	4,32	8.00	2,44	5.75	1,70	26.00	4,76	25.50	13,57
	MVPA %	34.52	4,55	42.85	5,83	43.45	15,95	47.61	8,01	42.10	7,81	40.61	17,32
05.04.2023	Lying down	.00	,00	.00	,00	.00	,00	.00	,00	.00	,00	.00	,00
	Sitting	.00	,00	.00	,00	.75	,95	6.25	8,01	7.00	8,75	23.25	16,37
	Standing	20.50	3,69	18.00	2,16	23.25	2,75	25.75	7,50	87.50	5,97	93.00	3,16
	Walking	14.00	4,08	16.00	2,44	10.50	4,72	7.50	2,38	48.00	8,83	38.50	8,96
	Very active	7.50	5,74	8.00	4,54	7.50	4,20	2.50	,57	25.50	13,17	13.50	9,25
	MVPA %	51.18	8,80	57.14	5,14	42.85	8,01	23.80	6,44	42.81	2,08	30.94	10,24
03.05.2023	Lying down	.00	,00	.00	,00	.00	,00	.00	,00	.00	,00	.00	,00
	Sitting	.75	,95	2.00	3,36	1.25	2,50	1.25	1,25	5.25	6,65	4.00	6,16
	Standing	22.50	2,88	28.00	2,16	23.25	3,50	25.00	2,16	96.25	9,63	83.25	12,09
	Walking	13.00	1,41	10.25	3,20	12.75	2,06	12.75	2,21	48.75	5,85	66.25	7,80
	Very active	5.75	1,70	1.75	1,50	4.75	3,77	3.00	2,94	15.25	7,63	14.50	11,12
	MVPA %	44.63	6,55	28.56	9,32	41.66	11,74	37.49	5,62	38.09	5,97	48.06	10,14

Table 2 shows primary school students' PA behaviors during BT and PEL hours. A total of 4 students, 2 girls, and 2 boys, were taken as references in the scores created.

In the first 2 BT hours of the second measurement taken, it was observed that the students met the MVPA behavioral threshold above 50%. In the last BT of the same day, the lowest of all scores was measured and the break time brought the PA average down considerably. In general, students' PA behaviors during BT were measured lower than expected. Consistent results were seen in measurements taken at different times for BT hours.

In the PEL, the MVPA levels of the students did not reach the reference value of 50% or more in any measurement. In the second measurement, students' PA behaviors in the PEL were determined to be relatively low. Although the highest PA level was measured in the last measurement of the PEL, the expectations were still not met.

Table 3. Comparison of Students' in-group SOFIT Scores with Friedman Analysis

Content of Measurement	Sofit	Date of Measurement	n	\bar{x}	\pm	Mean Rank	df	Chi-Square	Asymp. Sig.
Mean of Break Time	MVPA %	08.03.2023	4	42.107	7,813	2,00	2	2,000	,368
		05.04.2023	4	42.817	2,081	2,50			
		03.05.2023	4	38.092	5,972	1,50			
Physical Education	MVPA %	08.03.2023	4	40.617	17,329	2,13	2	5,733	,057
		05.04.2023	4	30.947	10,240	1,13			
		03.05.2023	4	48.062	10,141	2,75			

Table 3 shows the Friedman analysis comparison of MVPA in BT and PEL. As a result of the measurements taken at different times, it was determined that the MVPA behaviors ($p>.05$) at break times did not show a significant change. In the PEL, although the MVPA behavior scores were not statistically significant ($p>.05$), when they were examined in pairs, it was seen that the second measurement was relatively lower than the third measurement.

Table 4. Comparison of MVPA Scores in Break Time and PEL with Wilcoxon Test

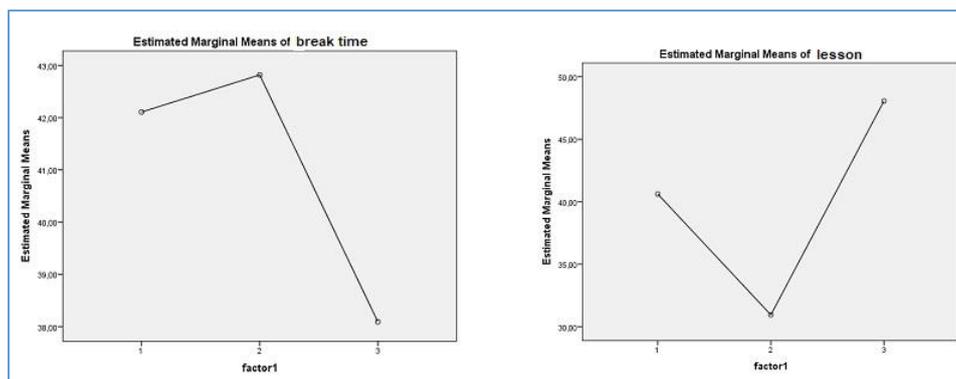
Date of Measurement	Mean of Break Time – Physical Education	Sequence	n	Rank Average	Rank Sum	Z	Asymp. Sig.
08.03.2023	MVPA %	Negative	2	3,00	6,00	-,365	,715
		Positive	2	2,00	4,00		
		Equal	0				
05.04.2023	MVPA %	Negative	4	2,50	10,00	-1,826	,068
		Positive	0	,00	,00		
		Equal	0				
03.05.2023	MVPA %	Negative	0	,00	,00	-1,826	,068
		Positive	4	2,50	10,00		
		Equal	0				

In Table 4, the Wilcoxon analysis of the students' MVPA percentages in the BT and PEL are compared. The MVPA percentages of the students did not differ significantly in all measurements during the PEL and BT ($p>.05$). However, it is noteworthy that the BT activities in the 2nd measurement and the PEL activities in the 3rd measurement are high.

Table 5. Comparison of MVPA Scores by Gender with Mann Whitney U Test

Date of Measurement	Subcategories	Gender	n	Rank average	Rank sum	U	P
08.03.2023	Mean of Break Time	Boy	2	2,00	4,00	1,000	,667
		Girl	2	3,00	6,00		
	Physical Education	Boy	2	1,50	3,00	,000	,333
		Girl	2	3,50	7,00		
05.04.2023	Mean of Break Time	Boy	2	2,50	5,00	2,000	1,000
		Girl	2	2,50	5,00		
	Physical Education	Boy	2	2,00	4,00	1,000	,439
		Girl	2	3,00	6,00		
03.05.2023	Mean of Break Time	Boy	2	1,50	3,00	,000	,333
		Girl	2	3,50	7,00		
	Physical Education	Boy	2	1,50	3,00	,000	,333
		Girl	2	3,50	7,00		

When Table 5 is examined; no significant difference was found in participation in MVPA in BT and PEL according to gender ($p>.05$).



Graphic 1. Variation of MVPA Scores Measured at Different Times

DISCUSSION

While international guidelines recommend that children do more than 50% of MVPA⁴⁷, schools are actively fighting obesity by paying attention to MVPA through the PEL⁴⁸. Unfortunately, today's children cannot meet the expected PA threshold despite all the support and suggestions²⁸. Especially the education programs implemented in primary schools should encourage PA. Otherwise, children's mobility will not develop and MVPA requirements will not be met. Van Cauwenberghe et al. (2012)¹⁴ observed that children were sedentary for more than half of the PEL time, and found that the current program did not meet the health-related PA recommendations. In their research, To et al. (2020)⁴⁹ determined that the MVPA level of children was not at the desired level as a result of the perceived low value of the PEL, the lack of professional development of PE teachers, and the education programs that overemphasized sports education rather than movement. It is accepted by all authorities that PA behaviors of children tend to decrease in the age of technology. In order to increase the decreased PA level, studies are carried out to increase PA with programs that prioritize movement training. Hall-López (2021)¹⁹ pointed out that successful results were not obtained in his study in which he evaluated the training program applied to increase MVPA. Van Beurden et al. (2003)⁵⁰ found that 9-week movement training applied to primary school children increased the PA behaviors of children, but did not bring them to the desired MVPA level in children. Since the PA levels of the children are insufficient at the beginning, the implementation period of the education programs gains importance here. Examining this issue by following the education-training period, primary school and secondary school will gain value in terms of detecting the deficiency. Ramer et al. (2021)⁵¹ examined the relationship between MVPA and enjoyment of PEL during an academic year. While it was seen that the students enjoyed doing PA, they could not reach the desired 50% MVPA level at the end of the academic year. Guthold et al. (2010)²², on the other hand, examined the PA status of children from 34 countries, especially Far East countries, for 4 years. While it was seen that children made different PA by country, most children adopted inactivity and did not meet the desired MVPA recommendation. Zhou et al. (2022)²⁴, on the other hand, found that female primary school teachers motivate their students less in PA and teachers with less than 5 years of professional experience cannot sufficiently mobilize their students about MVPA behaviors. Students' lack of ideal weight, their education in a crowded classroom environment³⁴ and low ability affect the MVPA status of students negatively¹⁰. In summary, most studies have shown that primary school children do not meet the MVPA requirement⁵²⁻⁵⁴. These results are similar to our study findings. It was

determined that primary school 4th-grade students did not reach a MVPA level above 50% as a result of 3 measurements taken in PEL, which lasted for 9 weeks. The lack of significant difference in the measurements shows consistency in terms of students' participation in PA in the process. At the end of the process, students' MVPA behaviors increased, but the size of the change was not significant. It is believed that the content of the lessons in the nature of games aimed at increasing PA the inability of children to perceive the games at the beginning of their inability to reach our goal, and the realization of teacher interventions negatively affect the MVPA.

Despite the negative results in the literature, it is a known fact that children's PA levels are high during school days⁵⁵. Children make higher MVPA on the day of PEL compared to other days³⁷. Powell et al. (2016)⁵⁶ found that Stretching whilst moving, High repetition of motor skills, Accessibility through differentiation, Reducing sitting and standing, and Promotion of in-class activity increased the MVPA level applied in the one-year teaching plan in British primary schools. Game-based lessons play a very important role in increasing children's MVPA behaviors⁵⁷. Errisuriz et al. (2021)¹⁸, observed positive increases in PA behaviors when 4th-grade teachers gave feedback to students. When a positive atmosphere is achieved in the context of the teacher, student, and school, children reach the desired MVPA levels^{32,58}. Even if the desired MVPA level was not reached in our study, it is considered positive that there is an increase in the MVPA levels of the students. It will guide researchers that this increase can be sustained with different interventions.

Break times (BT), which are applied in schools as a legal obligation, are of great importance in meeting the children's resting, feeding, toilet needs, playing games, socializing, and meeting the MVPA needs between classes⁵⁹. Children do up to 40% of the PA they should do daily during BT⁶⁰. This report shows similarities with the study results. The high number of students in the school in the city centers and the insufficient playgrounds affect MVPA behavior negatively. There may be a difference in the MVPA level according to the school tempo in children who receive education in rural areas⁵⁴. Considering that children may be more energetic in the morning, higher MVPA behaviors are observed in the first lesson hours^{50,61}. In the study, it was observed that the students did not meet the MVPA threshold during BT. However, higher percentages of children's MVPA behaviors were recorded during first BT. Children's MVPA behaviors decreased due to reasons such as fatigue, doing homework, and meeting their physiological needs during the day. Studies in the literature confirm this result. There were no significant changes in BT MVPA measures during the children's school day. This result is consistent with the study results of Weaver et al. (2018)²⁹.

Springer et al. (2013)⁶² reported that primary school-aged children from low-income families in urban centers participated in MVPA at a very high rate (66.4%) during the 20-minute BT. Hall-López and Ochoa-Martínez (2021)⁶³ also found that students with the normal fat percentage in primary school (2-3. grades) performed over 50% MVPA during the 27-minute BT. Stratton and Mullan (2005)²¹ found in their research that the time spent in MVPA was higher for the children who did activities in the painted playgrounds in the school garden during BT than the students in the other groups. During the study, the children played in the playgrounds in the school garden, spending great energy. However, when it is considered that children meet other needs besides MVPA during BT, it is predicted that an MVPA of around 40% can be evaluated at a good level.

An increase in the MVPA percentage of students is observed when the PEL is planned with PA-centered, team games and activities that require cooperation away from monotony⁴³. Boz et al. (2022)³⁶ found that activities carried out under the supervision of teachers, especially in small age groups (5-6 years), spend more time, energy, and intense activity compared to children's free play. Teachers' encouraging instructions were effective in increasing PA. However, the importance of break times that allow children to play freely in increasing MVPA is undeniable. So much so that Martínez et al. (2021)⁶⁴ found that MVPA behaviors of primary school-aged hearing-impaired children during BT were higher than the PEL. It can be thought that children who do not receive the teacher's encouraging instructions have higher MVPA in free play. As their children get older, the opportunities to make PA in BT and PEL become similar. Hall-López et al. (2019)³⁰ found that primary school students had the opportunity to play games during BT and that although there were active course contents in PEL, the students could not meet the 50% MVPA reference value. In our study findings, it was seen that the students did not meet the MVPA reference value in BT and PEL. However, the use of traditional games in the course contents and the presence of areas that allow playing games during BT brought the MVPA behaviors of children closer to the desired level. The expected 50% MVPA requirement can be met when free games during BT or traditional games promoting PA in PEL are played in a tournament format³³.

By nature, although boy and girl students study at the same age and in the same class in formal education, the status of making and enjoying PA differs. While boy students are dominant in participating in sports activities involving large groups, girl students are dominant in a relatively small PA, where social interaction is intense¹⁶. In games conducted on the basis of outdoor activity, boy students' PA behaviors are higher than girl students⁶². As boy students have the opportunity to play games during school days, there is a noticeable increase in MVPA levels³⁷. When the literature is examined extensively, it is generally accepted that primary school-age boys participate in PA more than girls^{19,22,51,57-58,65-67}. Contrary to the literature, no significant difference was observed in the behavior of performing MVPA according to gender in the study. The similarity of MVPA behaviors of boy and girl students who play traditional games together is in line with the study of Temel et al. (2023)³³. Teachers' encouragement of PA and the implementation of low and high-intensity activities increase the MVPA behaviors of girl and boy students alike^{29,53}. Traditional games played by students in PEL and during BT allow boys and girls to do MVPA alike. Despite the dominance of boy students in the literature, PA development of girl students was measured at the same level as males. In this direction, traditional games have gained importance in the development of PA.

As a result of the research; it was observed that the MVPA levels of the 4th-grade primary school students in the BT and PEL were at similar levels and were slightly below the WHO recommended value. The 3 different measurements taken for BT and PEL are consistent with each other and students tend to approach the expected MVPA. By playing traditional games in the BT and PEL, boy and girl students performed MVPA at a similar level and an important finding was obtained contrary to the literature.

RECOMMENDATIONS

Based on the research results; it is recommended to include content that will increase the mobility of students in PEL, to plan playgrounds that will allow playing during BT, and to increase BT.

Recommendations for Further Research

More consistent results can be obtained by increasing the number of measurements. In addition to the SOFIT data collection tool, data can be collected with the help of an accelerometer. By conducting similar research at different grade levels, an opinion accepted by everyone can be obtained.

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