

Examining the Impact of Sports and Physical Activities on Basic Motor Skills in Primary School Children

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Abstract

The aim of this study is to examine the effects of sports and physical activities on the fundamental motor skills of primary school children. The research was conducted with 54 volunteer students, including 27 in the experimental group and 27 in the control group, at Beyrebucak Primary School in Gazipaşa, Antalya. Necessary permissions were obtained from the Antalya Governorship and the parents of the students before the study. Within the scope of the research, the experimental group participated in activities using the Physical Activity Cards (PAC) referred to as yellow cards, which were implemented in physical education and game classes for 8 weeks, 3 days a week. In addition to measuring the students' height and body weight, their fundamental motor skills were evaluated using the Test of Gross Motor Development (TGMD-2). On the other hand, no intervention related to physical activity cards was provided to the control group. The research findings showed a significant difference in favor of the experimental group in terms of the total score of the TGMD-2 ($p < 0,001$). Moreover, there was a significant improvement in the experimental group in the subcategories of the TGMD-2, namely locomotor and object control skills ($p < 0,001$), whereas no significant changes were observed in the control group ($p > 0,05$). In conclusion, the study suggests that sports and physical activities can have a positive impact on the fundamental motor skills of primary school children.

Keywords: Gross motor development, motor skill, TGMD-2

Introduction

Motor development is a key factor in children's physical, cognitive, and social growth. Basic motor skills encompass all fundamental motor movements utilized in daily life, such as walking, running, throwing, jumping, and holding. However, it also encompasses a fundamental concept that forms the basis of more complex physical and sporting activities (Tang & Wang, 2023). The development of motor skills is a process that begins at an early age and continues throughout one's lifetime. During childhood, individuals acquire fundamental motor abilities, which then evolve into more sophisticated movements as they grow older (Goodway et al., 2019). In many countries, studies have shown that participation in physical activities and sports is an effective strategy for enhancing motor skill proficiency in children (Jia et al., 2024; Lemos et al., 2012; Zhang & Zhang, 2023).

In Turkey, the only course where children in primary school could previously engage in educational games and physical activities was the "Games and Physical Activities" course. However, following a change in 2008, the course was renamed "Physical Education and Games" (Yılmaz & Kurt, 2019). One of the key objectives of physical education and games is to enhance students' movement abilities and facilitate their motor development. PAC yellow cards are activity- and game-based materials designed for use in primary school "Physical Education and Games" lessons. The objective of these cards is to facilitate the development of fundamental movement skills, movement concepts, and game strategies in children. The yellow cards encompass displacement, balancing, object control, and combined movements, all in accordance with the developmental characteristics of children. The front side of the cards contains brief descriptions and visual depictions of the movements and games, while the back side contains learning keys and suggestions for diversifying the activities. Additionally, it offers constructivist assessments to support children's development and includes health-related information (Ince et al., 2018).

A review of the literature reveals that structured physical activity and sporting activities are effective in promoting fundamental motor development in children during the preschool and primary school years. For instance, Lemos et al. (2012) demonstrated that structured physical education, delivered by an expert, positively influenced the advancement of gross motor skills in kindergarten students. The positive impact of sports training on fundamental motor skills and life skills has also been demonstrated in autistic children (Huseyin, 2019). Furthermore, Boat et al. (2022) demonstrated that structured physical activity enhances cognitive functions and fundamental motor skill development in primary school children aged 8-9 years. This is achieved by incorporating more active lessons into the curriculum of subjects such as mathematics and English, where passive teaching methods are prevalent.

When the national literature is examined, various academic studies have been conducted to evaluate the development of Physical Activity Cards in different areas of children. As an illustration, Esen and Mirzeoğlu (2018) indicated that activities conducted through PAC cards resulted in an increase in children's academic learning time. In a 2013 study, Irez et al. (2013) found that PAC cards increased the amount of time teachers spent on in-class activities and encouraged students to engage in physical activity at a higher rate.

There are limited studies in the existing literature on the effects of using PAC cards for primary school children in Turkey. The aim of this study is to evaluate the effect of PAC yellow cards on primary school students' basic motor skills.

Material and Method

Research Design

In this research, the experimental method with pre-test post-test control group was used.

Research Group

The study was conducted with a total of 54 students, 27 in the experimental group and 27 in the control group, all of whom were enrolled at educational institutions in the Gazipaşa district of Antalya province during the 2022-2023 academic year.

Procedure

The necessary permissions were obtained from the Antalya Governorate for the implementation of the TGMD-2 Test and for sports and physical activities. Subsequently, a meeting was held with the administrators and classroom teachers at Antalya Gazipaşa Beyrebucak Primary School, during which the days and hours of the practices were decided. With the purposeful sampling method, the students who volunteered to participate in the study were divided into two groups: a control group and an experimental group. Both groups of students continued to teach physical education and game lessons in accordance with their annual plans, under the guidance of their class teachers. The experimental group was provided with the activities from the physical activity cards, which align with the curriculum outcomes for physical education and games, at the conclusion of each lesson. Following the initial assessment, the post-test was conducted after the 8-week program, which was implemented for 40 minutes, three days a week. The students' skills were then evaluated.

Data Collection

Test of Gross Motor Development (TGMD-2)

The Test of Gross Motor Development, Second Edition (TGMD-2) is a standardized protocol designed to evaluate the gross motor skills of children. It comprises 12 activities, divided into two subtests: locomotor and object control. The locomotor subtest encompasses running, galloping, hopping, leaping, horizontal jumping, and sliding, while the object control subtest includes striking a stationary ball, stationary dribbling, catching, kicking, overhand throwing, and underhand rolling. Each skill is demonstrated and scored based on specific criteria, with two trials for each activity (Ulrich et al., 2000).

Data analysis

IBM SPSS Statistics 22.0 (IBM Corp. Released 2013) was utilized to analyze the data of this study. Comparative tables were utilized to ascertain the class distribution in the experimental and control groups, and frequency and percentage values for the variables were provided. Kolmogorov-Smirnov and Shapiro-Wilk tests and graphs were employed to ascertain whether the Test of Large Muscle Motor Development (TGMD-2) sub-dimension scores and total scores exhibited a normal distribution. The dependent group t-test was used to determine within-group differences. All tests were conducted with a statistical significance level of $\alpha=0.05$.

Findings

The study's participant group consisted of 54 students, 27 in the experimental group and 27 in the control group, who were enrolled at Beyrebucak Primary School during the 2023-2024 academic year. The mean age of the participants was 8.4 ± 0.81 .

The results consist of comparisons between pre-test and post-test measurements for height, body weight, displacement skills, object control skills, and TGMD-2 scores between an experimental group and a control group (table 1).

Table 1. Comparison of Pre- and Post-Test Measurements of Height, Weight, Displacement, Object Control and Gross Muscle Motor Development Test in the Experimental and Control Groups

	Group	Pre-Test X ± SD	Post-Test X ± SD	Mean Difference	Comparison
Height (cm)	Experiment	129,44 ± 7,78	130,43 ± 7,58	-0,99 ± 0,69	t=7,457; p<0,001
	Control	130,06 ± 10,59	130,7 ± 10,64	-0,64 ± 0,59	t=5,715; p<0,001
Body Weight (kg)	Experiment	29,54 ± 5,70	29,64 ± 6,12	-0,10 ± 1,49	t=0,349; p=0,730
	Control	31,89 ± 8,70	32,40 ± 9,43	-0,51 ± 1,82	t=1,462; p=0,156
Displacement Skill	Experiment	30,26 ± 5,53	39,07 ± 5,20	-8,81 ± 5,12	t=8,943; p<0,001
	Control	30,15 ± 7,66	31,26 ± 7,07	-1,11 ± 5,58	t=1,035; p=0,310
Object Control Skill	Experiment	20,41 ± 4,67	28,15 ± 4,95	-7,74 ± 3,86	t=10,423; p<0,001
	Control	20,78 ± 7,22	22,15 ± 7,01	-1,37 ± 5,12	t=1,390; p=0,176
TGMD-2	Experiment	50,67 ± 7,79	67,22 ± 7,20	-16,56 ± 4,72	t=18,235; p<0,001
	Control	50,93 ± 12,88	53,41 ± 11,81	-2,48 ± 7,40	t=1,742; p=0,093

For height, both groups showed a statistically significant increase, with the experimental group ($t=7.457$, $p<0.001$) and the control group ($t=5.715$, $p<0.001$) improving. Body weight changes were not significant for either group, with the experimental group showing a minor increase ($t=0.349$, $p=0.730$) and the control group showing a also small decrease ($t=1.462$, $p=0.156$). Displacement skill and object control skill improved significantly in the experimental group ($t=8.943$, $p<0.001$ and $t=10.423$, $p<0.001$, respectively) but not in the control group ($t=1.035$, $p=0.310$ and $t=1.390$, $p=0.176$, respectively). TGMD-2 scores also showed a significant improvement in the experimental group ($t=18.235$, $p<0.001$) but not in the control group ($t=1.742$, $p=0.093$).

Discussion and Conclusion

The experimental group showed significant improvements in displacement skills ($p<0.001$), object control skills ($p<0.001$), and TGMD-2 scores ($p<0.001$). The control group did not show significant improvements in these areas.

Participation in organized sports has been associated with increased childhood motor performance, suggesting that sports involvement can enhance motor skill development from an early age (Vallence et al., 2019). Research indicates that interventions aimed at improving gross motor competence can enhance fundamental movement skills and motor coordination in children and adolescents (Barnett et al., 2016). Williams et al. (2008) found that preschool children with higher motor skill scores, particularly in locomotor skills, were more physically active, spending more time in moderate-to-vigorous and vigorous physical activity. Integrated sports games have been found to positively impact the training of basic motor skills in young children (Zhang & Zhang, 2023). The results of this study suggest that the structured activities provided by the PAC yellow cards were highly effective in enhancing these specific motor skills ($p<0.001$). In contrast, the control group did not show significant improvements in these areas. This underscores the importance of targeted interventions in developing motor skills. The structured nature of the PAC yellow cards likely provided the necessary repetition and progression needed for skill acquisition.

The TGMD-2 scores, which reflect overall gross motor development, also showed significant improvement in the experimental group ($t=18.235$, $p<0.001$). The control group, however, did not exhibit significant changes. This finding aligns with previous research indicating that

structured physical activity interventions are effective in promoting motor skill development (Boat et al., 2022; Lemos et al., 2012). The PAC yellow cards, by incorporating a variety of movement activities and progressive challenges, seem to have provided a comprehensive structure for motor skill enhancement.

The findings of this study support the hypothesis that structured physical activity programs, such as those utilizing PAC yellow cards, should be integrated into the school physical education curriculum. The significant improvements observed in the experimental group demonstrate the potential of these interventions to enhance motor skill proficiency, which is crucial for children's physical, cognitive, and social development (Zeng et al., 2017). Schools and educators may consider adopting structured approaches to physical education classes to maximize the benefits of such programs.

One limitation of this study is the relatively short duration of the intervention, which was only eight weeks. Longer-term studies could provide more insight into the sustained effects of such interventions on motor skill development. Furthermore, this study did not control for external factors such as diet and extracurricular physical activities, which could influence the results. Future research should consider these factors and also explore the impact of such interventions on other aspects of child development, such as cognitive and social skills.

As a result, the use of PAC yellow cards in primary school physical education classes significantly improves basic motor skills. This study provides evidence that structured physical activity interventions are effective in supporting motor development in children. Given the critical role of motor skills in overall child development, increasing the coverage of such approaches in the school curriculum could provide far-reaching benefits for children's physical, cognitive and social well-being.

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