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The effect of fundamental movement skills on the gross motor skills of third-grade primary school students

El efecto de las habilidades de movimiento fundamental sobre las habilidades motoras gruesas de los estudiantes de tercer grado de educación primaria

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Author contribution:

Sena Kırlangıç[1] Conceptualization, design, resources, materials, data collection, data analysis and interpretation, literature review, manuscript writing.

Sinan Bozkurt[2] Conceptualization, supervision, resources, manuscript review.

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Abstract

The aim of this study is to examine the effect of movement skill-specific practices in physical education and play lessons on the gross motor skills of third-grade elementary school students. The study group consisted of 16 students from the 3rd grade, 9-year-old group, at an elementary school in Istanbul, Turkey. In this study, a fundamental movement skills program using physical activity cards was applied to the study group during physical education and play lessons for 26 hours of instruction. To assess the students' gross motor skills, both pre-test and post-test evaluations were conducted using the TGMD-3. Fundamental movement skills were examined in two sub-dimensions: locomotor skills and ball skills. The collected data were analyzed using descriptive statistics, and differences between pre-test and post-test scores were analyzed with the Dependent Samples t-test and the Wilcoxon Signed Ranks test. Significant differences were found between the pre-test and post-test scores for running, galloping, hopping, jump, sliding, and total movement skills ($p < 0.05$). Significant differences were found between the pre-test and post-test scores for two-handed striking, overhead throw, underhand throw, and total object control skills ($p < 0.05$). Based on the results, it is emphasized that the movement skill practices in the physical activity cards played a significant role in the development of motor skills and the enhancement of object control skills for third-grade elementary school students. The development of these skills is crucial for children. Therefore, it is recommended that physical education teachers, classroom teachers, and researchers implement practices that promote the development of motor skills in children and regularly investigate and monitor their skill development.

Keywords: physical activity; physical activity cards; motor development; motor behaviour; physical education

Resumen

El objetivo de este estudio es examinar el efecto de las prácticas específicas de habilidades de movimiento en las lecciones de educación física y juegos sobre las habilidades motoras gruesas de los estudiantes de tercer grado de primaria. El grupo de estudio estuvo compuesto por 16 estudiantes del grupo de 9 años de la escuela primaria en Estambul, Turquía. En este estudio, se aplicó un programa de habilidades de movimiento fundamental utilizando tarjetas de actividad física al grupo de estudio durante las lecciones de educación física y juegos durante, totalizando 26 horas de instrucción. Para evaluar las habilidades motoras gruesas de los estudiantes, se realizaron evaluaciones tanto pre-test como post-test utilizando el TGMD-3. Las habilidades motoras fundamentales se examinaron en dos subdimensiones: habilidades locomotoras y habilidades con el balón. Los datos recopilados fueron analizados utilizando estadísticas descriptivas, y las diferencias entre las puntuaciones pre-test y post-test se analizaron con la prueba t para muestras dependientes y la prueba de rangos con signo de Wilcoxon. Se encontraron diferencias significativas entre las puntuaciones del pre-test y post-test para correr, galopar, saltar, deslizarse y las habilidades motoras totales ($p < 0.05$). Se encontraron diferencias significativas entre las puntuaciones pre-test y post-test para el golpeo con dos manos, lanzamiento por encima de la cabeza, lanzamiento por debajo de la mano y las habilidades de control de objetos totales ($p < 0.05$). Con base en los resultados, se enfatiza que

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las prácticas de habilidades de movimiento en las tarjetas de actividad física jugaron un papel significativo en el desarrollo de las habilidades motoras y la mejora de las habilidades de control de objetos en los estudiantes de tercer grado de primaria. El desarrollo de estas habilidades es crucial para los niños. Por lo tanto, se recomienda que los maestros de educación física, los maestros de aula y los investigadores implementen prácticas que promuevan el desarrollo de habilidades motoras en los niños e investiguen y monitoreen regularmente su desarrollo de habilidades.

Palabras clave: actividad física; tarjetas de actividad física; desarrollo motor; comportamiento motor; educación física

Introduction

Education is a comprehensive process that not only helps individuals acquire knowledge, skills, and values but also supports their emotional and social development. Learning lies at the heart of the educational process, and achieving goals is possible through an effective teaching method. Education not only ensures academic success but also provides children with essential life skills, such as motor abilities and social competencies, necessary for the situations they will encounter throughout their lives. Physical Education in early childhood is considered fundamental for the comprehensive development of children, encompassing physical, social, emotional, and psychological domains (Arufe Giráldez, 2020).

Sports, in addition to promoting physical health, also encourage significant personal development areas such as social skills, self-discipline, and teamwork. Childhood is a crucial period during which sports play a decisive role in the development of children's motor skills. By engaging in regular physical activities, children enhance their physical abilities, boost their self-confidence, and acquire social skills. Sports allow children to effectively develop their motor skills, as well as their mental, emotional, and social growth (Orhan, 2019; Günay & Yılmaz, 2023; Côté et al., 2009). Providing structured and purposeful Physical Education activities during this stage helps build essential motor and interpersonal skills from an early age (Arufe Giráldez, 2020). In recent years, Physical Education in Early Childhood Education has gained increasing attention across Europe, with researchers highlighting its role in fostering not only motor development but also socio-emotional competence (Hardy et al., 2021).

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Physical education is a vital field that supports both the physical and social development of children. Physical education classes not only help develop children's motor skills but also aid in acquiring teamwork, leadership, and other social skills. The physical activities conducted in these classes enable children to become familiar with their bodies, coordinate their movements, and explore their physical limits. Physical education plays a significant role in the development of motor skills as children learn gross motor skills such as speed, balance, agility, and endurance during physical activities (Kaya et al., 2019; Pate et al., 2006). Physical education classes in primary school provide an ideal context for promoting motor skill development through structured and play-based activities (Sánchez-López et al., 2020). Regular physical activity during childhood plays a key role not only in supporting the development of motor skills but also in maintaining physical fitness and overall health (García-Hermoso et al., 2022).

Physical Activity Cards (PAC) used in physical education classes offer students an interactive and effective teaching tool to develop basic motor skills. Starting from the 1st grade and gradually applied to upper grades, the Ministry of National Education (MEB) adopted the Physical Education and Games curriculum for primary schools, under the International Inspiration Project, and developed Physical Activity Cards for this purpose (MEB, 2012a; MEB, 2012b). In this context, the aim is to contribute to the psychomotor, cognitive, and affective development of students through games and physical education. These cards allow teachers to structure various movement activities to help students develop their motor skills. The use of Physical Activity Cards provides students with an enjoyable and motivating learning experience while improving their motor skills. Research shows that Physical Activity Cards help students reinforce their basic motor skills and enhance these skills through group activities (Yılmaz & Bozkurt, 2017).

Motor development refers to the process through which a child acquires physical skills by interacting with their environment. This process initially progresses from basic movements to more complex ones. Motor skills develop rapidly, especially during childhood, and help children adapt to their surroundings. As children develop their motor skills, they also make progress in gross motor skills such as balance, speed, coordination, and agility. Regular physical

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activities in early childhood not only support motor development but also help children build self-confidence and adapt to their environments (Piek et al., 2014; Stodden et al., 2008). Gross motor skills form the foundation of an individual's physical development, and childhood is the period during which these skills develop most rapidly. The development of gross motor skills should be supported through physical activities, encouraging children to make progress in these skills (Houwen et al., 2016; Gallahue & Ozmun, 2006).

Motor skill-focused educational programs at the primary school level significantly contribute to the development of children's gross motor skills. Physical activities conducted during this period allow children to develop basic movement skills and the motor skills associated with these movements. In particular, in physical education classes, games and activities reinforce children's gross motor skills. Moreover, these activities enable children to learn more complex motor skills and use these skills effectively in daily life (Kirk, 2010; Goodway & Robinson, 2006).

Physical activity cards (PAC) make a significant contribution to the development of gross motor skills. These cards support children in learning various motor skills in a fun and structured manner. Research indicates that physical activity cards are an effective tool for developing children's motor skills and facilitating the use of these skills in social interactions (Usluoğlu & Mirzeoğlu, 2017).

There is a substantial body of literature on the use of physical activity cards (PAC). One notable study in this field is by Kaptan and Bozkurt (2021), which examined the impact of physical activity interventions on 2nd-grade students' acquisition of motor skills. Aşan (2023) explored the effects of physical activity cards on coordination skills in middle school students aged 11-13. Additionally, Topsakal et al. (2019) examined the impact of fundamental movement skill training on primary school students' attention and motor characteristics using the differential learning approach. In their study, Allimant et al. (2023) investigated the effects of structured and unstructured physical activities on preschool students' gross motor skills and found that both types of activities supported motor development. However, there is no similar study using the TGMD-3 test with 3rd-grade students in Turkey. Therefore, this study is original and has the potential to make a significant contribution to the literature. The purpose of this

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study is to investigate the impact of movement skill-specific applications in physical education and play classes on the gross motor skills of 3rd-grade primary school students.

Material and methods

The ethical approval for the study was obtained from the Ethics Committee of a state university (Ethics Committee Approval Date and Number: 31.08.2022 / 06-2). In addition, the necessary official permissions were obtained from the Provincial Directorate of National Education (Ethics Committee Protocol No: 359829) and the school administration where the study was conducted. The parents of the students participating in the study signed written consent forms. It was clearly stated to the participating students and their parents that their performance during the implementation process would not affect their grades in any way. All participants voluntarily participated in the study.

Research Design

In this quantitative research, a single-group pre-test and post-test model, which is a type of quasi-experimental design, was used. Quantitative research involves objective and replicable observations and measurements (Büyüköztürk et al., 2008). The single-group pre-test and post-test design allows for evaluating the effects of an intervention by comparing measurements taken before and after the implementation on the same group (Karasar, 2020). In this study, the independent variable is the fundamental movement skill practices implemented through physical activity cards, and the dependent variable is gross motor skills.

Participants

In this study, the sample group consists of a total of 16 students (10 male and 6 female) from a 3rd-grade class (9 years old) at an elementary school in the Beykoz district of Istanbul. The non-probability "convenience sampling method" was used when forming the research groups (Gravetter & Forzano, 2012). In convenience sampling, researchers select individuals who are easy to reach, suitable for the study, and willing to participate. The participants' average age is 8.88±0.44 years, with an average height of 135.69±4.99 cm and an average weight of 33.88±6.45 kg.

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Data Collection Instruments

The study protocol was approved by the Ethics Committee of Marmara University. All participants gave their informed consent, and no incentive was provided for their participation. The study was conducted during the fall semester of the 2022-2023 academic year. The intervention was applied by the researcher under the supervision of the classroom teacher during class hours to the students forming the sample group. The Test of Gross Motor Development (TGMD-3) was used as the data collection tool in the sample group of the study. The Turkish version of the TGMD-3, adapted by Gençtürk (2022), was used in our study.

Test of Gross Motor Development (TGMD-3)

The Test of Gross Motor Development-Third Edition (TGMD-3) is a norm-referenced measurement tool developed to assess the basic motor skills of children aged 3 to 10 years (Ulrich, 2016). TGMD-3 is used to identify deficiencies in children's gross motor skills and to monitor their development in this area. The TGMD-3 consists of two main subtests. The first subtest includes six locomotor skills: running, hopping, jumping, skiping, jumping, and sliding. These skills are used to assess children's mobility and ability to move from one place to another. The second subtest includes seven object control skills: one-handed striking, two-handed striking, dribbling, catching, kicking, overhand throwing, and underhand throwing. These skills measure children's ability to control objects and their motor skills related to ball handling (Ulrich, 2016).

TGMD-3 provides a process-oriented, directly observed evaluation, with 3 to 5 performance criteria for each skill. These criteria reflect the most advanced movement patterns, and the child's performance in each skill is evaluated according to these criteria (Ulrich, 2016). The test takes approximately 15-20 minutes to administer and is conducted individually. Validity and reliability studies of the TGMD-3 have been conducted in various countries and populations. For example, a study in Brazil found that TGMD-3 had high content and construct validity, as well as strong internal consistency coefficients (Valentini et al., 2017). Similarly, a pilot study conducted in Germany also showed positive psychometric results for the test (Wagner et al., 2017).

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Practice phase

The activities and games included in the physical activity cards were implemented with the study group during the Physical Education and Play course in the fall semester of the 2022–2023 academic year. The intervention lasted for 13 weeks, with two class hours per week, totaling 26 instructional hours. At the beginning of each session, attendance was recorded, and students who participated regularly throughout the 13-week period were identified. Students who missed three consecutive classes were excluded from the study due to absenteeism and were not included in the groups. These activities took place at Marmara University's artificial turf football field, the school's asphalt outdoor area, and the small gymnasium with a parquet floor.

The exercises covered in the activity cards aimed to develop the students' motor skills, focusing on displacement, balancing, object control, and combined movements. The displacement movements included walking, running, jumping-hopping, step-taking-hopping, galloping-sliding, and rolling. Balancing movements included bending, stretching, spinning-swinging, starting-stopping, and static-dynamic balance. The object control exercises included ball handling drills, throwing-catching, catching, kicking, rolling, stopping-controlling, dribbling, and racket hitting. Combined movements included games such as tail chasing, relay races, caterpillar ball catching, and hitting moving targets. Each activity was structured with a warm-up, main section, and cool-down phases and was conducted in the form of games. The tests and game applications throughout the research process were carried out by the researcher, who is both a physical education teacher and a sports specialist.

Data Collection

During the data collection process, physical measurements such as height and body weight were taken using reliable and valid testing instruments. Height measurements were conducted with students standing barefoot next to a wall, ensuring their heads were aligned at a horizontal level. This procedure was carried out using a stadiometer and followed the ISAK (International Society for the Advancement of Kinanthropometry) protocols (ISAK, 2001). Body weight was measured with students dressed in minimal clothing and barefoot, using

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electronic scales. Additionally, the measurements were taken in the morning and on an empty stomach to minimize weight fluctuations throughout the day (Topsakal, 2020). During the TGMD-3 assessments, digital action cameras (GoPro) were used. The cameras were positioned at three different locations on the field to capture the movements from various angles. After the measurements were completed, the recorded digital footage was transferred to a computer and analyzed by three different referees, who then filled out the evaluation forms.

Data Analysis

The data analysis was conducted using the SPSS Statistics 25.00 software. In determining the appropriate analysis techniques, the skewness and kurtosis values of the variables were considered to assess the normal distribution; variables with values within the ±2 range were assumed to follow a normal distribution (George & Mallery, 2010). Descriptive statistics, including the arithmetic mean (X), standard deviation (Sd), minimum (Min.), and maximum (Max.) values, were provided. Depending on the normality of the data, either the Dependent Samples t-test or the Wilcoxon Signed Rank test was applied.

Findings

This section of the study presents the findings and interpretations based on the statistical analyses performed.

The study group consisted of 16 participants, of whom 37.5% were female and 62.5% were male. Additionally, 81.3% were right-handed and 18.8% were left-handed. The average age of the participants was 8.88 years, with an average height of 135.69 cm and an average body weight of 33.88 kg.

Descriptive statistical information regarding the gross motor development test scores of the study group is presented in Table 1.

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Table 1. Descriptive Statistical Information of the Gross Motor Development Test Scores of the Study Group

	Participants N=16	Pre- Test						Post- Test			
		Mean	S. Deviation	Min	Max	Skewness	Kurtosis	Mean	S. Deviation	Min	Max
Test of Gross Motor Development- 3rd Edition (TGMD-3)	**Locomotor Subtest** (score)										
	Run	5.38	1.67	2.00	8.00	0.10	-0.02	7.81	0.40	7.00	8.00
	Gallop	2.75	2.65	0.00	7.00	0.41	-1.23	5.69	2.52	0.00	8.00
	Hop	6.31	1.14	5.00	8.00	0.53	-1.06	7.63	0.72	6.00	8.00
	Skip	3.50	2.34	0.00	6.00	-0.38	-1.38	3.38	2.47	0.00	6.00
	Jump	3.63	2.36	0.00	8.00	0.51	-0.32	6.13	1.46	3.00	8.00
	Slide	4.63	2.47	0.00	8.00	-0.14	-0.93	6.94	1.18	4.00	8.00
	Locomotor Subtest Total	26.19	5.36	18.00	34.00	-0.16	-1.06	37.56	4.26	28.00	44.00
	Ball Skills Subtest (score)										
	Two-hand strike	5.50	2.71	0.00	9.00	-0.68	-0.24	7.69	1.08	6.00	10.00
	One-hand strike	4.06	2.18	1.00	8.00	0.26	-0.87	4.75	1.48	2.00	7.00
	Dribble	4.13	1.89	0.00	6.00	-1.28	1.21	5.00	1.21	2.00	6.00
	Catch	5.25	0.86	3.00	6.00	-1.27	1.91	5.38	1.26	2.00	6.00
	Kick	6.56	1.50	2.00	8.00	-1.95	5.19	6.81	1.17	4.00	8.00
	Overhand throw	4.94	2.02	1.00	8.00	-0.41	-0.73	7.31	0.95	5.00	8.00
	Underhand throw	4.75	2.15	2.00	8.00	0.05	-1.27	7.19	1.28	3.00	8.00
	Ball Skills Subtest (score)	35.19	8.85	15.00	48.00	-0.66	0.48	44.13	5.05	34.00	50.00

When examining the pre-test mean scores of the movement skills in the study group, the following results were observed: the mean score for running was 5.38, the mean score for galloping was 2.75, the mean score for hopping was 6.31, the mean score for skipping was 3.50, the mean score for standing long jump was 3.63, the mean score for sliding was 4.63, and the total mean score for movement skills was 26.19.

Regarding the post-test mean scores for movement skills, the following results were observed: the mean score for running was 7.81, the mean score for galloping was 5.69, the mean score for hopping was 7.63, the mean score for skipping was 3.38, the mean score for jump was 6.13, the mean score for sliding was 6.94, and the total mean score for movement skills was 37.56.

When looking at the pre-test mean scores for object control, the following results were observed: the mean score for Two-hand strike was 5.50, the mean score for One-hand strike

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was 4.06, the mean score for dribbling was 4.13, the mean score for catching was 5.25, the mean score for kicking was 6.56, the mean score for overhead throwing was 4.94, the mean score for underhand throwing was 4.75, and the total mean score for object control was 35.19.

For the post-test mean scores of object control, the following results were observed: the mean score for Two-hand strike was 7.69, the mean score for One-hand strike was 4.75, the mean score for dribbling while standing was 5.00, the mean score for t catching was 5.38, the mean score for kicking was 6.81, the mean score for overhead throwing was 7.31, the mean score for underhand throwing was 7.19, and the total mean score for object control was 44.13.

The results of the comparison of pre-test and post-test scores of the gross motor development test for the study group are presented in Table 2.

Table 2. Comparison of Pre-test and Post-test Scores of the Gross Motor Development Test for the Study Group

	Participants N=16	Pre-Test		Post-Test		Test Statistic
		Mean	S. Deviation	Mean	S. Deviation	
Test of Gross Motor Development- 3rd Edition (TGMD-3)	**Locomotor Subtest** (score)					
	Run	5.38	1.67	7.81	0.40	**T: -5.831; p: 0.000***
	Gallop	2.75	2.65	5.69	2.52	**T: -3.346; p: 0.004***
	Hop	6.31	1.14	7.63	0.72	**T: -4.392; p: 0.001***
	Skip	3.50	2.34	3.38	2.47	T: 0.198; p: 0.846
	Jump	3.63	2.36	6.13	1.46	**T: -3.162; p: 0.006***
	Slide	4.63	2.47	6.94	1.18	**T: -3.922; p: 0.001***
	Locomotor Subtest Total	26.19	5.36	37.56	4.26	**T: -7.045; p: 0.000***
	Ball Skills Subtest (score)					
	Two-hand strike	5.50	2.71	7.69	1.08	**T: -3.225; p: 0.006***
	One-hand strike	4.06	2.18	4.75	1.48	T: -1.037; p: 0.316
	Dribble	4.13	1.89	5.00	1.21	T: -1.962; p: 0.069
	Catch	5.25	0.86	5.38	1.26	Z: -0.458; p: 0.647
	Kick	6.56	1.50	6.81	1.17	Z: -0.357; p: 0.721
	Overhand throw	4.94	2.02	7.31	0.95	**T: -3.721; p: 0.002***
	Underhand throw	4.75	2.15	7.19	1.28	**Z: -2.995; p: 0.003***
	Ball Skills Subtent Total	35.19	8.85	44.13	5.05	**T: -3.705; p: 0.002***

T: Dependent Samples t-Test, **Z**: Wilcoxon Signed-Rank Test, **$p < 0.05$**: The relationship is statistically significant.

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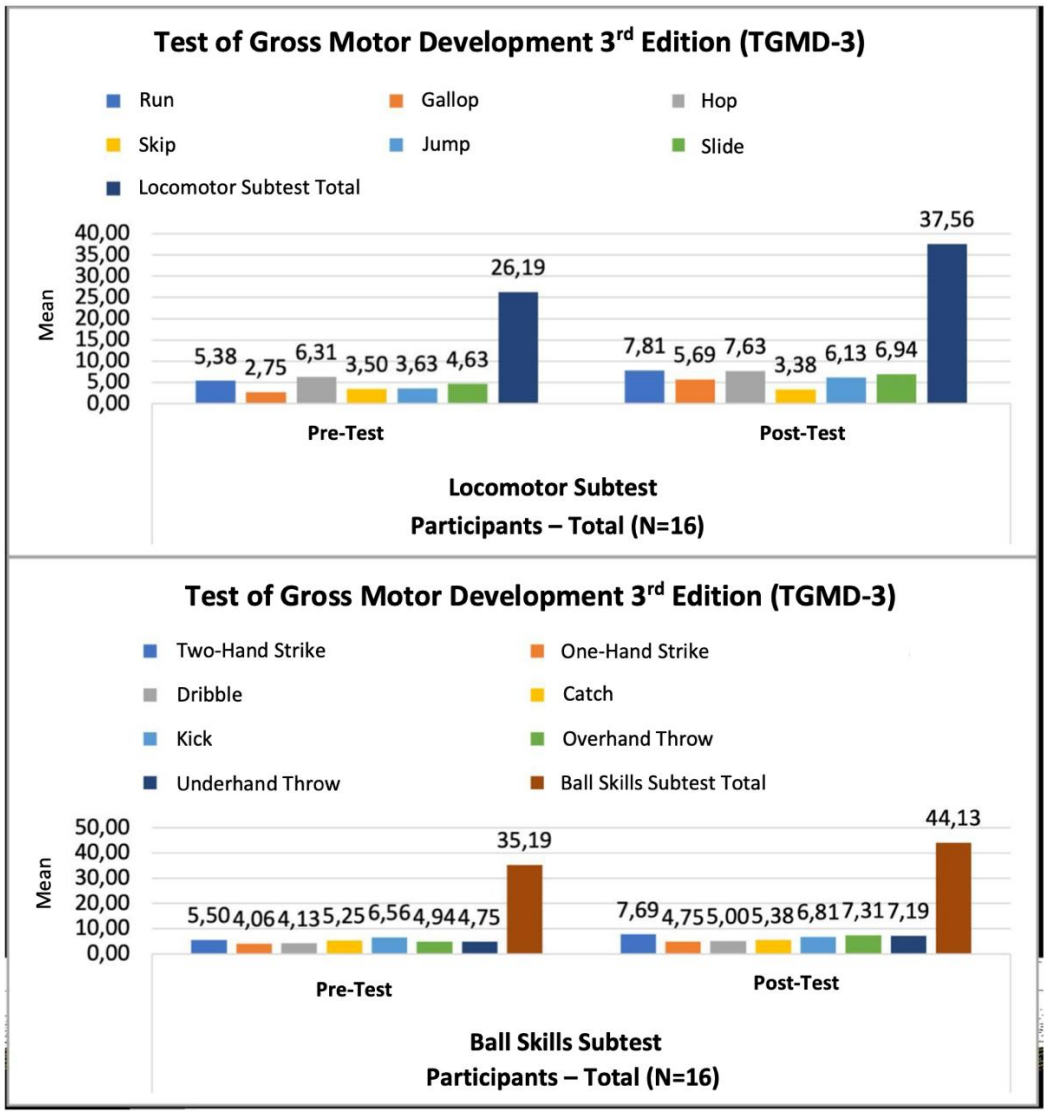
For the study group, there was no significant difference between the pre-test and post-test scores for the jump skill ($p>0.05$); however, significant differences were found between the pre-test and post-test scores for running, gallop, hopping, jump, sliding, and total motor skills ($p<0.05$).

For the study group, there was no significant difference between the pre-test and post-test scores for the following object control skills: One-hand strike, dribbling, catching, and kicking ($p>0.05$); however, significant differences were found between the pre-test and post-test scores for two-hand strike, overhead throwing, underhand throwing, and total object control ($p<0.05$).



Graphic 1. Gross Motor Development Test Scores of the Study Group

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It was found that the post-test scores for running, gallop, hopping, jumping, sliding, and total motor skills of the study group were statistically significantly higher compared to the pre-test scores.

It was also found that the post-test scores for for two-hand strike, overhead throwing, underhand throwing and total object control of the study group were statistically significantly higher compared to the pre-test scores.

Discussion

This study examined the effects of a 13-week physical activity card program involving movement skill applications on the gross motor skills of third-grade primary school students. The findings revealed that the program led to significant improvements in motor skills, although no meaningful differences were observed in the skill of skipping. Notable progress was identified in fundamental motor skills such as running, galloping, hopping, standing long jump, sliding, and overall locomotor skills ($p<0.05$). These results suggest that physical activity cards and movement-based education are effective tools in supporting children's motor development (Cohen et al., 2014). Similarly, Wibowo and Wardiana (2019) found that movement education models significantly improved fundamental movement skills in third-grade students, a finding that aligns with our study and supports the positive impact of different instructional approaches on motor development.

On the other hand, measurements in the area of object control showed significant improvements in certain skills, while others (e.g., striking a bouncing ball with one hand and stationary one-hand dribbling) did not yield statistically significant changes. However, skills such as striking a stationary ball with both hands, overhand and underhand throwing demonstrated significant progress ($p<0.05$). These outcomes suggest that physical activity cards may be more effective in enhancing certain specific motor skills. The findings of Lawson et al. (2021) also highlight that children tend to experience difficulties in object control skills, emphasizing the importance of developing these skills from an early age. Our results further reinforce this necessity. Similarly, in a study conducted by Dursun (2004), a specialized physical education program targeting basic skills led to significant improvements in running,

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catching, and balance abilities in favor of the experimental group, indicating that basic skill training contributes positively to children's motor development—findings that are consistent with our own.

In a study by Topsakal et al. (2019), the effects of a differentiated learning-based physical activity card program on primary school students' attention and motoric characteristics were examined. The post-intervention results showed statistically significant improvements in students' attention levels as well as in their 10-meter and 20-meter sprint performance ($p<0.01$). Likewise, Ataçocugu and Gülbeyaz (2019) investigated the impact of Brain Fit exercises on psychomotor skills in children aged 4 to 18. Children in the experimental group demonstrated higher levels of development in skills such as manual dexterity, tracking, catching, balance, and motor coordination compared to the control group. These findings are consistent with the results of the present study. As also proposed by Arufe Giráldez (2020), the integration of diverse and developmentally appropriate physical tasks contributes not only to motor competence but also to positive social behaviors and emotional growth in young learners.

The study conducted by Fadilah and Wibowo (2018), which examined the relationship between fundamental movement skills and play skills, revealed that these two skill groups moderately influence each other among third-grade students. This finding, consistent with the results of the present study, demonstrates that motor skills serve as a supportive element in play performance. Kuru (2008) investigated the effects of game-based movement training on the psychomotor development of 9-year-old children. The findings indicated improvements in skills such as running, throwing, and jumping among girls in the experimental group, as well as similar progress among boys. Although gender differences were not addressed in our study, these findings support the outcomes of our implementation with physical activity cards. Ersöz (2012) found that a multi-skill-focused movement program applied to boys aged 7–10 made positive contributions to their motor development. The study showed that the experimental group progressed in motor development, aligning with the findings of our research.

Yılmaz and Bozkurt (2017) examined the effects of fundamental movement skill training on motor development. In the training program, which incorporated motor skill activities included in the content of Physical Activity Cards, significant improvements were

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observed in the experimental group in motor skills such as standing long jump and flexibility. These results emphasize that physical activities can be an effective tool in promoting the development of motor skills. Kaptan and Bozkurt (2021) investigated the effect of physical activity interventions on the acquisition of movement skills in second-grade students. The findings showed statistically significant improvements in the 20-meter sprint and standing long jump in favor of the experimental group following the implementation of physical activity cards. Aşan (2023), in a study investigating the effects of movement-based activities from physical activity cards on coordination skills in students aged 11–13, found improvements in all coordination parameters among the children. These studies demonstrate that movement-specific practices positively contribute to motor skill development and support children's progress in these areas. Overall, movement-based activities included in the content of physical activity cards stand out as an effective educational tool for enhancing children's motor development. The significant improvements observed in locomotor and object control skills align with previous findings that targeted physical activity programs contribute positively to fundamental motor skill development (Rodríguez-Fernández et al., 2019).

Teixeira Costa et al. (2015), in a study with preschool children, found that structured physical education programs supported psychomotor development, with more pronounced improvements observed in the experimental group. This aligns with our findings, emphasizing the effectiveness of structured programs. Kurnaz and Altınkök (2023) found that a 16-week physical education program led to significant improvements in the motor skills of children aged 5–6. These results indicate the effectiveness of structured physical education programs in enhancing children’s motor skills. In a study conducted by Yıldırım and Kirişci, (2023), the effects of fundamental movement training and gymnastics programs on gross motor skills in children aged 5–6 were compared. The results revealed statistically significant improvements in standing long jump, dynamic balance, static balance, and agility between the pre-test and post-test for both experimental groups.

In their study, Allimant et al. (2023) reported that both structured and unstructured physical activity interventions improved overall motor development, especially in the domains of locomotor skills and object control. The findings suggest that unstructured physical activity

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interventions may yield more favorable results in motor development tests compared to structured programs. Yang et al. (2025) emphasized that structured physical activity programs directly support the development of fundamental movement skills and play a complementary role when natural development is insufficient. In a systematic review conducted by McDonough, Liu, and Gao (2020), the effects of physical activity on children's motor skill development were examined. Of the 25 randomized controlled trials included, 20 reported significant improvements in children's motor skills. Particularly, traditional physical activity interventions and exergaming-based approaches were found effective in enhancing children's motor abilities. In this regard, the findings of the present study parallel those of McDonough et al. (2020). However, unlike that review, our study utilized a structured, game-based approach through physical activity cards, aiming to simultaneously develop both locomotor and object control skills. In doing so, it not only addressed overall motor development but also highlighted the differentiated effects on distinct types of motor skills in detail.

Gross motor development is a critical aspect that should be enhanced in accordance with children's developmental stages; failure to do so may hinder participation in more complex motor behaviors in later years. Motor skills are essentially fundamental movement skills; therefore, instruction that supports FMS development should be implemented as early as possible. Donath et al. (2014) examined how card-based physical activity programs in preschool contributed to children's motor skill development. The findings demonstrated that movement-specific activities made significant contributions to children's motor development.

The originality of this study lies in its focus on investigating the effects of movement-based training using physical activity cards on the gross motor skills of third-grade students, a topic with limited prior research for this specific age group. Compared to international literature, while there are studies emphasizing the benefits of structured physical education programs in supporting psychomotor development and enhancing children's motor skills (e.g., Yang et al., 2025; Liu et al., 2023), this study's use of an approach that actively involves children—such as physical activity cards—highlights its unique contribution. Furthermore, while local studies often address individual aspects of motor development, this research offers a broader perspective by examining both locomotor and object control skills concurrently.

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These findings highlight the importance of integrating fundamental movement skill-focused activities within the primary education curriculum to support children's holistic development, encompassing physical, cognitive, and social domains (Liu et al., 2023).

Nonetheless, this study has certain limitations. Firstly, the research was conducted solely with third-grade students, which limits the generalizability of the findings. Additionally, the duration and frequency of the physical activity card implementation were restricted, preventing an assessment of long-term effects. Initial differences in motor skill levels among students also posed challenges in evaluating the impact of the intervention. Finally, as the study was carried out exclusively in a classroom setting, external environmental factors were not taken into account.

Conclusion

This study demonstrated that movement skill practices delivered through physical activity cards had a positive impact on the gross motor skills of third-grade students. The findings emphasize the importance of structured physical education programs in supporting children's physical and motor development, particularly in skills such as object control. However, the program's effectiveness may vary across different skill domains.

The study also highlights key limitations, including a small sample size and short intervention duration, which constrain the generalizability of the results. Future research should involve larger and more diverse participant groups and consider the influence of gender, as prior studies suggest potential differences in motor skill development between boys and girls (Logan et al., 2018; Barnett et al., 2016). Longer intervention periods may also yield deeper insights into the effectiveness of physical activity-based programs.

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