Journal of Physical Education and Sport ® (JPES), Vol. 23 (issue 10), Art 295, pp. 2567 - 2583, October 2023
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Exploring the impact of coordination-based movement education practices on fundamental motor movements and attention skills in 5-6-year-old children

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Published online: October 31, 2023
(Accepted for publication : October 15, 2023)
DOI:10.7752/jpes.2023.10295

Abstract
This study aimed to explore the effects of a coordination-based movement education program on the fundamental motor movement performance, fundamental movement skills, and attention skills in children aged 60–72 months. This research employed a randomized controlled trial, selecting participants through convenience sampling, encompassing a total of 60 preschool children. The participants were randomly assigned to either the experimental group (n = 30) or the control group (n = 30). Over a period of 12 weeks, the experimental group engaged in a structured coordination-based movement education program, while the control group continued with the Ministry of National Education's preschool education movement activities. To assess fundamental movement skill performance, the study employed 10 main tests, including squat jump, standing broad jump, countermovement jump, airtime, tennis ball throwing, sit-and-reach, 20 m linear sprint, flamingo balance (static), Y balance (dynamic), and an agility test. Additionally, attention skills were measured using the Frankfurter attention test (Frankfurter Tests für Fünfjährige-Konzentration: FTF-K). The results indicated that, compared to the control group, the experimental group exhibited significant improvements in countermovement jump, airtime, squat jump, standing broad jump, tennis ball throwing, sit-and-reach, 20 m linear sprint, agility, static and dynamic balance, and attention tests following the coordination-based movement education intervention. Intragroup comparisons within the control group did not reveal significant differences. Gender-specific analyses demonstrated no significant differences in pre-tests; however, post-intervention, boys showed significant improvements in standing long jump and tennis ball throwing, while girls demonstrated enhancements in sit-and-reach and static and dynamic balance. This study highlights the positive impact of coordination-based movement education practices on the enhancement of fundamental motor movement performance, fundamental movement skills, and attention skills in children aged 60–72 months.
Key Words: **Preschool children; coordination-based movement education; fundamental motor performance; fundamental movement skills, attention**

Introduction

Coordination-based movement education can be an efficient and cost-effective vehicle to increase children's physical activity. Recently, a body of research has focused on the physical and cognitive benefits of physical activity, with some studies specifically highlighting the cognitive and physical gains of coordinative exercise among preschool children (Dalziell et al., 2019; Dalziell et al., 2015). In the preschool stage, one of the efficient teaching methods is the coordination based movement education, which is used to develop the big and small muscles in the psychomotor area in game and activity classes. It was reported that, with the increasing complexity of the movement, the coordination level that is needed for the performance is also important, and the coordinative skills are classified as the motor learning, motor guiding, motor adaptation and changing skills (Altınkök, 2016; Meinel & Schnabel, 1987; Thies & Travers, 2006). Coordinative exercise engages interactions among multiple body parts and/or with manipulating objects to achieve goal-directed behaviors by requiring precise timing, temporal, and spatial estimation that requires perceptual and high-level cognitive information processing (Pesce, 2012).

It was stated that up to the age of seven, a child needs to learn fundamental movement skills sufficiently before entering the process of mastering movement patterns (Hardy et al., 2010). Since the motor development process which is also regarded as a lifelong process is seen as a building block, obtaining fundamental movement skills provides a basis for learning more complex and sport-specific skills at a later time. Children's physical, mental, and social development benefits from mastering fundamental movement skills (Lubans et al., 2010). Locomotor (such as hopping, running, and jumping), object control or manipulative (such as catching, throwing, kicking, sewing, cutting, and self-help), and balance (such as static or dynamic balance, twisting, and standing on one leg) skills are the three categories of fundamental movement skills (Gallahue & Ozmun, 2002;

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Gallahue et al., 2011; Stodden et al., 2008). Furthermore, it was emphasized that it was essential for an active lifestyle and athletic participation during childhood and adolescence (Haywood & Getchell, 2009; Seefeldt, 1980). It was underlined that when the development of fundamental movement skills is delayed in early childhood, it may prevent children from mastering complex movement skills, and as a result, their ability to participate in sportive activities in later life may be negatively affected (Mickle et al., 2011; King-Dowling et al., 2020). At this point, movement education interventions and pedagogical programs aimed at developing fundamental movement skills contribute to maximizing the fundamental movement skill capacities of preschool children (Revie & Larkin, 1995; Ruiz-Pérez & Palomo-Nieto, 2018).

Every fundamental movement skill, according to Roberton & Halverson (1984), is a movement model, which is a collection of coordinated actions grouped chronologically to describe the skill. Furthermore, it is stated that fundamental movement skills are evaluated in the environment through the sensory and executive hierarchy as is true for all movement activities, and that this analysis results in alterations that trigger the processing of subsequent actions (Cutsuridis et al., 2011). It is known that movement actions and attention essentially rely on a single subconscious mental image (Zatorre et al., 2007). Consequently, it is believed that in order for children to properly develop, acquire and perform fundamental movement skills, they need to be integrated and grasp the sensory, attention-related, cognitive, and motor information carefully. In addition, In many countries, the significance of movement education interventions is highlighted, and it is also said to be a major priority in many countries, to enhance and develop fundamental movement skills of preschoolers (Jones et al., 2011; Morrow et al., 2013). It is predicted that this is due to the fact that movement education interventions aimed at improving fundamental movement skills provide individuals with various benefits throughout their lives.

Children who don't receive enough education, experience and practice in fundamental movement skills may experience developmental delays in their gross motor skills (Goodway & Branta, 2003). Despite this emphasis, some countries appear to have a low frequency of preschoolers who can perform fundamental movement skills (Okely & Booth, 2004; Erwin & Castelli, 2008). According to various researhers, the development of fundamental movement skills at a young age highlights the importance of sport-specific abilities and physical exercise in later years (Plazibat et al., 2021; Balyi, 2001; Esen et al., 2023; Hedstrom & Gould, 2004; Tiktampanidi et al., 2021; Jaakkola et al., 2016; Lemos et al., 2012; Altınkök, 2016; Williams & Hodges, 2005; Altınkök, 2017a; Anshel & Marisi, 1978; Brown et al., 1981; Chatzipanteli et al., 2007; Deli et al., 2006; Altınkök, 2017b; Derri et al., 2001; Pollatou & Hatzitaki, 2001; Zachopoulou et al., 2004). Additionally, Sabo (2004) concluded that children who participate in physical and movement education activities benefit from the development of coordination and fundamental movement abilities. Many researches have investigated how preschoolers' fundamental movement skills differ depending on their gender. In this regard, Cliff et al. (2009) observed findings for gender differences among locomotor skills are mixed. However, according to three conducted researches have revealed that girls score better on higher locomotor skill tests than boys (Cliff et al., 2009; Barnett et al., 2014; Hardy et al., 2010). On the contrary, there are studies that conclude that boys are more proficient in locomotor skills (Robinson, 2011). However, Goodway et al. (2010) and Spessato et al. (2013) concluded that their research did not reveal any gender differences.

When the literature is evaluated in general, the evidence examining the fundamental movement skill differences in preschool children shows that there is no consensus on gender differences in locomotor skills (Hardy et al., 2010; LeGear et al., 2012; Bryant et al., 2014; Okely & Booth, 2004; van Beurden et al., 2002). It is stated that preschoolers' fundamental movement skills do not have the tendency to commonly differ between boys and girls at the early stages (Hardy et al., 2010; Van Waelvelde et al., 2008). However, several studies have found that the locomotor skills of boys and girls differ significantly. (Foulkes et al., 2015; LeGear et al., 2012; Van Waelvelde et al., 2008; Spessato et al., 2013). Some studies indicate that girls perform better (Barnett et al., 2008; Hardy et al., 2010; van Beurden et al., 2002), while other studies show that boys perform better (Robinson, 2010; Kurnaz, 2022; Altınkök, 2006). In some studies it has been reported that there is a gender similarity in balance skills (Van Waelvelde et al., 2008; Singh et al., 2015; Shala, 2009) while other studies have suggested that girls perform better (Livesey et al., 2007; Esen et al., 2023; Sigmundsson & Rostoft, 2003; Venetsanou & Kambas, 2011; Kurnaz, 2022).

Research findings, which do not reflect a common conclusion, suggest that there may be a wide range of individual differences in fundamental movement skills between different ages and genders in preschool (3-6 years) (Kokštejn et al., 2018; Gabbard, 2011; Gidley Larson et al., 2007). These studies demonstrate the positive effects movement education interventions have on fundamental movement skills in both boys and girls, irrespective of gender. Considering the lack of research on movement education interventions conducted in preschool children in Turkey, it is considered to be important to reveal similar proficiency levels before targeted interventions are developed.

The importance of attention cannot be ignored when it comes to both daily functioning and academic success. This term encompasses a variety of skills, such as the ability to focus on, switch between, and sustain attention to events, objects, and tasks in the external environment (Coratti et al., 2020).

Posner and colleagues discovered that these aspects of attention processing in the adult brain were supported by different but interconnected neural networks (Breckenridge et al., 2012; Posner et al., 2016; Coratti et al., 2020). According to Posner & Rothbart (1998) the definition of attention is the ability to choose pertinent information from the environment and manage both information processing and behavior. However, Fan et al. (2005) and Atkinson & Braddick (2012) stated that there is no complete consensus on the definition of attention. In addition, Atkinson & Braddick (2012) and Bertelli et al. (2007) argued that attention development, especially in infancy and early childhood, remains relatively uncertain due to the limited number of tools designed to measure the development of attention components in this age group. In this regard, Moyano et al. (2022) reported that there is no consensus on age-related changes in attention in early childhood. Though not empirical evidence, Goddard Blythe (2005) suggested that movement programs and opportunities lead to integration of reflexes and improved balance, coordination, attention, and learning. Additionally, they claimed that movement in an infant and young child provides a natural opportunity for development, regulation, and learning. Related to the impact of exercise on attention, two studies indicated that there was a positive relationship between attention and both agility and baseline aerobic fitness (Ericsson, 2008; Niederer et al., 2011). Considerable support was found for movement having an impact specifically on attention (Altenburg et al., 2016; Carlson et al., 2015; Ericsson, 2008; Packard, 2007; Niederer et al., 2011), with only one study finding no impact of movement on attention (Williamson, 2013).

Based on all of the aforementioned factors, it is believed that there are further study is necessary to investigate the effects of movement education practices on children's attention and fundamental movement skills especially during the early years. Thus, it seems that coordination based movement education could be promising for enhancing attention abilities and fundamental movement skills (Chou et al., 2020). As a result, both motor and attention skills are important to perform movement education requiring coordinative skills (Chou et al., 2020). In-group and intergroup comparisons of the experimental group's attention and fundamental movement skill levels were hypothesized to reveal a meaningful difference in favor of the experimental group. In terms of gender differences, it was hypothesized that girls' static and dynamic balance and flexibility levels differ significantly from boys', whereas boys' jumping, standing long jump, throwing, and speed parameters differ significantly from girls'. However, it was hypothesized that there is no obvious gender difference in terms of attention skill levels. It is believed that the results of this study could be of critical importance in providing a basis for both research and practical applications in teaching preschool physical education and game.

In this specific context, the primary purpose of the study was to investigate the effects of coordination-based movement education practices on fundamental motor movement performance and attention skills of children aged 60-72 months.

Material & Methods

Research design and experimental approach to the problem

This research used a randomized controlled trial. The research group was limited to 60-72 months old children. The convenience sampling technique, one of the purposeful sampling methods, was used to determine the research group. Both groups were randomly assigned (Kang et al., 2008). The subjects had no previous sports background. Before the study, both groups were practicing the activities in the traditional program. The subjects in the experimental group underwent a coordination-based movement education program. The program was implemented for a total of 48 hours over 12 weeks, with 2-course hours (60+60 minutes) on Tuesdays and 2-course hours (60+60 minutes) on Thursdays (2880 minutes in total). On the contrary, the children in the control group, who continued the movement activities included in the preschool education program of the Ministry of National Education (MNE, 2013) and did not participate in any other movement activity. The duration of physical activity was the same between the control group and the experimental group on a weekly basis and during the experiment.

Research group, participants, inclusion and exclusion criteria

Before the implementation of the coordination-based movement education program, each participant's parents provided demographic data and signed an informed consent form.

The inclusion criteria were: (1) preschool children aged 60-72 months with typical development, (2) no physical or neurological disorders, (3) no attendance problems, (4) no lower extremity or back pain, (5) no medical or neuromusculoskeletal disorders, or (6) any condition limiting participation in exercise, and (7) they were not involved in any organized form of physical activity for at least three months prior to the start of the program. All these criteria have been approved through the school directorate. The study included 60 students (n=30 experimental, n=30 control) enrolled in a state school affiliated with the Ministry of National Education, attending preschool, meeting the criteria, and having no attendance problems. Both groups commuted to school at approximately the same time, lived in Antalya city center and had similar socioeconomic status. The Scientific Research and Publication Ethics Committee of Akdeniz University approved all procedures in the present study (Number of Documents 121408, Number of Meetings: 07, Decision Number: 208). Declaration of Helsinki was followed throughout.

Data collection tools

Sit-and-reach test

The subjects underwent a sit-and-reach test to measure their flexibility in the hips and waist. Children fully extended their knees and placed their ankles on the floor in neutral dorsiflexion against the sit-and-reach box. The subjects were instructed to set hands on the box and carefully extend their knees as far forward as they could reach. The subjects stretched forward along the top surface of the box. It was measured in centimeters where the middle fingertips ended up on the surface (Cornbleet and Woolsey, 1996). The subjects took the test three times, with the top result being approved. To obtain correct measurements the test was conducted barefoot.

Flamingo balance (static) test

The static balance was measured using the flamingo balance test. The subjects extremities, both dominant and non-dominant, were tested. Subjects were asked to take off their shoes. Subjects were first asked to place their dominant extremity on the beam, and then bend their contralateral knee and hold their contralateral ankle (the ankle on the side opposite their dominant extremity) with one hand. The duration was started and it was recorded how long the subjects were able to hold their positions. The total number of falls was determined within 1 minute, and this score was then recorded as the subjects static balance scores. The test was canceled and a score of zero was registered as failed if the child tripped 15 times in 30 seconds (Adam et al., 1987; Rodriguez et al., 1998; Mackenzie, 2005).

Y balance (dynamic) test

In order to complete the Y balance test, one must maintain a balanced posture while reaching the anterior, posterolateral, and posteromedial directions on the test device. The Y balance test, is intended to measure the subjects levels of dynamic balance performance capacity when they are moving anterior, posterolateral, and posteromedial with each lower extremity limb while they are staying in a balance posture (Plisky et al., 2009).

The subjects must keep a balanced posture while reaching the anterior, posterolateral, and posteromedial directions on the test equipment in order to successfully complete the Y balance test. The Y balance test aims to assess the subjects levels of dynamic balance performance capacity as they move each lower extremity anteriorly, posterolaterally, and posteromedially while preserving a balanced posture (Plisky et al., 2009).

The three component Y balance test, which has been previously indicated to have high reliability (ICC=0.85-0.93), was utilized in the study (Move2-Perform, Evansville, Indiana, United States) (Park et al., 2020).

Implementation of Y balance test

The subjects were given permission to complete six trials on each of the three access directions and each lower extremity prior to the test evaluations (Engquist et al., 2015). All of the subjects who participated in the attempts were assessed for the real test about 20 minutes after the attempts, and they didn't wear shoes while the data was being gathered. The subjects were directed to maintain a one-leg stance while reaching their free lower extremities in the anterior, posteromedial, and posterolateral directions in accordance with their stance legs. This was done while standing on one leg with their toes behind the beginning line. To increase test repeatability and produce a consistent test process, a standard test sequence has been established. Reaching the right lower extremity three times in the anterior direction, the left lower extremity three times in the anterior direction, and repeating these steps for the posteromedial and posterolateral directions represented the defined test sequence (Plisky et al., 2009).

In the actual test, The researchers instructed the subjects to stand on the test platform with one lower extremity behind the starting line, move to the tested direction at the target distance without touching the ground, and then return to the starting position while preserving the same position. This stated instruction was only provided before the test. According to the criteria specified in the six actual test evaluations, the subjects were rated as failed in any area where they were unable to perform the task (Plisky et al., 2009).

20 m linear sprint test

The 20 m linear sprint test was used to assess the subjects sprint performance who took part in the study. After placing their feet on the starting line, the subjects were asked to cover the 20 m distance with clear starting and finishing points as quickly as possible with the sound of the whistle, and the running time was measured by a timekeeper. This test was applied twice in such a way that the subjects could rest between the test trials, and the performance, which was the shortest of the two trials, was recorded in seconds (Roth et al., 2018; Granacher & Borde, 2017; Mackenzie, 2005).

Agility test

The purpose of the agility test is to measure the subjects coordination and speed of reaction. The time between the subject running a distance of 3.05 meters (10 ft.) from the supine position to the vertical position, picking up the tennis ball, and returning to its original position is measured and written down in seconds. First of all, the subjects was asked to watch carefully what was done. The model lies on her back with her heels on the line towards the ball. As soon as he receives the command "Ready, start", he straightens up and runs towards the ball. He takes the ball and runs back to his old position. It is required that the movement be done as quickly as possible. After a trial was given, four applications was made. 30 seconds rest was given between applications. The application was repeated in cases where the child could not achieve the movement, falls while running, drops the ball, or starts the movement before the command (Altınkök, 2006).

Standing long jump test

Horizontal jump performance was assessed by applying a standing long jump test. In this test, it was important to make the subjects stand slightly apart behind a take-off line drawn on the ground. They were instructed to maintain an upright posture, land with both feet on the ground, jump and up with all of their strength. They then propelled themselves forward and jumped as high as they could. The movement involved a two-foot takeoff and a swinging-arm landing. The distance between the take-off line and the closest location where the back of the heel touched was measured using a standard measuring tape. After two attempts and a passive recovery time of 60 seconds between jumps, the best result was measured in centimeters for data analysis (Porter et al., 2010; Dello Iacono et al., 2022).

Squat jump, countermovement jump, and airtime test

Tests which are squat jump, countermovement jump and airtime were used to assess vertical jump performance and airtime levels. New Test 2000 performance analysis system (Newtest Oy, Oulu, Finland) was used in the implementation of the tests.

Squat jump test (SJ)

During the squat jump test, each subject was instructed to remain stationary in the center of the jump mat with their feet shoulder-width apart. They then remained in this position statically after reaching their preferred knee flexion in a controlled manner. With the command given within two-four seconds, they created the driving force by jumping as high as possible without bending their knees and with stretched legs until the jump over the jump mat was completed (Garcia-Ramos et al., 2020).

Countermovement jump test (CMJ)

The countermovement jump test required each subject to stand stationary in the center of the jump mat with their feet shoulder-width apart. Knees were fully extended in the starting posture, and hands were kept on the waist. Then, with the command, they quickly created their preferred knee flexion, and without waiting, they jumped as high as possible without bending their knees with their stretched legs until the jump over the jump mat with a counter movement was completed (Garcia-Ramos et al., 2020; Vescovi & Mcguigan, 2008).
The tests were repeated in cases where the subjects did not develop knee flexion and could not complete the tests in the appropriate positions for the test. In both tests, three trials were made and the highest values were recorded separately in centimeters.

Airtime test

Airtime performance levels were determined during the squat jump and countermovement jump tests. Based on the protocol for these two tests, the airtime was calculated individually for the squat jump and countermovement jump tests, and the highest values of the three trials were recorded in milliseconds separately (Altınkök, 2006).

Tennis ball throwing test

The subjects were asked to stand on the meter with the starting and ending points marked on the ground, one foot back and not crossing the starting line. Afterward, the subjects threw the tennis ball over the head with the arm of their choice as far and forward as possible with the command. Seven attempts were made and the distance between the starting line and the point where the tennis ball fell was measured and recorded in centimeters. The throwing performance value for each subject was calculated by subtracting the furthest and nearest throw scores from seven trials and taking the average (Morris et al., 1982; Altınkök, 2006).

Frankfurter attention test (Frankfurter Tests für Fünfjährige- Konzentration: FTF-K)

Attention level was evaluated with the Frankfurter attention test. The test was implemented for each subject individually. The sample on the front of the test was solved with each subject before starting the actual implementation. Afterward, the subjects solved the original test, which lasted 90 seconds. Before the test, all subject were informed to find and mark only the pears within 90 seconds among 42 pears and 124 apple figures in the test. The subjects were taken to the classroom where the test was implemented, one by one. In addition, possible tools and equipment that may cause distraction in the area where the test is implemented have been removed.

The subjects had 90 seconds to mark all of the pears, which made up the raw score. Marked each pear equal to one point. Only two apples count as pears and two apples add to the number of pears like a pear. No points will be granted if there are more than two apples marked.

The raw score gives us an idea of the subject attention level and there are 42 pieces in the test form. If the subjects can mark all 42 pears within 90 seconds, they can achieve the highest score of 42. The raw score obtained after the implementation of the test allows the subjects to be compared with their peers. Attention level is evaluated according to the comparison table created according to the determined norms (Raatz & Möhling, 1971).

Table 1 *Frankfurter attention test comparison table*

Raw Score	Percentage	Assesment
0 - 22	% 26	Below Average
23 - 32	% 49	Average
33 - 48	% 25	Above Average

The data collection process and intervention

During the data collection process, measurements, data recording, and intervention were carried out by the researchers. The data collection process consisted of three phases and these processes are as follows.

Preliminary studies and pre-test implementation

Before starting the program, preliminary studies were carried out in order to start the pre-tests, apply the measurement and test instructions used in the research, organize the measurement platforms, calculate the average time spent per measurement and test, and test the measurement and test platforms. After the completion of the preliminary studies, the pre-tests were implemented in the experimental and control groups separately.

Intervention and learning - teaching processes

The experimental group subjects underwent a coordination-based movement education program that enabled them to develop fundamental movement skills and attention variations as well as the improvement of coordinated movement performances through parkour, games, and stations that were planned each following the other. The activities was intended to be reasonably challenging movement exercises and moderate-vigorous physical activity. The experimental group received warm-up and preparation exercises before the beginning of each activity during the lesson preparation period. These exercises lasted around 10 minutes. In this way, it was aimed to teach them how to warm up before activities and familiarize them with different parts of the body. When the auditory signal was given to touch a part of the body, children act around like bees. The lesson's main section, which lasted about 40 minutes, included activities that developed body and area awareness (3 lessons), walking (5 lessons), attention (10 lessons), throwing (3 lessons), balance (5 lessons), sprinting (7 lessons), jumping (7 lessons), agility (4 lessons), flexibility (4 lessons) and general coordination skills (every lesson) were implemented by sharing between weeks. The repetition of previous exercises and the development of new fundamental movement skills were practiced in each lesson. Activities for cooling down and relaxing were applied at the end of the lessons, and they lasted for around 10 minutes. The intervention program and the traditional program were implemented by the researchers in the form of physical education lessons during the movement and play class hours of the school. The experimental and control groups did not engage in any other movement and play classes while the program was being implemented.

Post-test implementation

At the end of the 12-week period, the researchers administered the same test protocols that were conducted during the pre-tests in the 13th week.

Statistical analysis

In order to evaluate the data, SPSS version 22 was used. For each outcome, the mean ± standard deviation was computed. First, the Kolmogorov-Smirnov test was performed for normality and as a result of the test, it was determined that $p>0.05$ for all parameters. The independent sample T-test from parametric testing was then used to evaluate the differences between groups. To identify differences within groups, a paired group T-test was utilized.

Results

Table 2 *Descriptive and anthropometric characteristics of the participants*

		Experimental (n=30)	**Control (n=30)**	**N**	**%**
Gender	(g)	14	14		
	(b)	16	16	28	46.7
Age (month)	60	14	14	32	53.3
	72	16	16		
Mass (kg)		22.75 ± 4.68	24.07 ± 4.98	28	46.7
Height (cm)		1.18 ± .060	1.17 ± .051	32	53.3
Lower Limb Length (cm)		69.50 ± 3.88	67.60 ± 3.37		

Of the subjects, 30 (50.0%) were in the experimental group and 30 (50.0%) control group. 28 were girls (46.7%) and 32 boys (53.3%). 28 (46.7%) were 60 months old and 32 (53.3%) 72 months old. When the mean and standard deviation values of body weight, body length, and lower extremity limb length of the experimental and control groups were analyzed, it was 22.75 ± 4.68 in the experimental group and 24.07 ± 4.98 in the control group. In terms of body length, it was 1.18 ± .060 in the experimental group and 1.17 ± .051 in the control group. In terms of lower extremity limb length, the experimental group was 69.50 ± 3.88, while the control group was 67.60 ± 3.37.

Table 3. *Experimental and control group pre-test results*

	Experimental (n=30)	Control (n=30)	Independent T test				
			t	df	p	%	d
Countermovement Jump	14.80 ± 2.82	13.77 ± 2.35	1.539	58	.129	7.48	0.39
Airtime (CMJ)	370.13 ± 21.58	359.47 ± 27.51	-1.670	58	.100	2.97	0.43
Squat Jump	14.97 ± 2.31	15.67 ± 2.68	-1.083	58	.283	4.68	0.27
Airtime (SJ)	346.47 ± 28.94	357.27 ± 33.75	-1.330	58	.189	3.12	0.34
Standing Long Jump	.813 ± .166	.870 ± .115	-1.540	58	.129	7.01	0.39
Tennis Ball Throwing	8.23 ± 1.18	8.70 ± .797	-1.799	58	.077	5.71	0.46
Sit-and-Reach	19.97 ± 5.54	21.13 ± 3.61	-.957	58	.343	5.81	0.24

Sprint (20 meter)	6.42 ± .472	6.33 ± .702	.572	58	.570	1.42	0.15
Agility	5.84 ± .769	5.58 ± .809	1.255	58	.214	4.66	0.32
Flamingo Balance Test (R)	16.50 ± 4.88	14.87 ± 5.72	1.189	58	.239	10.96	0.30
Flamingo Balance Test (L)	17.20 ± 5.25	18.97 ± 5.58	-1.286	58	.204	10.29	0.32
Y Balance Test	**Anterior Reach**						
Right Lower Extremity	78.36 ± 24.45	81.87 ± 16.42	-1.333	58	.188	4.48	0.16
Left Lower Extremity	71.36 ± 23.90	73.77 ± 14.55	-1.411	58	.163	3.38	0.12
Y Balance Test	**Posteromedial Reach Distance**						
Right Lower Extremity	72.60 ± 26.07	75.17 ± 19.53	-1.385	58	.171	3.54	0.11
Left Lower Extremity	69.00 ± 24.15	76.01 ± 20.04	-1.556	58	.125	10.16	0.31
Y Balance Test	**Posterolateral Reach Distance**						
Right Lower Extremity	83.82 ± 26.26	85.87 ± 37.25	-1.448	58	.153	2.45	0.06
Left Lower Extremity	77.83 ± 30.13	81.39 ± 25.17	-1.510	58	.136	4.57	0.12
Frankfurter Attention Test	31.03 ± 6.44	33.37 ± 6.13	-1.436	58	.156	7.54	0.05

x̄ ± SS, mean-standart deviation; n, number; t, t test score; %, percentage of difference; cmj, countermovement jump; sj, squat jump; r, right; l, left.

When the results of the independent samples T-test used to compare the pre-test scores between the experimental and control groups are examined there is no statistically significant difference.

Table 4. *Experimental and control group post-test results*

	Experimental (n=30)	Control (n=30)	Independent T test				
			t	df	p	%	d
Countermovement Jump	17.97 ± 2.35	14.83 ± 2.60	4.890	58	.001**	21.17	1.26
Airtime (CMJ)	387.17 ± 28.71	375.00 ± 16.16	2.081	58	.042*	3.25	0.52
Squat Jump	18.37 ± 3.02	16.53 ± 2.82	2.427	58	.018*	11.13	0.62
Airtime (SJ)	384.43 ± 29.42	368.17 ± 21.79	2.433	58	.018*	4.42	0.62
Standing Long Jump	1.00 ± .143	.898 ± .100	3.263	58	.002*	11.36	0.82
Tennis Ball Throwing	9.72 ± 1.80	8.88 ± .817	2.311	58	.024*	9.46	0.60
Sit-and-Reach	25.99 ± 4.75	22.45 ± 4.81	2.862	58	.006*	15.77	0.74
Sprint (20 meters)	5.66 ± .532	6.12 ± .827	-2.539	58	.014*	8.13	0.66
Agility	5.20 ± .784	5.63 ± .752	-2.131	58	.037*	8.27	0.55
Flamingo Balance Test (R)	8.83 ± 4.18	13.13 ± 5.71	3.324	58	.002*	48.70	0.85
Flamingo Balance Test (L)	9.63 ± 4.36	17.47 ± 7.11	-5.138	58	.001**	81.41	1.32
Y Balance Test	**Anterior Reach Distance**						
Right Lower Extremity	93.74 ± 27.26	86.64 ± 23.61	2.041	58	.046*	8.19	0.27
Left Lower Extremity	86.27 ± 26.74	80.15 ± 34.35	2.249	58	.028*	7.64	0.19
Y Balance Test	**Posteromedial Reach Distance**						
Right Lower Extremity	88.99 ± 30.13	83.81 ± 35.89	2.108	58	.039*	6.18	0.15
Left Lower Extremity	85.70 ± 28.54	80.92 ± 34.28	1.523	58	.133	5.91	0.15
Y Balance Test	**Posterolateral Reach Distance**						
Right Lower Extremity	99.11 ± 32.85	85.87 ± 37.25	2.072	58	.043*	15.42	0.37
Left Lower Extremity	97.29 ± 34.31	91.74 ± 40.43	2.047	58	.045*	6.05	0.14
Frankfurter Attention Test	34.73 ± 5.31	32.03 ± 5.01	2.025	58	.047*	8.43	0.52

*x̄ ± SS, mean-standard deviation; n, number; t, t-test score; %, percentage of difference; cmj, countermovement jump; sj, squat jump; r, right; l, left; d, cohen's d value; *p<0.05; **p<0.01.*

When the independent sample T-test results are examined to compare the scores of the experimental and control groups for the post-test averages, the results are seen in favor of the post-test and experimental groups. Countermovement jump (17.97 ± 2.35 - 14.83 ± 2.60; $p<0.01$; d = 1.26), countermovement jump airtime (387.17 ± 28.71 - 375.00 ± 16.16; $p<0.05$; d = 0.52), squat jump (18.37 ± 3.02 - 16.53 ± 2.82; $p<0.05$; d = 0.62), squat jump airtime (384.43 ± 29.42 - 368.17 ± 21.79; $p<0.05$; d = 0.62), standing long jump (1.00 ± .143 - .898 ± .100; $p<0.05$; d = 0.82), tennis ball throwing (9.72 ± 1.80 - 8.88 ± .817; $p<0.05$; d = 0.60), sit and reach (25.99 ± 4.75 - 22.45 ± 4.81; $p<0.05$; d = 0.74), sprint (20 meters) (5.66 ± .532 - 6.12 ± .827; $p<0.05$; d = 0.66), agility (5.20 ± .784 - 5.63 ± .752; $p<0.05$; d = 0.55), flamingo balance test right (8.83 ± 4.18 - 13.13 ± 5.71; $p<0.05$; d = 0.85) and flamingo balance test left (9.63 ± 4.36 - 17.47 ± 7.11; $p<0.01$; d = 1.32) and Y balance test in anterior reach distance right (93.74 ± 27.26 - 86.64 ± 23.61; $p<0.05$; d = 0.27) and left (86.27 ± 26.74 - 80.15 ± 34.35; $p<0.05$; d = 0.19), right in posteromedial reach distance (88.99 ± 30.13 - 83.81 ± 35.89; $p<0.05$; d = 0.15), right in posterolateral reach distance (99.11 ± 32.85 - 85.87 ± 37.25; $p<0.05$; d = 0.37) and left (97.29 ± 34.31 - 91.74 ± 40.43; $p<0.05$; d = 0.14) and attention (34.73 ± 5.31 - 32.03 ± 5.01; $p<0.05$; d = 0.52) tests.

Table 5. *Experimental group pre-post test results*

	Pre	Post	Paired T test				
	(n=30		t	df	p	%	d
Countermovement Jump	14.80 ± 2.82	17.97 ± 2.35	-7.203	29	.001**	21.42	1.22
Airtime (CMJ)	359.47 ± 27.51	387.17 ± 28.71	-4.161	29	.001**	7.71	0.09
Squat Jump	14.97 ± 2.31	18.37 ± 3.02	-6.787	29	.001**	20.04	1.17
Airtime (SJ)	346.47 ± 28.94	384.43 ± 29.42	-6.906	29	.001**	10,96	1.30
Standing Long Jump	.813 ± .166	1.00 ± .143	-5.935	29	.001**	23.46	1.20
Tennis Ball Throwing	8.23 ± 1.18	9.72 ± 1.80	-3.849	29	.001*	18.10	0.97
Sit-and-Reach	19.97 ± 5.54	25.99 ± 4.75	-5.639	29	.001**	30.15	1.16
Sprint (20 meter)	6.42 ± .472	5.66 ± .532	7.194	29	.001**	13.43	0.15
Agility	5.84 ± .769	5.20 ± .784	5.262	29	.001**	12.31	0.08
Flamingo Balance Test (R)	16.50 ± 4.88	8.83 ± 4.18	8.188	29	.001**	86.86	1.68
Flamingo Balance Test (L)	17.20 ± 5.25	9.63 ± 4.36	7.954	29	.001**	78.61	1.56
Y Balance Test	**Anterior Reach Distance**						
Right Lower Extremity	78.36 ± 24.45	93.74 ± 27.26	-5.265	29	.001**	19.63	0.59
Left Lower Extremity	71.36 ± 23.90	86.27 ± 26.74	-6.847	29	.001**	20.89	0.58
Y Balance Test	**Posteromedial Reach Distance**						
Right Lower Extremity	72.60 ± 26.07	88.99 ± 30.13	-6.123	29	.001**	22.58	0.58
Left Lower Extremity	69.00 ± 24.15	85.70 ± 28.54	-6.302	29	.001**	24.20	0.63
Y Balance Test	**Posterolateral Reach Distance**						
Right Lower Extremity	83.82 ± 26.26	99.11 ± 32.85	-3.736	29	.001*	18.24	0.51
Left Lower Extremity	77.83 ± 30.13	97.29 ± 34.31	-6.504	29	.001**	25.00	0.60
Frankfurter Attention Test	31.03 ± 6.44	34.73 ± 5.31	-3.540	29	.001**	11.92	0.62

*$\bar{x}$ ± SS, mean-standard deviation; n, number; t, t-test score; %, percentage of development; cmj, countermovement jump; sj, squat jump; r, right; l, left; d, cohen's d value; *p<0.05; **p<0.01.*

When the paired sample T-test results are examined to compare the scores of the pre-post test averages of the experimental group, the results are seen in favor of the post-tests. Countermovement jump (17.97 ± 2.35 - 14.80 ± 2.82; p<0.01; d = 1.22), countermovement jump airtime (387.17 ± 28.71 - 359.47 ± 27.51; p<0.01; d = 0.09), squat jump (18.37 ± 3.02 - 14.97 ± 2.31; p<0.01; d = 1.17), squat jump airtime (384.43 ± 29.42 - 346.47 ± 28.94; p<0.01; d = 1.30), standing long jump (1.00 ± .143 - .813 ± .166; p<0.01; d = 1.20), tennis ball throwing (9.72 ± 1.80 - 8.23 ± 1.18; p<0.05; d = 0.97), sit and reach (19.97 ± 5.54 - 25.99 ± 4.75; p<0.01; d = 1.16), sprint (20 meters) (5.66 ± .532 - 6.42 ± .472; p<0.01; d = 0.15), agility (5.20 ± .784 - 5.84 ± .769; p <0.01; d = 0.08), flamingo balance test right (8.83 ± 4.18 - 16.50 ± 4.88; p<0.01; d = 1.68), flamingo balance test left (9.63 ± 4.36 - 17.20 ± 5.25; p<0.01; d = 1.56) and Y balance test in anterior reach distance right (93.74 ± 27.26 - 78.36 ± 24.45; p<0.01; d = 0.59) and left (86.27 ± 26.74 - 71.36 ± 23.90; p<0.01; d = 0.58), right in posteromedial reach distance (88.99 ± 30.13 - 72.60 ± 26.07; p<0.01; d = 0.58) and left (85.70 ± 28.54 - 69.00 ± 24.15; p<0.01; d = 0.63), right in posterolateral reach distance (99.11 ± 32.85 - 83.82 ± 26.26; p<0.05; d = 0.51) and left (97.29 ± 34.31 - 77.83 ± 30.13; p<0.01; d = 0.60) and attention (34.73 ± 5.31 - 31.03 ± 6.44; p<0.05; d = 0.62) tests.

Table 6. Control group pre-post test results

	Pre	*Post*	*Paired T test*				
	(n=30)		*t*	*df*	*p*	*%*	*d*
Countermovement Jump	*13.77 ± 2.35*	*14.83 ± 2.60*	*-1.606*	*29*	*.119*	*7.70*	*0.42*
Airtime (CMJ)	*370.13 ± 21.58*	*375.00 ± 14.16*	*-1.110*	*29*	*.276*	*1.32*	*0.02*
Squat Jump	*15.67 ± 2.68*	*16.53 ± 2.82*	*-1.379*	*29*	*.178*	*5.49*	*0.31*
Airtime (SJ)	*357.27 ± 33.75*	*368.17 ± 21.79*	*-1.460*	*29*	*.155*	*3.05*	*0.03*
Standing Long Jump	*.870 ± .115*	*.898 ± .100*	*-.974*	*29*	*.338*	*3.22*	*0.25*
Tennis Ball Throwing	*8.88 ± .817*	*9.72 ± 1.80*	*-.801*	*29*	*.430*	*9.46*	*0.14*
Sit-and-Reach	*21.13 ± 3.61*	*22.45 ± 4.81*	*-1.139*	*29*	*.264*	*6.25*	*0.31*
Sprint (20 meter)	*6.33 ± .702*	*6.12 ± .827*	*1.282*	*29*	*.210*	*3.43*	*0.02*
Agility	*5.58 ± .809*	*5.63 ± .752*	*-.326*	*29*	*.747*	*-0.89*	*0.06*
Flamingo Balance Test (R)	*14.87 ± 5.72*	*13.13 ± 5.71*	*1.039*	*29*	*.307*	*13.25*	*0.30*
Flamingo Balance Test (L)	*18.97 ± 5.38*	*17.47 ± 7.11*	*1.126*	*29*	*.269*	*8.59*	*0.23*
Y Balance Test	**Anterior Reach Distance**						
Right Lower Extremity	*81.87 ± 16.42*	*86.64 ± 23.61*	*.984*	*29*	*.333*	*5.83*	*0.23*
Left Lower Extremity	*73.77 ± 14.55*	*82.15 ± 34.35*	*1.673*	*29*	*.105*	*11.36*	*0.31*
Y Balance Test	**Posteromedial Reach Distance**						
Right Lower Extremity	*75.17 ± 19.53*	*83.81 ± 35.89*	*1.809*	*29*	*.081*	*11.49*	*0.29*
Left Lower Extremity	*76.01 ± 20.04*	*80.92 ± 34.28*	*.936*	*29*	*.357*	*6.46*	*0.17*
Y Balance Test	**Posterolateral Reach Distance**						
Right Lower Extremity	*85.87 ± 37.25*	*84.52 ± 20.18*	*2.047*	*29*	*.050*	*-1.57*	*0.04*
Left Lower Extremity	*81.39 ± 87.74*	*87.74 ± 40.43*	*1.731*	*29*	*.094*	*7.80*	*0.09*
Frankfurter Attention Test	*33.37 ± 6.13*	*32.03 ± 5.01*	*.865*	*29*	*.394*	*4.02*	*-0.23*

$\bar{x}$ ± SS, mean-standart deviation; n, number; t, t test score; %, percentage of development; cmj, countermovement jump; sj, squat jump; r, right; l, left; d, cohen's d value.

When the results of the independent samples T-test used to compare the pre-post test scores between the control groups are examined there is no statistically significant difference.

Table 7. *Pre-test results by gender*

	Girls (n=28)	Boys (n=32)	Independent T test t	df	p	%	d
Countermovement Jump	14.07 ± 2.50	14.47 ± 2.75	1.539	58	.129	2.84	0.15
Airtime (CMJ)	363.14 ± 23.78	366.25 ± 26.49	-1.670	58	.100	0.86	0.01
Squat Jump	15.07 ± 2.62	15.53 ± 2.42	-1.083	58	.283	3.05	0.18
Airtime (SJ)	349.43 ± 31.89	354.00 ± 31.78	-1.330	58	.189	1.31	0.01
Standing Long Jump	.823 ± .135	.857 ± .153	-1. 540	58	.129	4.13	0.23
Tennis Ball Throwing	8.37 ± 1.20	8.54 ± .856	-1.799	58	.077	2.03	0.02
Sit-and-Reach	21.53 ± 4.07	19.69 ± 5.05	-.957	58	.343	9.34	0.40
Sprint (20 meter)	6.40 ± .561	6.35 ± .631	.572	58	.570	0.79	0.08
Agility	5.74 ± .656	5.69 ± .906	1.255	58	.214	0.88	0.06
Flamingo Balance Test (R)	14.36 ± 4.61	16.84 ± 5.72	-1.836	58	.071	17.27	0.47
Flamingo Balance Test (L)	17.89 ± 4.84	18.25 ± 5.82	-.256	58	.799	2.01	0.06
Y Balance Test	**Anterior Reach Distance**						
Right Lower Extremity	87.35 ± 23.42	78.25 ± 24.42	1.466	58	.148	11.63	0.38
Left Lower Extremity	81.45 ± 31.42	72.65 ± 28.24	1.142	58	.258	12.11	0.29
Y Balance Test	**Posteromedial Reach Distance**						
Right Lower Extremity	85.93 ± 24.84	71.45 ± 35.54	1.804	58	.076	20.27	0.47
Left Lower Extremity	80.80 ± 29.92	69.84 ± 29.60	1.424	58	.160	15.69	0.36
Y Balance Test	**Posterolateral Reach Distance**						
Right Lower Extremity	97.04 ± 34.71	83.55 ± 29.61	1.624	58	.110	16.18	0.41
Left Lower Extremity	91.06 ± 33.61	79.30 ± 37.71	1.266	58	.210	14.83	0.32
Frankfurter Attention Test	31.96 ± 6.12	32.41 ± 6.63	-.267	58	.791	1.41	0.07

x̄ ± SS, mean-standart deviation; n, number; t, t test score; %, percentage of difference; cmj, countermovement jump; sj, squat jump; r, right; l, left; d, cohen's d value.

When the results of the independent samples T-test used to compare the pre-post test scores between the genders are examined there is no statistically significant difference.

Table 8. *Post-test results by gender*

	Girls (n=28)	Boys (n=32)	Independent T test t	df	p	%	d
Countermovement Jump	16.39 ± 2.51	16.41 ± 3.28	-.018	58	.986	0.12	0.06
Airtime (CMJ)	378.46 ± 20.10	383.38 ± 25.82	-.813	58	.419	1.30	0.02
Squat Jump	17.18 ± 3.15	17.69 ± 2.97	-.643	58	.523	2.97	0.16
Airtime (SJ)	379.29 ± 24.71	373.69 ± 28.89	.800	58	.427	1.50	0.02
Standing Long Jump	.911 ± .118	.983 ± .138	-2.145	58	.034*	7.90	0.56
Tennis Ball Throwing	8.63 ± 1.15	9.88 ± 1.45	-3.633	58	.001*	14.48	0.95
Sit-and-Reach	25.61 ± 5.53	23.00 ± 4.34	2.049	58	.045*	11.35	0.52
Sprint (20 meter)	5.94 ± .579	5.85 ± .842	.446	58	.657	1.54	0.01
Agility	5.55 ± .652	5.30 ± .888	1.243	58	.219	4.72	0.03
Flamingo Balance Test (R)	8.54 ± 3.81	13.13 ± 5.72	-3.586	58	.001*	53.75	0.94
Flamingo Balance Test (L)	12.04 ± 8.17	14.88 ± 5.73	-1.573	58	.121	23.59	0.40
Y Balance Test	**Anterior Reach Distance**						
Right Lower Extremity	90.01 ± 21.11	85.88 ± 24.89	.687	58	.495	4.81	0.17
Left Lower Extremity	83.68 ± 22.26	76.81 ± 22.10	1.198	58	.236	8.94	0.30
Y Balance Test	**Posteromedial Reach Distance**						
Right Lower Extremity	90.00 ± 18.44	75.15 ± 29.93	2.274	58	.023*	19.76	0.59
Left Lower Extremity	87.19 ± 20.23	75.31 ± 27.55	1.879	58	.060	15.77	0.49
Y Balance Test	**Posterolateral Reach Distance**						
Right Lower Extremity	96.57 ± 25.85	87.65 ± 29.54	.687	58	.495	10.18	0.32
Left Lower Extremity	93.84 ± 24.71	85.41 ± 35.36	1.055	58	.296	9.87	0.27
Frankfurter Attention Test	34.00 ± 4.66	32.84 ± 5.81	.841	58	.404	3.53	0.22

*x̄ ± SS, mean-standard deviation; n, number; t, t-test score; %, percentage of difference; cmj, countermovement jump; sj, squat jump; r, right; l, left; d, cohen's d value; *p<0.05.*

When the results of the independent sample T-test, which was conducted to compare the scores of the post-test averages by gender, are examined, it is seen that there is a statistically significant difference in favor of the post-tests and boys in the standing long jump (.983 ± .138 - .911 ± .118; $p<0.05$; d = 0.56) and tennis ball throwing (9.88 ± 1.45 - 8.63 ± 1.15; $p<0.05$; d = 0.95) tests. There was a significant difference in the sit-and-reach flexibility (25.61 ± 5.53 - 23.00 ± 4.34; $p<0.05$; d = 0.52), flamingo balance test right (8.54 ± 3.81 - 13.13 ± 5.72; $p<0.05$; d = 0.94) and Y balance test posteromedial reach distance right lower extremity (90.00 ± 18.44 - 75.15 ± 29.93; $p<0.05$; d = 0.59) parameters in favor of post-tests and girls.

Discussion

This research aimed to determine, define and compare the impact of coordination-based movement education practices on children's performance in fundamental motor skills and fundamental movement skills with attention skills between the ages of 60 - 72 months. Along with the targeted goals, the children in the experimental group engaged in the coordination-based movement education program for a total of 12 weeks. On the contrary, the children in the control group, who continued the movement activities included in the preschool education program of the Ministry of National Education.

Resarch results appear to be in line with some earlier research on children who are at the preschool stage (Šalaj et al., 2019; Guo et al., 2018; Plazibat et al., 2021; Uzun & Tok, 2023; Balyi, 2001; Esen et al., 2023; Barnett et al., 2014; Aktaş, 2021; Hedstrom & Gould, 2004; Tiktampanidi et al., 2021; Jaakkola et al., 2016; Morris et al., 1982; Lemos et al., 2012; Altınkök, 2016; Williams & Hodges, 2005; Hardy et al., 2010; Altınkök, 2017a; Anshel & Marisi 1978; Brown et al., 1981; Chatzipanteli et al., 2007; Deli et al., 2006; Altınkök, 2017b; Derri et al., 2001; Pollatou & Hatzitaki, 2001; Zachopoulou et al., 2004; Sabo, 2004). Based on the literature review, it is seen that many studies on fundamental movement skill interventions only examine pre and post comparisons and the results claim positive outcomes (Roth et al., 2015; Kurnaz, 2022; Bellows et al., 2013; Esen et al., 2023; Altınkök, 2006).

Haywood and Getchell (2005) underline that gender is a significantly influential variable in the timing, size, and volume of development, growth, and maturation and that gender-related differences and changes in preschool and early childhood are not significant. The ability of the muscles to produce maximum force in the shortest amount of time is known as explosive power, and jumping tasks frequently serve as indicators of explosive power (Malina et al., 2004). Malina et al. (2004) stated that muscle strength increases on average. There are significant annual increases in the vertical jump and standing long jump for preschool-aged children. According to observations, boys consistently outperform girls in tests of explosive power at all age ranges, and between the ages of 3 and 5, there are gender differences in the standing long jump and vertical jump parameters (Gallahue & Ozmun, 2002; Frederick, 1977; Spodek & Saracho, 2006; Burton & Miller, 1998). In addition, there are studies evaluating that movement education practices improve explosive power and that gender differences achieve better results in boys between the ages of 5.5 and 6.5 in explosive strength assessment tests than girls (Kostić et al., 2003). Everke (2009), reported that there are significant differences in favor of 5 years between the ages of 4 and 5 regarding jump parameters. It was concluded that jump parameter scores increased in all groups and significant gender differences were recorded in the vertical jump test, and girls scored better than boys. A significant difference was found between primary school children who received standard education and primary school children who received standard education and movement education in a balanced way, in favor of primary school children who received standard education and movement education in a balanced way in vertical jump parameters (Katie et al., 2003). It is emphasized that gender differences are at a minimum level between the ages of 3 and 6 in early childhood and become more evident in adolescence (Beunen & Thomis, 2000). In addition, according to Oja and Jurimäe (1998), boys outperformed girls in the standing long jump parameter. These minor differences among boys and girls as well as between ages are mainly linked to movement strength and speed. Social and cultural expectations for physical activity and motor movement performance capacities and socioeconomic factors also affect girls and boys at these ages (Spodek & Saracho, 2006; Malina et al., 2004).

Gender differences may be exacerbated by the types of physical activities that children are eager to participate in, which provide them with more opportunities to practice, enhance, and develop their skills (Harrell et al., 2003; Jago et al., 2005). Šalaj et al. (2019), concluded that there was no significant gender-related difference in gross motor skill and locomotor skill scores among preschool-aged girls. However, it was noted that there were differences in gross motor skills and locomotor skills among the selected gymnast girls and non-gymnast girls. According to Jurimäe and Jurimäe (2001), gender differences in preadolescent performance in the standing long jump and vertical jump parameters are primarily caused by environmental factors and performance differences ranging from low to moderate. In a study where a 12-week multi-directional movement education program was conducted, it was found that the experimental group's 10-meter linear sprint test scores significantly increased (Fischetti & Greco, 2017). Additionally, Guo et al. (2018) further highlighted that there is a strong correlation between activities that involve motor tasks and physical activity and that these two factors are crucial for the development of fundamental movement skills. In a research conducted on 3076 preschool children between the ages of 3-6, it was concluded that boys (n=1537) outperformed girls (n=1539) according to the findings of a 20-meter linear sprint performance test. However, taking into account the age of 6, it was stated that there was no significant difference (Latorre-Román, 2016). Everke (2009) emphasized in his research that the participants in the experimental group significantly improved their flexibility in sit-and-reach tests. In the third evaluation, it was concluded that girls performed better than boys and there were gender differences at the age of 5 years. In addition, this research underlined that flexibility weakens as the activity level decreases, but that it can be improved with practice. Kostić et al. (2003) stated that flexibility can develop positively with practice and that girls are more dominant in the sit-and-reach flexibility test. Živčić et al. (2008) concluded that children improved their sit-and-reach flexibility scores after a 9-month program with movement education practices. It has been reported that the fundamental movement performance capacities of preschool children improve with age, and the throwing capacities of children who do not have sufficient throwing experience do not improve or improve only to a limited extent (Morris et al., 1982). In the study conducted by Morris et al. (1982), there are remarkable similarities between the present study in terms of the mean scores of children in the tennis ball throwing test. It is seen that the results of the tennis ball throwing test among the pre-post tests of the experimental group are in favor of the post-test. In terms of gender, it is seen that the results are in favor of boys. Considering the results, it can be said that our hypothesis was confirmed in terms of this parameter. These similarities can be attributed to the common use of the same test, methodology, and assessment type. In addition, both studies included age groups with similar developmental characteristics. However, it is important to recognize that there may be differences in terms of time, geography, and socioeconomic factors that need to be taken into account when interpreting the findings. In terms of balance skills, there are some studies that emphasize the implementations including movement education, games or physical activity contribute positively (Tiktampanidi et al., 2021; Plazibat et al., 2021; Barrett and Smerdely, 2002; Costa et al., 2009; Esen et al., 2023; Overmoyer & Reiser, 2015). However, when it comes to evaluating the balance skill of preschool children via the Y balance test based on movement education programs, games, or physical activity, there are quite limited resources (Esen et al., 2023). Everke (2009) states that investigations of 4-year-olds' backward walking have shown a significant improvement in dynamic balance, and girls outperform boys in this regard. In addition, it is reported that balance performance significantly improved after implementing strength, coordination, and flexibility exercises (Barrett & Smerdely, 2002). According to Fotiadou et al. (2002), preschoolers' static and dynamic balance skills were enhanced by gymnastics education practices. Moreover, Kostić et al. (2003) found significant improvement in balance capacity, side walking and backward walking on a platform after conducting a dance-based program. In addition, Živčić et al. (2008) concluded that walking backward was strengthened by physical activity. Girls are reportedly more capable of keeping balance than boys until they reach the age of 7-8. (Spodek & Saracho, 2006; Mckenzie et al., 2002), and it is claimed that girls often have superior dynamic and static balancing motor capacities compared to boys (Gallahue & Ozmun, 2006; Frederick, 1977; Spodek & Saracho, 2006; DeOreo & Wade, 1971.).

These findings can guide health professionals, physical education and school specialists, physical education teachers, and child development specialists in using multiple methods to identify children aged 60-72 months with high or quite low fundamental movement skills and to design appropriate movement tasks according to gender differences.

Conclusions

No significant differences were found in the pre-tests regarding gender and group differences. This demonstrates that the groups of girls and boys and control were similar and close to each other at the beginning. The control group did not participate in the intervention program. However, when the post-test results are analyzed, it is seen that there is an improvement although there is no significant difference. This may be due to the rapid development of children. Therefore, it can be said that the positive change in the results of the physical tests applied is an expected situation.

With regard to our hypothesis, It was partially proven that girls typically perform better than boys in terms of flexibility and static and dynamic balance. Because the gender post-test findings show that while the parameter of the flamingo balancing test on the right showed a significant difference, no significant difference was detected on the left. This may be due to girls performing better with dominant lower extremities than boys. Even though there was no statistically significant difference between the right and left lower extremities in the anterior reach distance, the right lower extremity in the posteromedial reach distance, or the right and left lower extremities in the posterolateral reach distance, The Y balance test revealed that, on average, girls outperformed boys in all criteria.

Regarding boys, our research hypothesis was partially confirmed. While the standing long jump and tennis ball throwing parameters showed a statistically significant difference in favor of the boys, the vertical jump parameters showed no such difference. However, the findings revealed that all the results related to this hypothesis favored boys.

Our hypothesis about attention has been confirmed. Although there is no significant difference according to gender, it is seen that the mean scores of girls are higher. Examining the table 1, it was evaluated that boys performed "average" and girls performed "above average". This result may be due to the earlier development of fine motor skills in girls, earlier development of language skills, genetic differences, sleeping habits, and home environment.

Another of our hypotheses is that attention and fundamental movement skill levels are significantly different in favor of the experimental group compared to the control group, and there is a significant difference between the pre-post-tests of the experimental group in favor of the post-tests. The findings confirm this hypothesis. In addition, when the experimental group is evaluated with the table 1 in in-group and intergroup comparisons, it is observed that the attention level has increased from the "average" level to "above the average". The research demonstrates that fundamental movement skills and attentional skills both significantly developed more in the experimental group than in the control group. Furthermore, the coordination-based movement education program can be considered to be the main reason for the difference in the data that was collected. Consequently, these findings indicate that gender should be considered when investigating the fundamental movement skills and attentional skills of 60-72-month-old preschoolers.

As a result of the literature review, no research has been found that examines the development of attention skill levels of preschool 60-72 months children through a movement education programs. Therefore, the research can be seen as pioneering and original research specific to this field. In conclusion, it can be shown that the experimental group that obtained coordination-based movement education greatly outperformed the control group in terms of development in many regards and that the results generally supported the hypotheses and were parallel and similar to the findings of other studies. It is determined that coordination-based movement education program benefit greatly children between the ages of 60-72 months by fostering the development of their fundamental motor movement skill capacities and attention skill variations.

Recommendations

The processes of teaching and learning should be supported by pedagogical methods and adapted to children's developmental characteristics. In addition, child-centered pedagogical education methods should be applied. It is emphasized that more research is needed to promote the improvement of fundamental movement skills. This program can be implemented for children aged 60-72 months and all preschool children. It is recommended to be implemented in different age groups, taking into account their developmental characteristics.

In such implementations, apart from the coordination method, different methods and pedagogical approaches and sportive branches for individual or team sports can be included. In order to maximize the possible positive effects of the program, the duration of the implementations can be extended. By enlarging the research group and sample, researchers can include social-emotional development or socioeconomic differences in preschool children as well as fundamental motor skills performance and attention variations. Studies can be done by comparing coordination-based movement education with other pedagogical education approaches.

This research is dedicated to all the children around the world who have been deprived of all kinds of activities involving movement and play, especially education, which are regarded as natural needs.
Conflicts of interest - None

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