THE EFFECTS OF REGULAR PHYSICAL ACTIVITY ON MOTOR DEVELOPMENT

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ABSTRACT

The aim of this study that lasted for 12 weeks in primary school children aged 7-10 years is to examine the effects of game-based movement education studies on motor development. 128 volunteer children (male n = 72, female n = 56) participated in the study which was conducted in a special etude center in Istanbul after taking written consent from their parents. Preliminary measurement data has been formed by measuring children's age, height, weight, claw strength, flexibility, balance skills, vertical jump skills, quickness, and speed parameters. The children who brought written consent from their parents to take part in physical activities formed the experimental group (n=67, male 38, female 29); the others who would not take part in the physical activities due to various reasons formed control group (n=61; male 34, female 27). Various activities including game-based movement studies which would develop flexibility, quickness, coordination, speed, aerobic endurance, and strength have been applied to the participants for 12-week with 30-minutes 5 days in a week program in the special etude center's playground. In the last week of the movement education, last measurement data has been formed by re-measuring the parameters taken in preliminary measurement. The obtained data have been analyzed with descriptive statistics, independent sample t-test and matched sample t-test by using SPSS 20.0 program. As a result of the analyzes done, it was found that the physical activities that were performed during the twelve weeks had more positive effects on many parameters in the experimental group than the children in the control group, between 7 and 10 years, and this situation was determined to express difference in the level of p<,05 and p <,01. As a result, in this direction, it is stated that game-based movement education studies that lasted for 12-weeks have a positive effect on 7-10 years old children. It would be a crucial application for doing studies which would increase physical activity habits in this age group's alma mater in the name of raising healthy generations.

Keywords: *Game, Child, Movement Education, Physical Activity, Motor Development*

INTRODUCTION

Fundamental Movement Phase which is one of the psychomotor development processes coincides with children's primary school years. Fundamental movement

education has a great importance also in discovering children who are prone to athletic skills. In this context, it would be very effective in terms of children's meeting with physical activity and later on with sports atmosphere, accommodating themselves in this competitive environment, and proceeding in becoming an elite athlete (Ozkan and Ozkan, 2016; Sevimli 2015; Camliyer and Camliyer, 1997; Guven, 2017).

Primary school children's applying game-based movement education regularly and in a controlled manner would make a meaningful contribution to children's becoming an elite athlete in their branch by accelerating the motor development process (Kocyigit et. al., 2007; Karakucuk, 2008; Celik and Sahin, 2013; Baltaci, 2008). "Game and Physical Activities" lesson which is a part of primary school curriculum is the lesson which contributes to these children's physical development most (Guven and Yildiz, 2014), and it is a necessity in terms of physically active therefore growing healthy individuals (Siedentop, 2001).

In many studies conducted by numerous researchers who contributed to the field, it is stated that children's participation values to physical activities that include game-based movement education significantly affects their continuing such physical activities in the following years (Taras, 2004; Green and ark., 2005; Sallis et. al., 2000; Penney and Jess, 2004). In this context, it can be thought that game and physical activities lesson may provide an important share concerning making physical activities lifelong sustainability.

In this direction, the aim of this study that lasted for 12 weeks in primary school children aged 7-10 years is to examine the effects of game-based movement education studies on motor development

METHOD

In the study which was conducted in a special etude center in Istanbul, 128 volunteer children (male n=72; female=56) who received written consent from their parents participated. The children who brought written consent from their parents to take part in physical activities formed the experimental group (n=67, male 38, female 29); the others who would not take part in the physical activities due to various reasons formed control group (n=61; male 34, female 27). Preliminary measurement data has been formed by measuring children's age, height, weight, claw strength, flexibility, balance skills, vertical jump skills, quickness, and speed parameters.

Measurements

The children's age, height, and body weight values have been confirmed with classical methods.

Age Assessment

Age is determined by the month arithmetic based on the birth dates declared by the participants.

Height Measurement

The heights of the subjects were recorded by measuring the distance between the head's vertex and the foot of the following a deep inspiration while the head was in the Frankfort plane.

Weight Measurement

The weight measurements were conducted according to standard techniques while the participants are in standard sports outfit (shorts, t-shirt), and without shoes.

The methods used in participating children's measurements which was done with parents' permission are presented in paragraphs.

Handgrip Strength Measurement

The Jamar hand dynamometer, which is often used by researchers to measure the strength of the claw, and which is highly recommended by the American Association of Hand Therapists (AAHT) and has high reliability and validity, has been used (Shechtman et. al., 2005; Narin et. al., 2009). The participants who were allowed to choose a hand and use their dominant hands, were asked to try the dynamometer twice. The better degrees were recorded as preliminary and last measurement values.

Applied Tests

Flexibility Test

To determine the participants' flexibility values, a sit and reach test was applied and the measurements were recorded as the preliminary and the last. Flexibility values of the participants were measured with the help of Lafayette brand test table which has 35cm length, 45 cm width, and 32 cm height. Stretching was applied from the body to the forward, without bending the knees and the farthest point was tried to be reached. By two repetitions, the best results were recorded in cm (Muratli, 1997).

Flamingo Balance Test

Flamingo balance test has been applied for participants' static balance measurements. A 50cm length, 4cm height, and 3 cm width metal beam was used. Retries were calculated in 1 minutes (except falls) and recorded as scores (Sipal, 1989).

Vertical Jump Test

The measurements were done on a jumping platform (Fusion Sport, Smart jump, UK). The better of two tries was recorded.

Quickness Test

This test was conducted with Pro Agility test. Photoelectric chronometer (Newtest Powertimer 300) was used in the measurement. In the test where a single photocell door was used, a child went to the right, then to the left and back to the starting point from the midpoint of the 10-meter area, and ended the test. The same procedure was repeated by starting to the left first, the best value was recorded in seconds (Harman and Garhammer 2008).

Sprint Test

The aim of the study is to define how fast a child can run 20-meter distance. A zero line is drawn on the ground with a tape. The child's first 20-meter total sprint durations were measured with a photoelectric chronometer (Newtest Powertimer 300). The student is allowed to start 3-meters back. A model student is applied Sprint test in front of the student taken into the gymnasium. Meanwhile, the student watches the model. Then the student is tested three times in the Sprint Test. The average of the best two durations after omitting the worst one (Yarimkaya and Ulucan, 2015).

Implementation and Statistical Analysis

Various activities including game-based movement studies which would develop flexibility, quickness, coordination, speed, aerobic endurance, and strength have been applied to the participants for 12-week with 30-minutes 5 days in a week program in the special etude center's playground. The participants played one of the following games "Hopscotch", "Grab the Kerchief" "Tug of War", "Duck March Competition", "duck duck goose" in one day. By remeasuring preliminary parameters, last measurement data have been formed in the last week of game-based movement education. The obtained data have been analyzed with descriptive statistics, independent sample t-test and matched sample t-test by using SPSS 20.0 program.

FINDINGS

In the table (Table 1), which is related to age, height, weight data obtained from children's preliminary measurements; no significant difference has been found between experimental group and control group in the level of p<,05. This situation gives information on these two groups are similar.

Table 1. *T-test Results of Participants According to Age and Physical* Development

Variable	Group	n	Mean	Std. D.	t	df	*p*
Age (ay)	Experimental	67	102,76	14,65	,270	3	,406
	Control	61	101,81	15,84			
Height (cm)	Experimental	67	134,94	13,54	,252	17	,395
	Control	61	137,46	14,68			
Weight (kg)	Experimental	67	37,78	5,26	1,347	15	,165
	Control	61	37,12	7,10			

In the Table 2, where the results of the preliminary measurement t-test are related to the independent variables of the groups (claw strengths, flexibility, balance skills, vertical jump skills, quickness and speed parameters), no significant difference was found between experimental and control groups' mean values in the level of p<,05. This situation gives researchers information on these two groups are similar in terms of motor development parameters.

Table 2. *Preliminary Measurement T-test Results According to Groups' Independent Variables*

Variable	Group	n	Mean	Std. D.	t	df	*p*
Vertical Jumping (cm)	Experimental	67	24,16	6,98	,998	14	,165
	Control	61	25,84	6,46			
Claw Strength (kg)	Experimental	67	12,57	4,54	,687	18	,261
	Control	61	13,16	5,09			
Quickness (sec)	Experimental	67	4,70	,86	1,346	15	,171
	Control	61	4,77	,91			
Speed (sec)	Experimental	67	4,38	,56	,745	4	,280
	Control	61	4,49	,72			
Static Balance (Number of Errors)	Experimental	67	11,82	1,25	,738	4	,269
	Control	61	11,35	1,09			
Flexibility (cm)	Experimental	67	17,94	4,68	,135	8	,651
	Control	61	18,13	5,12			

The last measurement t-test results have been given in Table 3 according to the independent variables of the groups (claw strengths, flexibility, balance skills, vertical jump skills, quickness and speed parameters). A significant difference was found in favor of experimental group statistically in the level of p<,05 and p<,01. This situation gives researchers information on experimental group and control group become different in terms of motor development parameters at the end of the 12-week education process, and experimental group's mean values develop at the end of this period (Table 3).

Table 3. *Last Measurement T-test Results According to Groups' Independent Variables*

Variable	Grup	n	Mean	Std. D.	t	df	*p*
Vertical Jumping (cm)	Experimental	67	28,73	7,12	3,165	4	,017*
	Control	61	26,12	6,83			
Claw Strength(kg)	Experimental	67	16,09	5,11	3,53	6	,008**
	Control	61	13,56	4,91			
Quickness (sec)	Experimental	67	4,34	,98	2,041	7	,034*
	Control	61	4,85	,85			
Speed (sec)	Experimental	67	4,01	,69	4,129	6	,002**
	Control	61	4,39	,81			
Static Balance (number of mistakes)	Experimental	67	9,91	1,03	3,982	5	,006**
	Control	61	11,61	1,19			
Flexibility (cm)	Experimental	67	21,96	3,17	6,560	4	,000**
	Control	61	18,25	4,95			

**p<,05; **p<,01*

The preliminary and last measurement t-test results of the experimental group have been given in Table 4 according to the independent variables of the groups (claw strengths, flexibility, balance skills, vertical jump skills, quickness and speed parameters) (Table 4). Statistically, significant differences have been found between experimental group's preliminary and last measurement mean values in favor of the last measurement in the level of p<,01. This situation gives researchers information on experimental group's measurement values differ in terms of motor development parameters at the end of the 12-week education process, and these values develop at the end of the period.

Table 4. *Preliminary and Last Measurement T-test Results of Experimental Group According to Independent Variables*

Variable	Experimental Group	n	Mean	Std. D.	t	df	*p*
Vertical Jumping (cm)	Preliminary Measurement	67	24,16	6,98	4,930	8	,000**
	Last Measurement	67	28,73	7,12			
Claw Strength (kg)	Preliminary Measurement	67	12,57	4,54	5,147	5	,000**
	Last Measurement	67	16,09	5,11			
Quickness (sec)	Preliminary Measurement	67	4,70	,86	11,658	2	,003**
	Last Measurement	67	4,34	,98			
Speed (sec)	Preliminary Measurement	67	4,38	,56	13,519	2	,000**
	Last Measurement	67	4,01	,69			
Static Balance (Number of Mistakes)	Preliminary Measurement	67	11,82	1,25	6,305	4	,000**
	Last Measurement	67	9,91	1,03			
Flexibility (cm)	Preliminary Measurement	67	17,94	4,68	6,128	5	,000**
	Last Measurement	67	21,96	3,17			

***p<,01*

In Table 5, control group's preliminary and last measurement t-test results according to independent variables (claw strengths, flexibility, balance skills, vertical jump skills, quickness and speed parameters) have been given. No significant difference has been found in the level of p<,05 between control group's preliminary and last measurement mean values. This situation gives researchers information on control group's other abilities except static balance ability differ in a positive way as a part of natural motor development process at the end of 12-week period; and it shows that measurement mean values minimally increase at the end of this period.

Table 5. *Preliminary and Last Measurement T-test Results of Control Group According to Independent Variables*

Variable	Group	n	Mean	Std. D.	t	df	*p*
Vertical Jumping (cm)	Preliminary Measurement	61	25,84	6,46	,903	14	,265
	Last Measurement	61	26,12	6,83			
Claw Strength (kg)	Preliminary Measurement	61	13,16	5,09	,673	18	,298
	Last Measurement	61	13,56	4,91			
Quickness (sec)	Preliminary Measurement	61	4,77	,91	1,213	15	,199
	Last Measurement	61	4,85	,85			
Speed (sec)	Preliminary Measurement	61	4,49	,72	,763	4	,215
	Last Measurement	61	4,39	,81			
Static Balance (Number Of Mistakes)	Preliminary Measurement	61	11,35	1,09	,701	4	,223
	Last Measurement	61	11,61	1,19			
Flexibility (cm)	Preliminary Measurement	61	18,13	5,12	,121	7	,603
	Last Measurement	61	18,25	4,95			

In the light of obtained data, these data have shown researchers that experimental group's measurement values differ in terms of motor development parameters at the end of 12-week education period; and measurement mean values develop at the end of this period.

DISCUSSION AND RESULT

The mean values of the experimental and control group in the table (Table 1) regarding the age, height, and body weight data obtained from the pre-measures of the children are similar to those of many researchers working with this age group (Ongul et. al., 2017, Kerkez et. al., 2001).

The experimental group's vertical jumping skills last test measurements have been found as 28,73 cm in the study. In the studies conducted by Karagoz et. al., (2015), Ziyagil et. al., (1999), and Polat et. al., (2001) improvement was found in vertical jump values in the result of similar studies.

When the flexibility values were examined, it was determined that the experimental group reached to 21.96 cm after the movement education and this situation was in parallel with the studies of Ongul et al. (2017), Guler et al. (2010).

As a result of tug of war game played in game-based movement education, the claw strength values increased from 12.57 kg to 16.09 kg in the experimental group. Similar results were found in Bilgic et al. (2015) and Ibis et al. (2004)'s studies and these results show parallelism to the results of the study.

Playing games that increase speed and quickness like Grab the Kerchief for half an hour a week in a week by the experimental group results in a serious improvement in speed and quickness values. These developments are similar to

those of Yarimkaya and Ulucan (2015), Karagoz et al. (2015), Ziyagil and colleagues (1999), Baglar and colleagues (2017) and Guler et al. (2010).

When the last measurement values of static balance values were examined, it was determined that the experimental group made fewer errors than the control group. This situation is similar to the studies of Ozsaydi et al. (2015) and Karagoz et al. (2015). As a result of the analyzes done, it was found that the physical activities that were performed during the twelve weeks had more positive effects on many parameters in the experimental group than the children in the control group, between 7 and 10 years, and this situation was determined to express difference in the level of p<,05 and p <,01. As a result, in this direction it is stated that game-based movement education studies that lasted for 12-weeks have positive effect on 7-10 years old children. It would be crucial application for doing studies which would increase physical activity habits in this age group's alma mater in the name of raising healthy generations.

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