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Examining the Effects of Movement Activities of Coordinated Approach to Child Health (CATCH) Program on Locomotor and Manipulative Skills of 4-5 Years Old Children

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The main objective of the research is to examine the impact of regular implementation of Education Program made of CATCH Program Movement Activities on the locomotor and manipulative skills of preschool children. Implementation of Education Program made of CATCH Program Movement Activities was carried out in an independent preschool located in Kadıköy District in Anatolian Side of İstanbul Province, Turkey. Purposeful sampling method was used to determine the school where the experimental designed study will be conducted. The study group of the research consists of 64 children, 32 in experiment group and 32 in control group. To determine the efficiency of Education Program made of CATCH Program Movement Activities, education program was implemented with experiment groups for two days a week during 9 weeks. According to the results of pre-test and post-test measurements of experiment and control groups, no significant difference was determined between the locomotor subdimension, manipulative subdimension of the measurement instrument and measurement instrument total scores in pre-test measurements of the children ($p>.05$). According to the analysis results of post-test measurements following movement program, it was determined that there is a significant difference in locomotor subdimension, manipulative subdimension of the measurement instrument and measurement instrument total scores of both 4 and 5 years old children in favour of the experiment group ($p<.05$).

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Introduction

Motor development process is a process that starts in the mother's womb and ends only with the end of life. With the physical development of the baby in the mother's womb, the organism's central nervous system, the movement system in the passive dimension of the skeletal system, and the muscular system in the active dimension of the skeletal system begin to develop. Movement occurs as a result of the development and functioning of all these systems in an organized manner. Even though the movement is seen as reflexes in the first years of life and some of them last for a lifetime, some of them become voluntary over time and turn into motor skills.

Even though motor development which is described as the process of voluntary movement of the organism is parallel to the development of the central nervous system and physical growth; that is, the process of controlling the behaviours that occur in motor skills, undergoes changes, it periodically follows a regular sequence (Nalbant, 2015). When these periods are examined, it is seen that the first period is the period of reflexive movements which covers the age range of 0-1, dominated by reflexes that occur involuntarily and are controlled by the lower brain and form the basis of the stages of motor development. Immediately after the reflexive movements, the first forms of voluntary movements emerge with the development of the musculoskeletal and central nervous systems and the movement possibilities offered to the baby. This phase, which covers the age range of 0-2, is the period of rudimentary movements. Following the emergence of the rudimentary forms of movements, the phase of fundamental movements, which includes motor control and motor learning, takes place in the child's life very actively and the child acquires fundamental movement skills. Following the emergence of the rudimentary forms of movements comes the phase of fundamental movements, which covers the age range of 2-7, in which motor control and motor learning are intensively involved in the life of the child and in which the child acquires fundamental movement skills. The phase of fundamental movements coincides with the pre-school education years of the child and prepares the ground for the next period, the specialized movement phase (Gallahue, Ozmun & Goodway, 2012/2014; Muratlı, 2013; Nalbant, 2015).

There are some movements skills that children are expected to acquire and master through practice during the fundamental movements phase. These skills include locomotor skills involving running, gallop, sliding step, leaping, jumping, standing long jump and manipulative skills including throwing, catching, rolling, kicking the ball, hitting a stationary ball with a stick and bouncing the ball (Gallahue et al., 2012/2014; Sevimay-Özer & Özer, 2014). Reaching the maturity stage in these movement skills is the ultimate goal of the fundamental movement phase. Children who reach the maturity stage in movement skills acquire the relevant skills that they will use throughout their lives. From this point on, they start to combine the movement skills they have mastered and use them in more complex ways, and they include movement in their lives as an element of entertainment, both in sports, dance and in a different field.

In order to reach the maturation stage in movement skills, which is the ultimate goal of the fundamental movement phase, children should be supported both in terms of motivation and with regular movement activities appropriate to their developmental level. While preschool children acquire new movement skills, they may experience fears of being ridiculed or harmed (Nalbant, 2015; Sevimay-Özer & Özer, 2014). Children who are not motivated to overcome their fears and are not encouraged to try movement skills do not want to participate in movement activities, and children who do not participate in movement activities do not develop their movement skills at the desired level (Sevimay-Özer & Özer). Teachers and

families should assume great responsibilities in breaking this vicious circle. Studies have shown that the motivational support and environmental opportunities provided by families and teachers for children increase the physical activity level of children (Cools, Martelaer, Samaey, & Andries, 2011; Derscheid, Umoren, Kim, Henry, & Zittel, 2010; Zecevic, Tremblay, Lovsin, & Michel, 2010). Since this active participation enables the child to move, it helps children to experience movement skills and reach the maturity level in movement skills. It is also known that movement training programs, which are applied regularly and prepared in accordance with the motor development level of the child, positively affect the motor development and movement skills of the child (Günebakan, Saygın, Gelen & Karacabey, 2009; Scheffer, Ketelhut & Mohasseb, 2007; Ulutaş, Demir & Yayan, 2017; Wang, 2004; Yarımkaya & Ulucan 2015).

In light of the findings reported in the existing literature, the main drive for conducting the current study is to understand whether a movement program implemented in the fundamental movements phase affect all the movement skills of the child without focusing on a specific group of movements; thus, the goal of the current study was set to be to investigate the effect of a movement training program constructed on the basis of the CATCH program movement activities on the locomotor and manipulative skills of children aged 4-5 years old.

To this end, answers to the following research questions were sought:

(1) Do the movement development pre-test mean scores of the experimental and control group children aged 4 vary significantly?
(2) Do the movement development pre-test mean scores of the experimental and control group children aged 5 vary significantly?
(3) Do the movement development pre-test and post-test scores of the experimental group children aged 4 vary significantly?
(4) Do the movement development pre-test and post-test scores of the experimental group children aged 5 vary significantly?
(5) Do the movement development post-test mean scores of the control and experimental group children aged 4 vary significantly?
(6) Do the movement development post-test mean scores of the control and experimental group children aged 5 vary significantly?

Methods

Research Model

In order to examine the effectiveness of the Training Program created from the CATCH Movement Activities, the trial model, one of the quantitative research methods, and the “pre-test and post-test model”, one of the trial models, was used in the current study.

Quantitative research is a type of research that presents facts and events objectively in an observable, measurable and numerically expressible way. Objectively measuring social behaviours of individuals through observation, experiment and testing and researching them with numerical data are the purpose of this type of research. Trial models refer to a type of research in which the data to be observed are produced under the control of the researcher in order to determine the cause-effect relationships (Karasar, 2015, p.87).

In the pre-test-post-test control group model, there is an experimental group and a control

group formed through unbiased assignment (Karasar, 2015, p.97). A pre-test is applied to the experimental group and the control group, and after an intervention has been conducted on the experimental group, which is thought to have an effect on the experimental group, the experimental and control groups are subjected to a post-test (Baştürk, 2009, p.36-37).

Study Group

The implementation of the Training Program created from the CATCH Movement Activities was carried out in an independent kindergarten which is located in Kadıköy district, in the Anatolian side of Istanbul and which has a large multi-purpose hall besides the game hall and allowed the implementation of the movement program in its institutions for a period of school term. As this school could meet the criteria determined for the current study, it was found to be suitable for the purposive sampling method. In this regard, the participants of the study were selected from among the 4 and 5 year-olds receiving their pre-school education in this school. An experimental group and a control group were formed for 4 year-olds and 5-year olds, each.

While constructing the experimental and control groups, the classroom teachers were contacted and the children in the classes of the teachers who accepted the implementation of the movement program in their classes were considered to be taken into the experimental groups while the children in the classes of the teachers who did not accept the implementation of the program in their classes were considered to be taken into the control groups. The children who would be included in the experimental and control groups were selected from the classes of the teachers by means of the simple random sampling method. In the experimental and control groups of both age groups (i.e., 4 and 5 year-olds) equal numbers of female and male children were included and thus the study was conducted on a total of 64 children (8 female and 8 male children in each group). The distribution of the children in the study group across the groups and genders is given in the table below.

Table 1. The Number of Children in the Experimental and Control Groups According to Age and Gender

		Experimental Group	Control Group	Total
4 Year Olds	**Female**	8	8	16
	Male	8	8	16
5 Year Olds	**Female**	8	8	16
	Male	8	8	16
Total		32	32	64

Data Collection Tools

CHAMPS Motor Skills Protocol – (CMSP)

The CHAMPS Motor Skills Protocol (CMSP) is the product of the study conducted by Harriet G. Williams, Karin A. Pfeiffer, Marsha Dowda, Chevy Jeter, Shaverra Jones and Russel R. in South Caroline in 2009 to introduce a motor skills measurement tool to the literature (Williams et al., 2009).

In the validity study of the CHAMPS Motor Skills Protocol, the TGMD-2 measurement tool was used, and the measurements were conducted by using both of the measurement tools and

the comparison of the measurement tools was made (Williams et al., 2009). In the comparison of the tests, Pearson correlation analysis was used. According to the results of the analysis, the validity score of the locomotor sub-scales of the CMSP and TGMD-2 scales is .98, it is .97 for the manipulative sub-scales and it is .98 in total (Williams et al., 2009).

In the reliability study of the CHAMPS Motor Skills Protocol, two observers worked with 50 children from 22 schools and the scorings of the two observers were compared. In this regard, the inter-observer consistency score was found to be .99 for the locomotor sub-scale, .98 for the manipulative sub-scale and .94 in total (Williams et., 2009).

The CHAMPS Motor Skills Protocol was adapted to Turkish by Kılıç (2018). Within the scope of validity studies, the Test of Measuring Great Muscle Skills, which measures the same sub-headings and skills as the CHAMPS Motor Skills Protocol, was used for the criterion validity. The correlation values obtained as a result of the analysis made on the sub-dimensions and total scores of the measuring tools were determined as .89 for locomotor skills, .90 for manipulative skills, and .92 for the total score of the measurement tool ($p<.01$).

According to the results of test-retest conducted within the scope of reliability studies, there is a high level of positive correlation ($p <.01$) between the first and second measurements in terms of locomotor (.925), manipulative skills (.942) and total motor skills (.941) ($p<.01$).

The analysis for the internal consistency of the measurement tool was made for each skill in the two sub-dimensions and over the total score of the measurement tool. The values obtained from the locomotor sub-dimension of movement skills were found to be varying between .745 and .915 while the values obtained from the manipulative sub-dimension were found to be between .727 and .968. The total score of the measurement tool has the internal consistency value of .770.

As a result of the analyses conducted to determine the consistency between the evaluators, the correlation values between the evaluators were found to be .825 for the locomotor dimension, .915 for the manipulative dimension and .901 for the motor skills total (Kılıç, 2018).

Catch Early Childhood Program – It's Fun to be Healthy

The CATCH (Coordinated Approach to Child Health) program, on which the movement training program used in the current study is based, was formed to fight the obesity seen in children in America, can address the needs of children from different age groups, has a special training kit directed to children in their early childhood, aims to raise awareness in children about a healthy diet, to increase physical activity among children, to develop health policies at schools and to eliminate risk factors among children at risk through early interventions (It's Fun To Be Healthy, 2011; Sharma, Chuang & Hedberg, 2011).

Only the movements activities of the CATCH, which is a multidimensional health program with proven effectiveness in different points such as ensuring that children make the right choices about healthy eating, increasing the physical activity of children in and out of the classroom, providing support to families through participation studies (Sharma et al., 2011), were considered for the current study. From among these movement activities, movement skills that could be measured and evaluated with the measurement tool used in the current study selected and included in the movement training.

Data Collection Process

After the determination of the movement activities that could be measured from among the movement activities involved in the CATCH – (Early Childhood – It's Fun To Be Healthy), the activities found to be suitable for inclusion in the current study were translated from English to Turkish and thus the Training Program created from the CATCH Movement Activities was created (Annex 1).

In order for the translated activities to be implemented, a 9-week application schedule covering the months of February-March and April in the 2016-2017 school year was prepared. Interviews were made with independent kindergartens that could provide the physical environment suitable for the research and sufficient number of children for the experimental-control groups according to the prepared work schedule and the research permission was obtained from the Provincial Directorate of National Education. A meeting was held with the teachers of 4 and 5-year olds who were working in an independent kindergarten, which provided all the physical conditions and allowed the implementation of the Training Program created from the CATCH Movement Activities in their school for a term. The content of the movement program was explained and the teachers who allowed 1 class hour of practice, two days a week during the term were determined. The classes of the teachers who viewed the implementation of the program positively were determined as the experimental group and the other classes as the control group. In this context, pre-tests were administered to determine whether there was any difference between the levels of the experimental and control groups in the middle of February. The results of the pre-test revealed that the groups were equal. With the 4 and 5 age groups determined as the experimental group, the applications were started 2 days a week (Tuesday and Thursday) and 1 class hour a day in the afternoons according to the application schedule. The researcher allocated 1 class hour for both age groups each and worked with both groups independently. Two of the activities implemented within the context of the current study are given as examples in the annex section (Annex 2).

No intervention was made to the control groups while the movement activities were being implemented with the experimental groups. It was openly expressed to the control group teachers that a special study would be conducted with the experimental group and that they should not leave their own standard order, otherwise they might interrupt the research. After 9 weeks of application, the experimental and control groups were subjected to post-tests in which priority was given to the experimental group whose recall measurements would be made later.
No study was conducted with the experimental group during the 1-month period after the post-test measurements, and the recall measurements were administered to the experimental group in early June.

Data Analysis

In the analysis of the collected data, SPSS16 program package was used. In the analysis of the pre-test results of the experimental and control groups, independent samples t-test was used; in the analysis of the pre-test and post-test results of the control group, dependent samples t-test was used; in the analysis of the pre-test and post-test results of the experimental group, dependent samples t-test was used; in the analysis of the post-test and recall test results of the experimental group, dependent samples t-test was used and as the data did not show a normal distribution in the gender pre-test – post-test comparison, Mann

Whitney U test was used. While t-test conducts analyses on mean scores, Mann Whitney U test conducts analyses on the total scores.

Results

Before the implementation of the training program, 4 and 5-year old children in the control and experimental groups were subjected to a pre-test and the equivalence of the groups was examined with this measurement.

Table 2. Independent t-test Results Obtained from the Pre-test Scores Regarding the Movement Development of the 4-year Old Children in the Control and Experimental Groups

Variables	Group	n	X	SS	sd	t	p
Locomotor	Experimental	16	27.000	9.549	15	.390	.702
	Control	16	25.937	7.784			
Manipulative	Experimental	16	25.062	11.607	15	-1.165	.262
	Control	16	30.812	15.458			
Total score	Experimental	16	52.062	17.268	15	-.717	.484
	Control	16	56.750	19.871			

p<.05

In Table 1, the results of the comparison made between the pre-test scores of the 4-year old control group children and experimental group children having participated in the movement training program are shown. These results show that there is no significant difference between the control and experimental groups in terms of their locomotor skills scores, manipulative skills scores and total motor skills scores (p>.05).

Table 3. Independent t-test Results Obtained from the Pre-test Scores Regarding the Movement Development of the 5-year Old Children in the Control and Experimental Groups

Variables	Group	n	X	SS	sd	t	p
Locomotor	Experimental	16	38.062	11.156	15	-.782	.446
	Control	16	40.562	7.145			
Manipulative	Experimental	16	27.562	13.880	15	-1.846	.085
	Control	16	34.250	11.767			
Total score	Experimental	16	65.625	21.181	15	-1.734	.103
	Control	16	74.812	15.904			

p<.05

In Table 2, the results of the comparison made between the pre-test scores of the 5-year old control group children and experimental group children having participated in the movement training program are shown. These results show that there is no significant difference between the control and experimental groups in terms of their locomotor skills scores, manipulative skills scores and total motor skills scores (p>.05).

Table 4. Independent t-test Results Obtained from the Post-test Scores Regarding the Movement Development of the 4-year Old Children in the Control and Experimental Groups

Variables	Group	n	X	SS	sd	t	p
Running	Experimental	16	10.375	1.821	15	3.696	.002*
	Control	16	6.625	2.986			
Standing long jump	Experimental	16	7.500	2.683	15	4.284	.001*
	Control	16	3.937	1.569			
Sliding step	Experimental	16	10.062	2.322	15	2.611	.020*
	Control	16	7.562	2.421			
Gallop	Experimental	16	12.437	3.444	15	4.835	.000*

Jumping	Control	16	6.187	5.036	15	3.296	.005*
	Experimental	16	2.437	1.631			
Leaping	Control	16	1.375	1.746	15	2.692	.017*
	Experimental	16	6.562	2.965			
Locomotor	Control	16	3.562	2.707	15	5.369	.000*
	Experimental	16	49.375	10.556			
Throwing	Control	16	29.250	9.553			
	Experimental	16	9.437	3.501	15	3.054	.008*
Rolling	Control	16	5.312	4.541			
	Experimental	16	8.187	2.809	15	1.382	.187
Kicking	Control	16	6.562	3.244			
	Experimental	16	8.625	4.379	15	4.310	.001*
Catching	Control	16	3.687	2.914			
	Experimental	16	9.062	1.526	15	2.672	.017*
Hitting a stationary ball with a stick	Control	16	7.250	2.016			
	Experimental	16	7.062	3.473	15	1.091	.293
Bouncing a ball	Control	16	5.750	4.219			
	Experimental	16	5.312	2.845	15	1.647	.120
Manipulative	Control	16	3.312	4.629			
	Experimental	16	47.687	12.213	15	3.461	.003*
Total score	Control	16	31.875	17.480			
	Experimental	16	97.062	20.137	15	4.634	.000*
	Control	16	61.125	24.819			

p<.05

In Table 3, the results of the comparison made between the post-test scores of the 4-year old control group children and experimental group children having participated in the movement training program are shown. These results show that there is a significant difference in the locomotor sub-dimension total score, manipulative total score and motor skills total score in favour of the experimental group (p<.05).

When the scores of all the skills in the locomotor sub-dimensions were separately compared, a significant difference was found for all the skills in favour of the experimental group (p<.05). Although the scores obtained for the skills of "rolling", "hitting a stationary ball with a stick" and "bouncing a ball" in the manipulative sub-dimension by the experimental groups children are higher than those of the control group children, the difference between them is not statistically significant. In all the locomotor skills apart from these skills, a significant difference was found in favour of the experimental group children (p<.05).

Table 5. Independent t-test Results Obtained from the Post-test Scores Regarding the Movement Development of the 5-year Old Children in the Control and Experimental Groups

Variables	**Group**	**n**	**X**	**SS**	**sd**	**t**	**p**
Running	Experimental	16	11.750	.683	15	7.511	.000*
	Control	16	6.625	2.895			
Standing long jump	Experimental	16	8.437	2.096	15	4.090	.001*
	Control	16	5.125	2.526			
Sliding step	Experimental	16	12.437	1.750	15	4.461	.000*
	Control	16	9.312	1.887			
Gallop	Experimental	16	13.125	1.627	15	2.802	.013*
	Control	16	10.812	3.410			
Jumping	Experimental	16	4.062	1.289	15	3.746	.002*
	Control	16	1.750	2.175			
Leaping	Experimental	16	9.437	1.711	15	2.817	.013*
	Control	16	6.500	3.559			
Locomotor	Experimental	16	59.250	5.458	15	6.522	.000*
	Control	16	40.125	10.855			

Throwing	Experimental	16	11.437	4.210	15	2.394	.030*
	Control	16	6.875	5.725			
Rolling	Experimental	16	9.437	2.707	15	1.161	.264
	Control	16	8.375	2.848			
Kicking	Experimental	16	13.062	2.174	15	8.114	.000*
	Control	16	5.375	3.556			
Catching	Experimental	16	9.437	.813	15	1.126	.278
	Control	16	8.875	1.746			
Hitting a stationary ball with a stick	Experimental	16	9.750	3.660	15	4.614	.000*
	Control	16	4.687	3.177			
Bouncing a ball	Experimental	16	7.250	2.886	15	2.682	.017*
	Control	16	4.375	3.612			
Manipulative	Experimental	16	60.375	9.864	15	5.461	.000*
	Control	16	38.562	13.048			
Total score	Experimental	16	119.625	13.970	15	6.606	.000*
	Control	16	78.687	20.178			

p<.05

In Table 4, the results of the comparison made between the post-test scores of the 5-year old control group children and experimental group children having participated in the movement training program are shown. These results show that there is a significant difference in the locomotor sub-dimension total score, manipulative total score and motor skills total score in favour of the experimental group (p<.05).

Although the scores taken for the skills of "rolling" and "catching" in the manipulative sub-dimension by the experimental group children are higher than those of the control group children, the difference between them is not statistically significant. In all the manipulative skills apart from these skills and in all the skills in the locomotor sub-dimension, a significant difference was found in favour of the experimental group children p<.05.

Table 6. Results of the Dependent Samples t-test Conducted on the Pre-test and Post-test Scores of the 4-year Old Children in the Experimental Group

Variables	**Group**	**n**	**X**	**SS**	**sd**	**t**	**p**
Running	Pre-test	16	5.250	1.770	15	-9.944	.000*
	Post-test	16	10.375	1.821			
Standing long jump	Pre-test	16	3.562	1.093	15	-11.352	.000*
	Post-test	16	10.375	1.821			
Sliding step	Pre-test	16	5.125	3.575	15	-5.783	.000*
	Post-test	16	10.062	2.322			
Gallop	Pre-test	16	8.437	2.851	15	-4.781	.000*
	Post-test	16	12.437	3.444			
Jumping	Pre-test	16	.750	1.238	15	-4.521	.000*
	Post-test	16	2.437	1.631			
Leaping	Pre-test	16	3.875	3.117	15	-3.810	.002*
	Post-test	16	6.562	2.965			
Locomotor	Pre-test	16	27.000	9.549	15	-11.687	.000*
	Post-test	16	49.375	10.556			
Throwing	Pre-test	16	5.125	4.617	15	-4.987	.000*
	Post-test	16	9.437	3.501			
Rolling	Pre-test	16	4.562	3.482	15	-3.954	.001*
	Post-test	16	8.187	2.809			
Kicking	Pre-test	16	4.312	3.260	15	-4.616	.000*
	Post-test	16	8.625	4.379			
Catching	Pre-test	16	6.750	2.175	15	-3.522	.003*
	Post-test	16	9.062	1.526			
Hitting a stationary ball with	Pre-test	16	3.437	3.539	15	-2.977	.009*

a stick	Post-test	16	7.062	3.473			
Bouncing a ball	Pre-test	16	.875	1.258	15	-5.940	.000*
	Post-test	16	5.312	2.845			
Manipulative	Pre-test	16	25.062	11.607	15	-10.706	.000*
	Post-test	16	47.687	12.213			
Total score	Pre-test	16	52.062	17.268	15	-14.183	.000*
	Post-test	16	97.062	20.137			

p<.05

In Table 5, the results of the comparison made between the pre-test and post-test scores of the 4-year old children in the experimental group are shown. These results show that there is a statistically significant difference in the motor skills total score, the locomotor sub-dimension total score and the manipulative sub-dimension total score in favour of the post-test (p<.05). When the scores taken for all the skills in the locomotor and manipulative sub-dimensions were compared separately, a significant difference was found for all the skills in favour the post-test (p<.05).

Table 7. Results of the Dependent Samples t-test Conducted on the Pre-test and Post-test Scores of the 5-year Old Children in the Experimental Group

Variables	**Group**	**n**	**X**	**SS**	**sd**	**t**	**p**
Running	Pre-test	16	7.250	2.909	15	-6.708	.000*
	Post-test	16	11.750	.683			
Standing long jump	Pre-test	16	6.000	3.098	15	-3.538	.003*
	Post-test	16	8.437	2.096			
Sliding step	Pre-test	16	8.687	4.238	15	-3.491	.003*
	Post-test	16	12.437	1.750			
Gallop	Pre-test	16	10.375	3.862	15	-3.358	.004*
	Post-test	16	13.125	1.627			
Jumping	Pre-test	16	1.750	2.294	15	-4.125	.001*
	Post-test	16	4.062	1.289			
Leaping	Pre-test	16	4.000	3.577	15	-5.350	.000*
	Post-test	16	9.437	1.711			
Locomotor	Pre-test	16	38.062	11.156	15	-9.060	.000*
	Post-test	16	59.250	5.458			
Throwing	Pre-test	16	5.000	5.006	15	-4.382	.001*
	Post-test	16	11.437	4.210			
Rolling	Pre-test	16	5.500	4.163	15	-4.965	.000*
	Post-test	16	9.437	2.707			
Kicking	Pre-test	16	3.437	2.707	15	-12.351	.000*
	Post-test	16	13.062	2.174			
Catching	Pre-test	16	7.562	1.824	15	-3.890	.001*
	Post-test	16	9.437	.813			
Hitting a stationary ball with a stick	Pre-test	16	4.937	4.373	15	-5.745	.000*
	Post-test	16	9.750	3.660			
Bouncing a ball	Pre-test	16	1.125	3.095	15	-7.283	.000*
	Post-test	16	7.250	2.886			
Manipulative	Pre-test	16	27.562	13.880	15	-12.803	.000*
	Post-test	16	60.375	9.864			
Total score	Pre-test	16	65.625	21.181	15	-15.274	.000*
	Post-test	16	119.625	13.970			

p<.05

In Table 6, the results of the comparison made between the pre-test and post-test scores of the 5-year old children in the experimental group are shown. These results show that there is a statistically significant difference in the motor skills total score, the locomotor sub-dimension total score and the manipulative sub-dimension total score in favour of the post-test (p<.05).

When the scores taken for all the skills in the locomotor and manipulative sub-dimensions were compared separately, a significant difference was found for all the skills in favour the post-test ($p<.05$).

Discussion and Conclusions

The aim of the comparison of the results of the pre-tests administered to both the experimental and control groups was to determine the equivalence of the experimental and control groups. In other words, it should be determined that groups are not more advantageous over or superior to each other in terms of the skills to be measured because Karasar (2015, p.97) stated that the fact that the pre-test scores of the experimental and control groups differ significantly will make the interpretations of the comparisons difficult and will mean that the groups are not equal. As a result of the pre-test analyses conducted in the current study, it was found that there is no significant difference between the locomotor skills sub-dimension total score, manipulative skills sub-dimension total score and motor skills total score of the 4 and 5-year experimental group children and 4 and 5-year old control group children; that is, the control and experimental groups were found to be equal.

Post-test results obtained for both the 4-year old children and 5-year old children were found to be significantly different in favour the experimental group, indicating that the implemented movement program developed the skills of the children in the experimental group. The reason for this development can be explained by the fact that children had the chance to try and repeat certain skills with the implemented movement program. As Çağlak-Sarı (2011) and Goodway, Robinson and Crowe (2010) stated, children need to be supported with appropriate movement programs in the maturation stage of the fundamental movements phase. In support of this view, Müniroğlu (1995) stated that children's motor development levels are affected by the environmental conditions they are in. In addition to all this information, Castelli (2019) emphasizes that physical activity programs offer opportunities for children to develop fundamental motor skills. Because reaching the optimal development level of motor skills can only be achieved through practice and reinforcement (Logan, Robinson, Wilson & Lucas, 2012).

There are many national and international studies in the literature that demonstrate that when a movement program has been implemented, it gives positive results. Venetsanou and Kambas (2009) listed environmental factors affecting children's motor development in order of importance as follows: family, educational institutions and movement programs. The concept of family, which has an effect on the motor development of children, should be considered not only as individual family members, but also as the home environment where individuals live together. In a study, it was emphasized that the effect of home environment on children's motor development decreased. It has been stated that the effect of the developing technology on the decrease of the effect of the home environment on motor development, the inactivity of the children, the decrease in the options for physical activity at home and the decrease in time (Hu, Wu & Kong, 2021). Unlike home environments, which cannot provide children with sufficient variety or space for physical activity, this deficiency is expected to be eliminated in school environments. Because there is a wider physical activity environment in the school environment and there are professionals (teachers) who will prepare suitable activities for the motor development of children and the development of fundamental movement skills. When we look at the studies comparing the motor development of children with and without pre-school education, it is seen that there are studies indicating that the motor skills and basic movement skills of the children who are educated in pre-school

education institutions are in better condition (Valadi, 2021). Transferring the technical knowledge acquired in terms of appropriate environment and motor development to children in an accurate and appropriate manner ensures that children have more physical activity opportunities. As research results support, more physical activity leads to further development of motor competence (Barnett, et al. 2016; Niemistö, Finni, Haapala, Cantell, Korhonen, Saakslahti, 2019; Mota, Clark, Bezerra, Lemos, Reuter, Mota, Duncan, & Martins 2020). According to Venetsanou and Kambas (2009) implementing a movement program for children in educational institutions is necessary and important. Robinson, Wfebster, Logan, Lucas, and Barber (2012) demonstrated the effectiveness of the movement programs prepared by field specialist teachers on children's motor skills. In this regard, it is possible to say that teachers who are experts in the field and know the development of the child well can prepare appropriate programs for children and support the development of the child positively through regular practices. Bozdemir (1995) determined that the motor development of children was positively affected as a result of the movement education program he applied to children who were educated in different institutions. Kobal (2000) found that the gross motor skills of babies who received movement training were more advanced than those who did not receive training. Dursun (2004), on the other hand, in his study examining the effect of the movement training program including fundamental motor skills on the motor development of 6-year old children, determined that there was a significant difference in the motor development of the group in which the movement program was implemented. Şen (2004), in her study examining the effects of physical education practices on the motor development of children attending kindergarten, determined that the motor development of children in the group in which the physical education program was implemented was more advanced than the group in which this program was not implemented. In Wang's (2004) study, which examined the effect of the movement program applied to children aged 3-5 on their motor development, the gross motor skill scores of the children in the experimental and control groups differed significantly in favour of the experimental group. Similarly, Kırıcı (2008) and Gül (2012) determined that there was a significant difference in the motor development of the children in the experimental group as a result of the movement training they applied to children attending preschool education institutions.

It is seen that the 5-year old children got higher scores than the 4-year old children in all measurements, including the sub-dimensions of the measurement tool and the total score. This shows that 5-year old children are developmentally ahead of 4-year old children, which is an expected result because of the nature of development. Çelebi (1979) determined that the motor skills of older children are at a more advanced level. Similarly, Gülaç (2014), examining the motor development of children aged 3-5, found that the higher the age of the children is, the more advanced their motor development is. However, it is also stated that this natural difference, which is expected developmentally, can be reduced to a lesser extent thanks to the special movement programs to be applied and it can reduce the relative age effect on motor competence (Mecias-Calvo, Arufe-Giraldez, Cons-Ferreiro & Navarro-Paton, 2021).

It is seen that both 4 and 5-year old children got the lowest scores in all the measurements for the jumping and leaping skills under the subtitle of locomotor. This situation suggests that children generally do not have a lot of chances to experience these movements, that their muscles cannot be strengthened enough and that they have difficulty in doing the movements because they are not adequately exposed to these experiences, which is thought to be the reason for low scores taken from the measurements. Haktanır (2010) stated that there are three areas of change deeply affecting children and second of these three areas is the decrease

in the interaction of children with the street because of the loss of spaces where children can play freely. Hinkley, Crawford, Salmon, Okely, and Hesketh (2008) highlighted the importance of the environment for children to experience movements, and in their study, they stated that children who spend time outdoors are much more active than those who spend time indoors. Timurkaan (2003) compared the motor skills of children in residential areas with different physical characteristics and concluded that the motor skills of children living in rural areas are better. Fjortoft (2004) determined that the motor development of children who play in nature in natural play environments is significantly different from those of children playing in the playgrounds in institutions.

It was observed that both the 4-year old children and 5-year old children got lower scores from the skills of hitting a stationary ball with a stick and bouncing the ball, which are included in the manipulative sub-dimension. This indicates cultural differences particularly in relation to the skill of hitting a stationary ball with a stick. All the children involved in the study stated that they experienced the skill of hitting a stationary ball with a stick for the first time during the measurements. There were children who said that it was the "baseball" game when they saw the stick and ball. This indicates that since baseball is a popular sport in the United States, it enters the lives of children earlier while it is not very popular in Turkey, so children living in Turkey do not have much experience about this sport. Galberto dos Santos, Pacheco, Basso and Tani (2016), in their study comparing the fundamental motor skills of children from three different countries, determined that the skill of hitting a stationary ball with a stick was more advanced in children living in the United States than in children living in Portugal and China. This shows the effect of culture on this fundamental motor skill. Although a traditional street game tip-cat involves a more complex dimension of hitting a stationary object with a stick, it can be thought as a good way of developing this skill in our country; however, the decreasing number of children playing in the street and the decreasing popularity of street games make the acquisition of this skill by children more difficult unless they are provided with opportunities to engage in such games. The ball bouncing skill is a more difficult one as it requires both hand-eye coordination and keeping a moving object under control. Kayapınar (2002) examined the effect of movement training on hand-eye coordination in children aged 6-7 and determined that the children in the group receiving movement training had better hand-eye coordination and committed fewer mistakes than the other group. It is thought that the children's not being able to play with the ball at home and in the classroom, lack of activities involving using the ball in schools, or lack of opportunities to play with the ball directly in the playgrounds may be obstacles to the development of this skill. Sarı (2001) compared the motor development of children with and without pre-school education and found that there was no significant difference in their motor development. Özmen (2004), on the other hand, in his study examining the practices of movement education in preschool period, determined that the tools and equipment in the institutions were not at a sufficient level, and half of the teachers participating in the study spent less than 5 hours a week. Kerkez (2006) applied a motor development program to two groups of children; one group of children were under institutional care while the other group of children were living with their families and both of the groups were receiving pre-school education. Although the motor development scores of the children under institutional care were found to be lower than the scores of the children living with their families, the movement program applied showed a positive effect in both groups. Özdenk (2007), Akınbay (2014), and Akın (2015), on the other hand, in their study examining the effect of play on motor development, determined that the motor development of children who play regularly is more advanced. Giagazoglou, Karagianni, Sidiropoulou and Salonikidis (2008) examined the effects of types of educational institutions (private and public), educational environments and the

opportunities they offer to children on the gross motor development of the children. As a result of the analyses, it was determined that the school type has an effect on children's gross motor skills. They stated that the motor development of children in schools with large open spaces, allowing children to move freely and providing access to appropriate materials is more advanced than the motor development of children in schools that offer children limited and closed spaces. Reunamo, Hakala, Saros, Lehto, Kyhala, and Valtonen (2014), in their research investigating the effect of the educational environment on physical activity in day care homes and pre-school education institutions, determined that the most physically active time of children was the time they played free in the school and found that the rate of being physically active while playing games inside the school lagged behind the rate of being physically active when they were engaged in free play in the open air.

As a result of the current study conducted to investigate the effect of the CATCH Movement Program on children's locomotor and manipulative skills,

- It was determined that the CATCH Movement Program was effective on the development of the motor skills of the 4 and 5-year old children.
- It was found that the movement program applied to children developed all the locomotor (running, standing long jump, sliding step, gallop, jumping and leaping) and all the manipulative skills (throwing, catching, kicking, rolling, hitting a stationary ball with a stick and bouncing ball) of the 4 and 5-year old children.
- It was found that motor skills, which are the combination of locomotor skills and manipulative skills, of both the 4 and 5-year old children also developed.
- It is seen that even if children attend educational institutions, if they are not provided with suitable spaces for movement and appropriate tools and equipment and if they are not supported with movement programs, no difference occurs in their movement development.

Suggestions

Suggestions for Educators are below:

- Since the activities in the Training Program created from the CATCH Program Movement Activities were prepared by taking the developmental features into consideration, it coincides with the objectives set in the Ministry of National Education Preschool Education Program. In order for educators to better support motor development, they should actively use the Preschool Education Program and be informed about motor development, motor development measurement tools and the use of these tools. In this regard, training programs can be organized for educators.

Suggestions for Researchers are as follows:

- The effectiveness of the Training Program created from the CATCH Program Movement Activities was determined by working with 4 and 5-year old children. By working with children from different age groups, the effect of program in different age groups can be determined.
- In the current study, the Training Program created from the CATCH Program Movement Activities was implemented for 9 weeks. This study period can be spread over a year with regular repetitions and the effects of longer-term movement training can be examined.

- In the current study, all the measurements and activities were conducted on children with normal development. The CATCH Program movement activities have an activity pool prepared to be applied to children with different disability groups with adaptations, and these activities can be applied to different disability groups or children with developmental disabilities and their effectiveness can be examined.
- The parts of the CATCH Program movement activities that are not included in the current study can be translated and the effectiveness of these activities can be examined.
- The relationship between the CATCH Program movement activities and other areas of development can be examined.
- Using other movement activities in the CATCH Program, different movement programs can be designed, applied to pre-school children, and their state of supporting their development can be examined.

Suggestions made for Program Development are:

- The current study focused on only the movement activities of the CATCH Program. The suitability of the CATCH Program as a whole, which aims to increase the activity of children and give them healthy eating habits to support the healthy development of children, can be examined and used if found appropriate.
- Existing movement programs can be used and expanded, or new movement programs can be developed to support the motor development of children.

Note

This research was produced from the the first author's doctoral thesis titled " CHAMPS Motor Beceriler Protokolü'nün (CMBP) Türkçeye Uyarlanması ve CATCH Programı Hareket Etkinliklerinin Çocukların Lokomotor ve Nesne Kontrolü Becerileri Üzerindeki Etkisinin İncelenmesi".

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Annex 1. Schedule of CATCH Movement Training Program

		DATE	***DAY***	***NAME of ACTIVITY***	***SKILL TYPE***
FEBRUARY	***1.***	14.02.2017	Tuesday	FIRST MEETING	-
	2.	16.02.2017	Thursday	PRE-TEST	-
	3.	21.02.2017	Tuesday	Walk & march; Foam noodle train	Locomotor skills – Walking
	4.	23.02.2017	Thursday	Gallop & slide; Ride the pony	Locomotor skills – Galloping, Sliding
	5.	28.02.2017	Tuesday	Jump & hop; Hop; Skip	Locomotor skills – Jumping and hopping
MARCH	***6.***	02.03.2017	Thursday	Rainbow fish game	Locomotor skills – all skills
	7.	07.03.2017	Tuesday	GENERAL REPETITION	Locomotor skills – all skills
	8.	09.03.2017	Thursday	Roll it; Balloon Challenge	Manipulative skills – rolling, catching, striking
	9.	14.03.2017	Tuesday	Catch it; Beach ball volleyball	Manipulative skills – Catching, tossing, bouncing
	10.	16.03.2017	Thursday	Beach ball challenge	Manipulative skills – Throwing, catching, bouncing
	11.	21.03.2017	Tuesday	Throw it	Manipulative skills – Throwing
	12.	23.03.2017	Thursday	Massy backyard; Beanbag toss	Manipulative skills – Throwing, catching, rolling
	13.	28.03.2017	Tuesday	Jumping frogs on lily pads; Beanbag crazy	Locomotor & manipulative skills – walking, jumping, throwing, catching
	14.	30.03.2017	Thursday	Beach ball partner challenges	Manipulative skills – rolling, throwing, catching
APRIL	***15.***	04.04.2017	Tuesday	Hug the bug	Manipulative skills – bouncing
	16.	06.04.2017	Thursday	Throw then go; Beanbag crazy	Locomotor & manipulative skills – walking in different forms, throwing
	17.	11.04.2017	Tuesday	Jumping frogs on lily pads; Frogs and sinking lily pads	Locomotor & manipulative skills – walking, jumping, throwing, catching
	18.	13.04.2017	Thursday	GENERAL REPETITION	Locomotor & manipulative skills – all skills
	19.	18.04.2017	Tuesday	Kick it; Ball handling skills	Locomotor & manipulative skills – walking, running, , kicking
	20.	20.04.2017	Thursday	Under control; Score	Locomotor & manipulative skills – walking, running, , kicking
	21.	25.04.2017	Tuesday	GENERAL REPETITION	Locomotor & manipulative skills – all skills
	22.	27.04.2017	Thursday	POST-TEST	-
MAY	***23.***	01.05.2017 31.05.2017	-	Free weeks before permanence test	-
JUNE	***24.***	01.06.2017	-	PARMANENCE TEST	-

Annex 2.

Name of Activity: Roll It
Equipment: 1 playground ball per pair of children and one poly spot per child
Skill Themes: Rolling and catching; eye-hand coordination

Organization:

1- Children work in pairs.
2- Arrange the poly spots in two lines, approximately two feet apart. Make sure there is plenty of space on each side of spots for movement.
3- Partners sit on their own poly spot with legs straddled facing their partner.

Description:

1- This simple activity allows children to become comfortable manipulating a ball.
2- The object it to roll the ball so his partner can catch it.
3- The child who catches or captures the ball will then stand up, walk, or run around his partner (holding the ball), and return to his spot to roll it back.
4- Remind children to roll the ball. Throwing and bouncing are not okay.

Teaching Suggestions:

1- Demonstrate the activity with two children before the whole class participates.
2- Allow them to move farther away from each other as they improve.
3- Remind children that they will have greater aim if they roll the balls gently.

Adapted Ideas:

1- Children who use mobility devices may be transferred to seated position on the floor if appropriate. Children who cannot sit on the floor may roll a ball across a table to a partner while seated in a chair or wheelchair if appropriate.
2- Children who use wheelchairs and have limited upper body movement may be allowed to roll a ball on their lap trays. Ball sizes and weights may be changed when appropriate. An adult should provide close supervision and assistance.
3- Children with visual impairments may participate with a sighted guide. Beeper devices may be used as auditory cues for which direction the roll the ball.
4- Children with auditory impairments will require modeling for success. Sign language and/or pictures may be used clearer communication.