

## Effects of a Structured Physical Activity Program on Fundamental Motor Skill Development of Disadvantaged Institutionalized Children

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**Abstract:** The aim of this project is to develop an intervention program of structured physical activity to support fundamental motor development in disadvantaged institutionalized children. A pretest-posttest quasi-experimental design was used due to the lack of random assignment of participants. All 32 children in the Sanliurfa orphanage aged 9-11 years were assessed for their motor features using 20 meter running, standing long jump, sit and reach and hand grasping tests. A structured physical activity program was then built into the routine of the orphanage for six months. A repeat developmental assessment was performed at the end of six months to assess the impact. Out of the original cohort of 32, 28 children were available for post intervention assessment. The remaining was adopted before their assessment. Their mean 20 meter running decreased from 4.28” to 3.90”, sit and reach rose from 17.98 to 21.03 cm, standing long jump rose from 138.71 to 161.03 cm and hand grasping rose from 26.42 to 34.07 (right hand). There was also an overall change in the motions of the children. They became more active and more skilled.

**Key words:** Orphanage • Motor skill • Physical activity • Child health

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### INTRODUCTION

Orphanages remain the most common form of care for orphaned and abandoned children in many parts of the world [1]. An orphanage provides shelter and care for children who have lost their parents or are abused, abandoned and neglected. According to the figures for 2009, 35,756 persons were served by the Social Services and Child Protection Agency (SSCPA) of Turkey and 14,969 of them were children. These children are provided with care, food and shelter by experts, but the opportunities they have for communication with adults and other children are limited, as well as the opportunity to learn by exploration and by play. In previous studies, children who have lived in institutional environments have been found to have developmental delays in growth, language, intellect, motor skills and behavioral development, as well as increased risk of infectious disease [2-9]. Children with motor difficulties are not as successful in physical activities as their peers and this negatively affects their social participation. Children with motor difficulties also have low physical fitness levels, which reduces their motivation to participate in physical

activities. This is often referred to as the “Sports Proficiency Barrier” [10; 11].

Studies on the subject focus on developing programs aimed at improving the physical fitness levels of healthy children of various ages with low physical fitness levels, or children who, for various reasons, have motor coordination difficulties [12-16]. A special emphasis is placed on movement and play programs aimed at helping children who have developmental delays in basic motor skills in early childhood so that they can acquire mature skills [17; 18]. This is because acquiring mature patterns of fundamental movement skills during early childhood is necessary for successful participation in games and sports [17; 19]. Learning to move, through motor skill acquisition and physical fitness enhancement and learning through movement, by developing social skills and cognitive concepts are essential goals of a developmentally appropriate physical education program [20]. Studies have shown that structured play and physical activity can significantly improve the motor skills ability of children [21-26]. It also provides children with physical, social and emotional benefits that may encourage a more active and healthy lifestyle in the

present [27] and in the future [28-34]. However, there are very few studies on play and physical activity to support motor development in disadvantaged institutionalized children [35]. Taneja *et al.* (2002) applied a play program to institutionalized children six months to 2.5 years of age. Therefore, the aim of this study is to analyze the impact of a structured physical activity program on the fundamental motor skills of children in an orphanage.

## MATERIALS AND METHODS

**Preparation:** Because the SSCPA facility in Sanliurfa did not have a gym to conduct the study, a multi-purpose 50-people room at the basement of the facility was re-designed and turned into a gym. The environment was designed to make it attractive to the children and to make it a place where they can have fun and achieve success. Prior to the program, new track suits, sneakers, bathrobes and pedometers were distributed to motivate the children and various colorful sports equipment was used during the program to keep their motivation high.

**Participants:** Initially, all 32 children (14 girls and 18 boys) who were 9 to 11 years of age and who stayed at the SSCPA Sanliurfa Orphanage participated in the study. The study was completed with 28 of the initial participants (13 girls and 15 boys) because some of the children were adopted during the course of the study. Participants did not have any physical and/or mental disabilities, had been institutionalized for at least two years and previously did not participate in any regular physical/sports activity. Permission and approval of the Governorship of Sanliurfa was acquired prior to the study.

**Measures:** Weight and height measurements were made as part of the study, as well as 20 meter running, standing long jump, sit and reach and right hand and left hand grasping tests.

**Height:** Height measurements were made using a Soehnle ultrasonic height meter with a measurement precision of 0.01 cm, with the subjects standing barefoot.

**Weight:** Weight measurements were made using a Tartil digital scale with a measurement precision of 0.01 kg, with the subjects wearing shorts and t-shirts.

**Run:** Players were asked to complete a 10 minute specific warm-up including several accelerations to decide which foot to set on the starting line for the sprint start.

Running times were measured on a 20-meter long flat and linear racecourse using an electronic chronometer (SE-TS 100 Telemetrik Kronometre). Subjects were asked to run as fast as they could, starting from a line 50 cm behind the starting line of the 20 m racecourse. The running time was recorded in seconds when the subject reached the electronic door at the finish line and stopped the chronometer.

**Standing Long Jump:** Participants were asked to stand on a line and jump forwards using both feet. During the jump, subjects were allowed to kneel and swing arms. After the jump, the jumping length from the line to the heel closest to the line was measured in centimeters.

**Sit and Reach:** The sit-and-reach test is an indirect measure of hamstring flexibility. Participants were asked to wear tight shorts and were tested barefoot. The subjects sat with their heels firmly against the testing box (Lafayette Flexibility tester). Subjects kept their knees extended and placed their right hand over the left, with the long fingers even and reached forward as far as they could by sliding their hands along the measuring board. A tape measure on top of the measuring board indicated how far beyond the toes each individual reached. The distance from the toes (zero point) was measured in centimeters; positive values were awarded if subjects could reach beyond their toes and negative values were awarded if subjects could not reach beyond their toes. The score was the greatest distance contacted by the fingertips and was registered with an accuracy of up to 0.5 cm. Two trials were performed with 10 min separating measurements. The average of the two trials was used for data analysis. Environmental influences were standardized by measuring each subject at the same time of the day and in the same temperature conditions (25 °C). Also, no warm-up or stretching exercises were performed by the subjects prior to measurements [38].

**Hand Grasp:** Participants were asked to grasp the grip section of a J Teck Griptrack brand digital hand dynamometer sitting upright on a chair, with their feet on the ground and their measurement arm bent 90 degrees at the elbow and keep this position until the test was over. Participants were not allowed to see the display panel. Between two trials, participants were allowed to rest for 30 seconds [39].

**Procedure:** Tests (pretest-posttest) were made for all participants in line with the test protocol. All tests were made in the SSCPA Sanliurfa Orphanage gym in a quiet

Table 1: Structured physical activity program

Months	
2-3	4
<p>Aims</p> <ul style="list-style-type: none"> <li>•1 To perform basic motor skills and movement patterns, with or without equipment, in a range of environments.</li> <li>•2 regularly engage in periods of moderate to vigorous physical activity, using simple vocabulary to describe movement, physical responses of the body to activity and feelings about participation in physical activity</li> <li>•3 regularly engage in bouts of moderate to vigorous physical activity</li> <li>•4 describe the link between physical activity and health</li> <li>•5 identify and describe the components of health related fitness</li> <li>•6 start sharing equipment and space safely</li> </ul>	<ul style="list-style-type: none"> <li>•1 Demonstrate basic motor skills and some more complex skills</li> <li>•2 combine motor skills and movement patterns during individual and group activities</li> <li>•3 demonstrate control when participating in locomotor activities requiring change of speed, direction and level</li> <li>•4 create and perform rhythmic movement sequences in response to stimuli</li> </ul>
	<ul style="list-style-type: none"> <li>•5 Perform a broad range of complex motor skills</li> <li>•6 demonstrate a wide variety of motor skills and apply them to basic sports specific situations</li> <li>•7 create and perform coordinated movement sequences that contain a variety of motor skills and movement patterns</li> </ul>
	<ul style="list-style-type: none"> <li>•8 Perform confidently and efficiently in a range of movement environments (indoor, outdoor)</li> <li>•9 refine basic and complex motor skills</li> <li>•10 evaluate the performance of a partner and provide constructive criticism</li> <li>•11 Give feedback based on performance criteria to assist skill development</li> <li>•12 apply skills in increasingly complex games and activities</li> <li>•13 start working independently to improve performance</li> </ul>
<p>Movement Moderate: Balancing-Bending-Turning-Walking-Sliding-Galloping-Hopping-Jumping-Leaping-Skipping--Climbing-Kicking-Throwing-Catching- and Physical Activity Dancing</p> <p>Vigorous: Running-Rope jumping-Weight Lifting-Soccer-Volleyball-Basketball-Competition</p>	

environment and the participants were brought to the gym one at a time. All the participants received standard verbal instructions.

**Structured Physical Activity Program (SPAP):**

Following the initial measurements, children were divided into two age groups (Group 1: 15 children aged 108 to 114 months; Group 2: 17 children aged 115 to 132 months) and started the SPAP. The program aimed to increase the children’s enjoyment of physical activity, to improve fundamental motor skill quality and to potentially increase participation in physical activity. The program themes and content varied weekly but lesson formats remained constant. Regardless of theme, the emphasis was always on fun, giving it your best shot, individual development and acceptance of others. A total of 72 SPAP sessions were held over a 24-week period, 3 sessions a week. Sessions lasted 30 minutes in the first 2 months, 45 minutes in the 3<sup>rd</sup> month, 60 minutes in the 4<sup>th</sup> month, 75 minutes in the 5<sup>th</sup> month and 90 minutes in the 6<sup>th</sup> month. Two thirds of each session was reserved for moderate

physical activity and one third for intensive physical activity (36; 37). Moderate physical activities consisted of basic locomotor skills (walking, jumping, hopping, sliding, crawling, climbing), balance skills (axial movements, turns, rolls), manipulative skills (object control, throwing, catching, striking, hitting), rhythm activities and skills in games and sports involving these activities. Intensive physical activities, on the other hand, consisted of running, weight lifting, rope jumping and sports matches and competitions.

SPAP was applied by 2 physical education teachers in the SSCPA gym designed during the preparation phase and in outdoor sports fields.

**Data Analysis:** All statistical analyses were carried out using SPSS 16.0 for Windows. The significance level was set at 5%. Pre-and post-test means and standard deviations (S.D.) for the groups were calculated. A t-test for dependent samples was used to examine differences between pre-and post-test scores for the group.

Table 2: Means and standard deviations of measures

Variables	$\bar{x}$	Ss	Sd	t	P
20 m Running 1-20 m Running 2	.38214	.23920	27	8.454	.000
SLJ 1-SLJ 2	-22.3142	12.5212	27	-9.430	.000
Sit and reach 1-Sit and reach 2	-3.04643	1.52716	.28	-10.556	.000
Right hand 1-Right hand 2	-7.64286	4.56406	27	-8.861	.000
Left hand 1-Left hand 2	-8.78571	5.34968	27	-8.690	.000

## RESULTS AND DISCUSSION

The mean age of the participants was ( $\bar{x}=10.14\pm 1$ ). Because the study aimed to examine the effects of SPAP on locomotor and manipulative skills, differences in height ( $\bar{x}=129.82\pm 10.2$ ) and weight ( $\bar{x}=28.11\pm 5.53$ ), which vary by age, were not taken into consideration.

Table 2 reports the results of the dependent samples t-test conducted to see if there are differences in the measurements for running, standing long jump, sit and reach and hand grasp tests.

Results of the dependent samples t-test show that the differences between pretest and posttest measurements for 20 m running ( $t=8.454$ ,  $p<.01$ ), standing long jump ( $t=-9.430$ ,  $p<.01$ ) and sit and reach ( $t=-10.556$ ,  $p<.01$ ) tests were statistically significant. Results of the dependent samples t-test show that differences between the two measurements are also significant for right hand grasp ( $t=-8.861$ ,  $p<.01$ ) and left hand grasp ( $t=-8.690$ ,  $p<.01$ ).

It was found in the present study that the SPAP had a statistically significant and positive effect on the 20 m running skills of the disadvantaged children institutionalized by the SSCPA. Diallo *et al.* (2001) report significant differences in the 20 m running skills of soccer players aged 12-13 after a 10-week period of plyometric exercise [40]. Findings of the present study show that the difference between the two measurements concerning the sit and reach test is significant. These findings are parallel to those of other studies which have found that physical activity and play programs have a positive impact on the motor development of children in comparable age groups [41]. The structured physical activity program had a clearly positive impact on the motor skills of disadvantaged children institutionalized by the SSCPA.

## CONCLUSIONS

It was found that the structured physical activity program had positive effects on the fundamental motor skills of children in the 9-11 age group institutionalized by the SSCPA in Sanliurfa. These findings indicate that the responsibility of the orphanages does not end with

providing food, shelter and protection, but extends to offering them the opportunity to engage in regular physical activity by creating environments that are supportive of the motor development of the children and that motivate them for physical activity. In the preparation of physical activity programs, the different social, mental and emotional characteristics of institutionalized children need to be taken into consideration as well. Teachers and caregivers at these institutions also need to receive physical education training.

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