Middle-East Journal of Scientific Research 16 (6): 769-774, 2013
ISSN 1990-9233

DOI: 10.5829/idosi.mejsr.2013.16.06.75159

The Efficacy of Motor Skill Interventions among Turkish Preschoolers: A Review of the Turkish Literature and Recommendations

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Abstract: This paper reviewed scientific data regarding the efficacy of motor skill interventions on the development of fundamental motor skills (FMS) in typically developing preschoolers (ages 4 - 6) in Turkey. A systematic search was conducted for Turkish printed theses and research articles published between January 1980 and September 2012. A total of 11 studies met the inclusion criteria for this literature review. The studies selected had a combined sample size of 1,111 preschool children and the sample sizes ranged from 52 to 240 (average sample size 58.8) per study. Our findings indicated that motor skill interventions are effective at improving FMS in children. This review also highlights the limited number of existing interventions to improve motor development among young children in Turkey. It is important to continue determining the most effective characteristics of motor skill interventions (i.e. minutes of instruction time, instructional approaches, providers) to shape policy and curriculum recommendations for structured movement programs in early childhood settings.

Key words: Motor skill · Intervention · Preschoolers

INTRODUCTION

One component of physical development is learning fundamental movement skills (FMS). FMS are typically classified as object control and locomotor skills [1]. Locomotor skills include different movements to transport the body from one location to another, such as running, jumping, hopping, leaping, galloping and sliding. Object control skills include transporting, intercepting or projecting objects by actions such as throwing, catching, dribbling, kicking, underhand rolling and striking. Both locomotor and object control skills are basic skills of the physical domain. These skills must be mastered before learning more complex and specialized sports skills, which involve combinations of FMS in games, sports and dance activities [1- 5]. FMS enable children to apply basic motor skills to participate in sports and games that require more advanced movements [6]. For example, to participate in a game of basketball, individuals need basic competence in running, catching and throwing. Evidence supports the association between FMS competence and physical activity [2, 7-10]. However, FMS competence does not develop naturally. Rather, FMS need to be taught, practiced and reinforced through developmentally appropriate movement programs [3]. Preschool is the ideal time to work on FMS.

Currently, there are 6,198,957 children in the 0 - 4 age group in Turkey (3,016,307 girls and 3,182,650 boys) and preschool education for children ages 3 - 5 is optional [11, 12]. According to the Ministry of National Education [11], there are 27,197 preschool institutions in Turkey and the number of children enrolled in preschool education is 1,077,933 (515,754 girls and 562,179 boys). Similar to the global obesity epidemic, obesity also poses a health risk to Turkish children. According to several studies conducted in Turkey, the prevalence of obesity in children varies between 1.9 and 30.7% [13-15]. While the number of obese children is increasing in Turkish society, the age of the onset of obesity is decreasing [15]. Despite this trend, scientific data on the influence of movement and physical activity on Turkish children is limited. Additionally, there is no national movement and physical activity recommendations, guidelines or plans for Turkish preschoolers. The purpose of this review was to summarize literature that investigates the efficacy of motor skill interventions on FMS among preschoolers in Turkey.

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Findings from this review will provide scientific data and critical information related to physical activity recommendations to contribute to future studies and public health policies for pediatric populations in Turkey. Despite advances in international recommendations for physical activity among preschool children, Turkey lacks a set of guidelines for this population.

MATERIALS AND METHODS

Identification of Studie: Systematic computer searches for Turkish printed research articles and theses published between January 1980 and December 2012 were conducted using the Hacettepe University Journal of Physical Education and Sports Sciences, the Niðde University Journal of Physical Education and Sports Sciences, the Celal Bayar University Journal of Physical Education and Sports Sciences, the Selçuk University Journal of Physical Education and Sports Sciences, the Pamukkale University Journal of Sports Sciences databases and the National Thesis Center of the Turkish Council of Higher Education. Several keywords were used in the search: preschool, kindergarten, movement, physical activity, intervention, health, motor, psychomotor, play and development. A review of the reference lists of identified studies expanded the literature consulted for this review. Ten theses and one article that matched the criteria were summarized in Table 1, categorized by objective, sample and method.

Inclusion and Exclusion Criteria: All identified theses and articles were further examined to ensure that they met the inclusion and exclusion criteria. For the purpose of this review, the inclusion criteria consisted of: (1) motor skills-related interventions, (2) use of experimental research designs (i.e. randomized controlled trials, controlled clinical trials, comparative, quasi-experimental or multi-center studies) conducted in Turkey, (3) an age criterion in which subjects were between the ages of 4 and 6 years or the mean age was in this range, (5) implementation of the intervention in preschool or school settings and (6) assessment of pre- and post-test outcome measures. Studies were excluded if (1) the population was not defined as healthy, (2) they were purely observational

Table 1: Intervention studies with children ages 4 - 6 in Turkey.

Study	Type of work	Age	Sample (Experimental-control group numbers)	Intervention Content	Intervention provider	Total intervention duration	Intervention session (min)	Motor Assessment	Significant improvement (Y/N)
Altinkok [16]	Master's	5 - 6	n = 60 girls = 31 boys = 29 (E = 30 - C = 30)	Physical education	Researcher	16 weeks x 3 days 2400 min	50	Flamingo, stabilometer (static and dynamic) balance, agility, standing long jump, ball throwing, sprint, flexibility, grip strength, finger strength, vertical leap, duration to stay in the air	Y
Boz [17]	PhD	5 - 6	n = 120 girls = 60 boys = 60 (E = 60 - C = 60)	Basic movement training	Researcher	12 weeks x 2 days 720 min	30	TGMD-2 (Locomotor and Object control skills)	Y
Çelebi [18]	Master's	5 - 6	n = 60 girls = 30 boys = 30 (E = 30 - C = 30)	Movement training	Researcher	8 weeks x 3 days 1080 min	45	Agility, standing long jump, standing in balance on one foot, throwing a tennis ball, sprint and catch	Y
Dursun [19]	Master's	6	n = 54 girls = 25 boys = 29 (E = 28 - C = 11)	Movement training	Researcher	6 week x 2 days 540 min	45	Standing balance on one foot, velocity, ball catching, standing long jump, tennis ball launchers, sprint	Y
Kerkez [20]	National Article		5 - 6 girls = 54 boys = 51 (E = 57 - C = 48)	n = 105 Game and activity	Researcher	12 weeks x 2 days 1080 min	45	TGMD-2 (Locomotor and Object control skills)	Y
Kerkez [21]	PhD	5 - 6	n = 152 girls = 75 boys = 77 (E = 71 - C = 81)	Play and exercise	Researcher	12 weeks x 2 days 1080 min	45	TGMD-2 (Locomotor and Object control skills)	Y
Kesilmiş [22]	Master's	4 - 6	n = 136 girls = 70 boys = 66 (E = 93 - C = 43)	Gymnastics training	Researcher	12 weeks x 2 days 1440 min	60	Standing long jump, vertical leap, reaction time, hand-eye coordination, dynamic balance.	Y

Table 1: Continue

Study	Type of work	Age	Sample (Experimental-control group numbers)	Intervention Content	Intervention provider	Total intervention duration	Intervention session (min)	Motor Assessment	Significant improvement (Y/N)
Kırıcı [23]	Master's	4 - 6	n = 240 girls = 100 boys = 140 (E = 120 - C = 120)	Movement training	Researcher	8 weeks x 5 days 2000 min	50	Agility, standing long jump, standing balance on one foot, tennis ball launchers, sprint and catch	Y
Özbar [24]	PhD	4 - 6	n = 70 girls = 35 boys = 35 (E = 35 - C = 35)	Movement training	Researcher	40 weeks x 3 days 7200 min	60	Standing balance on one foot, dynamic balance, agility, flexibility, ball catching, tennis ball launchers, standing long jump, sprint, vertical leap, hand force	Y
Tüfekcioglu [25]	Master's	4 - 6	n = 62 girls = 31 boys = 31 (E =30 - C = 32)	Perceptual motor development activities	Researcher	14 weeks x 3 days 1440	30	Static balance, dynamic balance, velocity	Y
Ulutaş [26]	Master's	6	n = 52 girls = 26 boys = 26 (E = 26 - C = 26)	Major games	Researcher	8 weeks x 2 days 960 min	60	Balance, leaping, bouncing, running, catching, standing long jump, tennis ball throwing	Y Four of five skills

or cross-sectional, (3) no detailed description of the intervention was provided or (4) they took place in an afterschool program.

Two independent reviewers (Ph.D. candidates) carefully reviewed each article. The following data were extracted for studies that met the inclusion criteria: 1) author(s) and publication information (i.e. title, journal or institute, publication year), 2) description of study population (gender, age, sample size), 3) study design, 4) description of intervention components, 5) duration of intervention and follow-up period(s), 6) outcome measures and 7) summary of primary and secondary outcome(s). A third party resolved any differences.

RESULTS

In total, 11 student-directed research studies (3 PhD, 7 master's) and 1 national study that investigated the efficacy of motor skill interventions on FMS development among preschoolers (ages 4 - 6) in Turkey were published between 1995 - 2012. The combined sample size of the studies was 1,111 preschoolers (537 girls, 574 boys). The sample size ranged from 52 to 240 (average sample size 58.8) per study and a majority (n = 9) of the studies were conducted with older children, ages 5 - 6 years. Thus, it appeared that preschool institutions are the ideal setting for interventions that promote regular physical activity during the early childhood years. Researchers tend to focus on older children (e.g. 5- and 6-year-olds) because until 2012, Turkish children began their primary education at the age of 7. Currently in Turkey, children begin their primary education at the age of 6 and children ages 3 - 5 have the option of attending preschool at the Republic of Turkey Ministry of National Education [12].

Intervention Contents: The identified studies involved movement programs that focused on the development of basic motor skills [16, 19, 23 and 25] and games [21, 26]. From the literature, recommended activities for children ages 4 - 6 include locomotor (walking, running and jumping), non-locomotor (turning and twisting) and manipulative (throwing, catching and dribbling) skills, all of which are basic skills of the motor domain. These skills must be mastered before learning more complex and specialized sports skills, which involve combinations of fundamental movement skills in games, sports and dance activities [2, 4, 5 and 27]. In addition, given the benefits of the development of FMS and the large number of children enrolled in early childhood settings, these settings are ideal for the implementation of motor skill interventions [3]. None of the identified studies involved teachers or parents in the interventions.

Intervention Duration: Intervention durations ranged from 6 to 16 weeks (Table 1). However, one study lasted 40 weeks [24]. In the international literature for the same age group, the intervention durations ranged from 4 weeks to 1 year, with most interventions having duration between 8 and 12 weeks [3, 28- 33]. In the identified studies, the frequency of physical activity ranged from every other day up to 5 days per week. Instruction times in these studies ranged from 30 - 60

minutes per week over 2 - 5 sessions (Table 1). The United States recommends that preschool-age children should participate in at least 1 hour of planned and 1 hour of unstructured movement every day for healthy growth [34]. However, none of the studies in this review implemented structured physical activities that met this recommendation.

Motor Assessments: Studies use different tests to assess motor skills. Of the studies included in this review, only three studies [17, 20 and 21] used the Test of Gross Motor Development (TGMD-2) to assess motor skill competence. The TGMD-2 is an established and validated assessment of motor skill performance with established validity for Turkish children [17, 35]. Other studies used specific skills, such as balance, flexibility, running, throwing, catching, standing long jumps and vertical leaps, to assess motor skill competence [16, 18, 19, 22-26].

Intervention Efficacy: Although a limited number of studies exist, their findings demonstrated that motor skill-based interventions significantly improved FMS among Turkish preschoolers. Just Ulutaş [26] stated that games positively influenced balance, leaping, bouncing and standing long jumps but did not affect catching ability. It is possible that the games chosen in the study mostly consisted of locomotor skills such as running, sliding and jumping. Because catching is an object control skill, it may not have been improved by these types of activities.

DISCUSSION

This systematic review of studies conducted between 1980 and September 2012 investigated the efficacy of motor-skill interventions on the development of FMS in typically developing preschoolers (ages 4 - 6) in Turkey. From this review, 11 articles were identified as meeting the inclusion criteria. This review demonstrated that preschool-age children should participate in planned and regular physical activities [16-26, 36]. This finding is in agreement with several other studies showing that motor skill interventions provide children with the basic FMS competence needed for more advanced [3, 37-41]. Moreover, Logan *et al.* [3] found that lower FMS competence is associated with less participation in physical activity and overweight or obesity. Thus, implementing motor skill interventions may be an important strategy to promote physical activity and prevent childhood obesity. Yücel *et al.* [15] claimed that obesity should be monitored before 6 years of age to prevent the development of obesity during school-age and to reduce the increasing prevalence of adult obesity. Some previous studies claimed that parents and school administrators in Turkey have limited information about movement education, given that few studies and insufficient outreach have been conducted in this setting [42-44]. Therefore, there is an urgent need to understand the effectiveness of motor skill interventions among children ages 0 - 5 in Turkey. It is important to continue determining the most effective characteristics of motor skill interventions (i.e. minutes of instruction time, instructional approaches) to shape policy and curriculum recommendations for structured movement programs in early childhood settings in Turkey.

CONCLUSIONS

This review highlights the limited number of interventions that have been conducted to improve motor development among young children in Turkey. Future studies should include participants between the ages of 0 and 5, with a particular focus on children enrolled in preschool. For optimum effectiveness, a variety of interventions with different durations should be implemented daily. The physical activities included in these interventions should aid in the development of basic motor skills, such as fun games and dance activities. Standard test protocols that are well known in the international literature, such as TGMD-2, should be used to measure motor skill development. Research questions should focus on the optimal dose-response for overweight or obese preschool children to maintain a healthy weight. Additionally, the effect of physical activity in early childhood on developing obesity at later ages should be tracked. Teachers, researchers and parents should be involved in the implementation of interventions because parental involvement is critical to ensuring knowledge transfer from the intervention setting to the home environment.

From this review, we propose several recommendations for movement and physical activity for children 5 years of age and younger in Turkey. It is essential for health care workers, educators, coaches, child development experts and even families to consider these recommendations, as they will help with children's overall health and development. Schools and child-care centers should ensure that children have sufficient movement-activity opportunities and enough space and equipment to accomplish the recommended amounts of physical activity. Initially, emergency measures should be

taken to develop national physical activity guidelines for preschool-age children that consider the guidelines that are used in developed nations and have been recommended in scientific studies.

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