UDK: 159.943-053.4
373.2.011.3-051:796-053.4

PHYSICAL ACTIVITY OF 3-4 YEARS OLD CHILDREN IN KINDERGARTEN

Filip SHABANSKI[1]

Abstract

Three to four years old children delight in physical activity and love to run, climb, ride and swing. On the other hand, they quickly get tired if they do not have some rest between their burst of energetic activity. It is important to note that physical activity and sedentary behavior begin at a very young age and have been shown to persist from early childhood into adulthood. The vast majority of children in developed countries now are attending some form of daycare. Having in mind that environments have a powerful influence on children's physical activity levels, child daycare centers provide a good opportunity to emphasize the adoption of a physically active lifestyle by stimulating healthy behaviors and movement skills. We have successfully assessed children (both intervention and controls) from three care centers in the city of Sofia and measured the volume and intensity of their physical activity during selected periods of time. The primary outcome variables are time spent in moderate to vigorous physical activity using accelerometers and intensity of movements using pulse meters. Based on the results we divided the surveyed children in four groups and gave specific recommendations to pedagogues to stimulate or alter the physical activity of 3-4 year old preschoolers.

Keywords: volume, intensity of movements, care centers.

Introduction

Over the past two decades, the environment in which children grow up in developed countries, has fundamentally changed. According to the Organization for Economic Development and Cooperation about 64% of three-year olds and 72% of four years olds in Bulgaria are covered by some form of childcare, where they spend more than 30 hours a week. According to a recently adopted law attendance in kindergartens is compulsory from the age of 4 years. Given the influence of the environment on the lifestyle, daily regime in childcare is crucial for the formation of healthy habits and skills. Very important is the role of kindergartens for stopping and reversing the upward global trend in obeisity rates, which unfortunately is valid for kids and young people.

Scientific studies prove that there is a correlation between the development of fundamental motor skills in early childhood and the level of physical activity throughout life. Fundamental motor activities are composed of locomotive skills (such as moving the body through space by running, hopping, leaping, sliding etc.) and control skills (such as throwing, bouncing, kicking, catching etc.). The overall goal of physical activity in early childhood is to build proficiency in basic motor skills that will allow for later learning of more complicated movements and provide the foundation for future physically active way of life.

In this report, physical activity refers to bodily movement produced by skeletal muscles that results in energy expenditure [1]. Physical education is a kindergarten-based program that provides kids with opportunities to be physically active and to acquire the skills and knowledge needed to establish and sustain an active lifestyle Exercise is physical activity that is planned or structured, involving repetitive body movements done to improve or maintain one or more of the components of physical fitness (like aerobic fitness, muscular strength, flexibility etc.). Moderate-to-vigorous physical activity is the activity that causes some increase in heart rate and breathing and is usually associated with running, brisk walking, dancing, swimming, and cycling. Intervention is a program or set of actions designed to modify a health outcome.

[1] Sofia University, Department of Sports, Bulgaria, fshabanski@yahoo.com

Goal and methods

The goal of this paper is to assess 3 to 4 years old children (both intervention and control) from three care centers and measure to measure the volume and intensity of their physical activity during selected periods. The primary outcome variables are the number of steps using accelerometers and the intensity of physical activity measuring the heart beating of the kids.

Experimental work was carried out in three pre-school centers in the town of Sofia with 3-4 years old kids conditionally divided in two groups. The total number of the sample was 42 children (7 kids in the experimental and 7 kids in the control group in each kindergarten). In the first stage an investigation was carried out to determine the level of physical activity of all children in the sample. In the formative stage, the content and method for intervention was selected (table 1). In the control phase, the effectiveness of teaching was evaluated. All data were collected during months when the weather was conducive to outdoor physical activity.

The volume and intensity of physical activity was measured using three main methods and instruments: pedometers for determining the number of steps, heart rate measuring and direct observation. Pedometers offer a low cost estimate of total volume of physical activity and regardless of the fact that are not designed to record the magnitude of the movements they are a suitable and effective gross indicator of the physical activity in free living conditions. All participants received a pedometer at kindergarten on the first morning of the study. Before the pedometers were handed out, they were checked for proper function and reset at zero. The pedometers were fastened to the waistband of each kid's pants or skirts. All pre-schoolers had 10 valid days of pedometer data. At the end of each monitoring day, pedometers were collected at the same time. Then they were opened, data were recorded, pedometers were reset and were distributed back to the participants the next morning.

Heart rate monitoring was applied in order to assess the intensity of physical activity in the different period of the school day because energy expenditure is different whether it occurs during walking, running, or jumping. Kids' pulse was measured manually on the wrist At selected moments the number of beats was measured for 30 seconds and then the result was multiplied by two to get the beats per minute. The length of physical activity was assessed by using a stopwatch. At selected moments of the day the intensity of physical activity was determined by dividing the amount of loco motions to their duration in minutes.

Direct observation was used to assess the locomotive pattern of the different kids. This approach was very useful as participants were confined to a defined space – kindergarten classroom and playground. The protocols had strong evidence of concurrent validity using pedometers and heart rate monitoring so direct observation was shown to be a reliable approach to measuring physical activity.

Results

Pre-schoolers were on average 3.42 (±0.51) years old. They had a mean weight and height of 16.51 (±2.13) kg and 98.97 cm (±4.23) respectively. In total participants wore pedometers for an average of 476 (±3.15) minutes per day (372 – 547 minutes).

For the surveyed three kindergartens children's activity was 69 % sedentary, 15 % light and 16 % - moderate and vigourous. For 85 % of time kids did not have an active play opportunity, including 24 % time as naptime. On average, for 58.32 minutes per day children had an active play opportunity (39 % sedentary, 20 % - light and 41 % - moderate to vigourous). 41 minutes (±14.72) per day were outdoor with most of that time in child-initiated free play. Of the active play opportunity, outdoor free play was the most common, followed by indoor teacher-led, indoor unstructured play, and then outdoor teacher-organized. Children's mean moderate to vigourous physical activity was 23.78 minutes per day with 27 % of participants attaining more than 45 minutes per day.

The behavior of each child was observed and analyzed in relation to the volume and intensity of his motor activity. Depending on the degree of mobility participants were divided into three main groups (very active, medium active and low active kids).

The first group consisted of very active, but not particularly agil and coordinated kids, who often did not carefully implement the exercise. Thew were Impulsive, disorganized, and easily excitable; were unable to perform motor tasks at a moderate pace, and sometimes did not bring them to the end; made a lot of erratic movements; could not focus and listen to explanations of the instructor.

The second group included kids with an average degree of mobility. They had developed a good level of physical skills; implemented more various independent movements; participated actively in games and exercises of varying intensity; had a balanced behavior and good emotional tonus; tended to be natural leaders. Even when performing difficult tasks they did not seek the help of caregivers, and tried to overcome obstacles by themselves. However, these children were not always able to correctly and efficiently complete the task, especially in cases when they did not have sufficient mastery of the technique of movement.

The third group included the least active kids. These children were usually engaged in monotonous sedentary activities with a predominance of the static component; were not confident in their ability and refused to perform difficult tasks; when encountering difficulties preferred to passively wait for the help of the instructor; slow and timid.

Table 1. Physical activities in the intervention groups

Form of physical activity	Quantity of classes	Length of classes
Physical education classes	3 times a week	15 minutes
Morning exercises	Every day	7 minutes
Short time exercises	Every day – at least 5	3 minutes
Exercises after a nap	Every day	10 minites
Organized physical activity during walks	Every day	20 minites

The intervention consisted of increased organized physical activities, as is shown in table 1. On average, kids in the experimental group took 9 451 steps and those in the control group – 9 978 steps. Participants in the experimental group made on average 67 steps per minute and those in control group – 68. Boys took slightly more steps per day (9 766) compared to girls (9 689) ($p = 0.001$).

Discussion

This study found that in the three selected kindergartens, children were not presented many opportunities for active play, so more of children's time was sedentary. Compared with the recommended 120 minutes per day of physical activity, our average of 58.32 minutes per day is considerably lower. Teacher-led physical activity opportunities were rare and when present, children (in the experimental group) achieved lower share of time in moderate to vigorous activity compared with free play. Outdoor time was only 41 minutes, although children were more active compared with indoors. The interesting finding is that child-initiated activity resulted in less sedentary and more active play compared with teacher-led physical activity.

Unstructured free play has many of benefits for young children's social, emotional, cognitive, and physical well-being. According to numerous studies the duration of motor activity for pre schoolers should be at least 50-60% of the period of wakening hours, which equals 6-7 hours per day. The highest movements usually occur during the morning walk (10 to 12 a.m.). Motor activity then should be 65-75% of time spent outside. In addition, the number of steps is usually high during the morning gymnastics, and the breaks between different classes as well as after the nap. Immediiately after the nap kids should be given the opportunity to move on their own for a while and then the instructors can organize some sort of exercise.

Independent movements of children should be at least 2/3 of the total volume of physical activity. According to many researchers during the play, the children develop cognitive, communication, problem-solving, negotiation, and leadership skills [1]. That is why a number of teachers and pediatricians have expressed concern that eliminating play from young children's daily lives may be harmful to their physical and mental well-being [2].

Many researchers believe that although a certain amount of free play is indeed necessary and valuable for development, the ideal pre-school should not be exclusively devoted to unstructured play without any guidance from adults. Our results however seem to contradict previous studies according to which structured activities were associated with greater physical activity. The reason for this contradiction may be that in these studies interventions were made by trained professionals while in our case the structured activity was led by classroom staff. The main problem of such non-specialist way of physical education instruction is

that teaching is not individually tailored according to the health status and the physical development of each child.

Conclusions and recommendations

Our research showed that the inclusion of a structured physical activity session in the pre-school activity does not necessary result in decreasing daily sedentary time in 3-4 old children. One of the possible explanations for our results is the fact that instructions were not provided by certified teachers who had competence to deliver structured physical activity sessions. Based on these results, it is suggested to incorporate physical education specialists led sessions into the daily pre-school program. These sessions should not be implemented at the expense of the free play time and should take into account the different needs of very active and less active kids. The common approach to both groups of children should be to involve every kid in the preparation for the game – arrangement of the necessary tools, putting away the movable equipment after the game is over, re-writing the rules, inventing new games and activities, keeping the interest of kids by preventing boredome and monotony of doing the same activity day in and day out.

Subject oriented games on the other hand can be individually tailored by assigning different roles and stimulating concrete actions (like lifting the ladder to the ship, walking on an inclined board, jumping from the bench right in the gymnastic hoops, etc.). The instructor can force the kids to perform a variety of movements (for example: “Go to the grocery store on the bike, so it will be faster"). It is very important that childcare personnel gives verbal encouragement for more physical activity or persistence and precise implementation of exercises (to both very active and least active kids).

Another common approach to all groups of children is ti stimulate their joint participation in games which provide kids with opportunities to exercise and work different muscles. The level of physical activity in this case can be greater if children are verbally encouraged.

In general, increasing outdoor play and using professional teacher led activities can promote healthier activity levels in 3-4 years old kids in kindergartens.

References

Ageliki Nicolopoulou, The Alarming Disappearance of Play from Early Childhood Education, Human Development, 2010, 53:1-4.

Regina M. Milteer et al., The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bond: Focus on Children in Poverty, American Academy in Pediatrics, December 2011.