

CAN TIME SPENT IN THE KINDERGARTEN ENVIRONMENT BE PHYSICALLY DEMANDING FOR PRE-SCHOOL CHILDREN?

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- pre-school children,
- national educational program,
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- physical activity,
- physical effort.

Abstract:

The National Educational Program ISCED 0 in Slovak Republic in connection with the succession of daily activities in kindergartens uses the term daily schedule. As the National Educational Program (NEP) is the primary curricular document, the program should besides cognitive and mental development also define the methods and duties related to the personal care and motor competence of children.

The purpose of the study was to get familiar with the effects of particular forms of education on the children's development and to monitor the physical effort in children attending kindergartens during respective seasons of the year using the Polar Team 2.

Previous studies despite inconclusive findings have shown that in order to facilitate organism development, pre-school children should perform 6 hours physical activities, which equals 60 percent of being awake (Kučera, 1985), consisting of 60 minutes of organized and 60 minutes of spontaneous daily physical activity (NASPE, 2002, Sigmund & Sigmundová, 2011).

The results showed that the content of the NEP is a typical example of disrespecting basic human needs and lifestyle of pre-school children. All monitored seasons were characterized by insufficient volume of physical activity in terms of its volume and intensity.

INTRODUCTION

The knowledge of the life of our ancestors has confirmed that throughout phylogeny physical activity played a key role in developing and forming mankind. This statement is related to the character of activities performed by man when securing basic human needs over the whole period of phylogeny.

The role and importance of physical activity in people's lives was considered a natural part of ontogeny as evidenced by research conducted in the field of several branches of science including medicine. Several ancient physicians confirmed the benefits and irreplaceability of movement. In relation to this Greek physician Hippocrates stated that *all parts of the body which have a function, if used in moderation and exercised in labours in which each is accustomed, become thereby healthy, well-developed and age more slowly but if unused and left idle they become liable to disease, defective in growth, and age quickly*. Similarly serious was the opinion of Galen of Pergamos who regarded *drinking, eating, physical movement and rest* as four irreplaceable human needs. Besides that, from our point of view Galen as a modern sports physician stated that every physician is obliged to know the health benefits of both physical activity and physical education (Kučera et al., 1998).

What held true throughout the whole history of mankind does not apply to the last decades. The end of the 2nd millennium characterized by scientific and technical revolution

triggered changes associated with the status of labor force outside the epicenter of the manufacturing process. **For the first time in history people failed to replace and eliminate the absence of physical activity induced by changes in the manufacturing process and lifestyle.**

Over thousands of years mankind has evolved under conditions of relative insufficiency of food and high volume of physical activity. This means that mankind adapted to lower energy intake and higher energy expenditure. At present, we witness is the exact opposite. However, the ability to adapt to this new state has not yet developed (Junger, 2010, 2011).

This led to gradual disruption of the natural balance in functioning of individual human bodily functions. From our point view an example of a factor disrupting the balance of human life is the key competences for lifelong learning, which formed the basis for defining the competences included in the National Educational Program ISCED 0 - *psychomotor competences, personality competences, social competences, communicative competences, cognitive competences, learning competences and information competences* (NEP, 2008).

Their detailed analysis would definitely show that something basic is missing, which was confirmed at the FIEP European Congress (International Federation of Physical Education) held in Bratislava in 2007. The prolific discussion of experts resulted in the recommendation to complement the existing competences with the one of motor competence. This competence refers to *the ability to perform particular movements adequately relative to actual and perspective measures in the lifelong human development*. It sounds incredible, but present children compared to their ancestors are unable to acquire the basic locomotor skills in an adequate manner! It is the so-called locomotor capacity that is used as one of the criteria for the assessment of healthy development of children. We definitely know that one of the criteria of the termination of the suckling period is the ability to execute a flight phase, which is at the same time the measure of child's maturity. This means that a child who fails to master this manifestation of bipedal locomotion by 3 years and 5 months of age, or the height of whom did not exceed 106 cm and body mass 15 kgs may be considered motorically incompetent (Kučera, 1985).

Prevalence of pre-school children attend a pre-school facility that substitutes the educational functions of the family during the child's time spent in the facility. The National Educational Program is the primary curricular document that should definitely define also the methods and duties related to the care and motor competence of children. Out of 7 objectives associated with pre-primary education, we may only deduce a limited participation in motor development included in the objective no. 4, which specifies that teachers are obliged to **intentionally and systematically develop child's personality in the psychomotor, cognitive, social, emotional and moral area under creative conditions.**

Figuratively speaking, half of our existence, especially our physical existence, is based on a unitary word of psychomotor competence. Despite the fact that all objectives deal with the acquisition of various competences bringing enrichment into the spiritual life of the child, the authors of the document did not deem important to devote one specific objective to children's motor skills that underlie their healthy development.

According to ISCED 0, the educational process makes use of the **principle of child's activity**. When educating, the teacher acts as a **facilitator and manager** of the educational activity as well as a **counsellor** and **consultant**. The issue is the acceptance of the organizational succession of activities in kindergarten as opposed to the unpreparedness and inability of children to select activities included in the educational program. The research has shown that the activities selected by pre-school children depends on adults, parents, kindergarten teachers, etc. (Junger, 1986, Kučera, 1991, Dvořáková, 1998).

The daily activities regularly performed in a particular kindergarten are structured in the form of a daily schedule. According to the NEP the daily schedule should be flexible and

should allow to respond to the children's needs and interests. The daily schedule consists of *games and play-based activities, physical and relaxation exercises, outdoor play, rest, activities ensuring the child's regimen (personal hygiene, taking meals, setting lunch tables).*

The minimal volume of physical activity is referred to as the so-called threshold value. This value refers to the volume of physical activity needed for healthy development of human organism. The magnitude of the threshold value changes proportionately to the increasing age of the person. The research conducted so far has revealed that pre-school children should perform physical activity amounting to 60 percent of the awakening state, which is approximately 6 hours (Kučera, 1985), at least 2.5 to 3 hours in the zone of moderate stimulation of the cardiovascular system equaling 150 % of the resting value (Kučera, 1990,1991, Junger, 2000), or to adhere to the minimal limit equaling 60 minutes of organized and 60 minutes of spontaneous daily physical activity (NASPE, 2002, Sigmund, Sigmundová, 2011). The lowest volume of moderate to intense physical activity of 30- to 60-minute duration performed at school and out of school was reported by Corbin, Pangrazi (1996), Pangrazi, Corbin, Welk (1996).

According to the standards elaborated at our faculty, we may state that in general the resting heart rate in 5-to-6-year-old children equals approximately 100 beats per minute (bpm). To achieve health promotion based on the effect of developmental benefits a pre-school child should exercise at the rate of 150 bpm for 2 to 3 hours per day (Belej, Junger, Feč, 1997).

Our extensive research and scientific experience based on the weekly time records of pre-school children showed that with regard to movement performed in kindergarten facilities, individual forms of physical activity are performed in the time frame of 3 hours. The problem is that most activities are performed at low intensity level. It seems striking and alarming that at present there is no activity included in the kindergarten daily program that would guarantee the required physical load of pre-school children. Despite that the creators of primary educational and teaching materials and even their implementors (kindergarten teachers) do not deal with this issue. It is often the case that kindergarten teachers regard motor education of children as their own rest from demanding work, or as other components of educational program, requiring exemplary organization and discipline.

In their home environment pre-school children perform 2 to 2.5 hours of physical activity during the working days and almost 5 hours during the weekends, during which children do not stay in the kindergarten facilities (Junger, 2000).

AIM

The aim of the study was extend the knowledge related to the physical load in pre-school children within all components of daily schedule of a particular kindergarten using theoretical analysis and own research. The paper makes part of the research project VEGA No. 1/0237/13 "*Physical, functional and motor development in pre-school children in the context of the National Educational Program ISCED 0.*"

METHODS

Pre-school children were selected randomly. Out of all kindergartens located in Prešov, we selected the Kindergarten in Budovateľská street, where out of 21 children in total, 5 boys and 5 girls were selected. Mean age was 5.6 years and the age ranged from 5 to 6 years. Each child was physically mature without health problems. The parents of all children signed a written informed consent and agreed to participate in the research.

At the baseline, basic anthropometric parameters, resting heart rates and aerobic zones using the Karvonen formula were determined. The data were used to determine individual profiles used with the Polar Team 2 (PT2).

The research was conducted during two seasons of the year, namely in the fall and in the winter under standard weather conditions characteristic for the type of season. In the fall, temperatures averaged 17 to 20 °C, under partly cloudy conditions, with occasional showers. In the winter months the temperatures ranged from +3 °C do -4 °C. It was partly cloudy with heavy snowing on Thursday amounting to 50 cm of snow.

The monitoring in the winter was specific due to the inclusion of the preliminary swimming practice planned in advance into the daily schedule. The practice sessions took place from 9:00 a.m. to 9:30 a.m. The children travelled to the swimming facilities by public transport. The bus ride took approximately 15 minutes. The research in the water environment was specific as for the use of measuring devices as the measurement using PT2 is not recommended by the manufacturer. Despite this limitation, the course of measurement was comparable to other outdoor physical activities performed by children during the time spent in the kindergarten. The data transfer between the receiver and PT2 was trouble-free also due to the fact that children moved in the pool water 40 cm deep and most of the pool activities were performed in the vertical position.

The exercise intensity was determined using 3 zones. The first zone was ranged from the reference value equaling 150 % of the resting heart rate to the lower limit of the aerobic threshold. The second zone corresponded with the aerobic zones of children and the third one represented exercise intensity exceeding anaerobic threshold.

The research also consisted of the daily schedule observation conducted by a trained student. The observation took place during the whole day irrespective of the environment, where the children were located. This allowed for recording the time and content of the daily schedule. The observer's role was also to monitor and to fix the receivers in case of troubleshooting.

The collected data were processed using the statistical software STATISTICA 10 (Stat Soft, 2012).

RESULTS

The succession of regularly performed daily activities was processed in the form of the daily schedule.

As the daily schedule includes rest as well, we decided to monitor heart rate (HR) of children also during sleep. The HRs during sleep were then compared to the resting heart rates. The results showed that while the resting heart rate values equaled approximately 96 bpm, the heart rate values when resting equaled 92.7 bpm (fall) and 95.4 bpm (winter). What is alarming is the volume of rest amounting to 2.5 hours per day. The ISCED 0 states that rest should last at least 30 minutes depending on the individual needs of children.

The activities ensuring the regimen were of similar nature. In both seasons, children performed these activities for 80 minutes on average. When performing such activities, the heart rate of children averaged 110.6 bpm, or 114 bpm, which equals 51.7 % and 53.3 % respectively.

Games and play-based activities are spontaneous activities organized by teachers. With regard to the design of the daily schedule, such activities may be implemented 2 to 3 times per day. In the fall, the time frame equaled 147 minutes and 200 minutes in the winter, respectively. The measurements showed that in both seasons the heart rate of play-based activities averaged 107.5 min⁻¹ and 108.3 min⁻¹, which equals 50.2%, resp. 50.6% of maximum.

From the research perspective, the highest level of exercise was induced by physical and relaxation exercises (see Table 1). According to NEP such exercises may be characterized as planned activities that should be performed every single day adhering to the basic mental and hygienic principles. On average, the time volume devoted to these activities was 12 minutes

per day in the fall and 30 minutes in the winter. The measurement results also showed that when performing such activities heart rate averaged 124.6 bpm and 126.3 bpm, respectively.

Table 1. Physical and relaxation exercises

Number	Sex	Fall			Winter - pool		
		AHR		MHR	AHR		MHR
		%	x	%	%	x	%
1.	M	55	117	77	61	130	91
2.	F	56	119	78	60	128	77
3.	M	57	121	82	60	128	85
4.	M	62	132	86	58	124	81
5.	F	58	124	84	58	124	84
6.	F	61	130	84	55	117	83
7.	M	60	128	82	57	122	76
8.	M	54	115	80	64	136	85
9.	F	61	130	85	59	126	80
10.	F	61	130	81	60	128	81

Legend: AHR – average heart rate, % - of maximal heart rate, x – arithmetic mean HR related to specific activity, MHR – % of maximal heart rate

The time spent outdoors contains children’s physical activities, walks, but also educational activities, etc. Due to the content variety and options the outdoor time was assessed separately as outdoor play and walking. According to NEP the outdoor stay should take place every day except extreme weather conditions.

In the kindergarten setting the time for outdoor play in the fall averaged 39 minutes per day (see Table 2). When performing this activity the heart rate averaged 134 bpm, which is 62.6 % of maximal heart rate.

The outdoor play also contains more organized physical activity such as walking (see Table 3). In the fall this activity was performed for 20 minutes once a week. The children’s heart rate averaged 124 bpm. In the winter time, walks lasted 8 minutes a day on average. The walks were used to get to the stations of public transportation. The children’s average heart rate was 122.3 bpm.

Table 2 Time spent outdoors – outdoor play

Number	Sex	Fall			Winter	
		AHR		MHR	AHR*	MHR*
		%	x			
1.	M	60	128	90	-	-
2.	F	55	117	80	-	-
3.	M	71	151	93	-	-
4.	M	70	149	93	-	-
5.	F	64	136	90	-	-
6.	F	65	139	86	-	-
7.	M	63	134	89	-	-
8.	M	60	123	83	-	-
9.	F	62	132	81	-	-
10.	F	59	126	81	-	-

Legend: AHR – average heart rate, % - of maximal heart rate, x – arithmetic mean HR related to specific activity, MHR – % of maximal heart rate, * not monitored (swimming practice)

Table 3. Time spent outdoors – walking

Number	Sex	Fall			Winter		
		AHR		MHR	AHR		MHR
		%	x	%	%	x	%
1.	M	58	124	70	54	115	75
2.	F	50	107	61	51	109	72
3.	M	59	126	74	55	117	68
4.	M	58	124	75	56	119	69
5.	F	55	117	69	59	126	74
6.	F	62	132	69	58	124	76
7.	M	63	134	72	64	136	69
8.	M	60	128	75	61	130	75
9.	F	58	124	75	62	132	71
10.	F	58	124	68	54	115	69

Legend: AHR – average heart rate, % - of maximal heart rate, x – arithmetic mean HR related to specific activity, MHR – % of maximal heart rate

DISCUSSION

The monitoring of the kindergarten daily schedule in the fall showed that the volume of physical activity was 278 minutes, which averaged 55 minutes and 36 seconds of organized and spontaneous physical activity per day. This means that children spent 16.85 % of the time being awake by participating in any type of physical activity. Compared to the findings by Junger (2000) who reported that children were active for 3 hours and 12 minutes, which equaled 39.2 % of time being awake, our findings showed that the time of participation in physical activity was 2 hours and 16.5 minutes lower. The results are comparable due to the fact that the monitoring took place in the same seasons of the year. As compared to the findings reported by Mišková (1992) the daily volume of physical activity in our sample of children was lower by 1 hour and 13.5 minutes.

Table 4. Average daily volume of PA and children’s exercise intensity

Number and sex		Week in the fall		Week in the winter	
		ADHR %	Stimulating load (min)	ADHR %	Stimulating load (min)
1.	M	54	20:05	55	9:12
3.	M	52	21:54	56	9:26
4.	M	55	26:48	53	5:59
7.	M	51	23:11	52	5:12
8.	M	45	18:50	52	8:06
2.	F	51	14:40	54	7:55
5.	F	50	24:23	51	5:35
6.	F	53	21:53	52	3:05
9.	F	51	20:50	51	6:55
10.	F	55	23:51	52	9:14
Volume of PA		55:36		38:00	

Legend: M - male, F - female, ADHR: average daily heart rate during the whole week in % of maximal heart rate, Volume of PA: volume of physical activity per child per day in minutes, stimulating load: time in minutes performed at the exercise intensity equaling 150% resting heart rate or more.

In the fall, children exerted effort that averaged 51.7 % of the maximal heart rate, which equaled the value of 110.6 bpm. The comparison of average daily heart rate and resting heart rate showed that heart rate during the day increased by 10 to 15 bpm on average.

Monitoring of the winter week was atypical as the children's program contained preliminary swimming practice. This meant that the morning transport to the swimming facility and water practice lasted approximately 30 minutes. After the swimming practice, the children were asked to rest in a room furnished with beds and toys. The whole time spent in the pool, resting room and changing room were also monitored. We monitored transport to the kindergarten as well. Apart from that, the program adhered to the daily schedule. During the winter week, the total volume of physical activity was 190 minutes (whole week), which equaled 38 minutes of physical activity per child per day (swimming activities and time spent walking). Low volume of physical activity may be attributed to the practice in the water, following which teachers did not want to expose children to cold environment outside. Thus, children spent only 11.5 % of the awakening time performing physical activity in the kindergarten. Compared to the findings reported by Junger (2000), the volume is lower by 2 hours and 34 minutes.

During this week children exerted effort that averaged 52.8 % of the maximal heart rate, which equaled approximately 113.4 bpm per day. Their heart rate compared to the resting heart rate increased from 13.4 to 19.4 bpm. As compared to the findings reported by Kučera (1985), their daily average heart rate was 47.7 bpm lower.

CONCLUSION

The research findings are alarming from the viewpoint of the scientifically confirmed demands related to the optimal development of children. With regard to the offered daily activities in kindergartens the National Educational Program ISCED 0 is characterized as open and flexible. The educational activities taking place in the kindergartens do not stimulate the functional and motor development of children irrespective of their gender. The problem is that even specifically targeted activities such as physical and relaxation exercises and outdoor play do not substitute this insufficiency. This sub-threshold effect was identical regardless of different seasons of the year, during which the research was conducted. The research is going to continue in the remaining seasons of the year.

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