

PHYSICAL ACTIVITY OF WARSAW'S SIX YEAR OLD CHILDREN AND ITS CORRELATION WITH PHYSICAL FITNESS

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Abstract

Introduction. Physical activity and physical fitness are among the positive measures of health. Their assessment is justified from the point of view of prevention of many civilization diseases. The aim of this paper is to describe the physical activity of six year old children in Warsaw and to determine its relationship to physical fitness. **Material and methods.** The study was conducted in two series – in the spring of 2011 and 2012. Data were collected for 742 children from selected pre-school institutions in Warsaw. The average age of the children born in 2005 (2011 edition) and 2006 (2012 edition) was 5.84 ± 0.31 years. The numbers in both categories were equal, and amounted to 371 girls and boys. The choice of educational institutions was such, as to ensure that the sample was representative. In order to assess the children's physical activity, the method of diagnostic survey was used (questionnaire). The questionnaire addressed to the parents included questions about the participation of their children in pre-school, extracurricular and family forms of physical activity and the amount of time spent on passive leisure activities. To evaluate the physical fitness we used a test consisting of five motor trials (bend while sitting down, sit up from the lying position 30 s, long jump from stationary position, run 10x5 m, 1 kg medicine ball throw forward). Mathematical analysis of the material utilised selected methods of descriptive statistics (including cluster analysis), standardization of data and the χ^2 test. **Results.** In the both gender subgroups three clusters were formed, corresponding to the above-average, average, and reduced physical fitness. Parents of children with the highest level of motor skills often declared significant participation of their children in family and extracurricular forms of physical activity and less time spent in front of TV or computer. **Conclusions.** In the population of six year old children in Warsaw positive relationship were found between the claimed physical activity and physical fitness.

Key words: physical activity, physical fitness, six year old children

Introduction

Physical activity and fitness are considered to be good indicators of health, and their nature and importance are emphasised in a number of publications [1, 2, 3]. J. Nowocień [2] – referring to previous sources – indicates five areas covering the entire period of ontogenesis, affected by physical activity. The first of them is associated with high quality and healthy lifestyle. The second one relates to the prevention of many diseases, especially of the so-called civilization diseases, mainly including overweight and obesity, type II diabetes and cardiovascular diseases. The third one – therapeutic treats physical activity as a therapeutic or a correction agent to a variety of developmental disorders. Physical activity also plays an important role in reducing increased nervous tension resulting from stress (fourth area). Finally, the fifth one of these areas is referred to as positive aging.

Physical fitness is highly dependent on physical activity. Together with rational nutrition, it determines the state of health at all stages of life. Appropriate level of physical activity affects physical development, motor and psychosocial development of children and adolescents [4]. In the literature we can find a number of arguments in support of the beneficial effect of an active lifestyle of the level of physical fitness. This applies program of activities undertaken during physical activities at educational institutions, as well as other forms of, extracurric-

ular, so called out of school (extracurricular organised) and family activities [5, 6, 7, 8, 9, 10, 11]. Unfortunately, reports on the current state of both physical activity and physical fitness of children and adolescents are highly disturbing [4, 12, 13]. Observation of changes in physical activity of Polish youth from the late 90s shows that its level decreases with age and is consistently lower than recommended. According to the HBSC report (Health Behaviour in School-aged Children) of 2010, "one of the causes of low physical activity of children and adolescents is the development of new information and communication technologies, including those utilising cell phones, computers and the Internet. The use of these technologies results in immobilization of the user for many hours, and because of its attractiveness compete with mobility classes" [4]. The HBSC international project is being implemented in a total of 43 countries in Europe and North America. In Poland, these studies were carried out three times in the 90s, and then in 2002, 2006 and 2010. In its latest edition, based on survey data obtained from a survey of young people 11-18 years, levels of physical activity in this age group were assessed. It turned out that the recommended standards (at least one hour of moderate or high activity per day) were not satisfied by the vast majority of students (a total of more than 80%). This percentage is better in the younger than in the older age categories (about 73% in 5th grades of primary school and nearly 90% of high school students), and among boys compared with girls [4]. A negative opinion on the

state of youth's physical activity was formulated by Kościelnik and Jopkiewicz [13] on the basis of an over 1500 strong group of school children aged 11-16 from Mazowieckie and Świętokrzyskie voivodeship. It was demonstrated that only 30% of patients achieved satisfactory, almost 45% – low, and about 25% – a very low level of physical activity. Similar results were presented in the work of Marchewka et al. [14], on the health behaviours of secondary school students in Bielsko-Biala. The authors stated in the conclusion that only a small proportion of the young people undertake physical activity recommended by the experts, despite its knowledge of the health and aesthetic values.

The assessment of physical fitness of children and youth in Poland is facilitated cross-section surveys of student population repeated every 10 years, conducted since 1979 by the Department of Physical Education Theory of the Jozef Pilsudski University of Physical Education in Warsaw. Its last edition covering over 50 000 girls and boys aged 7-19 years were conducted in 2009 and 2010. In the light of the mentioned studies, in the physical fitness tests, including Eurofit – international test and a 12 minute Cooper run, over the 1999-2009/2010 decade a significant deterioration in performance in terms of both men and women and the vast majority of age groups was found. The decline in motor skills applied to all motor abilities – coordination, strength in endurance and speed events. In the tests: long jump from stationary position, 50 m run and 4x10 m, sit up from lying position, regression of the results obtained was remonstrated especially in the younger age categories (7-10 years) [12].

In the context of the evidence presented in the literature, what seemed interesting was the diagnosis of physical activity and fitness in the final stage of pre-school education – important from the point of view of development of healthy habits. Therefore, the aim of the study was to characterise the physical activity of six year old children in Warsaw and to determine its relationship to physical fitness.

Material and methods

The study was conducted in two series – in the spring of 2011 and 2012. The data were collected for 742 children in selected kindergartens in Warsaw. The average age of children born in 2005 (2011 edition) and 2006 (2012 edition) was 5.84 ± 0.31 years. The numbers in both categories were equal, and amounted to 371 girls and boys. The choice of educational institutions was such, as to ensure that the sample was representative.

In order to assess the children's physical activity, the method of diagnostic survey was used (questionnaire).

The questionnaire addressed to the parents included questions concerning their children's lifestyles, grouped into 4 groups:

- Do you/how often/ engage into family physical activities (e.g. walking trips, bicycle rides, swimming pool visits, ski outings etc.)?
- Does your child participate in extracurricular activities in the kindergarten (if so, how many)?
- Does your child participate in extracurricular activities organised by other institution than the kindergarten (if so, how many)?
- Generally, how much time does your child spend watching TV or playing computer games?

Based on answers provided by the respondents, data were obtained on participation of the respondents in pre-school and family and extracurricular organised physical activities and the timing of passive leisure activities. The survey questions were of multiple choice nature, with one answer to be selected (so-

called disjunctive cafeteria) or semi-open ended.

To evaluate the physical fitness we used a test consisting of five motor trials (bend while sitting down, sit up from the lying position 30 s, long jump from stationary position, run 10x5 m, 1 kg medicine ball throw forward).

Mathematical analysis of the material utilised selected methods of descriptive statistics (including cluster analysis), standardization of data and the χ^2 test. For standardized numerical values specifying the level of physical fitness of children, a cluster analysis was performed. This method was used for the isolation of homogeneous subsets of the population selected in such a manner as to ensure that object qualified for a number of groups (three – in the case of this study) were as similar to each other as possible, and at the same time that the groups were as different from each other as possible (15). In cluster, we examined the prevalence of individual responses to survey questions about the child's level of physical activity in the family. The significance of differences between the abovementioned frequencies was verified using the χ^2 test, assuming statistical significance levels of ** $p < 0.01$ and * $p < 0.05$.

Results

Presentation of the research results was divided into two parts. The first one of them relates to the characteristics of physical activity of six year old children in Warsaw, the second one – attempts to determine the relationship between their activity and physical fitness. Figures 1-4 show the percentage distribution of response quoted in "Materials and Methods" survey questions.

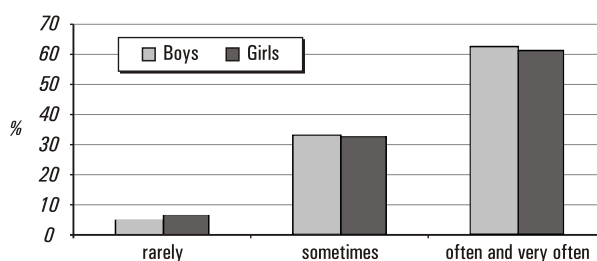


Figure 1. Percentage distributions of responses to survey questions regarding undertaking family physical activity in the tested group

In the responses to the survey question about the frequency of physical activity undertaken in the family, the most frequently selected options included "often and very often", corresponding to at least twice a week, or even daily activities undertaken by parents and children. This option was selected by over 60% of the respondents, parents of both boys and girls. The answer "sometimes" (once a week) was selected by another 30% of the respondents. The "rarely" option was selected least often (4.7% – boys, 6.5% – girls) (Fig. 1).

The respondents reported widespread participation of their children in physical activities in the kindergarten. Among those, the most frequently mentioned forms of physical activity included fitness and dancing exercises (eurhythmic), corrective gymnastics and dance classes. According to the parents, nearly 70% of boys and 76% girls participated in three or more additional physical activities. The second most common answer choice (almost 19% of parents of boys and more than 15% of parents of girls) was participation in two extracurricular activities. The option of 1 activity was reported rarely (8.5% boys and 6% – girls), and the option "not involved" was selected only marginally (respectively 3.3% and 2.7%) (Fig. 2).

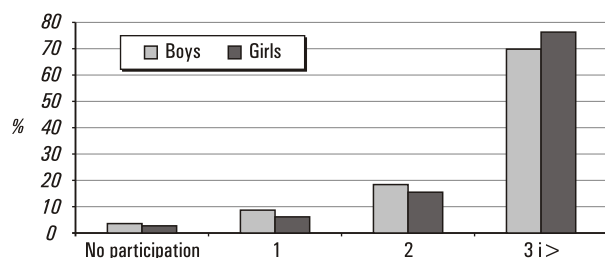


Figure 2. Percentage distributions of responses to survey questions regarding the participation of tested children in pre-school physical activities

In the responses to the survey question about the child involvement in organised extracurricular physical activities the most often selected option was "not involved". This option was selected by around 50% of the respondents, while a further 30% of parents reported the child participation in some one form of such activities (more boys than girls). The option "two forms of activity" was selected about around 10% of times, and only a few respondents acknowledged the child engaging in three or more extracurricular forms of physical activity (more than 3% – boys and about 2% – girls) (Fig. 3).

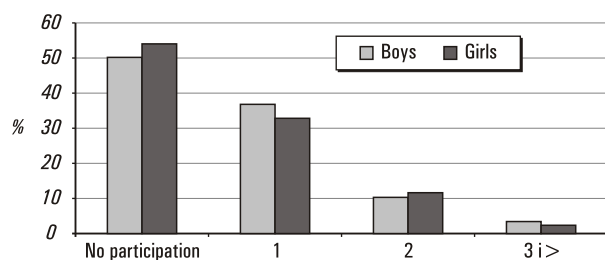


Figure 3. Percentage distributions of responses to survey questions regarding the participation of tested children in extracurricular physical activities

The most frequently declared response to the question about the time spent by the child in front of TV or computer "1-2 hours a day" (about 45%). Slightly fewer (40%) were selected the option "less than 1 hour". Longer passive leisure time (2-3 hours) was indicated by more than 10% of parents of boys and less than 10% of parents of girls. The answer "more than three hours" was chosen least often (1.9% and 1.4%) (Fig. 4).

It should be noted that the frequency of selection of individual variants answers to the questions in the survey differed slightly among parents of boys and girls (Fig. 1-4).

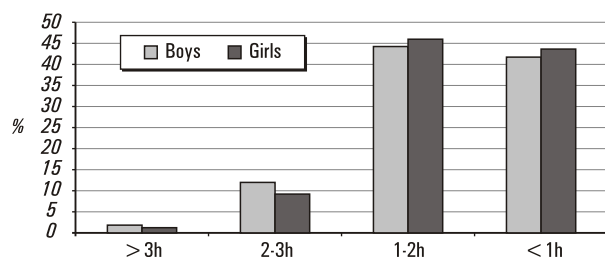


Figure 4. Percentage distributions of responses to survey questions regarding the amount of time spent on passive leisure activities

Analysing the physical fitness test, in the both gender subgroup, 3 clusters were found to exist, corresponding (roughly speaking) the above-average (line with diamonds), average (line with squares) and the reduced (line with triangles) level. The regular pattern of the results was consistent with highlighted notes of motor skills levels in the jumping, running and ball throwing tests. In the case of abdominal muscle strength test (sit ups from lying position) the III cluster respondents obtained better results than the II cluster children. However, in the test bend forward in sitting down position best results were obtained by the II cluster boys, and the poorest results were obtained by the III cluster boys. Among the girl, in the same test, the results were as follows: cluster I, III, II. In all performance tests of physical fitness, in the both gender categories, cluster I respondents performed better than the cluster III subgroup. The biggest differences between the extreme clusters were observed among boys in the jumping test (SD 1.5) and in the case of girls – in jumping and running tests (more than 1.5 SD) (Fig. 5).

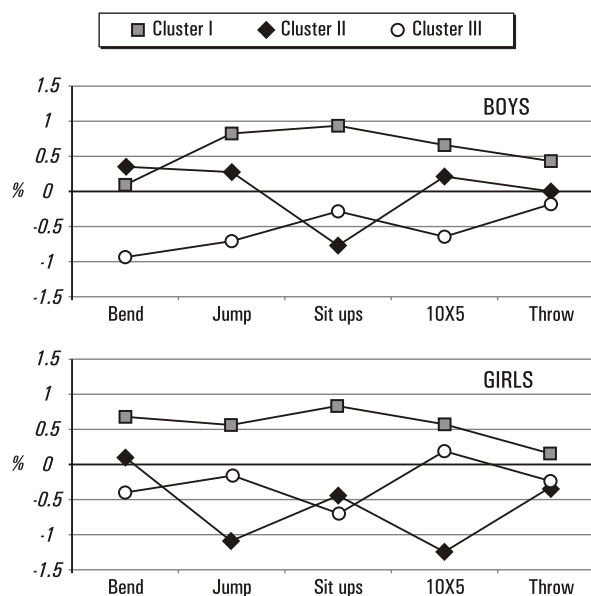


Figure 5. The standardized values of the tests of physical fitness in isolated groups of tested boys and girls

After the selection of clusters, frequency of answering survey questions about the level of physical activity was determined (including the belonging of the respondents to one of the clusters). Analysis of the figures contained in Table 1 shows differences in the level of physical activity of respondents, qualified to various physical fitness groups. This applies to both gender categories. A significant relationship was discovered between children's fitness and their participation in organized extracurricular physical activities. This relationship was found in both, the boys subgroup ($p < 0.01$) the girls subgroup ($p < 0.05$). Differences in the children's participation in this form of activity were observed between I and II cluster respondents. Trends of a similar nature were noted in the case of family physical activity (girls – $p < 0.01$) and passive leisure activities (boys – $p < 0.05$). These differences were again related to respondents from extreme clusters (I-III).

Table 1. Percentage distributions of responses to survey questions regarding the level of physical activity (including allocation of the subjects to one of the clusters)

Response	Cluster			Cluster		
	I	II	III	I	II	III
	Boys			Girls		
Family physical activity						
not at all, rarely	2	4	10	6**	4	10
sometimes	30	35	34	24**	36	38
often, very often	68	61	56	71**	60	52
Kindergarten organised physical activities (classes)						
no participation	2	5	3	4	1	3
one class	11	5	9	9	3	5
two classes	16	19	23	17	13	15
> three classes	71	71	65	70	83	76
Extracurricular physical activities						
no participation	46**	52	54	46*	55	60
one class	34**	38	40	34*	31	33
two classes	13**	8	3	16*	12	7
> three classes	4**	2	2	4*	1	1
Passive forms of leisure (television, computer etc.)						
over 3 h	1*	2	3	1	3	1
2-3 h	9*	10	20	7	6	14
1-2 h	50*	47	33	44	48	46
< 1 h	40*	41	45	48	44	39

* - different from cluster III, $p < 0.05$; ** - different from cluster III, $p < 0.01$

Discussion

The results of the studies demonstrate positive effects of physical activity of six year old children in Warsaw, and confirm the positive relationship between the declared activity and physical fitness.

The percentage distributions demonstrate frequent involvement of the tested boys and girls in the family forms of active leisure (Fig. 1) and their participation in pre-school physical activities (Fig. 2). As far as the tested group was concerned, organised forms of extracurricular activities proved to be less popular. The referenced research also provided some optimistic data on passive forms of leisure activities.

Despite some inconsistency in the research methods and techniques (making it difficult to directly compare the two groups) it can be considered the study achieved significantly better results on the level of physical activity than in the diagnosis of 11-18 year old adolescents [4]. Also, the study performed by Czaprowski et al. [16] on sedentary behaviour of children and adolescents aged 7-16 years shows that younger students in static positions spend less time than girls and boys in junior high school and older elementary school children. These authors documented that with age there is a significant increase in such behaviour, both, on, daily and weekly basis. Analysis of physical activity of a select group of primary and secondary schools children has shown that 7 year olds (i.e. close to the age group covered by this study) compared to older children, spent less time walking to school and back road walking to and from school or participating in extracurricular physical activities [17].

Some of the research results concerning the relationship between activity and physical fitness are repeatedly confirmed the importance of physical activity for the development of children documented in literature. Let us recall that in the present

study has demonstrated higher level of motor skills in Warsaw's 6-year-olds combined with claimed frequent participation in organized extracurricular forms of active leisure. Similar results were obtained in studies of selected groups of children and adolescents [7, 8, 10, 18].

Positive changes in physical fitness (and somatic built) due to increased physical activity were reported in the studies of a selected group of 14-15 year old girls and boys [7]. The annual observation demonstrated improved physical fitness of youths (mostly girls) participating in extracurricular physical activities as compared to their peers involved only compulsory school physical education classes. This was the case in long jump from stationary position, with space 4x10 m shuttle run and sit ups from lying position. Significantly better results in the same performance tests were reported in studies of over 900 strong group of young people of Kielce aged 10-15 years with different levels of physical activity [18].

Impact of recreational forms of physical activity on changes in exercise capacity and physical fitness has been shown in the research studies of 10-12 year old boys published by Poliszczuk et al. [8]. The researchers utilised Denisiuk's tests of strength, power, speed, agility and endurance, measures heart rate and performed the Ruffier test. The study demonstrated that "each motor skill in people recreationally involved in sport was developed at a higher level than in the control group". At the same time it was found that "adaptive changes in physiological parameters in the tested boys were clearly visible in the heart rate". In addition, it was noted that "physical activity differentiated the tested children in terms of cardiovascular fitness" [8].

Similar trends were observed in the study of a 44 strong group of 15-16 year old boys from Warsaw, practicing volleyball. Compared to their tall peers the young volleyball players demonstrated significantly higher levels of fitness in most parts of the test sample of the international test (except pull ups). Particular advantage of the boys involved in volleyball achieved significantly better results in the jumping ability test.

Conclusions

Based on the presented test results set against data referenced in the literature the following conclusions have been drawn:

1. Physical activity of six year old children in Warsaw can be assessed positively. It is mainly based on family forms of active recreation and physical activities organized in the kindergarten. It seems that at this stage of life sedentary behaviour does not pose a threat to orderly development processes.
2. The study confirmed the existence of a relationship between activity and physical fitness. Parents of children with higher motor skills declared their frequent participation in family, kindergarten, and especially extracurricular physical activities and little time spent on passive leisure.

Acknowledgements

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