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## Physical activity of children primary school aged in the context their BMI

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### Abstract

In the process of creating a positive attitude towards physical activities is very important to focus primarily on youngest age groups. Examine their habits and behavior in their lifestyles and to explore possibilities of interventions that promote positive behavioral habits in terms of their health. For the future generations of adults, then we can expect an increase in the benefits of physical fitness of the population, in a more responsible approach to their own health and the preference of a healthy lifestyle. The aim of the research is to determine the relationship between BMI and physical activity levels in children of school age. The research group consisted of 81 children from primary schools in the Czech Republic, the average age of  $10.23 \pm 0.42$  years. Information about physical activity (active energy expenditure, number of steps) were obtained by ActiGraph. The level of BMI were evaluated in accordance with the points of reference of the Czech Republic. We confirmed significant relationship between the level of physical activity in the leistung time after school lessons and BMI of children (p

<0.04). In boys were found statistically significant differences in physical activity at school ( $p < 0.05$ ) between the monitored categories of BMI. It is necessary to study habits and behavior of children in their lifestyle and look for possibilities that supports positive behavioral of interventions habits of in context of their health.

Keywords: children, primary school age, physical activity, Body Mass Index

Data was obtained by project International Visegrad Fund No. 11320057.

## **Introduction**

The problem of rising obesity due to lower rates of physical activity of youth and adolescents is mentioned in many researches (Salmon, Telford, Crawford, 2002 [1]; Cabak, Woynarovska, 2004 [2]; Charzewska, Wajszczyk, Chabros, 2006 [3]). According to the long-term study realized in the Czech republic, the number of steps per day of children lowers after two months from the start of the compulsory school attendance (Miklánková, Sigmund & Frömel, 2007 [4]). So there is the importance of taking care about the youngest age categories, when making positive relation to physical activities. There is the need of research children's habits and behavior of children and find opportunities of interventions which will support positive behavioral habits of children's lifestyle. Fixing positive principles in this area can create a premise to follow those positive principles even in adult age. They become important part of prevention in the fight against the lifestyle diseases, which arises for example like the result of overweight and obesity. In the future we can premise benefits like increased physical fitness of the population, more responsible attitude to their own health and the preference of healthy lifestyle.

The effects of school physical program on the overall level and quality of physical activity of children during the week is known today (Jansen et al., 2008 [5]; Lee, Burgeson, Fulton, Spain, 2007 [6]). Therefore it is necessary to monitor the quality of school educational programs in the areas of health education, especially in the youngest age categories. Some experts for example recommends state authorities to carry through at least 150 hours of physical education per week for all kids attending primary schools and high-schools into national programs (Davidson, 2007 [7]). Important part of this is establishing regular and repetitive monitoring of impacts of the qualified teaching of physical education. The *Toronto Charter for Physical Activity* (2010) [8] recommends to prefer those educational systems, which prefer educational programs with compulsory physical education. Physical education

should have high quality level and include especially „non-competitive“ physical activities. All teachers should be educated in the area of physical education, which means not only teachers specialized on physical education. Dowda, Pate, Trost, Almeid, Sirard (2004) [9] or Timperio, Salmon, Ball (2004) [10] see the importance of school supporting physical activity of children in the work of more qualified teachers, who can access more physical activities and higher level of quality physical program to children during their time in school. Zask, van Beurden, Barnett, Brooks, Dietrich (2001) [11] mention that school environment has an impact on the volume of spontaneous or directed physical activity. The idea of setting intervention programs for increasing physical activity of children and youth is gaining higher importance (Trudea, Shepard, 2005 [12]; Ward, Dowda, Trost, Felton, Dishman, Pate, 2006 [13]).

There are three main problematic areas defined in the Czech Republic: the change of preference orientation of citizens, development of material-technical base, widening the offers of physical and sports programs for different groups of population (<http://www.msmt.cz/sport/narodni-program-rozvoje-sportu-pro-vsechny>). This concept should be brought to life also by schools and educational institution.

The aim of the research was the analysis of motion behavior of children with different BMI. Hypotheses: 1. In the children with higher level of BMI is assumed lower level of physical activity at school. 2. In the children with higher level of BMI is presumed higher level of sedentary activities in time outside school.

### **Material and methods**

The research group consists of 81 children (36 girls; 45 boys) from the primary levels of Czech primary schools. The selection of probands was aimed according to the aims of the research. The average age of research group was  $10,23 \pm 0,42$  years. Due to the young age of the probands the confirmation of participation in the research of legal representative was asked for. The research was anonymous and voluntary. For the realization of the research was asked confirmation of the school management. The data about weight and height was collected by educated administrator (physical education teacher) through scale device TANITA BC-587 and anthropometer A-226. Data was obtained by project International Visegrad Fund No. 11320057.

The average height of the probands was  $145,66 \pm 8,38$  cm, the average weight was  $37,69 \pm 12,63$  kg. BMI and weight was scaled according to national reference values (Vignerová et al., 2006) (Table 1).

The average BMI of the research group was 17,59 kg/m<sup>2</sup> (boys 18,05 kg/m<sup>2</sup>; girls 16,79 kg/m<sup>2</sup>). There were three groups of probands created according to percentile graphs for assessment of children's BMI (Vignerová et al., 2006) (Table 2). There were no probands in so called limited zones: underweight (< 10) and obese (97 <).

Table 1 Evaluation BMI (Vignerová et al., 2006; modified)

Category	Percentile
obese	97 <
overweight	90– 97
plump	75–89
proportionate	25–74
thin	10–24
underweight	< 10

*Legende: Category ...category of BMI; Percentile ...percentile range*

Table 2 Groups of probands according to BMI (n = 81)

Group	BMI [percentile]	all	boys	girls
A	< 25	22	11	11
B	25–75	38	21	17
C	> 75	21	13	8
Summary		81	45	35

*Legende: A, B, C ... group of children according to the percentile range*

The information about physical activity of probands were collected through modified version of IPAQ questionnaire – short version (2005) [14]. From 102 distributed questionnaires came 78,43 % back. The questionnaire determines frequency physical activity (number of days per week) and level of realized physical activity (only moderate to vigorous physical activity). The questionnaire was enriched about questions considering PA at school and PA in leisure

time during week days after school. Our new look – we monitored also the duration of PA on the given level (min/day). Moderate to vigorous physical activity we evaluated comprehensively, separately at school and separately in time outside school lessons. Collected data about PA were transformed according to the questionnaire’s manual into intensity of physical activity. The frequency of physical activity or inactivity in the context of sex and BMI of probands was measured by chi square method ( $\chi^2$ ). Statistical significance of differences in the level of PA among groups with different BMI was measured by Kruskal-Wallis ANOVA. The level of statistical significance was declared  $p < 0,05$ . The results were compiled by the program STATISTICA 12.0.

## Results

There were 12 children with prevailing demanding intensity of physical activity PA (min. 3000 MET/week) in the research group (6 girls, 6 boys). And there were 69 kids with prevailing moderate level of physical activity (min. 600-2999 MET/week) in the research group (30 girls, 39 boys). Low intensity of PA (under 600 MET) was not found in the overall research group. There were found no significant differences in terms of BMI among groups during the monitored week in the volume of PA. But we can see lower volume of PA of the over-weighted children (group C), mainly in case of boys (Figure 1).

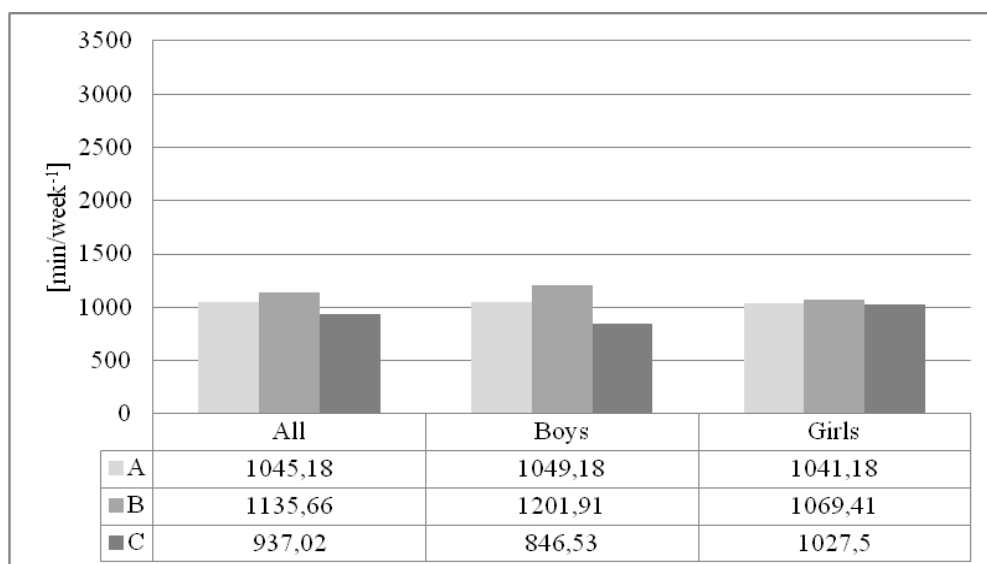
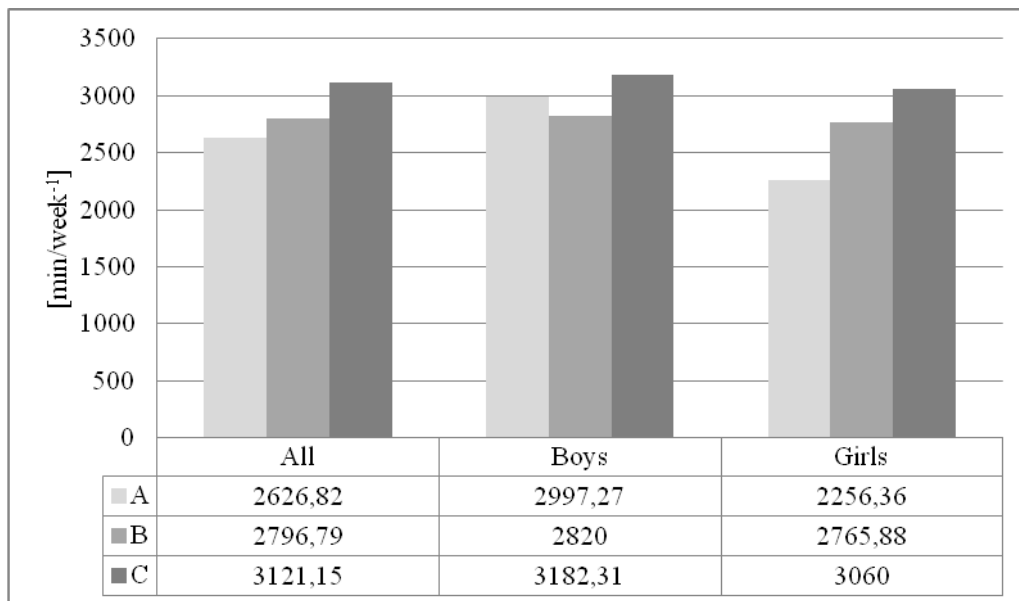


Figure 1 The volume of physical activity [ $\text{min}/\text{week}^{-1}$ ], ( $n = 81$ )

*Legende: A, B, C group of children according to the percentile range;  $\text{min}/\text{week}^{-1}$  ... total number of minutes per week*

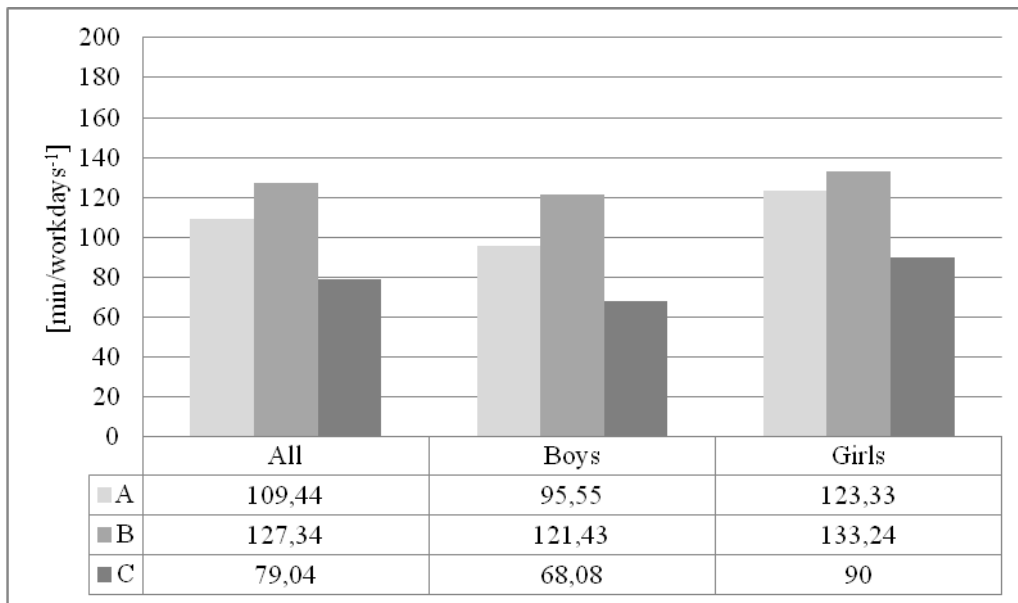
The volume of inactivity of children with overweight is higher than of children with normal BMI even though it is not statistically significant (Figure 2).



*Legende: A, B, C ... group of children according to the percentile range; min/week<sup>-1</sup> ... total number of minutes per week*

Figure 2 The volume of physical „inactivity“ [min/week<sup>-1</sup>], (n = 81)

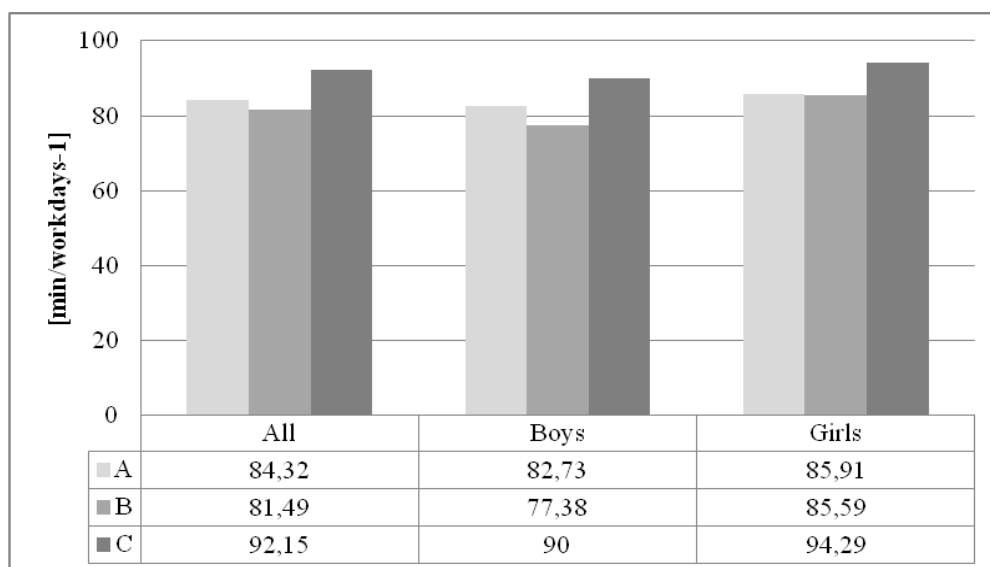
We confirmed significant relationship between volume of physical activity in the leisure time after school lessons and BMI of children ( $p < 0.05$ ) during workdays (Figure 3). Closer relationship between BMI and physical activity was found in boys ( $p < 0.04$ ). There was no significant relation found in girls ( $p < 0.06$ ).



Legende: A, B, C ... group of children according to the percentile range; min/week<sup>-1</sup> ... total number of minutes per week

Figure 3 Physical activity in the leistung time after school lessons [min/workdays<sup>-1</sup>], (n = 81)

In boys were found close relation statistically significant differences in physical activity at school (p<0.05) between the monitored categories of BMI. In this case the time at school has an activating effect (Figure 4).



Legende: A, B, C ... group of children according to the percentile range; min/week<sup>-1</sup> ... total number of minutes per week

Figure 4 Physical activity at school [min/workdays<sup>-1</sup>], (n = 81)

## Discussion

The obesity in childhood can increase the risk of many diseases and illnesses in adulthood (e. g. Rychtecký, Tilinger, Chytráčková, Sloupová, Unger, Řepka, 2006 [15]; WHO, 2011 [16]). According to Tláškal (2006) [17] the obesity of 7 years old children is present in roughly 51 % into adulthood, if it is not dealt with in childhood. Some experts (Kunešová, 2006 [18]; Cabrnchová, 2006) [19] assume continuity between increased number children with overweight with the change of children's movement program due to the start compulsory educational. Low volume of PA of children with overweight during school lessons could lead to promote sedentary behavior. Relationship between family environment and physical activities of child was confirmed by many researches (e.g. Dowda, Dishman, Pfeiffer, Pate, 2006 [20], Silventoinen, 2003 [21]; Trudeau, Laurencell, Shephar, 2004 [22] etc.). Research Unit Sport Scotland (2003) [23] recommends to parents to monitor the child's weight and react on inclinations to passive spending of leisure time (watching TV, video, DVD, playing computer games) mainly of children aged from 6 to 12 years.

Activities which could be done by both - children and parents are preferred (Malina, Bouchard, Bar-Or, 2004 [24]; ČSL JEP, ČOS JEP, 2006 [25]). On the other side the more active kids could be limited by the time spent at school (Barnett, O'Loughlin, Gauvin, Paradis, Hanley, 2006 [25]; Corbin, Le Masurier, Franks, 2002 [26]). We see the low volume of PA at school time primarily in girls with normal weight in the research group. Analysis of the effects of school curricula shows how much contribute to an increase in moderate to vigorous physical activity a child. Schools also have the potential to affect PA children by encouraging increased participation in extracurricular physical activities (leisure activities offered at the school, exercise equipment, supervision of teachers etc.). Children have a positive attitude towards physical activities, but as they age, their perception of the PA as a positive experience declines. Quality educational programs in schools can help sustain this positive perception of the PA and older (A. Lee, S. H. Lee, Tsang, To, 2003 [27]; Trudeau, Shephard, 2005 [28]). According to Corbin (2002) [29] or Dowda, Pate, Trost and Sirard (2004) [30] there is the importance the complexity of children's school physical program in the support of PA. School educational programs focusing on quality exercise regimen pupils have no direct impact on the health of the child, but the positive effects will be reflected in other development phases of life of the individual (Dyment, Bell, 2007 [31]; Going, Thompson, Cano, Stewart, Stone, Harnack, et al., 2003 [32]; Lowry, Wechsler, Kann, Collins, 2001 [33]; McKenzie, Marshall, Sallis, Conway, 2000 [34]).



## Conclusion

From the results is clear that the problematic part of the day is the time spent at school. One option how to gain the positive changes is increasing the quality of all forms of school physical education is optimalization of movement programs of primary schools. In accordance to other authors we consider this as a crucial point to evaluate school educational programs on primary schools. The next starting step is to focus on the university education of future teachers on the level primary schools.

Improve the quality of education of teachers in terms of physical activity of children and of educational subject physical education. It should be a greater number of studies that deal with the influence of education programs on healthy individuals behavior in adulthood and allowing optimum use of the time allocated in curricula, physical activities and physical education. Also the cooperation of family and schools in the field of health education should become an ordinary experience. If the physical activities are an ordinary part of children's and family's lifestyle we can premise that the children will transform the same pattern into their new families in adulthood.

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