

# Education of Children in the Area of Physical Activities as a Foundation for Lifelong Sports

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## Abstract

The aim of the research was to analyse the level of movement skills in pre-school aged children in context of stimulation to physical activities at school and in the family background. The research group consisted of 62 pre-school aged children (28 boys, 37 girls) with average age 5,6 years. TGMD-2 test was used for the assessment of the quality of movement skills. Questionnaire ESPA was used for the assessment of the stimulation level to physical activities of children. The level of pre-school children's movement skills was assessed in groups with different stimulation to physical activities. Among those groups was found statistical significant difference ( $p \leq 0,001$ ). Children with high and above average stimulation to physical activity show higher level of managed movement skills. Due to low age of children, parents play significant role. The research results in pre-school children indicate positive importance of aimed stimulation to children's physical activity which creates quality basis for future lifelong sports. The data was obtained within the project GF\_PdF\_2018\_006.

**Keywords:** preschool children, gross motor skills, stimulation to physical activities

## 1. Introduction

The current problem in many countries of the world is the increasement of civilization diseases caused, among other things, by the lack of physical activity. Therefore, it is in the interest of physicians and educators to find a mechanism to prevent and promote health. In the youngest age categories, it is necessary to develop an algorithm of so-called "healthy" behavior and to create a habit of spending leisure time actively. A lifelong learning system in the field of physical education and the development of motor skills plays an important role in this. The level of child's motor skills is an important factor in the lifelong learning process of movement skills and the formation of a positive relationship to physical activity. Positive effects on physical health are sufficiently clarified (Biddle & Asare, 2008; Mark & Janssen, 2008; Proper, Singh, van Mechelen, & Chinapaw, 2011; Ruiz et al., 2008). Researches from recent years also suggests a comprehensive relationship between cognitive component, motor development, and an amount of acquired motor skills (Abdelkarim, 2017; Decker, England, Carboni & Brooks, 2011; Howie & Pate, 2012; Jenni, Chaouch, Cafflisch, & Roussonc, 2013; Tomporowski, Lambourne, & Okumura, 2011). Evidence has been found that there is a positive relationship between the amount of physical activity, cognitive abilities and school success. The amount of motor skills that the child gradually acquires in the course of life are positively correlated with cognitive functions. The ability to coordinate movements, visual-motor function, and overall physical fitness predict school maturity and school readiness of the child. Physical activity has a positive effect not only on the child's cognitive function but also on the structure and function of the brain. (Haapala et al., 2014; Huang et al., 2015; Pang & Fong, 2009; Van Dusen, Kelder, Kohl, Ranjit, & Perry, 2011). Therefore, aimed support for the lifelong learning of a wide range of motor skills from childhood as a prerequisite for a positive approach to physical activity is highly important. Motor deficiencies in the area of motor skills highlight the possibility of learning disabilities. Problems in the field of gross motor skills, especially in children, are negatively reflected in the process of socialization and adaptation to the school environment. They can lead to the rejection of an individual by a group of children and consequently to a gradual reduction of the child's activity already in pre-school education (Ahmadi & Shahi, 2010; Gwynne & Blick, 2004; Venetsanou, Kambas, Aggeloussis, Serbezis, & Taxildaris, 2007). As children with motor disorders also have difficulties with motor learning of movement skills, they do not participate in sports and physical activities that lead to decline of total physical fitness, social isolation, and in the end to loss of motor skills (Pahlevanian, & Ahmadizadeh, 2014). As a result, the level of social attractiveness of the individual within the classroom is reduced, which can lead to individual rejection and consequently to bullying (Smith et al., 2013; The American Occupational Therapy Association [AOTA], 2014).

The level of motor skills is also related to the ability of the child to adapt to the new environment and the orientation in relationships and behavior in the new social group (Arbesman, Bazyk & Nochajski, 2013; Cho, Ji, Chung, Kim, & Joung, 2014; O'Donnell, Deitz, Kartin, Nalty, & Dawson, 2012). Well-managed locomotor and manipulative skills allow children to participate in activities with other children in both the classroom and extracurricular activities. During these activities, spontaneous development of social competences and communicative skills occurs. The ability to successfully participate in common movement tasks in a group of children thus leads to an understanding of social rules and significantly supports and speeds up the process of socialization (Biddle & Asare, 2011; Fedewa & Ahn, 2011). A childhood social behavioral algorithm can support the ability to integrate seamlessly into the group even in older age categories, including adapting to the social environment of the working group in adulthood.

Experts (Ericsson, & Karlsson, 2014; Kantomaa et al., 2013; Hasanati, Khatoonabadi, & Abdolvahab, 2010; Mohammadi, Nazarian, & Sabzi, 2009) recommend focusing on developing the physical activity of the population in the youngest age and stimulating the child towards lifelong learning in the area of motor skills. Early diagnosis of childhood motor impairment also provides opportunities for faster initiation and programming of interventions and increasing the probability of successive improvements of the diagnosed negative state. An important role in the process of creating a positive relationship to physical activity is one of the factors supporting health education in the field of physical education. Education in the field of physical education in the education systems of most states is focused on age groups - from school age to adolescent and adult population. However, in a number of countries, it is also targeted at preschool children, and through the offer of lifelong learning in the area of leisure time activities also applies to older people and senior citizens. Aimed support in mentioned field which starts in the youngest age categories has later - in the following age categories - more significant effects (Scheerder et al., 2006; Venetsanou, Kambas, Aggeloussis, Serbezis, & Taxildaris, 2007). Therefore, the purpose of this research is to extend the area of study to the stimulation of physical activity in physical education at kindergarten and in the family of pre-school children to the level of its gross motor skills. The aim of the research was to map and evaluate the level of gross motor skills in preschool children and to assess possible differences in the level of the children's motor skills in the context of stimulation to physical activity. The partial aim was to compare the level of motor skills of pre-school children in terms of gender.

Within the framework of this research, the following issues have been solved: 1. Is there a significant relationship between stimulation to physical activity and the level of gross motor skills of preschool child? 2. Are there significant differences in the level of gross motor skills from a gender perspective already in pre-school children?

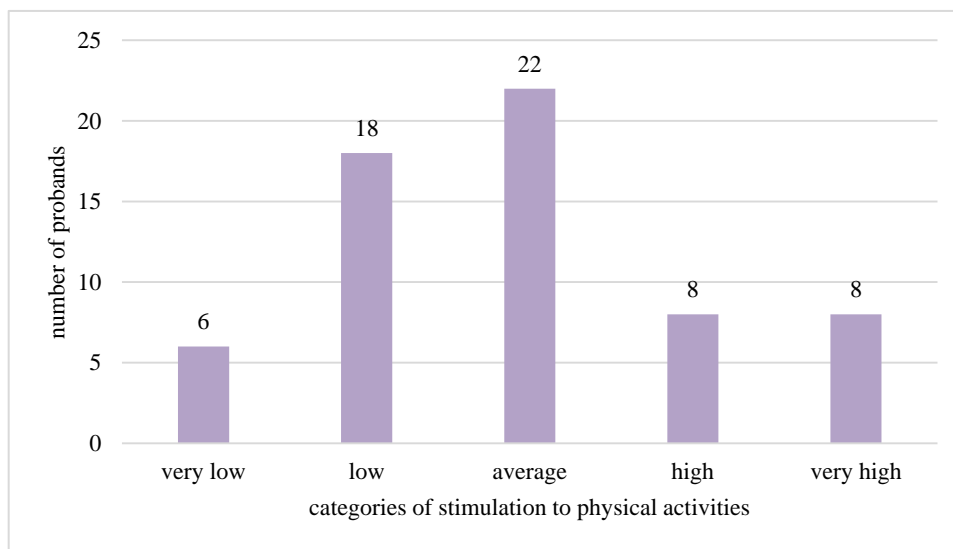
## 2. Methods

The research was carried out between April and May 2018. The testing of probands was approved by the Ethics Committee of the PdF UP in Olomouc and the managements of nursery schools. Altogether, 75 legal representatives/parents of pre-school children were approached. Based on the agreement of the legal representatives, a total of 62 children (25 boys, 37 girls) with an average age of  $5.8 \pm 0.38$  years, average height of boys  $118.88 \pm 4.12$  cm, girls  $118.42 \pm 1.22$ , average boys weight  $21.42 \pm 4.58$  kg and girls  $21.05 \pm 3.06$  kg. None of the children were obese or disabled. All children attended nursery schools that had an educational plan in accordance with the legislation for pre-school education and conditions for physical activities corresponding to the standards in the Czech Republic. Legal representatives/parents of children were informed about the realization of the research, acquainted with its goals and organization of the research. Legal representatives/parents of children have been declared anonymity of the data they have obtained, and the possibility for the child to withdraw or interrupt the research at any time. During the research, children's reactions were monitored and, in the case of negative signs, the testing was canceled. The level of stimulation to physical activity (PA) was determined by a modified version of the Environmental Stimulus for Physical Activity questionnaire (ESPA) (Renson & Vanreusel, 1990). Due to the low age of the children, information on the individual components of PA stimulation (spatial, material and transport stimulation, and incentives for social participation in the family) was obtained from their parents. The same information, but about PA stimulation in kindergarten, was obtained from kindergarten teachers who observed a particular child. In accordance with the ESPA questionnaire evaluation manual, 5 groups of children with different levels of PA stimulation were created: very low level of stimulation to PA - score below 48 points, low level of stimulation to PA - a score of 48 to 60 points, average level of stimulation to PA - 61-86 points, high level of stimulation to PA - 87 - 99 points and a very high level of PA stimulation - over 99 points. The level of motor skills was determined by the TGMD-2 test (Gross Motor Development, Ulrich, 2000) which monitors the level of locomotor and manipulative skills. The gross motor score is converted to a standard score in the child's age context and further to the Gross Motor Development Coefficient (GMDQ). GMDQ is divided into seven categories: very poor < 70 points, poor 70-79 points, below average 80-89 points, average 90-110 points, above average 111-120 points, superior 121-130 points, very superior >130 points. The testing time for children in the gross motor skills level was distributed to the morning hours of the kindergarten where spontaneous activities took place. Testing was always attended by the pedagogical worker of the kindergarten. Only complete proband data from complete testing and polling was included in the results. Due to the

low proband representation in the individual PA stimulation categories, the statistical significance of differences in GMDQ was processed by Kruskal-Wallis variance analysis. The overall level of PE stimulation in the context of the GMDQ level of the research population was determined by the t-test. Significant significance of differences in GMDQ from the point of view of gender was processed by the Mann-Whitney test. The data was obtained within the project GF\_PdF\_2018\_006.

### 3. Findings

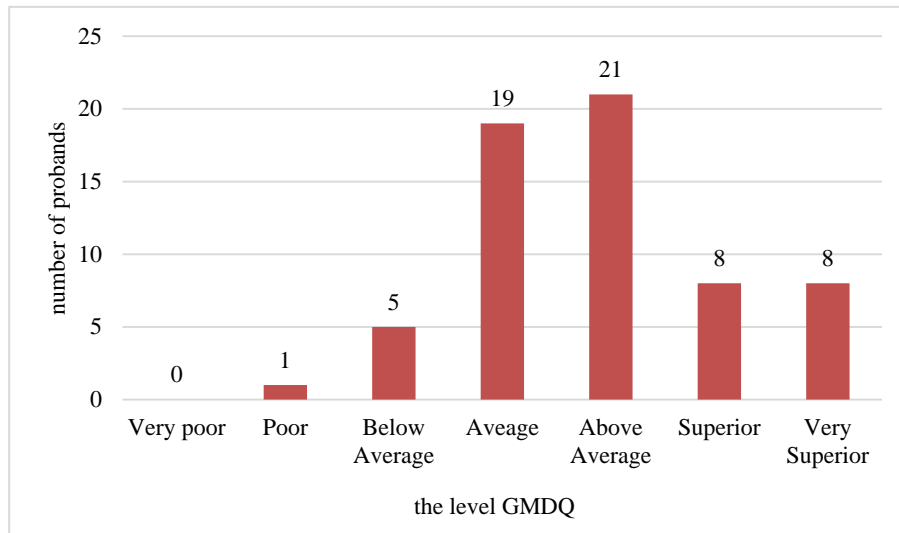
In terms of PA stimulation in context with environment, the total number of probands was 29.03% in the low PE stimulation group and 35.48% with the average level of PE stimulation. High and very high levels of stimulation showed 12.9% in each group. On the other hand, only 9.68% of children (Graph 1) were found in the very low PE stimulation category. The average score achieved by the research group of pre-school children was  $73.17 \pm 7.40$  points out of a maximum of 120 points. In the sub-area of spatial stimulation (offering space for games and children's sports), the research group achieved 13 points from a maximum of 24 points. Due to the low age of children and the demands for their safety, nursery schools offer standard facilities according to the legislation - playrooms and playgrounds in the premises of these schools. In families, the situation is more positive. Material stimulation to PA (offering toys and sports tools encouraging a child to PA) is closely related to the financial possibilities of kindergartens and families. The research group reached a score of 18.33 points from a maximum of 28 points. In the field of transport stimulation (preference of the way of transport to kindergarten and back) the average number of points was 2.62 out of the maximum possible 4 points. Parents mostly preferred active transport - walking (69.35%) and part of the children were transported to the kindergarten by car (20.97%). From the point of view of stimulating social participation (spending leisure time in facilities focused on physical activity and participation in sports summer camps), the research group reached 3.39 points out of a maximum of 8 points. A total of 33.87% of children from the research group have never been a member of any children or sports organization. The permanent members of the sports organization were 24.19% of the children. On the other hand, only 4.84% of children are permanent members of children's organizations that offer other leisure activities (eg arts, chess, musical instrument, etc.) than physical activities. Participation in sports camps (summer and winter) confirmed 2.1%. From the total number of monitored probands, 83.87% never participated in any children's camp or sports camp. Only 1.61% of children out of the total were already in pre-school age at both children's and sports camps. In this area, an average of 1.28 points was obtained from a maximum of 4 points.



Graph 1. Categories according to the level of stimulation to physical activities (n=62)

Legende: number of probands-the occurrence frequency of people in the categories of stimulation to physical activities

The positive finding is that in the area of gross motor skills most of the preschool children achieved average and above average values (average - 31%, above average - 34%). Low number of probands was in poor (2%) and very poor category (0%). The same percentage (13%) of probands was in the upper and very superior categories (Graph 2). In the subtest of locomotive skills, the probands scored in average  $43.23 \pm 6.34$  points, while in the subtest skills of the manipulative skills the average score was  $31.89 \pm 8.73$  points. The average GMDQ achieved by the research group was  $111.24 \pm 15.92$ .

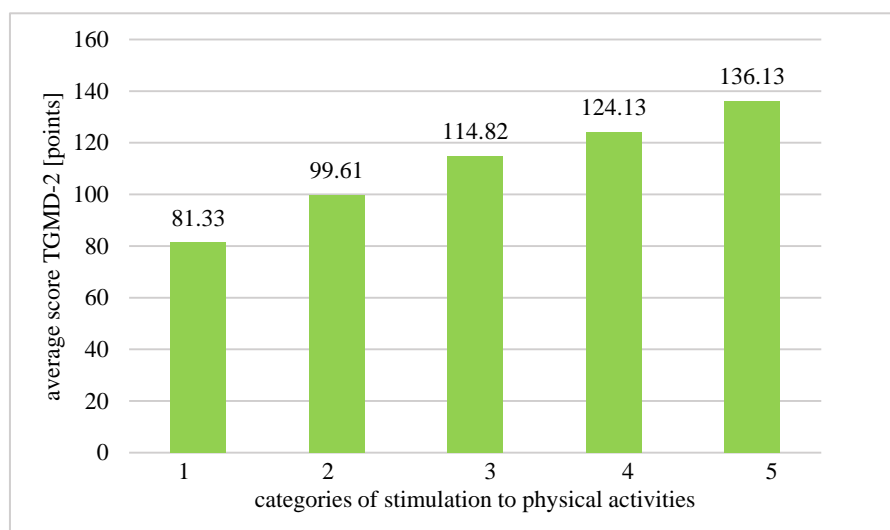


Graph 2. Categories according to the level GMDQ (n=62)

Legende: GMDQ-Gross Motor Development Quotient; number of probands-the occurrence frequency of people in the categories of the Gross Motor Development Quotient

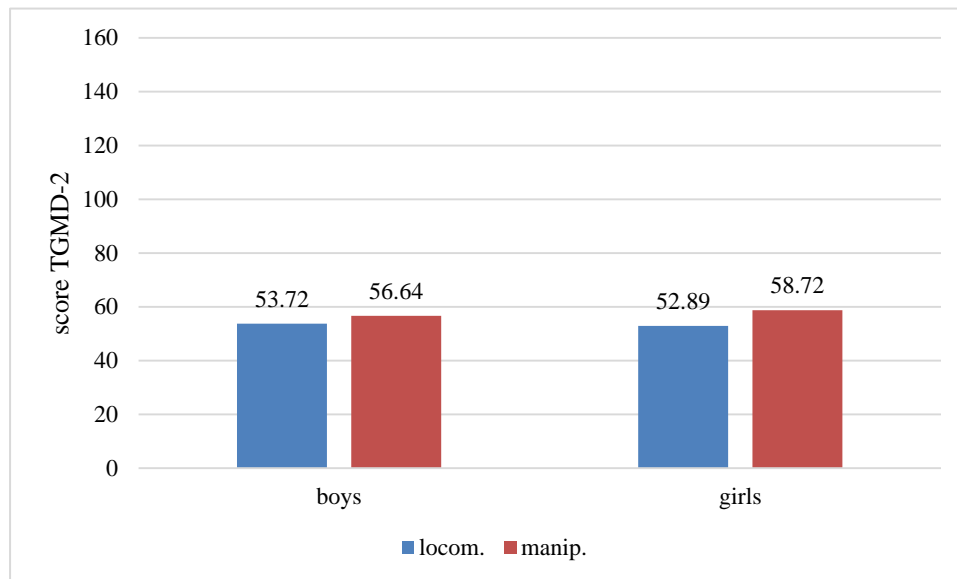
**4. Results, Conclusions and Recommendations**

There was significant difference ( $t=18.17$   $p < 0.001$ ) found between the levels of stimulation of children to physical activity and levels of their gross motor skills (GMDQ). Children more motivated to physical activity by offering a suitable environment or sporting aids and sports tools achieve better results in the assessment of movement skills (Graph 3). Among the individual groups of probands created from the point of view of PA stimulation (Graph 1), Kruskal-Wallis analysis showed statistically significant differences ( $p < 0.001$ ) at the GMDQ level for very low and average, high and very high groups. Among the low and average groups the statistical significance was found in GMDQ difference  $p < 0.01$  and between low and high and also among low and very high  $p < 0.001$ . The proband group placed in the average category showed the statistical significance of the difference in the GMDQ value also with the group in the very high category ( $p < 0.01$ ). There was not found a significant difference between high and average PA and high and very high PA groups (Table 1). In the average GMDQ were found no statistically significant differences between girls and boys in children from the research group ( $U = 426.00$   $p = 0.63$ ). Nevertheless, there was a slightly higher success rate in locomotor skills in boys and the opposite in girls in manipulative skills (Graph 4).



Graph 3. Score of gross motor skills in the context of stimulation to PA [points] (n=62)

Legende: 1-very low level stimulation to PA; 2-low level stimulation to PA; 3-average level stimulation to PA; 4-high level stimulation to PA; 5-very high level stimulation to PA



Graph 4. Categories according to the level GMDQ of boys and girls (n=62)

Legende:score TGMD-2-points of score;locomot.-locomotor skills; manip.-object controlling skills

Table 1. Statistical difference in the GMDQ between groups with different level of stimulation to PA (n=62)

GDMQ	1	2	3	4	5
1		1,41	3,85**	4,82**	5,64**
2	1,41		3,49**	4,57**	5,61**
3	3,85**	3,49**		2,01	3,09*
4	4,82**	4,57**	2,01		0,89
5	5,64**	5,61**	3,09*	0,89	

Legende: \* p<0,05; \*\*p<0,01–0,001

When focusing on physical activity, it is not possible to rely on the child's natural desire for movement, but it is necessary for the school and family to stimulate the need of movement to develop this need. A positive change in environmental stimulation to PA may also trigger a positive change in movement behavior, whether it is directed to correcting an individual response to the environment or changing the environment (Ewing, 2005; Kuo, Voorhees, Haythornthwaite, & Young, 2007). Support for PA is achieved through the expansion of hiking and cycling paths, financing of public facilities, more efficient PA Urbanization, expanding the proximity of PA neighborhoods, building children's playgrounds in the residential area, increasing publicity of PA and supporting and creating comprehensive education programs in the field of health care (Frank & Engelke, 2001; Pate, Pfeiffer, Trost, Ziegler, & Dowda, 2004). Increased PA was found in children attending kindergartens with sufficient indoor and outdoor space compared to children from schools located in one building in the city center (Louie & Chan, 2003). The material and spatial facilities of schools' kindergartens and primary schools are closely related to their financial capabilities and to the attitude and willingness of nursery staff to use sports aids and space to stimulate children to physical activity. Although children attending kindergarten spend most of the day in this environment, the family of the child plays an important role in building a positive relationship to physical activities, for example by supporting active transport to and from kindergarten. By preference for the movement and active spending of leisure time, this lifestyle becomes natural for children in the future (Healthy People 2020, 2010). Higher levels of schools (elementary school, secondary and university) can later on more easily develop and promote this desirable active behavior of children, later pupils and students (Dagkas & Stathi, 2007; Daum & Buschner, 2012; Hestbaek, 2017). Further exploration of this issue is necessary, especially in the youngest age categories, in order to understand the mechanism of the transfer of movement-active behavior into older age groups and to use this knowledge in the development of curricular documents for education (Cools, De Martelaer, Samaey, & Andries, 2009; Hastie, de Ojeda, & Luquin, 2011; The American Alliance for Health, Physical Education, Recreation and Dance [AAHPERD], 2012; I. D. Tudor, Grigore, & M. Tudor,

2014). By supporting the role of preschool education in the process of lifelong learning in the field of physical education and by searching for possibilities of targeted interventions for motor development we can gradually achieve a reduction in the extent of civilization diseases as well as the elimination of a number of problems that in later age categories affect not only physical but also mental, emotional health (Van Wely, Balemans, Becher, & Dallmeijer, 2014; Zeng et al., 2017). The state should put some pressure on school management to allocate sufficient time for systematically designed physical education of children in school education programs at all levels of schools could bring the desired effect in maintaining interest in PA in older age categories as well. In addition, consideration should be given to the extent of state support to economically weaker families and the share of schools as state institutions in supporting children's health. We recommend to pay attention to the economic consequences of civilization diseases that lead to insufficient PA in the lifestyle of humans, and at least to quantify the economic impact of these civilization illnesses on the future generation. There is a need to develop a sophisticated system of lifelong learning in the field of physical education and sport - from children, youth to adults and seniors - in the field of healthy lifestyle and its benefits to the quality of life of every individual.

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