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**GROSS MOTOR SKILLS AND VERBAL COMPETENCES OF A  
PRIMARY AGED CHILD**

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*Abstract*

Gross motor skills are considered to be in connection with different cognitive abilities. The relationship is not clearly stated in various contemporary researches. The research question: Is there a relationship between the level of gross motor skills of primary aged children and their verbal competences? The purpose of the study is to assess the relationship between the level of gross motor skills and verbal competences of children in primary school age within the project GF\_PdF\_2019\_0003 and therefore contribute to problematics of connection between motor skills and cognitive abilities of a child. The research group consisted of 200 children from Czech elementary schools at the age  $9,87 \pm 0,65$  years. For the assessment of gross motor skills was used TGMD-2 test battery. The verbal competences of a child were assessed by Czech version of Cognitive abilities test. The Ethics Committee approval of the author's department was obtained for the research. More than half of children (57 %) scored average level of gross motor skills. And bigger percentage (22,5 %) scored lower levels than average. The results indicate loose relationship between motor skills and verbal competences of a child in primary school age. Motor skills of the research group were mostly average and so were the verbal competences. But, both measured categories deserve higher focus from the primary teachers. Verbal expression will be useful for the child in future life and good motor skills can also allow better social connection in professional life

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**Keywords:** Motor skills, verbal competence, child.



## 1. Introduction

Basic motor skills present an important part of physical education programs in pre-primary and also primary education (Akbari et al., 2009; Payne & Isaacs, 2011). The importance of development of motor skills has shown that body actions play a critical role in children's cognition (Needham & Libertus, 2011). Many authors in recent years investigate motor skills in connection with different cognitive abilities (Gashaj, Oberer, Mast, & Roebbers, 2019; Cadoret et al., 2018; Higashionna et al., 2017; El-Hady, El-Azim, & El, 2018; Oberer, Gashaj, & Roebbers, 2018). The results and points of perspectives are different across the field. Oberer, Gashaj and Roebbers (2018) focused on different school readiness factors measured in kindergarten with the aim to predict later academic achievement during compulsory school education. In addition, this study confirms that basis for successful school years are set even lower than the beginning of compulsory school education. Very important is also education in pre-school age in kindergartens. Another study in older children of Cadoret et al., (2018) showed that motor proficiency, cognitive ability and academic achievement were positively correlated with each other. And authors highlight the fundamental importance of motor skills in children's academic achievement in early school years. In the Czech Republic is the topic of motor skill proficiency in connection with cognitive and executive function still neglected. This project (GF\_PdF\_2019\_0003) should highlight the importance of motor skills and bring some change to Czech system of education, where physical education and physical activities do not have the optimal position. This is highlighted especially in the foreign literature and foreign countries all over the world, where also intervention programs are created to improve motor proficiency of children (Bellows, Davies, Anderson, & Kennedy, 2013; Jones, et al., 2011, etc.). Libertus and Hauf (2017) investigated perceptual, social, and cognitive development in connection with motor skills. Our focus is on verbal competences of a child. Verbal intelligence is also widely researched in different connections (Ayduk et al., 2007; Deckert, Schmoeger, Schaunig-Busch, & Willinger, 2019; van der Schuit, Segers, van Balkom, & Verhoeven, 2011; Francis, Hawes, Abbott, & Costa, 2018; Jackson & Beaver, 2015). Verbal competences are part of cognitive abilities and in our case means operations with symbols representing words, which is caused by the selection of the research method (see below). Houwen, Visser, van der Putten, and Vlaskamp (2016) dealt with connection between language development, which can be associated with verbal competences, and motor skills like in our case. In the Czech Republic there is no study aimed in this direction. The main aim of this study is to assess the relationship between the level of gross motor skills and verbal competences of children in primary school age, which can lead to improving position of physical education within the system of compulsory subjects in lower level of primary schools. This issue may also be a subject of lifelong education for primary school teachers, who can increase the level of gross motor skills due to regular intervention or optimal level (appropriate activities, correct technique, suitable load interval, etc.) of physical activity within the physical education lessons. So the results of this study can go beyond the borders of primary schools but also help increase the level of future primary teachers.

## 2. Problem Statement

Fundamental motor skills are currently in scope of attention of many researches from different points and perspectives (Akbari et al., 2009; Payne & Isaacs, 2011; Gashaj, Oberer, Mast, & Roebbers, 2019;

Cadoret et al., 2018; Higashionna et al., 2017; El-Hady, El-Azim, & El, 2018; Oberer, Gashaj, & Roebbers, 2018). Deeper understanding of this perspective and important issue can lead to increased quality of education, which is important for future welfare of the society. Confirmation of the relationship between motor proficiency and verbal competences of children can lead to better position of Physical Education in primary schools, where this subject is compulsory but rather neglected. Also the preparation of future teachers can be affected by the results deeper understanding of this phenomena.

### **3. Research Questions**

The main research question is, if there is a relationship between the level of gross motor skills of primary aged children and their verbal competences.

- 3.1. Will there be found significant differences in the level of gross motor skills in terms of gender?**
- 3.2. Are girls significantly better in locomotor skills?**
- 3.3. Do boys have significantly higher level of object control skills?**
- 3.4. Are there significant differences in verbal competences between genders?**

### **4. Purpose of the Study**

The purpose of the study is to assess the relationship between the level of gross motor skills and verbal competences of children in primary school age within the project GF\_PdF\_2019\_0003 and therefore contribute to problematics of connection between motor skills and cognitive abilities of a child.

### **5. Research Methods**

The research group consisted of 200 children from Czech elementary schools at the age  $9,87 \pm 0,65$  years. Primary school education starts the child after reaching the age of six. The research was approved by the Ethics Committee of the Pedagogical Faculty of Palacký University in Olomouc and implemented as part of the IGA\_PdF\_2019\_015 project. The child was placed in the research after signing written agreement of his / her parents / legal representatives and after the approval of the management of kindergartens. The participation in the project was voluntary and free of charge. The anonymity of the data was declared and guaranteed to all participants. Children may have asked questions during the testing, could at any time temporarily interrupt or leave the research based on their decision or decision made by their parents/ legal representatives. Children's responses were observed and, in case of a negative reaction, testing was interrupted or ended. For the assessment of gross motor skills was used TGMD-2 test battery (Ulrich, 2000). The test monitors the level of locomotor and object control skills. The result is a standard score that is converted from rough score based on the child's age and gender. The standard score is converted to Gross Motor Quotient (GMQ), which is an indicator of the final level of gross motor skills. Based on GMQ, the level of motor skills is assessed in the following categories: very superior (>130 points), superior (121–130 points), above average (111–120 points), average (90–110 points), below average (80–89 points), poor (70–79 points) and very poor (<70 points). The verbal competences of a child were assessed by Czech version

of Cognitive abilities test. The cognitive abilities test allows the assessment of an individual's abilities. It provides a series of individual measurements using abstract and symbolic relationships and manipulation with those relationships. The test is constructed on the basis that three types of symbols play a role in children's and adult thinking: symbols representing words, symbols of quantity, and symbols representing spatial, geometric or pictorial patterns (Thorndike & Hagen, 1998). The word battery, which was used for the measurement of verbal competences, contains the following four subtests: vocabulary, sentence completion, classification of terms, and verbal analogies. For the research group was used test variant C for children aged 9.6 to 11.3 years. The achieved gross score (number of correct answers) is converted according to the child's age into the standard age score (SVS) and the corresponding percentile. The correlation between the level of motor skills and the level of verbal competences was declared with correlation coefficient. Gender differences in gross motor and verbal competences were evaluated by t-test. The level of significant importance was declared on  $p < 0.05$ . Data were processed by software STATISTICA, version 13.4.0 (Tibco Software, Inc., 2019).

## 6. Findings

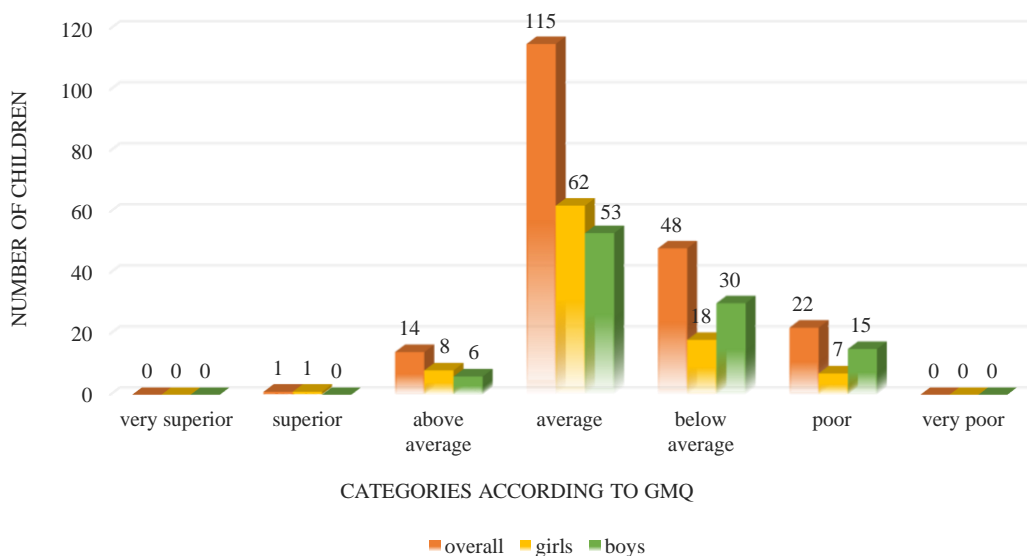
The main research question was, if there is a relationship between the level of gross motor skills of primary aged children and their verbal competences. The results confirmed the relationship between motor skills and verbal competences of a child in primary school age. The results revealed moderate positive correlation  $r_s = 0,49$ , but this value was statistically significant on the level  $p < 0.05$ . The research group achieved in average GMQ  $95,67 \pm 11,17$  points and in SVS  $103,32 \pm 11,02$  points (Figure 01).

The results from the area of motor skills indicate that more than half of children achieved average score of gross motor skills (Table 01). But more than one third of assessed children achieved lower score than average, which is rather alarming. The fact is just confirmed by the results that show that only 7,5 % of children have higher level of gross motor skills than is the average.

**Table 01.** Children divided into categories according to GMQ standard score (n=200)

GMQ category	Number of children	Percentage
very superior	0	0%
superior	1	0,50%
above average	14	7%
average	115	57,50%
below average	48	24%
poor	22	11%
very poor	0	0%

Further examination of the results showed that were found statistically significant differences between boys and girls in the level of gross motor skills ( $p=0,002$ ). Mean values of GMQ for girls is 96,53 while boys achieved only 91,92 points. Detailed results including the data about motor proficiency are shown in the Figure 01.



**Figure 01.** Children divided into categories according to GMQ standard score (n=200)

In locomotor subtest boys achieved greater dispersal in the level of locomotor skills. Boys scored the lowest standard scores but also the highest, while girls were grouped rather in higher numbers in categories around and above 10 points of standard score. Statistical analysis confirmed no essential difference between boys and girls ( $p=0,12$ ). Girls achieved slightly better average results (9,93) than boys (9,41).

In object control subtest boys again represents more categories according to standard score. This fact caused that there was found a statistically significant difference between boys and girls in object control skills ( $p=0,01$ ), where girls had in average 8,92 points of standard score, while boys only 7,89 points.

The last research question was connected to differences in gender in terms of verbal competences. Used statistic method (T-test) revealed no significant difference  $p= 0,46$ . Girls achieved in average 103,95  $\pm$  10,59 points, while boys scored in average lower values 102,75  $\pm$  11,42 points. It is clear that those results are really close to each other and that in this age there is no significant difference in verbal competences in term of gender.

## 7. Conclusion

The research results confirmed rather negative impact of primary school education and family background in Czech children. But the results can be also caused by inappropriate pre-school education, as it was mentioned in the introduction. The results from last years on different children from the Czech Republic unfortunately follow the same pattern, that mean Czech children reach generally average or worse categories of gross motor skills, which include locomotor and object control skills. The important thing is, that despite hints from current academic literature, also in the Czech Republic was confirmed the relationship between motor proficiency and part of cognitive abilities, which is represented in this study by verbal competences. Statistically significant moderate positive correlation  $r_s= 0,49$  was found, but this subject should be still more examined. Only after that we can generalize this findings and attempt to some

possible changes, primarily from the point of view of physical education, which still does not have adequate place within the compulsory school subjects.

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