

## ORIGINAL SCIENTIFIC PAPER

# Differences in Motor Abilities of Younger School Children based on their Sex

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## Abstract

The aim of this research is to determine whether there is any statistically significant difference in motor abilities of boys and girls of younger school age. The sample includes 76 examinees with 37 males and 39 females. All are 5th and 6th graders of primary school. The evaluation of motor abilities is based on 5 tests. Multivariate analysis of variance is applied for determination of differences within the whole system of motor tests, whereas univariate analysis of variance is used for determining differences in each motor test. According to the findings, statistically significant differences in motor abilities between boys and girls at the studied age can be noticed in the test 20 m running from flying start, which is in favour of boys and in the test sit and reach, in favour of girls, while the differences in other tests are not statistically significant. Considering the evaluation of motor abilities, boys have statistically much better results in the speed of alternative movements and explosive strength, whereas girls have achieved much better results in the test for flexibility. It has also been concluded that 5th and 6th graders have statistically better results in the space of coordination and explosive strength, whereas girls are much better in the field of flexibility and suppleness.

**Key words:** motor abilities, pupils, boys, girls

## Introduction

Physical education is part of general education. Nowadays, physical education is part of physical culture aside from sport and sport recreation. There are many definitions of physical education but they overall agree that this is a planned and directed process of forming human personality and primarily human's physical structure i.e. biomotor potential. In former socialist countries, physical education was understood as an integral part of general education with the first objective being comprehensive preparation and training people for work and personal defense. In our region, physical education is considered to be an integral and unalienable part of general education. Physical education is considered to be an integral part of general education with the objective of strengthening and improving health, encouraging proper growth and development, increasing the level of physical abilities, forming motor abilities and habits without disregarding the functions typical

for other forms of education.

Physical development represents the process of changes in morphological and functional human properties during an individual life. Each period of life (prenatal, early postnatal, childhood, youth, adulthood and senior age) are characterised by particular changes in the form and functional possibilities of the organism.

Physical education is directed towards the young people's health, development of physical strength without disregarding the spirit and certain intellectual qualities. This is a process of applying physical exercises and teachers' methodology for the purpose of forming, maintaining and improving motor abilities, psychological traits and social adaptation of personality. Physical development and physical education of a child contain the inclination of a child to question, discover, try and thus examine the space and the surroundings, enabling the acquisition of certain experience. Development of motor



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abilities is possible to realise via the teaching process of physical exercise which is to be implemented in a planned, rational and organised manner and therefore, it should be planned and programmed, and later realised and controlled (Findak, 1999). By testing certain motor abilities and comparing them with the existing norms, a better overview of the entire classes' abilities is possible.

Since motor skills develop from birth, their development is also experiencing some changes that occur during adolescence and go back to old age. Their development, especially in youth, is not always the same for boys and girls. For each motor skill, there is some sensible period in which the development is at its best. Individual differences in the dynamics of growth are a significant source of variability in form, function and capabilities of the human body. Turbulent and complex phenomenon of growth and development is a regular process, in which we can define a series of principles within which the individuality of the rate of change arouses special interest, particularly the demands exerted on the body through physical activity (Mišigoj-Duraković, 2008). At the beginning of school age, most of the nerve structures have been developed and the basic form of movement has been established thus making this age ideal for practising basic skills. The effects of exercise on the development of these skills can be observed earlier. During the middle and older school-age, basic skills training turns into a specific exercise, and combinations thereof, according to the requirements of each sport/discipline (Mišigoj-Duraković, 2008). Motor skills increase with maturation. Girls achieve motor skills plateau around the age of 14 and boys a few years later. Biologically more mature boys are more sensitive to the impact of training, which is not the case among girls (Malina, 1994). Knowledge of the principles of growth and development as well as morphological and functional and physiological changes that occur in youth is essential for anyone who directs a child to physical activity. If physical exercise is well chosen and dosed, it can be a stimulating factor in the growth and development, but excessive and/or age inappropriate physical activity can have a negative impact (Mišigoj-Duraković, 2008).

Previous researches show that the level of motor abilities development of pupils of both sexes within the assessed developmental period is different in relation to the respective sex. Conducted researches mostly indicated the superiority of boys in terms of motor abilities development. Based on the obtained results, any authors are concluded that there is a statistically significant difference between the subsamples defined according to gender at the level of motor skills. Boys are more dominant in the abilities that develop under the influence of physical exercise, while girls show much better results in flexibility. It can be concluded that irregular physical exercise results in poorer motor development among girls compared to boys (Badric, 2011).

The objective of this research is to determine whether there is a statistically significant difference in terms of motor abilities between boys and girls of younger school age.

## Methods

Data obtained in the research of differences in motor abilities of younger school children of different sex, are controlled and prepared for processing in accordance with the set research objective. Data bases were organised based on the monitored traits and prepared for the planned statistical pro-

cessing. Results obtained through the statistical processing are shown in the tables and they were assessed according to the associated logical units. Overall, the overview of the research results enabled perception of total differences in motor abilities of younger school children of different sex via availability of explanation of certain connections, in accordance with the objective of the research, i.e. it contributes to a clear determination based on the expected application of the obtained results in practice.

Based on the nature of scientific researches, this research belongs to the category of empirical studies, whereas in terms of the objective of implementation it represents an applicative research with the purpose of obtaining new knowledge and information required for practical use in the teaching practice in the educational institutions (Bala, 2007).

As for the time definition, this research has a transversal character, and it is consisted of a single measuring of appropriate motor abilities indicators pertaining to younger school children of different sex.

As for the level of control, this research belongs to the category of field researches conducted under natural living conditions (Bala, 2007).

## Sample of examinees

The sample of examinees was composed of 76 examinees, or more precisely 37 boys, with the average age of 11.76 years and 39 girls, with the average age of 11.99 years. The examinees were the pupils attending the fifth and sixth grades of the Elementary School „Dusan Radovic“ from Nis.

## Sample of tests for assessing motor abilities

Assessment of motor abilities was conducted by the use of 5 (five) tests:

1. Backward polygon (for coordination assessment);
2. Hand tapping (for assessment of alternative movements speed);
3. Standing long jump (for explosive strength assessment);
4. High start 20 m run (for speed assessment);
5. Seated forward bend (for suppleness assessment)

## Data assessment methods

Data assessment statistics contains descriptive statistics: arithmetic mean and standard deviation. Multivariate analysis of variance (MANOVA) was also applied for determining differences in the entire system of motor tests between boys and girls as well as the univariate analysis of variance (ANOVA) for determining differences in each motor test. SPSS program 20.0 for Windows was used for analysing the collected data.

## Results

Based on the presented basic descriptive statistics of motor tests in boys and girls (Table 1), it is noticeable that better average test results with the focus on coordination, speed of alternative movements and explosive strength were achieved by boys, whereas girls were better in the test assessing flexibility which might have been assumed.

Based on the presented results of the univariate analysis of variance between boys and girls and the results of the multivariate analysis of variance (Table 2), it is noticeable that the results of the multivariate analysis of variance  $p=0.000$ , indicate the existence of a statistically significant difference in motor abilities between boys and girls of the respective age. By

**Table 1.** Descriptive statistics of motor tests assessing boys and girls

Tests	AM		SD	
	B	G	B	G
Backward polygon	162.43	171.12	42.456	38.178
Hand tapping	18.67	18.67	2.157	1.876
Standing long jump	168.23	166.54	20.878	21.176
High start 20 m run	42.87	44.88	3.211	3.129
Seated forward bend	51.12	63.68	10.220	11.392

Legend: AM–arithmetic mean; SD–standard deviation; B–boys; G–girls

applying the procedure of the univariate analysis of variance (ANOVA) it was determined that there were statistically significant differences in favour of boys regarding the test High start 20 m run, whereas in the test Seated forward bend there was a statistically significant difference in favour of girls. In all other tests there were differences which do not hold statistical significance. The obtained differences were determined based on the level of statistical significance  $p < 0.05$ .

**Table 2.** Significance of differences (ANOVA) between sexes

Tests	f	p
Backward polygon	3.358	0.058
Hand tapping	0.421	0.513
Standing long jump	0.670	0.411
High start 20 m run	19.329	0.000
Seated forward bend	81.989	0.000

$F=15.144, P=0.000$

Legend: f–univariate analysis of variance test; p–level of significance of differences between groups within a single test; F–multivariate analysis of variance test; P–level of significance of differences between groups within a system of applied tests

## Discussion

Based on the obtained and analysed results of the multivariate analysis of variance and the univariate analysis of variance it can be deduced that there is a statistically significant difference among the examinees defined by the sex concerning the level of their motor abilities. Having analysed individual tests based on the univariate analysis of variance statistically significant differences were observed between boys and girls in the following tests: 20 m run, in favour of boys and Seated forward bend in favour of girls. As for the other tests, there were some observed differences; however, they held no statistical significance.

The assessment of motor abilities showed that boys scored statistically more significant results regarding the speed of alternative movements (tapping) and explosive strength (long jump), whereas the girls realised statistically better results in the test assessing flexibility (seated forward bend with legs apart) (Cvetkovic, Obradovic & Krneta, 2007).

In the research of differences in motor abilities among pupils attending the fifth and sixth grades, where the used sample included 213 girls and 224 boys from elementary schools, it was noted that the boys in both grades scored better results

in the domain of coordination and explosive strength, whereas girls scored better in the domain of flexibility or suppleness (Badric, 2011).

Over the last decades, motor abilities were one of the most frequent subjects in the field of physical culture. Motor abilities development level of pupils significantly conditions their regular growth and development. Unfortunately, over the last two decades we have been witnesses of all the more conspicuous tendency in reduction of physical activity of children which is not the scenario occurring only in our region but also in the surrounding countries (Siljeg, Zecic, Mrgan & Kevic, 2009). There are probably several reasons for such a situation, and some of them derive from the absence of the desire to start with physical exercises being exceptionally beneficial for the human being, which is again the result of the total lack in knowledge of values and irresponsibility for your own body, as well as the negligence of its needs, we associate men with technological innovations telling them that the need for any type of movement–exercising, is a tiresome waste of time and as such absolutely unnecessary (Zivanovic, 2009).

This research derives a conclusion on the existence of statistically significant differences between two assessed group, i.e. boys and girls. Similar researches indicate that the level of motor abilities of boys and girls within the assessed developmental period is different in relation to the examinees' sex. Conducted researched mostly indicated the superiority of boys in terms of motor abilities.

It is never too soon to start with the adoption of healthy habits and education on the importance of physical activity. Studies show that most children practicing a sport and being physically active in their childhood, retain such habits in their adult years. Physical activity also makes a positive impact on development–children practicing sport activities from their earliest years, develop work habits and self-discipline early in their life. On the other hand, it also has a positive role in the emotional development of children since it facilitates the process of their socialisation. Conversely, an inactive childhood can pose a serious hazard to health when the child turns into adulthood.

## Acknowledgements

There are no acknowledgements.

## Conflict of Interest

The authors declare there are no conflict of interest.

**Received:** 07 September 2017 | **Accepted:** 26 November 2017

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