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QUANTITATIVE ANALYSES OF THE DIFFERENCE IN THE MOTORIC SPACE OF OLDER SCHOOL AGE STUDENTS

ABSTRACT

In a sample of 255 students aged 12.4 years, divided into two subgroups: 136 boys and 119 girls attending primary schools in Belgrade, a research was conducted to determine quantitative differences in the motoricspace. For each hypothetical motoric factor was applied one motoric test prescribed by the Committee for the Development of Sport of the Council of Europe (1993). By applying the multivariate (MANOVA) analysis of variance there was determined a statistically significant difference in the overall motoricspace between boys and girls (F = 2.204; P = 0.000). By a separate analysis, univariate (ANOVA) analysis of variance, differences were observed in the variables Sitting forward bend in favor of the girls, and in the variables: Standing long jump, Hand grip, Lying body raise, Endurance in pull-ups, and the variable Cone running 10x5 meters in favor of the boys.

Key words: *primary school, differences, fourth grade children, motoric capabilities.*

1. INTRODUCTION

Physical inactivity of children, and premature decline in the level of motoric skills causes results in excessive body weight (Findak, & Mraković, 1998; Duraković, & Mišigoj-Duraković, 2006, Van Sluijs et al., 2007), which is a good foundation for development of cardiovascular diseases (high blood pressure, hypertension, ischemic heart disease), endocrine diseases (type II diabetes, insulin, and glucose intolerance), and imbalances of mental health (depression, anxiety, lack of confidence), which is indicated by findings (Morrison et al., 2002; Clarke, 1986; Freedman et al., 1999, Strauss, 2000; Sinha et al., 2002; Mišigoj-Duraković, 2008). Due to the presented analyses, regular monitoring of the motoric skills in children and determination of possible differences between genders, as well as differences in residential status, gains importance because of a timely action of kinesiology treatments (Pelemiš, Pelemiš, Mitrolić, & Lalić, 2012). The principles of development of the motoric skills are generally in line with the principles of growth and development (Mraković et al., 1997; Horvat, & Vuleta, 2002; Vraneković et al., 2003, Starc et al., 2010), and the presence of

differences in motoricspace are less in hypothetical motoric factors with a higher genetic predisposition (Horvat, & Vuleta 2006). Levels of the motoriccapabilities of boys and girls in the tested developmental period differ in relation to gender (Krsmanović, 1980a; Matić, 2007a). Most researchers in kinesiology conclude that boys are significantly better in the motoriccapabilities than girls. Thisis indicated by findings (Krsmanović, 1980b; Matić, 2007b; Obradović, Cvetković, & Krneta, 2008).
The aim of this paper was to determine the differences in the motoriccapabilities of older school age children who attend the sixth grade of primary school.

2. METHOD

The study was of transversal character, and was used the *ex post facto* research design. The sample of the subjects for the study was derived from a population of children of older school age in Belgrade, with the non-probability sampling method ie. *quota sample*. The measurement of the motoriccapabilities were made at the beginning of the second semester of 2011/2012 school year, on a sample of 255 subjects divided into two subgroups: 136 boys and 119 girls who were not included in kinesiology treatment (physical training) at the time of the measurement. Before the survey the children were givena questionnaire and the data whethertheywere covered with a kinesiological treatment were given by themselves. All of the subjects at the time of the measurement attended the primary schools "Kralj PetarII", "Djordje Krstić", "Josif Pančić","Vladimir Nazor", "Aca Milosavljević", "Filip Kljajić","Vladislav Ribnikar", "Svetozar Marković", "Jefimija", "14.oktobar, "Jovan Jovanović Zmaj" and "Živojin Perić" in Belgrade. The parents were, before the motoric measurements, required consent for research on their children (Declaration of Helsinki for biomedical research).
As a sample of measuring instruments were selected the following motoric tests (based on the "*EUROFIT*" battery of tests prescribed by the Committee for the Development of Sport of the Council of Europe, 1993).

I For assessment of general equilibrium
1) *Flamingo balance test (sec.)*

II For assessment of segment speed
1) *Hand tapping (sec.)*

III For assess. of the flexibility of the hip joint
1) *Sitting forward bend (cm.)*

IV For assess. of knee extensor strength
1) *Standing long jump (cm.)*

V For assess. of hand flexor muscle strength
1) *Hand grip (kg.)*

VI For assess. of repetit.strength of abd.muscles
1) *Lying body raise (sec.)*

VII For assess. of arms and shoulders strength
1) *Endurance in pull-ups (sec.)*

VIII For assess. of agility
1) *Cone running 10x5 m. (sec.)*

The statistical processing of the data included calculation of the basic descriptive statistics for the measures of central tendency: arithmetic mean (AM); measures of variability: the standard deviation (S), and the differences amongthe groups of the subjects in the whole area of the motorics were tested using parametric statistical methods of the Multivariate (MANOVA) analysis of variance, while to determine the differences within the groups was used the Univariate (ANOVA) analysis of variance.

3. RESULTS

Table 1 shows the basic descriptive statistics of the tested variables, the values of the multivariate Wilks F test and its statistical significances, and the values of the univariate f test and its statistical significances, all at the level of conclusion of p = 0.01.

Table 1. DESCRIPTIVE STATISTICS AND DIFFERENCESAT MULTIVARIATE AND UNIVARIATE LEVEL

VARIABLES	Boys (N=136)		Girls (N=119)			
	AS	S	AS	S	f	p
Flamingo balance test (sec.)	15,90	8,51	16,16	7.70	0,06	0,797
Hand tapping (sec.)	13,00	1,78	12,93	1,50	0,14	0,704
Sitting forward bend (cm.)	14,59	6,85	20,23	7,66	38,49	**0,000**
Standing long jump (cm.)	160,72	24,32	141,89	23,92	38,60	**0,000**
Hand grip (kg.)	28,90	6,77	26,05	5,79	12,88	**0,000**
Lying body raise (sec.)	22,91	3,99	19,73	3,38	46,60	**0,000**
Endurance in pull-ups (sec.)	17,52	7,09	6,58	4,34	213,18	**0,000**
Cone running 10x5 meters (sec.)	22,07	2,15	23,18	2,24	15,93	**0,000**
F=2,204 P=**0,000**						

Legend: AS – arithmetic mean; S – standardndeviation; f – univariate f test; p – level of statistical significance of f test; F – multivariate Wilks F test; P – statistical significance of multivariate F test.

Based on the value of the multivariate Wilks F test it can be concluded that there is a statistically significant difference (P=0.000) between the subjects of different genders in terms of their motoriccapabilities at the value of F=2.204. With a separate analysis of each motoric variable, it is concluded that these differences are present in the variables: *Sitting forward bend* in favor of the girls (p=0.000), and the variables: *Standing long jump* (p= 0.000); *Hand grip* (p=0.000); *Lying body raise* (p=0.000); *Endurance in pull-ups* (p=0.000) and the variable *Cone running 10x5 meters* (p=0.000) in favor of the boys. The differences at the univariate level are also visible by regular inspection of their arithmetic means.

4. DISCUSSION

The results obtained in this study may be explained by different processes of socialization that take place within the family and close environment, and directly affect the anthropological status of children (Pelemiš, Pelemiš, Mitrović, Lalić, & Prica, 2012). The needs for movement are various, which in most research points to higher levels of motoriccapabilities in favor of boys. The differences in favor of girls in the test for the assessment of flexibility in the hip joint can be explained with a different constitution of the pelvis, as well aswith a greater range of motion in the hip joint. The pelvis in girls is different

than in boys even intrauterine, they have a wider pelvis and semi-mobile joint (*Simphisis pubis*) (Pelemiš, Pelemiš, Rankić, & Jovanović, 2013), which caused statistically significant differences in their favor. The boys achieved better results in explosive strength of the lower extremities, the static strength of arms and shoulders, repetitive strength of body and agility, which is consistent with the findings (Bleslauer, Delija, & Mesarič, 2006; Batez, Krsmanović, Dmitrić, & Pantović 2011), in a similar sample of subjects.

5. CONCLUSION

Given the low level of physical activity that is observed here and in other parts of the world (Ekelund et al, 2011; Hardy et al, 2010) and the general decline in the level of the motoriccapabilities in young people in recent years (Boddy et al, 2012; Tomkinson & Olds, 2007), there is an urgent need to develop and evaluate different programmed kinesiology treatments, but which will also be attractive to children, and also to take more account of the application of these treatments both in schools and in extracurricular activities, depending on the size and needs of the influence on the motoric skills, defined on the basis of the established gender differences.

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