

DIFFERENCES IN MOTOR SKILLS OF SEVENTH-GRADE BOYS AND GIRLS

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Abstract

The results of recent studies of primary school students' motor skills showed existence of constant decline of these skills for both genders. On the other hand, considering differences of motor skills abilities between genders, it has been confirmed in a number of studies that boys had better results than girls. Results of this study, conducted on sample of 150 boys and girls from seventh grade of primary school, are very consistent to those findings, with small differences. Namely, girls had better results in five tests: two flexibility tests (shoulder flexibility-SF and forward bend on the bench-FBB), speed test (foot tapping-FT), one coordination test (arm and leg drumming - ALD) and one balance tests (standing on the reversed balance rail - SRR), which indicates somewhat smaller differences in motor abilities between boys and girls for tested sample.

Key words: boys, girls, motor skills, primary school

Introduction

The modern era is characterised by many technological inventions that made everyday life pretty comfort and free from physical efforts. However, modern humans have more obligations and duties and less time for themselves, living under constant stress with poor diets as an addition to the dangerous combination on the psychosomatic status. This picture is quite worrying when we consider primary school students who are in important phase of development. According to the findings of the study conducted in cooperation of Ministry of Education of Republic of Serbia, Ministry of Youth and Sport and The Republic Institute for Sports about primary school children's physical abilities, boys had 6% and girls 12% poorer results at certain motor tests compared to earlier results. At the same time, they found that results of children from Serbia were mainly under average scores from those of EU children (The Republic Institute for Sports, 2010). Declination of motor skills was reported in neighboring countries (Šiljeg, Zečić, Mrgan, & Kević, 2008; Strel, Bizjak, Starc, & Kovač, 2009) and western countries as well (Janz, Dawson, & Mahoney, 2000; Tomkinson, Olds, & Gulbin, 2003; Wedderkopp, Froberg, Hansen, & Andersen, 2004).

One of the most efficient ways to fight this negative tendency could be intensification of physical education classes in primary schools. The fact is that real working conditions for physical education classes, their volume and intensity are not adequate for causing positive adaptation to physical exercise. Therefore, creation of new programs that encompass these parameters in physical education might be of real necessity. Nonetheless, it is important to consider gender differences for well-known fact that boys and girls aged 7 to 12 significantly differ morphologically and in motor skills as well.

Many authors found that boys and girls differences in motor skills are noticeable from an early age as 6 to 7 years (Sturza Milić, 2008; Bala, Jakšić, & Popović, 2009; Halaši & Lepeš, 2012). At somewhat older sample (10,4 years), authors (Batez, Krsmanović, Dimitrić & Pantović, 2010) found significant differences in motor skills where boys had better results in most of applied tests (8 out of 11), but girls had more success in flexibility and repetitive strength tests. Similar results were reported in another study (Mikalački & Čokorilo, 2007) where boys had better results in 7 out of 8 tests. Girls were better only in flexibility test V-sit and reach. Krsmanović and Radosav (2008) explored anthropometric and motor skill differences between boys and girls aged 9 to 11 and found that boys were better in all tests except flexibility test V-sit and reach. Šahbegović, Mikić, and Reljić (2009), studied differences in morphological, motor and situational-motor skills on a sample of 160 boys and girls aged 11 to 13. Based on the results of multivariate variance analysis, authors found statistically significant differences between the two groups. Boys were more successful in most of tests except the flexibility tests (shoulder flexibility and forward bend). Extensive research on gender differences in physical development and motor skills of fourth grade children of three generations (1983/84, 1994/95 and 2005/06) was conducted by Jovanović and Jovanović (2008). Sample was consisted of 700 students (331 boys and 369 girls) and authors reported that boys from 1983/84 generation were better in all tests apart from flexibility tests and speed of alternative movements. In generation 1994/95, boys did better in all but flexibility tests. The same happened for 2005/06 generation, where girls had better results in flexibility only. Somewhat different results were reported in another study of fifth and sixth grade students (Badrić, 2011)

where boys had better results in strength (repetitive and explosive) and coordination, while girls dominated in flexibility. Interestingly, there were not significant differences in speed tests. Georgiev, Aleksandrović, and Petrov (2009), studied motor skills of 500 students (250 boys and 250 girls) aged 12. They applied 21 motor test (each skill was tested by three tests) and found that boys had better scores in 16 tests: precision (all three tests), explosive strength (all three tests), static strength (two tests), coordination (two tests), balance (two tests) and movement frequency (all three tests). Girls were more successful in following five tests: flexibility (two tests), one test of rhythmical structure, one balance test and one static strength test.

Methods

The sample was selected from a population of 150 seventh-grade students (76 boys and 74 girls) from two public primary schools: „Vlada Aksentijević“ and „Starina Novak“ in Belgrade. The mean age was 13.96 for boys and 13.94 for girls. The tests for evaluation of motor skills were drawn from motor skills test batteries (Gredelj, Metikoš, Hošek, & Momirović, 1975; Kurelić et al., 1975). We applied following tests: precision - ball throw at the horizontal target (BTH) and ball kick at the vertical target (BKV); balance - balancing on one foot on the balance rail (BBR) and standing on the reversed balance rail (SRR); coordination - figure eight running with ducking (8RD) and arm and leg drumming (ALD); speed - plate tapping (PT) and foot tapping (FT); flexibility - shoulder flexibility (SF) and forward bend on the bench (FBB); strength - standing long jump (SLJ) and flexed arm hang (FAH). Data from all variables were computed in the statistical program SPSS 11.5. Statistical procedures included descriptive statistics and discriminant analysis for determining the differences between the boys and girls in motor skills.

Results and discussion

Table 1. Descriptive indicators of girls' variables

Variable	N	Range	Min.	Max.	Mean	St. Dev.	Skew.	Kurt.
BTH	74	24.00	4.00	28.00	14.77	5.03	0.05	-0.07
BKV	74	15.00	1.00	16.00	8.84	3.09	-0.15	-0.33
BBR	74	24.90	2.10	27.00	8.17	4.09	1.89	5.62
SRR	74	19.30	2.80	22.10	7.56	4.36	1.66	2.53
8RD	74	18.60	52.10	70.70	61.47	4.52	0.06	-0.79
ALD	74	15.00	0.00	15.00	6.73	3.23	0.04	-0.41
PT	74	25.00	25.00	50.00	37.42	4.71	0.28	0.66
FT	74	13.00	23.00	36.00	30.23	2.90	-0.12	-0.29
SF	74	67.50	47.50	115.00	78.64	13.35	-0.04	0.46
FBB	74	52.00	16.00	68.00	42.27	9.42	0.01	0.67
SLJ	74	107.00	94.50	201.50	151.61	22.44	0.10	0.71
FAH	74	71.60	0.50	72.10	14.79	13.39	2.21	6.07

The results from Table 1. show that most variables do have normal distribution except for variables of static strength and balance (FAH, BBR, and SRR) where Skewness significantly exceeds 1.00, making positively skewed distribution. Furthermore, two of three mentioned variables (BBR=5.62 and FAH=6.07) have higher kurtosis which could be attributed to few extreme results that significantly vary from the mean value. Numeric values of standard deviation indicate high homogeneity in variables foot tapping and ball kick at the vertical target (FT and BKV). On the other hand, high heterogeneity is noted in variables standing long jump, flexed arm hang and shoulder flexibility (SLJ, FAH, and SF) which refers to significant individual differences in these skills.

Table 2. Descriptive indicators of boys' variables

Variable	N	Range	Min.	Max.	Mean	St. Dev.	Skew.	Kurt.
BTH	76	24.00	8.00	32.00	18.58	5.05	0.64	-0.04
BKV	76	20.00	3.00	23.00	12.42	4.28	0.01	-0.43
BBR	76	38.50	3.60	42.10	9.59	5.56	3.27	15.58
SRR	76	36.10	2.60	38.70	7.81	5.26	3.96	19.87
8RD	76	19.30	48.10	67.40	56.92	4.34	0.13	-0.31
ALD	76	16.00	0.00	16.00	7.55	2.99	0.37	0.41
PT	76	21.00	31.00	52.00	38.99	3.67	0.59	1.85
FT	76	21.00	18.00	39.00	30.99	3.57	-0.81	2.59
SF	76	70.00	56.00	125.00	89.56	14.37	-0.11	-0.50
FBB	76	32.00	16.00	47.00	33.72	7.41	-0.25	-0.74
SLJ	76	98.00	134.00	231.00	179.00	23.97	0.20	-0.69
FAH	76	92.00	1.10	93.10	30.22	18.61	0.89	1.35

The insight of Table 2. shows that most variables have normal distribution. Similarly, to previous analysis, exceptions are variables for the balance assessment (BBR and SRR) with positively skewed distribution. The same variables had very high kurtosis due to few extreme results that caused leptokurtic distribution. Numeric values of standard deviation and range indicate that most homogenous results were in variables for assessment of alternative movement speed (PT and FT) and coordination - arm and leg drumming (ALD). However, the most heterogenous results were noted in variables: standing long jump (SLJ), flexed arm hang (FAH) and shoulder flexibility (SF) which indicates high spread of the results and slight decrease of test discriminativity. Based on the results from Table 3. it is clear that discriminant function is significant (Sig.=.00) and high coefficient of canonical correlation (Can. Corr=.73) indicates that the function discriminates well. Wilks' Lambda value of .47 indicate that group means significantly differ. All these indicators show that motor skills significantly contribute to discrimination with regard to gender. Coefficients from Table 4. indicate that variables which have important partial contribution to discriminant function are: forward bend on the bench (FBB=-.54), standing long jump (SLJ=.42), figure eight running with ducking (8RD=-.38) and

shoulder flexibility (SF=.35), while the least contribution had balancing on one foot on the balance rail (BBR=.01), which suggest a flexibility and explosive strength as the function that mostly discriminates between girls and boys. Table 5. shows group means (centroids) indicate almost identical scores but with opposite signs meaning that boys and girls significantly differ in motor skills.

Table 3. Significance of discriminant functions

Function	1
Eigenvalue	1.14
Wilks' Lambda	0.47
Chi-Square	108.2
Canonical Corr.	0.73
df	12
Sig.	0

Table 4. Coefficients of discriminant function

Variable	Function
	1
BTH	.14
BKV	.18
BBR	.01
SRR	-.03
8RD	-.38
ALD	-.16
PT	.01
FT	-.05
SF	.35
FBB	-.54
SLJ	.42
FAH	.19

Table 5. Group centroids

Gender	Function
	1
Male	1.05
Female	-1.08

Group centroids and canonical discriminant function coefficients show that boys had better results in seven tests: precision - ball throw at the horizontal target (BTH) and ball kick at the vertical target (BKV); explosive and static strength (SLJ and FAH), balance - balancing on one foot on the balance rail (BBR), coordination - figure eight running with ducking (8RD) and alternative movement speed - plate tapping (PT). Girls had better results in five tests: flexibility - shoulder flexibility (SF) and forward bend on the bench (FBB), alternative movement speed - foot tapping (FT), coordination - arm and leg drumming (ALD) and balance - standing on the reversed balance rail (SRR). Besides, it should be noted that in tests of coordination figure eight running with ducking (8RD) and shoulder flexibility (SF), better results is lower score, hence boys had better result in figure eight running with ducking test and girls in shoulder flexibility test.

Comparing the results with other studies, they are most consistent to those of Georgiev, Aleksandrović and Petrov (2009) where boys had better results in the majority of tests but girls did better in five tests as well as in our study. Namely, girls were better in two flexibility tests, one coordination test, one balance test and one static power test. The common characteristic of our findings with the results of some previous studies was that girls dominated in flexibility tests, while boys usually have better results in other tests in this age (Mikalački i Čokorilo, 2007; Krsmanović i Radosav (2008; Jovanović i Jovanović, 2008; Šahbegović, Mikić i Reljić, 2009; Batez, Krsmanović, Dimitrić i Pantović, 2010; Badrić, 2011).

Table 6. Classification results

	Boys	Girls	Total
Boys	61	15	76
Girls	9	65	74
Boys %	80.3%	19.7%	100%
Girls %	12.2%	88.8%	100%

The results presented in Table 6. show simple summary of number and percent of subjects classified correctly and incorrectly. These figures indicate that 80.3%, boys were correctly predicted to the group. As for girls that classification was more successful with 88.8% correctly classified. Overall separation of the groups was conducted with accuracy of 84%.

Conclusion

The main results of this study indicated that motor skills significantly differ between genders. Boys demonstrated greater proficiency in seven motor tests evaluating precision (BTH and BKV), strength (SLJ and FAH), balance (BBR), coordination (8RD) and alternative movement speed (PT). On the other hand, girls outperformed boys in five motor tests: flexibility (SF and FBB), alternative movement speed (FT), coordination (ALD) and balance (SRR). Having in mind that each motor skill was evaluated by two tests, it could be said that boys absolutely performed better in precision, and strength, while girls did the same in flexibility.

The remainder of four motor skill tests (coordination, balance and speed) showed „mixed“ results where boys and girls had better results in one of two tests. This result is mostly in agreement with findings of Georgiev, Aleksandrović and Petrov (2009), while certain similarities were found in previous research (Mikalački i Čokorilo, 2007; Krsmanović and Radosav, 2008; Jovanović and Jovanović, 2008; Šahbegović, Mikić and Reljić, 2009; Batez, Krsmanović, Dimitrić and Pantović, 2010). Yet again, considering the results of earlier studies, it must be said that girls had some interesting results (better score in alternative movement speed - foot tapping) and further investigation would be recommended in future research.

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RAZLIKE U MOTORIČKIM SPOSOBNOSTIMA UČENIKA I UČENICA SEDMOG RAZREDA OSNOVNE ŠKOLE

Sažetak

Rezultati skorijih znanstvenih istraživanja motoričkih sposobnosti učenika osnovnih škola pokazali su da postoji problem konstantnog opadanja razine motoričkih sposobnosti kod učenika oba spola. S druge strane kada se govori o razlikama u motoričkim sposobnostima obzirom na spol u više istraživanja potvrđeno je da dječaci imaju bolje rezultate od djevojčica. Rezultati ovog istraživanja, koje je provedeno na uzorku od 150 dječaka i djevojčica sedmog razreda osnovne škole, u najvećoj meri su u suglasnosti s tim saznanjima, uz postojanje određenih razlika. Naime, djevojčice su ostvarile bolje rezultate na ukupno pet testova: dva testa fleksibilnosti (duboki pretklon na klupici i iskret s palicom), jedan test brzine alternativnih pokreta (taping nogom), jedan test koordinacije (bubnjanje rukama i nogama) i jedan test ravnoteže (stajanje na obrnutoj klupici za ravnotežu), što ukazuje na nešto manje razlike između spolova u razini motoričkih sposobnosti za ispitivani uzorak.

Ključne riječi: dječaci, djevojčice, motoričke sposobnosti, osnovna škola

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