

# THE LEVEL OF PHYSICAL DEVELOPMENT AND MOTOR PERFORMANCE OF MIDDLE SCHOOL AGE GIRLS FROM THE BANSKÁ BYSTRICA REGION

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## **Abstract**

The aim of article was to determine the level of physical development and motor performance of middle school age girls in a primary school in Banská Bystrica. The tested group consisted of 41 girls of Spojova Primary School in Banská Bystrica in decimal average age of 11.59 years. We have researched their physical development on the base of measurement of basic somatic parameters: body height, body weight, BMI, skin fold on the arm (triceps) and skin fold on the calf (medial calf). Motor performance was measured using the modified test batteries used in the state of the SR enriched educational program on the flexibility tests (Standing broad jump, sit-ups in 30 seconds, Shuttle run 10 x 5 m, Pull up, Endurance shuttle run, Sit and Reach). Observed results were compared with measurements of Moravec et al. (2002), girls from Spojova school achieved in two tests (shuttle run 10 x 5 m, push-ups) statistically significantly worse results, whereas in one test (sit-ups in 30 seconds) statistically significantly better outcome and in the three tests (standing broad jump, endurance shuttle run, sit and reach) were not statistically significant differences. The research results confirm the insufficient level of school girls School Data link and recommended limiting the reach level A. This table modified by girls assigned to the group with low physical fitness. Attached are the results of the input measurement for experimental investigations aimed at the possibility of increasing levels of physical fitness through fitness 12 weeks intervention programme. Research is carried out under the grant VEGA 1/0840/09 effectiveness of new approaches fitness training in sports games.

*Keywords: physical development, motor performance, middle school age girls.*

## **Introduction**

The level of physical fitness and motor performance of children in school age is not currently dedicated with as much attention as this issue deserves. Negative phenomena in the physical and motor development of students confirmed the considerable amount of research both here and abroad. They point out that the state of physical development is not corresponding to the level of motor performance and that there are differences by school type and by the extent of after-school physical education and sport activities. This issue is addressed in the work of

these authors: Celikovsky et al. (1979), Sykora (1972), Pavek (1980), Semetka (1982), Moravec et al. (1990, 2002), Strel (1997), Suchomel (2004, 2006), Štihec (1999) and also the Cooper Institute (2003).

Realised studies of these and other authors such as Kuntzleman & Reiff (1992), McMurray et al. (1995), Malina et al., (2004), Bezdeková (2005) show that the level of physical fitness and motor performance is directly related to health, psychological well-being, and that today's young generation comes out of the comparison with the past generation as more advanced physically, but its physical fitness does not keep pace with the physical development. This fact is largely caused by the lack of regular physical activity and improper regimen. One of the ways how to change this situation is to focus on the qualitative aspects of educational process in school physical education (Jürimäe Jürimäe T. & J., 2001).

The topic of our report was created in order to focus on the issue of motor performance and physical fitness in the selected files. We deal with the girls in middle school age and the obtained results characterize the current state of motor performance of female students in selected elementary schools.

According to Herbert et al. (1988), the school-age girls are involved in sports activities in a smaller number with less intensity and for a shorter period of time. On the basis of lack of participation there also arises a low physical fitness.

It is very important to note that motor performance, physical fitness and health are factors that make the mental and intellectual potential of pupils and students but also of the adult population. Movement and sports activities should have a unique place mainly in children and youth. The important role in shaping the personality is to form an individual whose relationship to active sport and movement is positive (Kasa, 1994). Only in a small amount of school children there was formed a lasting positive relationship to active movement concerned in the interests of recreational activities and sports. All this has resulted in the increasing number of children with low fitness levels, many boys and girls have various health problems and excess weight (Moravec et al., 1990).

According to Keating & Silverman (2009), it is necessary to fully understand the role and the importance of testing physical fitness and motor performance of young people in school, which is an important prerequisite for good health and it is a part of issue of school education in the subject of physical and sports education.

For this purpose we use tests as tools to evaluate the performance of physical education and training process, but also for individual and group performance evaluation. We consider them as a significant and one of the main diagnostic tools in the work of teachers, educators, trainers and so on. Certainly they are also motivating forces, because they involve individuals in the direction of further motor and physical development and self-improvement (Mikus, Kasa, Sykora, 1991).

Creating positive attitudes towards physical activity and physical fitness at this age can be positively reflected in the level of physical activity in later life (Bunc, 1994, Westcott et al. 1995; Ignico & Ethridge, 1997).

## **1 Aim**

The aim of report was to determine the level of physical development and motor performance of middle school age girls in primary school in Banska Bystrica.

## 2 Methods

To obtain a data of physical development and motor performance of the 10-11 years old female students, there was selected a single cross-sectional research. Its objects were girls of the 6th year of fully organized primary school in the street Spojova in Banska Bystrica. The tested girls fell within the normal population, i.e. girls who participate in compulsory school physical education within three hours per week, and those who participate in interest physical and sports activities. Testing included 36 school girls of primary school in Banska Bystrica.

According to Moravec (2002), Slovak average was tested by the trained teams of scientific professionals in collaboration with students and teachers of physical education during most of the year 1993. Testing by system Eurofit was attended by all pupils of selected classes of 23 primary schools. There were 122 tested girls in decimal age of 11.51 years.

Physical development was verified on the basis of measuring the basic somatic parameters: body height, body weight, BMI, skin fold on the arm (triceps) and skin fold on the calf (medialcalf). Motor performance was measured using the modified test battery used in the state of the SR enriched educational program on the flexibility tests (Standing broad jump, sit-ups in 30 seconds, Shuttle run 10 x 5 m, Pull up, Endurance shuttle run, Sit and Reach).

The main methods of evaluating the facts, used in our research, are: arithmetic average, standard deviation, tables and bar charts, BMI, one-sample t-test unequal variances.

## 3 Results and Discussion

In Table 1 we can see differences in measured values of physical development and motor performance of girls from primary school Spojova and Slovak average.

Tab. 1 Overview of the results and differences in physical development and motor performance

	ZŠ		SR		Difference ZŠ-SR
	$\bar{x}$	s	$\bar{x}$	S	
<b>BH</b>	150.86	6.79	151.43	8.26	-0.57 cm
<b>BW</b>	41.55	9.02	39.85	8.25	+1.70 kg
<b>BMI</b>	18.42		17.54		
<b>D. AGE</b>	11.59		11.51		
<b>SF T</b>	12.91	5.37	9.81	6.71	+3.10 mm
<b>SF MC</b>	13.37	5.88	10.81	4.25	+2.56 mm
<b>JUMP</b>	148.86	20.01	154.52	18.43	-5.66 cm
<b>SU</b>	24.36	1.86	21.67	4.31	+2.69
<b>10x5</b>	24.22	4.20	21.86	1.98	+2.36 s
<b>PU</b>	8.47	6.64	18.61	15.59	-10.14 s
<b>ESR</b>	37.55	14.46	38.57	16.66	-1.02
<b>SaR</b>	19,00	7.11	21.64	6.20	-2.64 cm

In Table 2 we can see that 66.2% of girls from primary school Spojová attained in all tests according to modified table of Moravec (1996) minimum basic standard. Only 9.4% of girls achieved level of performance above average standard and so in the test of Endurance shuttle run there were 11 girls and in the test Pull up 6 girls. Based on these findings, we can conclude that physical fitness and motor performance on the primary school is on a very low level and therefore we recommend to streamline hours of physical education on non-traditional physical activities (hockey, round - hockey, ringo, Pilates, aerobic etc.) and motivate girls to after-school physical activity.

Tab. 2 Number of girls included in the various standards according to modified table

Standard/ number of girls	Shuttle run 10x5	Standing broad jump	Sit-ups in 30 seconds	Endurance shuttle run	Pull up
C	0	0	0	11	6
B	8	17	3	11	5
A	28	19	33	14	25
Together	36	36	36	36	36

Legend: A = minimum basic standard, B = average standard, C = above the average standard (Hauser, 2008)

Tab. 3 Statistical significance of the increase in physical fitness and motor performance of the student's one-sample test

Somatic parameters and tests of motor performance	P (T<=t) P value of t test <0,05
BH	0.53918*
BW	0.37355*
BMI	0.00201*
D. AGE	0.01577*
SF T	0.14461*
SF MC	0.00035*
JUMP	2.5116* E-08
SU	1.4902* E-09
10x5	0.72046*
PU	0.05603*

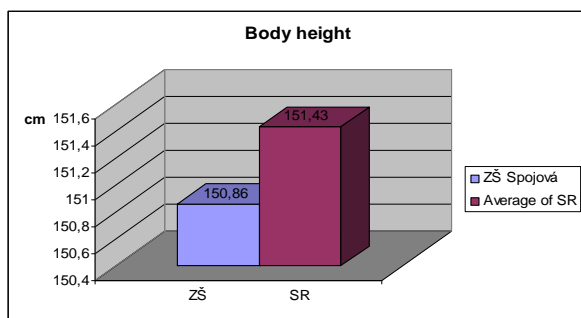


Fig. 1 Comparison of body height

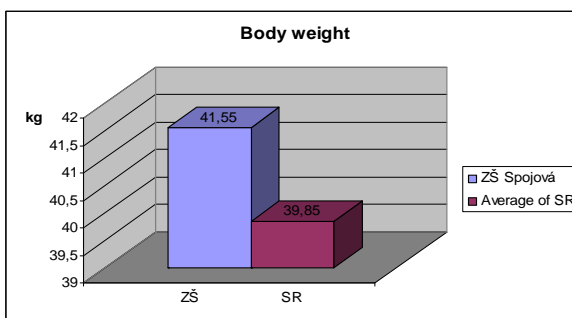


Fig. 2 Comparison of body weight

In Figure 1, we compared the body height of two files. School girls of primary school Spojova reached during our research lower level of body height with difference 0.57 cm. Figure 2 shows that primary school Spojova girls, although they showed lower levels of body weight, their physical additions show the opposite value with the increase which is about 1.7 kg from the Slovak national average of girls.

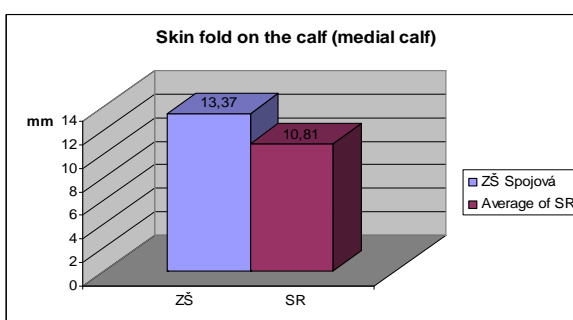
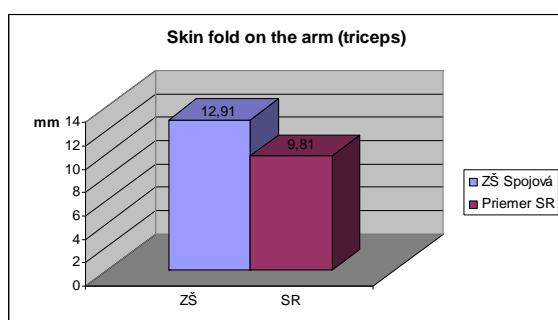


Fig. 3 Comparison of skin fold on triceps Fig. 4 Comparison of skin fold on medialcalf

On the figures 3 and 4 we can see the skin fold thickness at triceps and medialcalf. In terms of genetic determinate body fat component of the ontogenetic patterns does not give in as much as the basic physical dimensions, especially height of the body (Moravec, 2002). Bigger value of the skin fold thickness on triceps with difference of 3,1 mm and the calf with 2,56 mm was recorded in girls at primary school Spojova. The physical development can confirm that only in the average thickness of triceps skin fold was confirmed statistical significance (see Table 3).

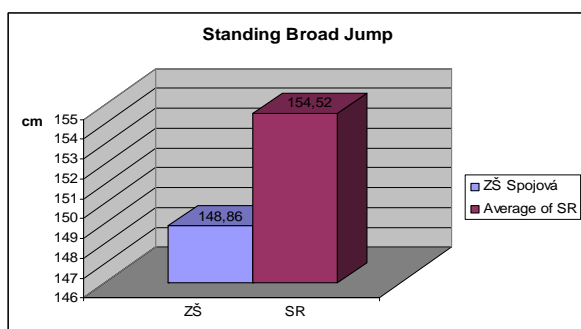
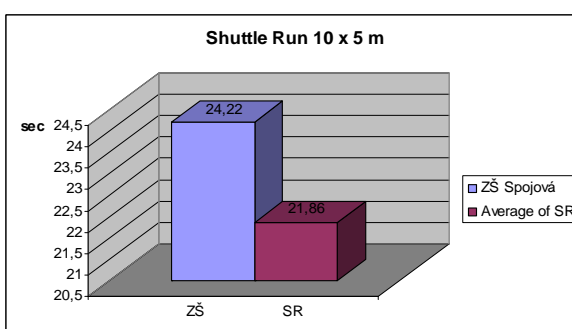


Fig. 5 Comparison of standing broad jump Fig. 6 Comparison of shuttle run 10 x 5 m



In figure 5 we can observe differences in the explosive power of lower limbs in a test Standing broad jump of the nationwide average in comparison with the testing of the set at the primary school Spojová. Based on one - sample t-test we can conclude that in this test we did

not confirm the statistical significance, see the table 3 (0.145\*). Test Standing broad jump showed that girls from primary school Spojova had worse average results in the explosive power of lower limbs and in test results lagged behind the Slovak average with 5.66 cm. The evaluation aimed at testing of the cross-country speed acceleration (Figure 6). In terms of testing, we can conclude that the Slovak average achieved significantly better results again. P value of t-test is less than 0.05 and it means that in this case the statistical significance was confirmed, see table 3 ( $2.5116 \cdot 10^{-8} < 0.05$ ). The difference between a set of primary school Spojova and the national average showed in the value of 2.36 seconds. These results suggest that the speed-power capabilities of girls at primary school Spojova are at a low level, whereupon it would be more appropriate to rank lessons' exercises to develop speed and strength abilities.

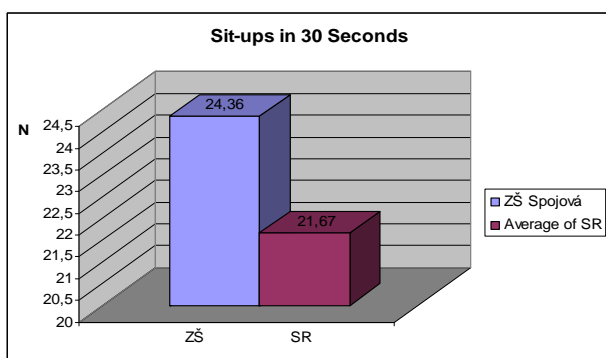


Fig. 7 Comparison of sit-ups 30 sec

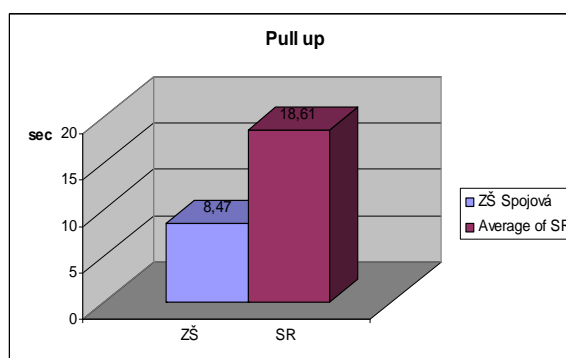


Fig. 8 Comparison of pull up

To test the strength development of abdominal and hip-thigh muscles of Slovak average and of girls of primary school Spojova we used the test of Sit-ups in 30 seconds. In a figure 7 we can see the measured differences in average test Sit-ups in 30 seconds between our observed sets. Calculated p-value of t-test shown in a table 3 confirms a statistically significant difference in benefit of girls at primary school Spojova ( $0.00035 \cdot 10^{-4} < 0.05$ ). Endurance strength of abdominal and hip - thigh muscles in the tested group is significantly different. Best performances were measured in girls of primary school Spojova and it is about 2.69 better than the girls' nationwide average.

In Figure 8 we can see that the static strength endurance in test Pull up was again significantly better in the Slovak average. The difference between the measured average times (see table 3) was statistically significant ( $1.4902 \cdot 10^{-9} < 0.05$ ). Static arm strength to maintain position in Pull-up palms up grip on horizontal bar was in girls from the nationwide average 10.14 seconds better than in the file of primary school Spojova.

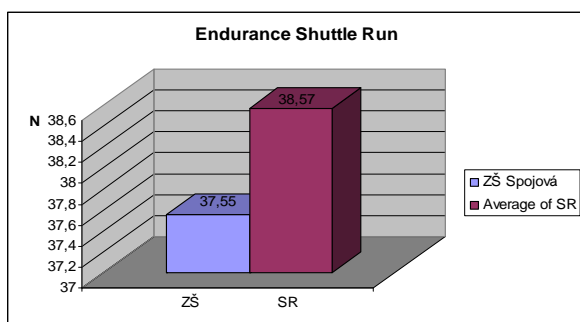


Fig. 9 Comparison of endurance shuttlerun

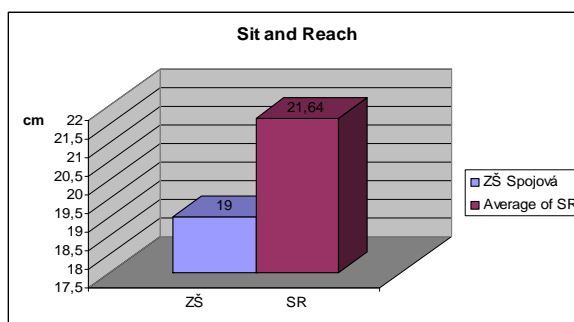


Fig. 10 Comparison of sit and reach

On figure 9 we can see the measured values of the test for aerobic endurance, which shows us a better readiness of Slovak average girls. The difference between the studied population represents a value of 1.03 in this case we can speak of statistically significant difference (0.720). We share the view that in the level of performance in endurance shuttle run were also involved motivational factors, methods of making the test and the lack of proportional representation of means of the development of aerobic endurance in performed physical activities.

The test Sit and Reach, which can be seen in figure 10, shows the anatomical conditions in the hip-waist and back area for a max. range of motion. Observed set of girls at a primary school Spojová reached 2.64 cm worse outcome than it was in the case of the second followed group of Slovak average. The difference between measured data of primary school Spojova and nationwide average is not statistically significant (0.0560\*) in our case, measured difference may be only coincidental.

## Conclusion

Based on the research results we can conclude that motor performance and physical fitness of research files of primary school Spojova is at a lower level in most of the parameters to the national average of Slovakia. Observed results were compared with measurements of Moravec et al. (2002), girls from primary school Spojova achieved in two tests, Shuttle run 10x5 (2.5116\* E-08 < 0.05), Pull up (1.4902\* E-09 < 0.05) statistically significantly worse results, whereas in one test Sit-ups in 30 seconds (0.00035\* < 0.05) significantly better outcome and in the three tests (Standing broad jump, Endurance shuttle run, Sit and Reach) there were not statistically significant differences.

The research results confirm the insufficient level of physical fitness and motor performance of girls at primary school Spojova. At the recommended limits 66.2% of girls achieved level A, which according to a modified table assigned girls to the group with low physical fitness. However, these results cannot be generalized to the entire population.

For practice, we would like to recommend the following:

- to make the pupils of primary school Spojova achieve good results in relation to general physical performance, it is necessary to assume a positive attitude towards physical education and physical activity. We should therefore look for such procedures and activities that will contribute to their development and will motivate pupils. If these measures satisfy the assumption the physical performance of primary school Spojova will be at a higher level
- periodical check the level of motor performance and physical fitness of students with at that time most valid test batteries.
- in developing the content of a lesson it is necessary to focus on the overall physical development of the individual.

Nowadays the computers are thanks to the program of the Ministry of Education (e.g. Infovek) installed in every school which satisfied one requirement to streamline the diagnostic system in school physical education. It is only needed to create a software system, to upgrade test batteries as required by the needs of the present and we have a chance to create significant social pressure because of the actual state of physical development and physical performance of the Slovak population. With the application of the long – term monitoring we can create nationwide as well as individual picture of the development, growth and motor performance of the individual.

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## **ÚROVEŇ TĚLESNÉHO ROZVOJE A MOTORICKÉ VÝKONNOSTI DÍVEK STŘEDNÍHO ŠKOLNÍHO VĚKU Z BANSKOBYSSTRICKÉHO REGIONU**

Cílem příspěvku bylo zjistit úroveň tělesného rozvoje a motorické výkonnosti dívek středního školního věku na základní škole v Banské Bystrici. Testovaný soubor tvořilo 41 dívek základní školy Spojové v Banské Bystrici v průměrném decimálním věku 11,59 roku. Tělesný rozvoj jsme zjišťovali na základě měření základních somatických parametrů: tělesná výška, tělesná hmotnost, BMI, kožní řasa na rameni (triceps) a kožní řasa na lýtku (Medialcalf). Motorickou výkonnost jsme měřili pomocí modifikované testové baterie používané ve státním vzdělávacím programu SR obohacenou o testy na ohebnost (skok do dálky z místa, leh-sed (počet za 30 sekund), člunkový běh 10 x 5 m, výdrž v shybu, 90 ° kliky, vytrvalostní člunkový běh, předklon s dosahováním v sedu). Zjištěné výsledky byly porovnány s měřeními Moravce a kol. (2002), přičemž žákyně ze ZŠ spojové dosáhly ve dvou testech (člunkovou běh 10x5, výdrž v ohybu) statisticky významně horší výsledky, v jednom testu (leh-sed) statisticky významně lepší výsledek a v třech testech (skok do dálky z místa, vytrvalostní člunkový běh, předklon s dosahováním v sedě) nebyly zaznamenány statisticky významné rozdíly.

### **DAS NIVEAU DER KÖRPERLICHEN ENTWICKLUNG UND DER MOTORISCHEN LEISTUNGSFÄHIGKEIT VON MÄDCHEN IM MITTELSCHULALTER AUS DER REGION BANSKÁ BYSTRICA**

Ziel dieses Beitrags war es; das Niveau der körperlichen Entwicklung und der motorischen Leistungsfähigkeit von Mädchen im Mittelschulalter an der Grundschule Banská Bystrica festzustellen. Die getestete Gruppe bestand aus 41 Mädchen der Spojová-Grundschule in Banská Bystrica im Alter von durchschnittlich 11,59 Jahren. Die körperliche Entwicklung haben wir an Hand der Messung grundlegender somatischer Parameter ermittelt: Körpergröße, Körpergewicht, BMI, Hautfalten am Arm (Trizeps) und der Wade (mittlere Wade). Die motorische Leistungsfähigkeit haben wir mit Hilfe modifizierter Test-Batterien gemessen, die im staatlichen Bildungsprogramm der Slowakischen Republik angewandt wurden. Dazu kamen Tests der Gelenkigkeit (Weitsprung aus dem Stand, Rumpfbeugen (die in 30 Sekunden erreichte Anzahl), Achterlauf 10 x 5 m, Klimmzüge, 90 ° Liegestütze, Ausdauer-Achterlauf, Strecksitz mit Oberkörpervorlage). Die festgestellten Ergebnisse wurden mit Messungen Moravec et al. (2002) verglichen, wobei Schülerinnen der Spojová-Grundschule in zwei Tests (Achterlauf 10x5, Ausdauer im Vorbeugen) statistisch gesehen bedeutend schlechtere Ergebnisse erzielten, aber in einem Test (Rumpfbeugen) bedeutend bessere Ergebnisse erreichten und in drei Tests (Weitsprung aus dem Stand, Ausdauer-Achterlauf, Strecksitz mit Oberkörpervorlage) keine statistisch bedeutenden Unterschiede vermerkt wurden.

### **POZIOM ROZWOJU FIZYCZNEGO I SPRAWNOŚCI MOTORYCZNEJ DZIEWCZĄT W ŚREDNIM WIEKU SZKOLNYM Z REGIONU BANSKA BYSTRICA**

Celem opracowania było sprawdzenie poziomu rozwoju fizycznego i sprawności motorycznej dziewcząt w wieku szkolnym w szkole podstawowej w Banskjej Bystricy. Badaną grupę stanowiło 41 dziewcząt ze szkoły podstawowej Spojova w Banskjej Bystricy w przeciętnym wieku decymalnym 11,59 lat. Rozwój fizyczny badano w oparciu o pomiary podstawowych parametrów somatycznych: wysokość ciała, waga ciała, BMI, triceps i Medialcalf. Sprawność motoryczną mierzono przy pomocy zestawu testów stosowanego w państwowym programie edukacyjnym Słowacji poszerzonego o testy na giętkość (skok w dal z miejsca, brzuszki (ilość za 30 sekund), "bieg czółenkowy" 10 x 5 m, wytrzymanie w zgięciu, pompki 90<sup>0</sup>, wytrzymałościowy "bieg czółenkowy", skłony z dosięgiem na siedząco). Otrzymane wyniki porównywano z pomiarami Moravca i zespołu (2002), przy czym uczennice ze SP osiągnęły w dwóch testach ("bieg czółenkowy" 10x5, wytrzymanie w zgięciu) statystycznie o wiele gorsze wyniki, w jednym teście (brzuszki) statystycznie o wiele lepszy wynik a w trzech testach (skok w dal z miejsca, wytrzymałościowy "bieg czółenkowy", skłony z dosięgiem na siedząco) nie zaobserwowano statystycznie większych różnic.