

COMPARISON OF PHYSICAL ABILITY AND PHYSICAL PERFORMANCE OF CHILDREN IN PRIMARY EDUCATION

^aMARIÁN MERICA, ^bRÓBERT OSAĐAN, ^cVIKTÓRIA KOVÁČOVÁ

*Comenius University in Bratislava, Faculty of Education
Račianska 59, 813 34 Bratislava, Slovak Republic
e-mail: ^america@fedu.uniba.sk ^bosadan@fedu.uniba.sk
^cwiki.kovacova94@gmail.com*

Abstract: The authors in their article approach the issue of physical ability and physical performance of children in primary education on the basis of diagnosing their motor skills. Testing was performed using a comprehensive Eurofit test battery consisting of nine tests. The aim of the article is to evaluate and compare the motor skills of children of younger school age in the village and in the city. The monitoring took place at two primary schools, in the town and in the village. The sample consisted of 104 students. They were boys and girls of the fourth and second year at the 1st stage of primary school. Based on the use of nine motor tests, using statistical indicators of the Student's t-test, we demonstrated statistically higher performance of children from the city, compared to children from the village. At the same time, tests of motor skills showed us higher performance of children in the fourth grade compared to children in the second grade - as well as in testing boys and girls. We also measured higher physical performance in boys overall than in girls. The article also brings a comparison of motor skills of the examined group with files by other authors. The article also provides an evaluation of the Body Mass Index (BMI) of children in our group in primary education, as well as an evaluation and comparison of body height and body weight of the examined group, as well as a comparison with measured somatometric indicators of other authors.

Keywords: physical performance, younger school age, diagnostics, motor skills, village and city.

1 Introduction

Without adequate physical activity, we cannot imagine life in our schools. Adequate physical activity is an important part of every individual's life, from kindergartens to colleges. According to Jakabčič (2002), during physical development, a child's physical performance increases significantly during the period of a young schoolboy, children are constantly on the move, but they are not yet able to manage their energy well, they can be exhausted quickly. The movement is coordinated and becomes graceful. Physical fitness, dexterity, mastery of various skills is also great psychological importance - it provides the child with a certain position in the group of peers. Oravcová (2009) states that in motor development the child's movements are graceful, well coordinated, physical movement is very important for a child of this period, he is looking for it. Good movement coordination allows him to give good sports performances, he is also skillful in other physical activities (dance, movement games). Physical and movement ability are a ticket to success in the children's group in this period. Dexterity, skills, physical performance are appreciated by other children. Physically weaker boys are more often lonely and compensate their gaps by success in school or other hobby activities.

Several authors, for example Belešová (2017, 2018), Čavojský (2015), Severini (2018) emphasize that teachers significantly influence the development of education system, education and upbringing. The importance of the teaching profession extends to all areas of society. The teacher influences the nature and quality of the relationship with students, conditions the atmosphere in the classroom, stimulates students' interest - including their relationship to sports and active physical activity, their experience at school, the development of their knowledge and their whole personality. This topic, as developed, opens up further opportunities for qualitative research, e.g. Kostrub (2016), Severini and Kostrub (2018). We are sure that the effort of teachers of physical and sports education is a constant effort to provide space for each student to be able to exercise physically and to feel the success of their activities, which will accompany him throughout his life.

The exclusion or restriction of physical activity usually has a negative effect on human activity: physical fitness is reduced, various diseases develop and aging processes are accelerated. On the contrary - active physical activity helps by activating the cerebral cortex, creating improved conditions for the

development of thinking, creation, interactions and experience. This is one of the reasons why suitably focused physical activity is very often recommended against the undesirable consequences of strained mental activity, such as: sport recreational activities, physical work, hobbies related with moves and other activities. Several researches by physical education doctors and pedagogical experts confirm that physically fit individuals are able to suppress fatigue from the monotony of life, because good condition allows them to retain much more energy, and therefore interest in their work. We encounter the recommendation of physical activities as a part of a healthy lifestyle in the works of several authors, e.g. Adamčák (2010), Antala et al. (2014), Argaj (2016), Bence (2011), Belešová (2012), Belešová-Talapková (2020), Gregor (2007, 2013), Horváth et al. (2010, 2016), Hřčka et al. (2011), Kampmillerová (2015), Kompán et al. (2009), Merica (2018), Miňová (2014), Šimonek (2012), Šimonek et al. (2014) and others. Among other things, these authors emphasize the need for regular exercise from the earliest school age.

2 Methodology

The Goal. The goal of the article is to evaluate and compare the motor skills of children in primary education in the village and in the city through a comprehensive battery of Eurofit tests, consisting of nine (9) tests. At the same time, compare our obtained results with the results of other authors. The research sample consisted of 104 pupils in the second and fourth year of primary schools. The article is also focused on finding out the physical condition of children in selected primary schools.

The Task. Based on our goal, we set the following tasks: to select schools bases in the village and in the city to solve our problem, to select a battery of tests to determine and compare motor skills in children in the 1st grade of primary school, to carry out planned testing. Statistically process and evaluate the measured results.

Hypotheses. Based on the goal and tasks of the work, we have built 5 hypotheses, which we present in the results of the work.

Methodology. Our research involved 104 children from primary schools in the town of Sládkovičovo (53 children), of which 30 were boys and 23 girls, and from the village of Veľké Úľany (51 children), of which 28 were boys and 23 girls. They were children of the second and fourth years from the 1st grade of primary school.

Data acquisition methods: To find out the data on children's motor abilities, we chose a battery of Eurofit tests according to (Moravec et al. 2002), which consists of the following nine (9) tests: "Flamingo" balance test (T1), Plate tapping (T2), Forward bending in sitting (T3), Long jump from a place (T4), Manual dynamometry (T5), Lie down - sit up in 30 s (T6), Stay in pull-up (T7), Shuttle run 10 x 5 m (T8), Endurance shuttle run (T9). We used basic somatometric measurements to determine the data on body weight and body height of the monitored children.

Methods of processing and evaluation of results: We statistically processed and evaluated the achieved measured data on the basis of a statistical method: Student's t-test (parametric paired t-test), which compares differences in two groups. Statistical significance was determined based on $p < 0.01$, $p < 0.05$, $p < 0.1$ significance level. The use of several statistical methods can also be found in the authors Gunčaga, Zawadowski and Prodromou (2019). Statistical tests can also be performed in relation to different study results of siblings within one family (see Gorajska, Stando and Gunčaga, 2018). Comparison of statistical quantities can be performed in quantitative research using Student's t-test, which is generally divided into two variants: one-sided or two-sided t-test (Kitchenham, et al., 2016; Gauthier & Hawley, 2015). The T-test can be applied in a statistical analysis provided that the data satisfy the normal probability distribution. Otherwise, it is possible to compare bilaterally

using the Mann-Whitney test (Kitchenham, et al., 2016). Wilcoxon's exact test with many applications is very often used in pairwise comparisons - both in the technical and educational field, e.g. (Barot, et al., 2020; Cieslar, et al., 2020).

3 Results and discussion

The results obtained from the testing of motor skills of children in primary education are presented in tables with an opinion on the individual five hypotheses. From hypothesis testing using Student's t-test, we confirm or do not confirm the existence of statistically significant dependences based on $p < 0.01$, $p < 0.05$, $p < 0.1$ level of statistical significance.

At the same time, we compare our obtained results with the results from other authors: Moravec et al. (2002) and Perič et al. (2010). The resulting part also contains the evaluation of body weight and body height of children with the present calculation of the Body Mass Index (BMI) and its subsequent comparison with values from other authors.

3.1 Evaluation of hypotheses

Statistical method: Student's t-test (parametric paired t-test) was performed for the following established hypotheses (H1, H2, H3, H4, H5):

H 1: Tests of motor skills show higher performance in children from the village than in children from the city.

H 2: Tests of motor skills show higher performance in boys than in girls.

H 3: Tests of motor skills show higher performance in fourth-year children than in second-year children.

H 4: Tests of motor skills show higher performance in boys in the fourth year than in boys in the second year.

H 5: Tests of motor skills show higher performance in fourth-year girls than in second-year girls.

Next, we proceed to the presentation of results based on the Student's t-test with simultaneous opinions on the following five hypotheses. (H1, H2, H3, H4, H5).

H 1: "Tests of motor skills show higher performance in children from the village than in children from the city" (Table 1, Table 2, Table 3). In the first hypothesis, we assumed that the children from the village would be more successful in the tests than the children from the city because even today it is still possible to feel the agricultural and economic lifestyle in the village, that the village children move more in the yard, as most of them lives in houses. We assumed that they devote more time to work in the garden and around the yard, so they are more physically active and at the same time more capable. Our first hypothesis (H1) was not confirmed (was rejected), as children from the village showed higher performance in only four motor tests and children

from the city showed higher performance in the following five motor tests: balance test, plate tapping, manual dynamometry, lie down-sit up for 30s and test: stay in pull-up. From the achieved results, we state that the children from the city did better in the tests, which were focused on static balance, frequency speed and strength of the dominant hand, strength of the upper limbs, lumbar-thigh and abdominal muscles. The children from the village did better in these four tests: forward bending in sitting, long jump from a place, shuttle run 10 x 5 m and endurance shuttle running - which means that they achieved better results in tests focused on torso mobility, explosive force lower limbs, running speed and endurance. Based on the above, we can conclude that tests of motor skills have shown higher performance in children in the city than in children in the village. We achieved statistically significant results in two tests, namely in the test: plate tapping at $p < 0.05$ and test: endurance shuttle run already at $p < 0.01$.

In tab. (1) we present the results achieved in nine tests of physical performance (T1 - T9) in children from the city. In tab. (2) we present the results of tests of children from the village. In tab. (3) we see the evaluation of hypothesis (H1) by Student's t-test. In the first test: the "flamingo" balance test (T1) were better students from the city. When evaluating the t-test, we found that this was not a statistically significant result. In the second test: plate tapping (T2) children from the city finished better than from the village. However, in this test a statistically significant result already occurs at $p < 0.05$ and $p < 0.1$. In the third test: forward bending in sitting (T3), children from the village achieved better results, although the result measured by us is not statistically significant. In the fourth test: the long jump from a place (T4), again children from the village were better, but the values do not represent statistical significance. In the fifth test focused on manual dynamometry (T5), we measured more favorable values for students from the city. However, we cannot talk about statistical significance in this test. In the sixth test: lie down-sit up (T6) again finished better children from the city than from the village. The measured values are not statistically significant. In the seventh test: endurance in pull-up (T7), we obtained better values from children from the city than from the village, although these are not statistically significant results. In the penultimate eighth test: shuttle running (T8), we measured better time for children from the village than tested children from the city, but even these values are not statistically significant. In the last ninth test: the endurance shuttle run (T9), were children from the village better than from the city. Here, however, we speak of statistically significant results at $p < 0.01$, $p < 0.05$ and $p < 0.1$. We state that our Hypothesis (H1) was not confirmed (was rejected), as in five motor tests children from the city were more successful and only in four children from the village.

Table 1 Evaluation of achieved results in children's tests - the city (H1)

The city	\bar{x}	R_x	med(x)	mod(x)	d	\bar{d}_x	Min.	Max.	σ	s
T1	1,62	8	1	1	74,83	1,41	0	8	1,86	1,88
T2	13,1	9,6	13,1	11,1	84,83	1,60	9,2	18,8	1,97	1,99
T3	0,85	38	1	0	362,15	6,83	-19	19	8,34	8,42
T4	125,85	96	124	{131, 133, 120, 104, 130}	903,84	17,05	87	183	22,00	22,21
T5	20,34	20	20	{16, 20}	215,05	4,05	13	33	5,05	5,09
T6	22,13	30	22	{20, 22}	214,71	4,05	10	40	5,43	5,48
T7	9,71	60	0	0	565,89	10,67	0	60	13,87	14
T8	25,10	14	25	{26.6, 24.4}	123,70	2,33	15,4	29,4	2,91	2,93
T9	54,77	133,9	53,3	{72.5, 28.3}	964,33	18,19	14,1	148,0	25,51	25,75

Table 2 Evaluation of achieved results in children's tests - the village (H1)

The village	\bar{x}	R_x	med(x)	mod(x)	d	\bar{d}_x	Min.	Max.	σ	s
T1	1,82	8	1	0	84,47	1,65	0	10	2,17	2,19
T2	17,7	16,90	13,7	13,7	148,28	2,9	10,2	27,1	3,92	3,96
T3	1,82	25	3	8, -8	274,58	5,38	-10	15	6,44	6,50
T4	126,33	102	120	120	806,66	15,81	88	190	19,83	20,03

T5	18,80	24	18	16	230,62	4,52	11	35	5,45	5,50
T6	20,48	22	20	18	209,76	4,19	11	33	5,38	5,44
T7	8,53	33,80	6,25	9	290,44	5,8	0	33,8	7,74	7,82
T8	23,51	17,2	23,8	23,8	123,54	2,42	12,9	30,1	3,34	3,38
T9	100,50	295,2	84,5	60	1964,6	38,52	44,8	340,0	59,25	59,84

Table 3 Evaluation of hypothesis (H1) by t-test

Test	σ^2	S_x^2	σ	s	H.t.	H.p.	p<0,01	p<0,05	p<0,1	Evaluation
T1	3,48	4,18	2,02	2,04	-0,501	617299	-	-	-	City
T2	10,16	9,73	3,18	3,11	-2,579	0,010115	-	S.	S.	City
T3	56,08	56,94	7,48	7,52	-0,658	0,511798	-	-	-	Village
T4	439,80	448,37	20,97	21,17	-0,111	0,90741	-	-	-	Village
T5	28,16	28,12	5,30	5,3	1,476	0,142894	-	-	-	City
T6	29,96	29,87	5,46	5,5	1,533	0,128318	-	-	-	City
T7	128,45	130,65	11,33	11,38	0,520	0,603667	-	-	-	City
T8	10,37	10,01	3,22	3,16	2,407	0,010176	-	-	-	Village
T9	2576,1	2093,7	50,75	45,75	-5,095	0,00001	S.	S.	S.	Village

H:2 „Tests of motor skills show higher performance in boys than in girls” - tab. (4), tab. (5), tab. (6).

In compiling other hypotheses, we took into account the developmental and physiological aspects of individual age categories and gender of students. The above hypothesis (H2) was confirmed to us, because the boys were more capable in the following as many as seven tests: plate tapping, long jump from the place, manual dynamometry, lie down-sit up, stay in pull-up, shuttle running and endurance shuttle running. The girls passed the balance test and the forward bending in sitting, it means two tests. Statistically significant results were demonstrated in the following four tests: long jump from a place, already at p <0.01, manual dynamometry at p <0.05, endurance in pull-up, also at p <0.01 and shuttle running at p <0.1.

In tab. (4) we present the results achieved in nine tests of physical performance (T1 - T9), which were achieved by boys. In tab. (5) we present the results of tests of children from the village. In tab. (6) we see the evaluation of hypothesis (H2) by Student's t-test. Next, we comment on the achieved results of individual tests. In the first test: the "flamingo" balance test (T1), the girls were more successful, although this was not a statistically significant result. In the test: plate tapping (T2) were

more successful boys, although the result was not statistically significant. In the third motor test: forward bending in sitting (T3), the girls were more successful - the result was not statistically significant. In the fourth motor test: long jump from the place (T4), with a statistically significant result at p <0.01, p <0.5, p <0.1, the boys were better placed. In the test: manual dynamometry (T5) the boys were more successful at the values of significance: p <0.05, p <0.1 where we talked about statistically significant results. In the motor test: boys sat more easily in 30 s (T6), although the results measured by us are not statistically significant. In the test of endurance in pull-up (T7) the boys were more capable and their achieved results are statistically significant at the values of significance: p <0.01, p <0.05, p <0.1. In the penultimate motor test: a 10 x 5 m (T8) shuttle run, the boys achieved better results. This result is statistically significant at p <0.1. The last test: the endurance shuttle run (T9) was better performed by the boys, even it is not a statistically significant result. Based on the results obtained in motor tests, we state that the hypothesis (H2) was confirmed, given that boys showed higher performance in even seven (7) tests, while girls only in two (2) tests. Statistically significant results were obtained in the following four tests: long jump from a place (T4), manual dynamometry (T5), endurance in pull-up (T7) and a 10 x 5 m shuttle run (T8).

Table 4 Evaluation of achieved results - boys (H2)

B	\bar{x}	R_x	med(x)	mod(x)	d	\bar{d}_x	Min.	Max.	σ	s
T1	1,84	10	1	0	100,51	1,73	0	10	2,30	2,32
T2	13,78	17,9	13,2	11,1	130,16	2,28	9,2	27,1	3,25	3,28
T3	1,00	34	2	{4, 8}	342,00	5,89	-19	15	7,21	7,28
T4	132,45	103	131	120	1036,89	17,87	87	190	21,96	22,16
T5	20,60	24	20	23	274,20	4,72	11	35	5,76	5,81
T6	21,53	24	20,5	20	252,06	4,34	11	35	5,58	5,62
T7	12,26	60	8,1	0	597,65	10,48	0	60	13,44	13,56
T8	23,72	17,2	23,9	{24,1, 23,8, 22,9}	131,60	2,26	12,9	30,1	3,10	3,13
T9	81,68	333	66,5	72,5	2241,87	37,99	7,0	340,0	56,34	56,82

Table 5 Evaluation of achieved results - girls (H2)

G	\bar{x}	R_x	med(x)	mod(x)	d	\bar{d}_x	Min.	Max.	σ	s
T1	1,57	6,0	1	0	61,4	1,33	0	6,0	1,59	1,61
T2	14,14	16,8	13,7	13,6	94,7	2,05	10,2	27,0	3,07	3,10
T3	1,75	30,0	2,5	{-8, 6, 0}	299,5	6,51	-11	19,0	7,81	7,90
T4	118,07	76,0	119	130	614,9	13,36	88	164,0	16,44	16,62
T5	18,30	17,0	18	16	165,8	3,6	11	28,0	4,33	4,38
T6	20,98	30	20	18	182,9	3,97	10	40,0	5,29	5,35
T7	5,66	24,9	3,6	0	231,7	5,03	0	24,9	6,27	6,34
T8	24,97	15,8	25,05	{25, 24,4, 26,4, 28,9, 26,6}	115,53	2,51	13,7	29,5	3,23	3,26
T9	69,79	283,6	63,65	{72,5, 73,2, 59,6, 40,4}	1139,38	24,76	14,1	297,7	42,25	42,71

Table 6 Evaluation of hypothesis (H2) by t-test

Test	σ^2	S_x^2	σ	s	H.t.	H.p.	p<0,01	p<0,05	p<0,1	Evaluation
T1	4,10	4,17	2,02	2,04	0,693	489337	-	-	-	Girls
T2	10,13	10,3	3,18	3,20	-0,571	568755	-	-	-	Boys
T3	56,22	57,19	7,49	7,56	-0,502	616527	-	-	-	Girls
T4	439,80	396,40	20,97	19,90	3,658	0,0403	S.	S.	S.	Boys

T5	28,16	27,39	5,30	5,23	2,225	0,28276	-	S.	S.	Boys
T6	29,85	30,37	5,46	5,51	0,511	610288	-	-	-	Boys
T7	128,38	119,95	11,33	10,95	3,039	0,03014	S.	S.	S.	Boys
T8	10,37	10,19	3,22	3,19	-1,969	0,51662	-	-	S.	Boys
T9	2600,51	2615,53	50,99	51,14	1,182	239897	-	-	-	Boys

H 3: „Tests of motor skills show higher performance in fourth-year children than in second-year children“ - tab. (7), tab. (8), tab. (9).

We tested this hypothesis regardless of whether children are from the city or the village, and also regardless of gender differences. Hypothesis (3H) was confirmed. 4th year students were more successful in five (5) motor tests: balance test, plate tapping, long jump from a place, manual dynamometry and lie down-sit up. 2nd year students were more successful in four (4) tests: forward bending in sitting (T3), endurance in pull-up (T7), shuttle running (T8) and endurance shuttle running (T9). We achieved statistically significant results in tests: balance test (T1) at $p < 0.1$, plate tapping (T2), already at $p < 0.01$, long jump from place (T4) at $p < 0.05$, manual dynamometry (T5) and shuttle run test (T8). In both tests, the results were significant even at the level of statistical significance $p < 0.01$.

In tab. (7) we present the achieved results in nine tests of physical performance (T1 - T9) achieved by 4th year students. In tab. (8) we offer the results of tests of motor skills of 2nd year students. In tab. (9) we can see the evaluation of hypothesis (H3) by Student's t-test. Next, we comment on the achieved results of individual tests. 4th grade students passed the "flamingo" balance test (T1) more successfully. The results obtained are

significant at a significance level of $p < 0.1$. In the test: plate tapping (T2) were faster 4th grade students. The measured results are statistically significant at the significance level $p < 0.01$, $p < 0.05$ and $p < 0.1$. In the test: forward bending in sitting (T3) were 2nd year students more successful, although the results were not statistically significant. In the fourth test: the long jump from the place (T4), 4th were placed better and the results measured by us are significant at $p < 0.05$ and $p < 0.1$. In the test: hand dynamometers (T5) we see better values in 4th. These results are significant at $p < 0.01$, $p < 0.05$ and at $p < 0.1$. In the test: lie down-sit up in 30s (T6), 4th year students were more successful, although the results obtained are not statistically significant. It is interesting that in the last three tests the 2nd year students were more successful. These were statistically significant results only in the eighth test: shuttle running (T8). The results measured by us are significant at $p < 0.01$, $p < 0.05$, $p < 0.1$. Based on the achieved results, we confirm that the children of the 4th year showed higher performance in the tests of motor skills, specifically in five tests, while the children of the 2nd year passed only 4 tests better. We can state that hypothesis (H3) has been confirmed. Statistically significant results were achieved by children in the following tests: balance test (T1), plate tapping (T2), long jump from a place (T4), manual dynamometry (T5) and shuttle running (T8).

Table 7 Evaluation of achieved results - children of 4th year (H3)

4th	\bar{x}	R_x	med(x)	mod(x)	d	\bar{d}_x	Min.	Max.	σ	s
T1	1,43	8	1	0	85,22	1,27	0	8	1,64	1,65
T2	12,87	7,9	12,88	11,1	98,57	1,49	9,2	17,1	1,79	1,80
T3	0,43	38	0	0	390,29	5,82	-19	19	7,28	7,34
T4	129,60	100	128	120	1072,59	16,00	90	190	20,75	20,90
T5	21,48	22	21	18	273,34	4,07	13	35	5,05	5,09
T6	21,64	19	21	20	235,64	3,51	12	31	4,36	4,39
T7	9,12	60	5,45	0	577,6	8,75	0	60	12,51	12,60
T8	24,89	14,2	25	{25, 26,6}	159,42	2,37	15,4	29,6	2,96	2,98
T9	75,22	325,9	63,4	{72.5, 28.3, 60}	2315,28	34,55	14,1	340	58,35	58,79

Table 8 Evaluation of achieved results - children of 2nd year (H3)

2nd	\bar{x}	R_x	med(x)	mod(x)	d	\bar{d}_x	Min.	Max.	σ	s
T1	2,24	10	1	0	73,67	1,99	0	10	2,49	2,53
T2	15,68	17	14,1	13,8	124,32	3,36	10,5	27,1	4,21	4,26
T3	2,95	29	5	{10, 4, 8}	230,59	6,23	-14	15	7,57	7,68
T4	119,73	78	120	120	574,81	15,53	87	165	19,84	20,11
T5	16,16	14	15	{13, 14, 15, 16}	112,10	3,02	11	25	3,83	3,89
T6	20,75	30	18,5	18	192,50	5,34	10	40	7,05	7,15
T7	9,16	29,3	5,9	0	281,38	7,60	0	29,3	8,85	8,97
T8	23,15	17,2	23,8	23,8	86,85	2,34	12,9	30,1	3,35	3,40
T9	80,77	111,3	72	{60, 136.5, 72.5}	997,50	26,95	41,8	153,1	32,48	32,93

Table 9 Evaluation of hypothesis (H3) by t-test

Test	σ^2	S_x^2	σ	s	H.t.	H.p.	$p < 0,01$	$p < 0,05$	$p < 0,1$	Evaluation
T1	4,10	4,03	2,02	2,00	-1,970	0,51496	-	-	S.	4th
T2	10,13	8,6	3,18	2,93	-4,076	0,00018	S.	S.	S.	4th
T3	56,08	55,7	7,48	7,46	-1,643	10328	-	-	-	2nd
T4	439,80	425,56	20,97	20,62	2,334	0,21505	-	S.	S.	4th
T5	28,16	22,12	5,30	4,10	5,518	0,0001	S.	S.	S.	4th
T6	29,96	30,38	5,47	5,51	0,782	435466	-	-	-	4th
T7	128,45	131	11,33	11,44	-0,017	985733	-	-	-	2nd
T8	10,37	9,87	3,22	3,14	2,712	0,07833	S.	S.	S.	2nd
T9	2576,10	2619,40	50,75	51,18	-0,529	59732	-	-	-	2nd

H 4: „Tests of motor skills show higher performance in boys in the fourth year than in boys in the second year“ - tab. (10), tab. (11), tab. (12).

Hypothesis (4 H) was confirmed, because even in seven (7) motor tests were older boys of the 4th year more successful. Only in two tests: forward bending in sitting (T3) and in the test: shuttle run (T8) the boys of the 2nd year gave better results. It is interesting that we recorded statistically significant results in the

first five tests, namely - in the balance test (T1) at $p < 0.05$, in the plate tapping test (T2) already at $p < 0.01$, in the test the forward bending in sitting (T3) at $p < 0.05$, in the test long jump from a place (T4) at $p < 0.1$ and in the test manual dynamometry (T5) in which the results were significant already at $p < 0.01$.

In tab. (10) we present the achieved results in nine tests of physical performance (T1 - T9) achieved by boys of the 4th year. In tab. (11) we offer the results of tests of motor skills of 2nd year boys. In tab. (12) we see the evaluation of hypothesis (H4) by Student's t-test. Next, we comment on the achieved results of individual tests.

The first motor test: the "flamingo" balance test (T1) was better performed by 4th graders. The measured results are statistically significant at $p < 0.05$ and $p < 0.1$. The second test (T2) was also passed more successfully by boys of the 4th year and the values measured by us are significant at $p < 0.01$, $p < 0.05$ and $p < 0.1$. In the third motor test (T3) the boys of the 2nd year were better.

Table 10 Evaluation of achieved results - boys of 4th year (H4)

4th	\bar{x}	R_x	med(x)	mod(x)	d	\bar{d}_x	Min.	Max.	σ	s
T1	1,32	8	1	0	41,52	1,22	0	8	1,72	1,75
T2	12,82	7,9	12,7	{17.1, 10.2, 11.1, 14.1, 13.4}	53,52	1,62	9,2	17,1	1,94	1,97
T3	-0,71	31	-0,5	2	172	5,05	-19	12	6,41	6,51
T4	137,12	100	135,5	120	620,23	18,24	90	190	22,45	22,79
T5	23,15	20	22	22	148,17	4,35	15	35	5,37	5,45
T6	21,88	19	22	20	134,47	3,95	12	31	4,96	5,04
T7	12,54	60	5,9	0	407,13	12,33	0	60	15,76	16,01
T8	24,14	14,2	24	{25, 27.4, 22.9, 23.2, 23.9}	74,57	2,19	15,4	29,6	2,85	2,90
T9	84,27	319	72	72,5	1476,04	43,41	21	340	66,78	67,78

Table 11 Evaluation of achieved results – boys of 2nd year (H4)

2nd	\bar{x}	R_x	med(x)	mod(x)	d	\bar{d}_x	Min.	Max.	σ	s
T1	2,58	10	1	1	55,5	2,31	0,0	10	2,76	2,82
T2	15,10	16,6	13,75	{13.1, 11.8, 13.8, 11.1}	78,65	3,27	10,5	27,1	4,12	4,21
T3	3,42	29,0	4,5	4	144,66	6,02	-14	15	7,59	7,75
T4	125,83	78	120	120	377,33	12,72	87	165	19,42	19,84
T5	17,00	14	16	13	84	3,5	11	25	4,16	4,25
T6	21,04	24	20	18	113,25	4,71	11	35	6,31	6,45
T7	11,88	29,3	11,9	0	193,6	8,06	0	29,3	9,34	9,54
T8	23,14	17,2	23,8	{23.8, 24.4, 24.1}	57,42	2,39	12,9	30,1	3,33	3,40
T9	78,16	146,1	66	{60, 136.5}	771,04	30,84	7	153,1	37,46	38,23

Table 12 Evaluation of hypothesis (H4) by t-test

Test	σ^2	S_x^2	σ	d	H.t.	H.p.	p<0,01	p<0,05	p<0,1	Evaluation
T1	5,30	5,09	2,30	2,25	-2,093	0,40835	-	S.	S.	4th year
T2	10,61	9,69	3,25	3,11	-2,723	0,08643	S.	S.	S.	4th year
T3	52,10	49,69	7,21	7,04	-2,193	0,32437	-	S.	S.	2nd year
T4	482,66	467,91	21,96	21,63	1,956	0,55375	-	-	S.	4th year
T5	33,27	24,97	4,99	5,76	4,614	0,00023	S.	S.	S.	4th year
T6	31,14	32,08	5,58	5,66	0,556	579928	-	-	-	4th year
T7	180,79	187,26	13,44	13,68	0,180	857048	-	-	-	4th year
T8	9,63	9,73	3,10	3,11	1,203	233917	-	-	-	2nd year
T9	3174,20	3276,17	56,34	57,23	0,404	687174	-	-	-	4th year

H 5: „Tests of motor skills show higher performance in fourth-year girls than in second-year girls“ - tab. (13), tab. (14), tab. (15).

Based on the results obtained, we state that hypothesis (H5) was confirmed, as the 4th passed six (6) motor tests better, while the younger girls only passed the following three (3) tests: forward bending in sitting (T1), shuttle running (8) and endurance shuttle run (T9). We obtained statistically significant results in the tests: plate tapping (T2), already at $p < 0.01$, long jump from a place (T4) at $p < 0.05$, manual dynamometry (T5) at $p < 0.01$, shuttle run (T8) at $p < 0.05$.

These results are statistically significant for $p < 0.05$ and $p < 0.1$. In the test: the long jump from a place (T4) were more successful boys of the 4th year. This result is statistically significant at $p < 0.1$. In the fifth (T5), sixth (T6) and seventh tests (T7), fourth-year students were again more successful. A statistically significant result was also recorded in the test: manual dynamometry at $p < 0.01$, $p < 0.05$, $p < 0.1$. Penultimate test: shuttle run (T8), younger students of the 2nd grade ran more successfully. However, the results were not statistically significant. The last test (T9) was passed by older students of the 4th grade. However, this result is not statistically significant. Hypothesis (H4) determined by us was confirmed. Even in seven (7) tests did the children of the 4th year show higher performance, while the younger children showed in only two tests. We recorded statistically significant results in the following tests: balance test "flamingo" (T1), plate tapping (T2), forward bending in sitting (T3), long jump from a place (T4), manual dynamometry (T5).

In tab. (13) we present the achieved results in nine tests of physical performance (T1 - T9) achieved by girls in the 4th year. In tab. (14) we offer the results of tests of motor skills of 2nd year girls. In tab. (15) we can see the evaluation of hypothesis (H5) by Student's t-test. Next, we comment on the achieved results of individual tests. The first motor test: the "flamingo" balance test (T1) was passed better by girls in the 4th year, although we cannot talk about statistically significant values in this test. Test: plate tapping (T2) was also completed more successfully by girls of the 4th year, but in this case we are talking about statistically significant values at $p < 0.01$, $p < 0.05$ and $p < 0.1$. The third motor test: forward bending in sitting (T3) was passed better by girls in the 2nd year, although we cannot say that these are statistically significant results. It is interesting

that in the tests: (T4), (T5), (T6), (T7) the girls of the 4th grade were more successful. We observe statistically significant values in the test: long jump from a place (T4) at $p < 0.05$ and $p < 0.10$ and also in the test: manual dynamometry (T5) at $p < 0.01$, $p < 0.05$ $iP < 0.1$. In the last two tests (T8) and (T9) the girls of the 2nd year were more successful. In the test: the shuttle run (T8) we can talk about statistically significant data at $p < 0.05$ and p

< 0.1 . The last hypothesis (H5) was confirmed to us, as the girls of the 4th year showed higher performance in six (6) tests, while the girls of the 2nd year only in three (3) tests. We measured statistically significant values in: test: plate tapping (T2), long jump from a place (T4), manual dynamometry (T5), shuttle run (T9).

Table 13 Evaluation of achieved results - girls of 4th year (H5)

4th	\bar{x}	R_x	med(x)	mod(x)	d	\bar{d}_x	Min.	Max.	σ	s
T1	1,55	6	1	0	42,72	1,29	0	6	1,53	1,56
T2	13,11	6,3	12,96	{14.4, 11.1, 12.7, 13.7}	45,07	1,36	10,2	16,5	1,62	1,64
T3	1,62	29	2	0	213,87	6,48	-10	19	7,94	8,07
T4	121,85	72	124	130	401,15	12,15	92	164	15,37	15,61
T5	19,76	15	19	{16, 18, 20}	109,75	3,32	13	28	4,03	4,09
T6	21,39	14	21	20	98,96	2,99	15	29	3,62	3,68
T7	6,25	24,9	4,2	0	182,35	5,52	0	24,9	6,66	6,78
T8	25,67	10,6	26,4	{24.4, 28.9, 26.6}	77,23	2,34	18,9	29,5	2,86	2,19
T9	65,94	283,6	60	{40.4, 59.6}	841,68	25,50	14,1	297,7	46,32	47,04

Table 14 Evaluation of achieved results - girls of 2nd year (H5)

2nd	\bar{x}	R_x	med(x)	mod(x)	d	\bar{d}_x	Min.	Max.	σ	s
T1	1,62	6,0	1	0	18,61	1,43	0	6	1,73	1,80
T2	16,76	15,8	15,7	13,6	42,90	3,30	11,2	27	4,15	4,32
T3	2,08	23,0	5	{6, 5}	84,76	6,52	-11	12	7,46	7,77
T4	108,46	47	105	104	166,46	12,80	88	135	15,10	15,72
T5	14,62	10	14	14	24,61	1,89	11	21	2,49	2,59
T6	19,92	30	18	16	78,46	6,03	10	40	8,02	8,35
T7	4,16	18,7	3,6	0	42,38	3,26	0	18,7	4,82	5,02
T8	23,17	15,0	23,8	{13.7, 20.7, 20.8, 22.8, 23.2, 23.3, 23.8, 23.9, 24, 24.9, 25, 26.4, 28.7}	29,35	2,25	13,7	2,25	3,40	3,54
T9	79,57	97,6	72,5	72,5	278,24	21,40	43,4	141	27,12	28,23

Table 15 Evaluation of hypothesis (H5) by t-test

Test	σ^2	S_x^2	σ	d	H.t.	H.p.	$p < 0,01$	$p < 0,05$	$p < 0,1$	Evaluation
T1	2,55	2,66	1,59	1,63	-0,130	896516	-	-	-	4th
T2	9,45	7,06	3,07	2,65	-4,194	0,0013	S.	S.	S.	4th
T3	61,11	63,85	7,81	7,99	-0,174	862536	-	-	-	2nd
T4	270,40	244,72	16,44	15,64	2,613	0,12225	-	S.	S.	4th
T5	18,77	14,03	4,33	3,74	4,193	0,00131	S.	S.	S.	4th
T6	28,06	28,88	5,29	5,37	0,835	407776	-	-	-	4th
T7	39,33	40,2	6,27	6,34	1,006	319609	-	-	-	4th
T8	10,44	9,6	3,23	3,09	2,468	0,17528	-	S.	S.	2nd
T9	1785,24	1827,0	42,25	42,74	-0,973	335437	-	-	-	2nd

3.2 Comparison of the tests' results of motor skills of children from our group with other groups

When comparing the results of our group of children from primary schools Sládkovičovo and Veľké Úľany (Set of primary schools SL + VÚ) and children from the group Moravec et al.

2002 - (Eurofit) and the sample of Perič et al. 2010 - (Sports talent) we present some differences. However, it should be noted that in the sample of the author Perič et al. 2010 - (Sports talent) talented individuals were tested and therefore we present this set only for interest. We compared the results in all nine tests (T1 - T9) separately for boys and girls.

Table 16 Comparison of test results of our group with other girls - boys

Boys							
Test	Group	4th			2nd		
		\bar{x}	n	s	\bar{x}	n	s
T1	Group ZŠ SL+VÚ	1,32	34	1,75	2,58	24	2,76
	Eurofit	12,28	74	7,01	18,05	73	7,79
	Sports Talent	-	-	-	-	-	-
T2	Group ZŠ SL+VÚ	12,82	34	1,79	15,09	24	4,21
	Eurofit	16,91	74	3,13	18,99	73	3,01
	Sports Talent	-	-	-	-	-	-
T3	Group ZŠ SL+VÚ	0,7	34	6,51	3,41	24	7,75
	Eurofit	20,19	74	5,54	19,85	73	5,01
	Sports Talent	8	-	-	10	-	-
T4	Group ZŠ SL+VÚ	137,11	34	22,79	125,83	24	19,84
	Eurofit	149,3	74	17,87	132,52	73	16,38
	Sports Talent	176	-	-	158	-	-
T5	Group ZŠ SL+VÚ	23,147	34	5,45	20,24	24	6,18
	Eurofit	22,03	74	4,22	17,67	73	3,94
	Sports Talent	-	-	-	-	-	-

T6	Group ZŠ SL+VÚ	21,88	34	5,04	21,04	24	6,45
	Eurofit	21,28	74	5,23	19,01	73	5,09
	Sports Talent	22	-	-	20	-	-
T7	Group ZŠ SL+VÚ	12,53	34	16,01	11,87	24	9,54
	Eurofit	19,17	74	14,38	9,9	73	10,33
	Sports Talent	24	-	-	22	-	-
T8	Group ZŠ SL+VÚ	42,13	34	2,9	23,13	24	3,4
	Eurofit	22,73	74	2,38	24,2	73	2,71
	Sports Talent	11,2	-	-	11,7	-	-
T9	Group ZŠ SL+VÚ	84,26	34	67,78	78,16	24	38,23
	Eurofit	335	74	1,62	286	73	1,23
	Sports Talent	-	-	-	-	-	-

In tab. (16) we present a comparison of the results of the mentioned three groups of boys. The first two sets are from the general population and the third set is listed for interest due to the fact that it has talented individuals. Here it is very likely that these individuals will be the most successful. Next, we comment on the achieved results of individual tests. In the first test: the "flamingo" balance test (T1), our group (ZŠ SL + VÚ) was more successful than the group (Eurofit). In the test: plate tapping (T2) again the boys from our group achieved better results compared to the group (Eurofit). In the third test: the forward bending in sitting (T3) group (Eurofit) was more successful compared to our group. They were even the most successful of the three ensembles. In the test: long jump (T4) the students we tested were the least successful, then the boys from the group (Eurofit) and the most successful was the group (Sports Talent), where we noticed a significant difference compared to the previous two groups. In the fifth test: manual dynamometry (T5) the set (Eurofit) was more successful than our set. In the test: lie down-sit up (T6) we encounter an interesting result. Our sample (ZŠ SL + VÚ) of boys of the 2nd year achieved better results compared to the sample (Sports Talent). In the test: endurance pull-up (T7), our group was the weakest in the 4th year. However, our 2nd year boys were more successful than the boys from the group (Eurofit). However, the values achieved by the sample (Sports Talent) are significantly better than the other two groups. In the penultimate test: the shuttle run (T8) 4th from the group (Eurofit) achieved a faster time than our group, but the boys of the 2nd year from our group were more successful than the group (Eurofit). The group (Sports Talent) was again by far the most successful. In the final evaluation, we state that in the evaluation of motor skills tests, children of the 4th year of the group (Eurofit) showed higher performance, they were more successful in five (5) tests, while the children tested by us in four (4) tests. When comparing the 2nd year, the group (Eurofit) demonstrated higher performance in six (6) tests. Our group (ZŠ SL + VÚ) only in three (3) tests of motor skills. As we compared two groups (2nd and 4th year) together in eighteen (18) tests, in conclusion it should be noted that in ten (10) tests the boys we tested (ZŠ SL + VÚ) showed higher performance and in eight (8) tests the boys from group (Eurofit). We state that the boys of our group (ZŠ SL + VÚ) were more successful compared to the group of boys (Eurofit). However, the most successful of all three groups of boys was the group (Sports Talent), which achieved significantly better results in almost all tests compared to the other two groups (Tab. 16).

In tab. (17) we present a comparison of the results of the mentioned three groups of girls. Then, we comment on the achieved results of individual tests. During the test: the balance test "flamingo" (T1) was the most successful our group of girls (elementary school SL + VÚ). Test: our group of girls passed the plate tapping (T2) most successfully. During the test: the forward bend in sitting (T3) was the most successful group (Eurofit), followed by the group (Sports Talent) and the girls of our sample finished in the last place. In the test: the long jump

from a place (T4) the most successful girls were in the group (Eurofit). In the fifth test: manual dynamometry (T5) was again the most successful group of girls (Eurofit). In the sixth test: lie down-sit up (T6) was the most successful our group of girls (ZŠ SL + VÚ), followed by the group (Eurofit) and then the group (Sports Talent). In the test: endurance pull-up (T7) the girls of the group (Sports Talent) were significantly the most successful, followed by the group (Eurofit) and our group finished last. In the eighth test: the shuttle run (T8) were again by far the most successful girls from the group (Sports Talent). In this test (T8) the fourths of the set (Eurofit) were more successful than our sample, but the seconds of our sample were more successful than the sample (Eurofit). In the ninth test: the endurance shuttle run (T9) was more successful group (Eurofit) than our group. In conclusion, we state that our group of girls (SL + VÚ primary school) was more successful in seven (7) motor tests compared to the group (Eurofit), which was, however, more successful in eleven (11) motor tests. We state that overall, the group of girls (Eurofit) was more successful. We did not include the group of girls (Sports Talent) in this comparison. In the overall comparison of the groups of boys and girls of the two groups, our group (ZŠ SL + VÚ) was more successful in seventeen (17) motor tests and the group (Eurofit) was more successful in nineteen (19) motor tests. In this overall comparison, the group (Eurofit) was more successful than our group (Tab. 17).

In our article, we consider some facts to be interesting: in five hypotheses we achieved statistically significant results up to 4 times, although always at a different level of significance in the following tests: plate tapping (T2), long jump from a place (T4) and manual dynamometry (T5). When comparing the results of motor skills of older children with younger children in our study group, younger children achieved better performance in the test: forward bending in sitting (T3) compared to older children. When comparing the boys and girls of our group (ZŠ SL + VÚ) with the group Moravec et al. 2002 - (Eurofit) and Perič et al. 2010 - (Sports talent) we came to an interesting finding and that our group (ZŠ SL + VÚ) of boys and girls of the 2nd year achieved more successful results in the test: lie down - sit up (T6) than the group (Eurofit) and the group (Sports talent). The boys of the 4th year were also very close to being more successful than the two mentioned groups. In summarizing the results from all nine motor tests, the boys in our group were more successful than the boys in the group (Eurofit). When evaluating the group of girls, we came to the conclusion that the girls of the group (Eurofit) showed higher performance in motor tests than our group of girls. When comparing fourths, regardless of gender, the children of the group (Eurofit) performed higher in the tests of physical fitness and physical performance. We showed higher performance of our children in 2nd year than in the children of the group (Eurofit). In tab. (16, 17) in the overall comparison of the achieved results between our tested children and those examined by Moravec et al. 2002 - (Eurofit) we state that tests of motor skills showed higher performance in children of the group Moravec et al. 2002 - (Eurofit).

Table 17 Comparison of test results of our group with other groups - girls

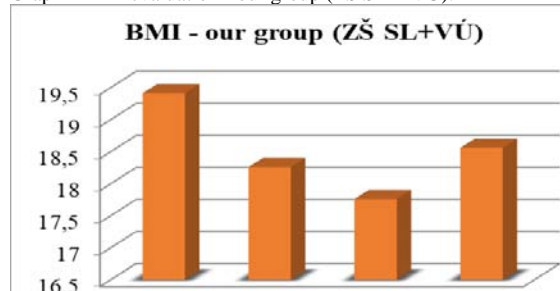
Girls							
Test	Group	4th			2nd		
		\bar{x}	<i>n</i>	<i>s</i>	\bar{x}	<i>n</i>	<i>s</i>
T1	Group ZŠ SL+VÚ	1,54	33	1,56	1,61	13	1,8
	Eurofit	11,36	75	7,25	17,72	71	9,87

	Sports Talent	-	-	-	-	-	-
T2	Group ZŠ SL+VÚ	13,11	33	1,64	16,76	13	4,15
	Eurofit	16,11	75	2,30	17,45	71	2,21
	Sports Talent	-	-	-	-	-	-
T3	Group ZŠ SL+VÚ	1,62	33	8,07	2,07	13	7,77
	Eurofit	22,92	75	5,2	20,83	71	5,78
	Sports Talent	14	-	-	12	-	-
T4	Group ZŠ SL+VÚ	121,84	33	15,61	108,46	13	15,72
	Eurofit	140,36	75	16,16	123,46	71	15,76
	Sports Talent	170	-	-	152	-	-
T5	Group ZŠ SL+VÚ	19,75	33	4,09	14,61	13	2,59
	Eurofit	20,37	75	4,85	14,79	71	3,33
	Sports Talent	-	-	-	-	-	-
T6	Group ZŠ SL+VÚ	21,39	33	3,68	19,92	13	8,35
	Eurofit	21,17	75	4,48	17,61	71	5,85
	Sports Talent	20	-	-	18	-	-
T7	Group ZŠ SL+VÚ	6,25	33	6,66	4,16	13	5,02
	Eurofit	8,93	75	7,37	8,92	71	6,87
	Sports Talent	15	-	-	13	-	-
T8	Group ZŠ SL+VÚ	25,67	33	2,91	23,16	13	3,54
	Eurofit	23,34	75	1,71	26,00	71	3,98
	Sports Talent	11,7	-	-	12,2	-	-
T9	Group ZŠ SL+VÚ	65,93	33	47,04	79,56	13	28,23
	Eurofit	297	75	1,35	236	71	0,94
	Sports Talent	-	-	-	-	-	-

3.3 Comparison of body weight and body height of children of our group (ZŠ SL + VÚ) and children of the group Moravec et al. 2002 - (Eurofit)

In graph (1) we present the evaluation of the weight-height index: Body Mass Index (BMI) of the children of our group in primary education (ZŠ SL + VÚ). From graph (1) we can read that boys in the 4th year have an average (BMI) of 19.41, which

Graph 1 BMI evaluation - our group (ZŠ SL + VÚ).



In tab. (18) we evaluate the weight of our group using the statistical method t-test. We are based on previous

Table 18 Evaluation of the weight of our group (ZŠ SL + VÚ) - (t-test)

Weight	s^2	S_2^2	σ	s	H.t.	H.p.	p<0,01	p<0,05	p<0,1
ZŠ SL 4th & 2nd ZŠ VÚ 4th & 2nd	107,47	108,64	10,36	10,42	-0,831	407153	-	-	-
ZŠ SL 4th ZŠ VÚ 4th	112,72	114,07	10,61	10,68	-1,052	296148	-	-	-
ZŠ SL 2nd ZŠ VÚ 2nd	84,58	88,08	9,19	9,38	-0,412	681652	-	-	-
ZŠ SL 4th B ZŠ VÚ 4th B	111,83	115,86	10,57	10,76	-0,845	403398	-	-	-
ZŠ SL 4th G ZŠ VÚ 4th G	106,83	111,08	10,33	10,53	-0,714	479144	-	-	-
ZŠ SL 4th ZŠ SL 2nd	130,81	130,72	11,43	11,53	1,431	157231	-	-	-
ZŠ VU 4th ZŠ VU 2nd	78,62	73,17	8,86	8,55	2,484	0,1609	-	S.	S.

In tab. (19) we evaluate the body height of our group using the statistical method t-test. We are based on previous measurements, where we compared the body height of our group (ZŠ SL + VÚ), which consisted of primary schools in the town of Sládkovičovo and in the village of Velké Úřany. We

indicates a normal weight. The boys of the 2nd year are underweight with a value of 18.26. The opposite gender, 4th year girls, have a BMI of 17.76, which also means underweight. Girls attending 2nd year have a BMI of 18.56, which means normal weight. In assessing BMI, we came to the fact that, on average, children reached underweight and normal weight. The average BMI never showed overweight or obesity, either I., II., or III. degree.

measurements, where we compared the body weight of our group (ZŠ SL + VÚ), which consisted of primary schools in the town of Sládkovičovo and in the village of Velké Úřany. We performed measurements between years and gender. We created 7 groups, among which we compared the average body weight and body height. The highest body weight was found by the boys of the 4th year from Velké Úřany, namely: 39.87 kg and the lowest by the boys of the 2nd year from Sládkovičovo, namely: 30.77. We achieved statistically significant values when we compared the children of the 4th year with the children of the 2nd year from the primary school in Velké Úřany. The results were significant even at $p < 0.05$. We can talk about statistically significant values in this case when comparing body weight between 4th grade and 2nd grade students from Velké Úřany. These results are significant at $p < 0.05$ and $p < 0.1$.

performed measurements between years and gender. We created 7 groups, among which we compared the average body weight and body height. The highest body height was reached by the boys of the 4th year from Velké Úřany, namely: 141.47 cm. On average, the lowest children were from the village from the 2nd

year with a height of 130.88 cm. We achieved statistically significant results when comparing body height of children of the 4th and 2nd year from Sládkovičov and also of children of the 4th and 2nd year from Veľké Úľany. Statistically significant results were already in both cases at $p < 0.01$. We can talk about

statistically significant results when we compared body height between 4th and 2nd years pupils at the Primary School in Sládkovičovo and subsequently between 4th and 2nd year pupils at both schools. In both cases, these are statistically significant results at $p < 0.01$, $p < 0.05$ and $p < 0.1$.

Table 19 Evaluation of the body height of our group (ZŠ SL + VÚ) - (t-test)

Body height	σ^2	S_x^2	σ	s	H.t.	H.p.	p<0,01	p<0,05	p<0,1
ZŠ SL 4th & 2nd ZŠ VÚ 4th & 2nd	56,28	57,11	7,5	7,55	0,484	62916	-	-	-
ZŠ SL 4th ZŠ VÚ 4th	35,72	36,64	5,97	6,05	-0,392	695575	-	-	-
ZŠ SL 2nd ZŠ VÚ 2nd	39,50	41,22	6,28	6,42	0,209	835201	-	-	-
ZŠ SL 4th B ZŠ VÚ 4th B	34,50	36,24	5,87	6,01	-0,567	574293	-	-	-
ZŠ SL 4th G ZŠ VÚ 4th G	35,81	37,75	5,98	6,14	-0,017	986116	-	-	-
ZŠ SL 4th ZŠ SL 2nd	58,93	43,96	7,67	7,73	4,878	0,0001	S.	S.	S.
ZŠ VÚ 4th ZŠ VÚ 2nd	53,06	32,14	7,28	7,34	6,253	0,0001	S.	S.	S.

In tab. (20) we compare the body weight and body height of the boys of our group (ZŠ SL + VÚ) and the group Moravec et al. 2002 - (Eurofit). We can draw the following findings. The body weight of the boys in our group in the 4th and 2nd year is higher than of the boys in the group (Eurofit). In terms of body height,

the boys of the 4th year of the group (Eurofit) are taller than the boys of our group. On the contrary, the boys of the 2nd year of our group are taller than the boys of the 2nd year of the group (Eurofit).

Table 20 Comparison of body weight and body height - boys

		4th boys			2nd boys		
		\bar{x}	n	s	\bar{x}	n	s
Body weight	Group ZŠ SL+VÚ	38,05	37	10,72	31,35	29	8,81
	Eurofit	36,35	108	9,82	26,29	73	4,93
Body height	Group ZŠ SL+VÚ	140,8	37	5,95	131,24	29	5,64
	Eurofit	143,52	108	7,97	127,76	73	5,85

In tab. (21) we compare the body weight and body height of the girls in our group (ZŠ SL + VÚ) and the group Moravec et al. 2002 - (Eurofit). We can draw the following findings. The body weight of girls in the 4th and 2nd year of our group is higher

compared to girls in the 4th and 2nd year of the group (Eurofit). The body height of the girls of the 4th and 2nd year of our group is also higher compared to the girls of the 4th and 2nd year of the group (Eurofit).

Table 21 Comparison of body weight and body height - girls

		4th girls			2nd girls		
		\bar{x}	n	s	\bar{x}	n	s
Body weight	Group ZŠ SL+VÚ	34,33	39	10,47	31,38	18	10,26
	Eurofit	33,13	75	6,53	25,4	71	5,74
Body height	Group ZŠ SL+VÚ	139,33	39	6,06	130,77	18	7,51
	Eurofit	138,36	75	6,91	125,83	71	6,48

4 Conclusion

In our article, we tried to approach the issue of physical performance of children in primary education. The tested group consisted of boys and girls of the fourth and second year at the 1st stage of primary school. In a sample of 104 pupils, we diagnosed their motor skills using a comprehensive Eurofit test battery, which consisted of nine tests. The goal of the paper was to evaluate and compare the motor skills of children of younger school age in the village and in the city. The monitoring took place at two primary schools, in the town of Sládkovičovo (Slovakia) and in the village of Veľké Úľany (Slovakia). Based on the use of nine motor tests, using statistical indicators of parametric paired t-test, we demonstrated statistically higher performance of children from the city, compared to children from the village. At the same time, tests of motor skills showed us higher performance of children in the fourth year compared to children in the second year - as well as in testing boys and girls. We also measured higher physical performance of boys as a whole comparing to girls. The article also brings a comparison of motor skills of the examined group with groups of other authors.

We also consider as interesting finding that with five hypotheses we achieved statistically significant results up to 4 times, although always at a different level of significance in the following tests: plate tapping (T2), long jump from a place (T4) and hand dynamometers (T5). When comparing the results of motor skills of older children with younger children in our study group, younger children always achieved better performance in the test: forward bending in sitting (T3) than older children.

In the overall comparison of the achieved results between our tested children and those examined by R. Moravec et al. 2002 (Eurofit) we state that tests of motor skills showed higher performance of children tested in the group Moravec et al. 2002 (Eurofit). When comparing our group with the file of Perič et al. (2010), who tested talented individuals, we found that this group demonstrated higher performance in motor skills than our group, only when performing the test: lie down-sit up (T6). The boys of the 2nd year examined by us performed on average more repetitions in the test than the children of the Perič group (2010), who are considered to be sports-gifted.

The article also brings an evaluation and comparison of body height and body weight of children in our research group (ZŠ SL + VU), but also a comparison with somatometric indicators of other groups, which were monitored by other authors. When

comparing body height and body weight, which we and the authors R. Moravec et al. 2002 (Eurofit), we can state that the body weight of boys and girls of the 2nd and 4th year of our group (SL and VU) is higher than the group of Moravec et al., 2002 (Eurofit). We noticed an exception only for boys in the 4th grade, where children tested by Moravec et al. 2002 (Eurofit) are taller by less than a centimeter. We achieved statistically significant results when comparing body height of children in the 4th and 2nd year from Sládkovičovo (Slovakia) and also of children in the 4th and 2nd year from Veľké Úľany (Slovakia). Statistically significant results were already in both cases at $p < 0.01$. In assessing BMI, we came to the fact that, on average, the children in our group reached underweight and normal weight. The average BMI never showed overweight or obesity, either I., II., or III. degree.

Literature:

- Adamčák, Š.: *Pohybové hry a školská telesná a športová výchova*. Banská Bystrica: Univerzita Mateja Bela, 2010. 207 p. ISBN 978-80557-0099-1.
- Antala, B. et al.: *Telesná a športová výchova a súčasná škola*. Bratislava: NŠC, FTVŠ UK, 2014. 343 p. ISBN 978-80-971466-1-0.
- Argaj, G.: *Pohybové hry. Teória a didaktika*. Bratislava: FTVŠ UK, 2016. 2008 p. ISBN 978-80-223-4022-9.
- Barot, T., Burgsteiner, H., & Kolleritsch, W.: Comparison of Discrete Autocorrelation Functions with Regards to Statistical Significance. In: *Advances in Intelligent Systems and Computing. Springer*, 2020. ISSN 2194-5357 (in Print).
- Belešová, M.: Činitele ovplyvňujúce voľný čas mládeže. In: MMK 2012, roč. 3 [elektronický zdroj]. Hradec Králové: Magnanimitas, 2012. pp. 2243-2252 [CD-ROM]. ISBN 978-80-905243-3-0.
- Belešová, M.: Prekonceptie detí o Slovensku. In: *Vedecké snúdie v predprimárnej pedagogike*. Šala: Spoločnosť pre predškolskú výchovu, 2017. pp. 75-82. ISBN 978-80-971016-2-6.
- Belešová, M., Talapková, J.: Základy racionálnej výživy u detí predškolského veku. In *Žiak, pohyb, edukácia: vedecký zborník 2020*. Bratislava: Univerzita Komenského, 2020. pp. 59-64. ISBN 978-80-223-5013-6.
- Belešová, M.: *Primárne vzdelávanie v teórii a v praxi*. Bratislava: Vydavateľstvo Univerzity Komenského, 2018. 192 p. ISBN 978-80-223-4577-4.
- Bence, L.: *Telesný rozvoj, pohybová výkonnosť a humanizácia vyučovania školskej telesnej výchovy na ZŠ*. Banská Bystrica: Univerzita Mateja Bela Fakulta humanitných vied, 2011. 63 p. ISBN 978-80-557-0131-8.
- Cieslar, M.; Koudela, T., Pienias, G., Barot, T.: Identification of Similarities in Approaches to Paired Comparisons in Visual Arts Education. In: *Advances in Intelligent Systems and Computing. Springer*, 2020. ISSN 2194-5357 (Accepted).
- Čavojský, I.: Žiaci primárneho vzdelávania a ich vzťah k učiteľovi ako autorite In: *Integratívny prístup v primárnom vzdelávaní*. Liberec: Technická univerzita v Liberci, 2015. pp. 64-70.
- Gauthier, T. D., Hawley, M. E.: Statistical Methods. In: *Introduction to Environmental Forensics: Third Edition*, 2015. pp. 99-148.
- Gorajska, M., Stando, J., Gunčaga, J.: The Influence of Birth Order on the Results of the State E-Test in Mathematics. In: (Smyrnova Trybulska, E., Ed.) *E-Learning and Smart Learning Environment for the Preparation of New Generation Specialists, Book Series: E-learning*, 2018. 10. pp. 199-219.
- Gregor, T.: *Psychológia športu*. Bratislava: Mauro Slovakia, 2013. 400 p. ISBN 978-80-9680927-9.
- Gregor, T. Vplyv telesného pohybu na psychické zdravie In: *Revue medicíny v praxi*, 2007. roč. 5, č. 1. pp. 29-38.
- Gunčaga, J., Zawadowski, W., Prodromou, T.: Visualisation of Selected Mathematics Concepts with Computers - the Case of Torricelli's Method and Statistics. In: *European Journal of Contemporary Education*, 2019. 8 (1), pp. 69-91.
- Horváth, R. et al.: *Výber športových talentov*. Prešov: Vydavateľstvo Prešovskej univerzity, 2016. 207 p. ISBN 978-80-555-1751-3.
- Horváth, R. et al.: *Diagnostika motorickej výkonnosti a genetických predpokladov pre šport*. Prešov: PU v Prešove, 2010. ISBN 978-80-555-0270-0.
- Hrčka, J., Kovářová, M., Beňačka, J.: *Pohybová aktivita edukantov fyzioterapie vo voľnom čase a jej reflexia na vybraných zdatnostných a zdravotných charakteristikách*. Trnava: UCM, 2011. 151 p. ISBN 978-80-8105-323-8.
- Jakabčič, I.: *Základy vývinovej psychológie*. Bratislava: IRIS, 2002. 83 p. ISBN 80-89018-34-13.
- Kampmillerová, L.: Športové výcviky v základnej škole. Bratislava: Raabe, 2015. 133 p. ISBN 9788081401992.
- Kitchenham, B., Madeyski, L., Budgen, D. et al.: Robust Statistical Methods for Empirical Software Engineering. In: *Empirical Software Engineering*, 2017. 22 (2), pp. 579-630. 133 p. ISBN 9788081401992.
- Kompán, J. et al.: *Súčasný stav a nové trendy v hodnotení telesnej zdatnosti a pohybovej výkonnosti žiakov základných škôl*. Banská Bystrica: Fakulta humanitných vied Univerzity Mateja Bela, 2009. 201 p. ISBN 978-80-8083-887-4.
- Kostrub, D.: *Základy kvalitatívnej metodológie – keď interpretované významy znamenajú viac ako vysoké čísla*. Bratislava: PdF UK, 2016. 161 p. ISBN 978-80-223-4166-0.
- Kováčová V.: *Diagnostika motorických schopností testami Eurofit u detí mladšieho školského veku (rigorózna práca)* Bratislava: PdF UK (rigorózna práca). Bratislava, PdF UK, 2020. 133 p.
- Merica, M.: Effect of Stretching on Sports performance in Softball. In: *Sportivnye igry v fizičeskom vospitanii, rekreacii i sporte: zborník z medzinárodnej vedeckej konferencie*. Smolensk : SGAFKST, 2018. pp. 119-121.
- Miňová, M.: *Teória a prax telesnej výchovy v materskej škole*. Prešov: Prešovská univerzita v Prešove, 2014. 158 p. ISBN 978-80-555-1168-9. EAN 97888055511689.
- Moravec, R., Kampmiller, T., Sedláček, J. et al.: *Eurofit. Telesný rozvoj a pohybová výkonnosť školskej populácie na Slovensku*. Bratislava: SVSpreTVaŠ, 2002. 180 p. ISBN 80-89075-11-8.
- Oravcová, J.: *Vývinová psychológia*. Banská Bystrica: Univerzita Mateja Bela, 2010, 232 s. ISBN 978-80-80839-37-6.
- Severini, E.: Samostatnosť dieťaťa vo výskumných interpretáciách rodičov = Child's autonomy in parent's research interpretations. In: *Terazniejszosc i przyszlosc edukacji dzieci, mlodziwie i doroslych wybrane problemy*. Siedlce: Akka, 2018. pp. 67-87. ISBN 978-83-948104-7-4.
- Severini, E., Kostrub, D.: *Kvalitatívne skúmanie v predprimárnom vzdelávaní*. Prešov: Rokus, 2018. 182 p. ISBN 978-80-895-1071-9.
- Šimonek, J. et al. (2014). *Metodická príručka telesnej výchovy pre materské školy a prvý stupeň základných škôl*. Bratislava: AT Publishing, 2014. 140 p. ISBN 978-80-88954-62-0.
- Šimonek, J.: *Testy pohybových schopností*. Nitra: UKF, 2012. 194 p. ISBN 978-80-970857-6-6.

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