

THE INFLUENCE OF MOVEMENT GAMES ON CHANGES IN COORDINATION SKILLS IN CHILDREN OF YOUNGER SCHOOL AGE

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Abstract: In their contribution, the authors approach the issue of changes in coordination skills in children of younger school age due to movement games. 40 children from the Roma settlement at the Primary School in Lomnička in the Stará Ľubovňa district in the eastern part of Slovakia participated in our research. The goal of the contribution is to implement motor coordination tests selected by us, abilities in the experimental and control group in children of the 4th year of primary education. At the same time, evaluate the body weight and body height of children with the simultaneous calculation of the Body Mass Index (BMI). We evaluate the obtained results on the basis of Student's t-test and Mann-Whitney U-test. Our experiment lasted 8 weeks, and we performed measurements for both groups at the beginning and at the end of the monitored period. We recorded the best performance improvements in both the experimental and control groups in the "catching the ball and then stopping it" test and in the test "jumping over the jump rope" in 30 s. Due to the increased interest in testing among children from the Roma settlement of Lomnička, we recommend that testing be carried out more often at this primary school.

Keywords: Movement games, children in primary education, motor tests, coordination skills.

1 Introduction

Movement games are natural activities for children and form an integral part of children's lives, whether in school or out-of-school environments. The biggest opportunity for the implementation of movement games, as deliberate movement activities with set and observed rules that bring joy and satisfaction to children, is created mainly in physical and sports education classes. Knowing the state of movement abilities of children of younger school age in primary education contributes significantly to its positive influence in terms of prevention and the goal of the set requirements for children. By looking for effective models for the development of movement skills in physical and sports education, we will help children discover the benefits of movement activities and the possibilities of enjoying them. Their development should take into account and respect the age and individuality of each child. We believe that among the factors that influence the entire process of motivating children to physical education and sports are primarily the quality and quantity of comprehensible information in everyday life, the climate of school and home, the teacher, coach and family, but also the child himself.

According to Opravilová (2016), play is one of the main activities of people. It is a broad term that can be defined from different perspectives. Some experts explain play as a manifestation of innate energy that a child needs to express. Others see play as an exercise in which children acquire skills they will need in life. Several opinions emerged that helped to understand play as an important and main activity in children's lives. The authors Lynch & Vargová (2020) state that play is one of the basic human activities that we mostly associate with early childhood. A child spends a significant part of his day playing, through play he satisfies his basic needs, this activity is a means of developing all aspects of his personality, through play he gets to know the world - he learns. Human play is an activity in which social relations between individuals are manifested. According to Gáborová & Porubčanová (2016), children play more and more with their friends, they are very active, they need continuous movement. They play in parCG, on climbing frames, they start showing interest in football and other sports. Preschoolers also like logic and board games.

The author Podprocká (2013) states that with each game, children develop certain competencies and overall the child's development is developed and guided. Comenius considered play as a need that supports the development of movement, sensory and mental abilities. This is also why our pedagogy considers play to be one of the main important tools and methods of education. Horváth et al. (2010) emphasizes that somatic and movement testing has a wide scope and at the same time affects the individual, school, region, education and health departments, their orientation, with important goals for a healthy lifestyle for the whole society. The author Šimonek (2018) is of the opinion that when determining children's talent for sports, not only the level of motor skills should be monitored, but also the level of motor competences manifested in basic locomotion walking, running, jumping, throwing, rolling a ball, jumping rope, jumping over an obstacle, etc. The state of gross motor skills usually reveals the quality of children's motor skills more than performance in tests of motor skills.

The importance of the teaching profession affects all areas of society's life, including our children's free time and their activities, including sports at school, but also outside of school. Therefore, several authors: e.g. Antala et al. (2018), Antala (2021), Belešová (2023 a, b), Benčuriková, & Labudová (2022, 2023), Horváth (2001), Koreňová, Severini & Čavojský (2023), Merica & Belešová (2022), Merica & Barnáková (2021), Severini & Kostrub (2018), Severini, Kožuchová & Brezovská (2021) emphasize that teachers significantly influence the development of education. upbringing and education. According to the authors Gáborová & Porubčanová (2016), Kostrub (2022), the teacher influences the nature and quality of the relationship with the students, conditions the atmosphere in the classroom, stimulates the students' interest - including their relationship to sports and active physical activity, their experience of life at school, the development of their knowledge and their entire personality. Other authors, e.g. Duda, Stula & Trzeciak (2023), Gregor (2013, 2017), Gregor et al. (2023), Harsa et al. (2023), Kampmiller & Vanderka et al. (2012), Kaplánová (2018), Ondrejková & Gregor (2023), Petrikán (2021), Sun (2013), recommend physical activities as part of a healthy lifestyle and emphasize the need for regular exercise in children from the earliest school age.

Movement skills, especially coordination skills and their development are brought closer in their work by the authors: Lednický (2005), Měkota & Novosad (2005), Belej & Junger et al. (2006), Sedláček & Lednický (2010), Laczó et al. (2014), Šimonek (2012, 2018), Mačura et al. (2022) and others. And we must also not forget the fact that it is extremely important for every child to observe appropriate physical activity in conjunction with rational nutrition. In case, it is generally known that the exclusion or limitation of physical activity usually has a negative effect on human activities: physical fitness decreases, various diseases arise 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 survival. These attributes are part of today's school in educating our children. In terms of the variety of games, there are different categorizations of games according to different criteria.

2 Methodology

Goal. The goal of the article is to evaluate and compare changes in motor performance and coordination skills in children of younger school age from a Roma settlement. At the same time, evaluate the body weight and body height of children with the simultaneous calculation of the Body Mass Index (BMI). The research sample consisted of 40 pupils of the fourth grade of the primary school in the Roma settlement of Lomnička in the district of Stará Ľubovňa. Our experiment lasted 8 weeks.

Tasks. Based on the goal, we set ourselves the following tasks: choose an elementary school to solve our problem, create a training plan with movement games (as an experimental factor), choose tests to determine and compare motor performance in coordination skills in children in the 1st level of elementary school, perform planned testing. Statistically process and evaluate the measured results.

Hypotheses. Based on the goal and tasks of the work, we established the following hypothesis (H1).

H1: We assume that after completing the 8-week program, motor skills tests will show us better results in the experimental group (with the addition of a training plan with movement games) compared to the control group for boys and girls in the 4th grade at the 1st level of the Elementary School in the Roma settlement in Lomnička.

Characteristics of the research object: Our research was attended by (40 children) from an elementary school in the Roma settlement of Lomnička, of which there were 20 boys and 20 girls. They were students of the fourth grade from the 1st level of the named primary school. The control group had 10 boys and 10 girls. The experimental group had 10 boys and 10 girls.

Data collection methods: to find out data about children's coordination abilities, we selected the following six (6) tests: Jumping over a rope in 30 s (Neuman, 2003), Catching a hung ball (Měkota, Blahuš, 1983), Balance test - Flamingo (Moravec et al. 2002), Stopping a rolling ball and stopping it on command by a student (Šimonek, 1999), Running to numbered balls (Měkota, Blahuš, 1983), Jumping from a high place for accuracy (Belej, Junger, 2006).

Methods of processing and evaluating the results: we statistically processed and evaluated the obtained measured data based on the statistical method: Student's T-test (parametric paired T-test), which compares the differences between two groups. Statistical significance was determined based on the $p < 0.01$, $p < 0.05$, $p < 0.1$ level of significance. Statistical tests can also be carried out in relation to the different study results of siblings within the same family. Comparison of statistical variables can be carried out in quantitative research using the 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 statistical analysis under condition that the data meet the normal probability distribution. Otherwise, two-sided comparisons can be made using the Mann-Whitney test (Kitchenham et al., 2016). In pairwise comparisons, the Wilcoxon exact test is very often used with many applications - both in the technical and educational fields, e.g. (Barot et al., 2020; Cieslar et al., 2020).

3 Results and discussion

We present the results obtained from testing the motor skills of children in primary education in tables and graphs with a view to the established hypothesis (H1). From testing the hypothesis (H1) using Student's T-test, we confirm or not confirm the existence of statistically significant dependencies based on the $p < 0.01$, $p < 0.05$ level of statistical significance. At the same time, we present an overview of the results of the entrance and exit tests of motor tests before the start of the monitored period and after the 8-week period. The tables also include the average value of the achieved results, the standard deviation, the Student's T-test of the significance of the differences between two quantities, the range of variation and the Mann-Whitney U-test. The results section also contains an evaluation of the body weight and height of children with the simultaneous calculation of the Body Mass Index (BMI).

In tab. (1, 2, 3, 4) we present the somatic indicators and the Body Mass Index (BMI) of the group of children of younger school age that we are monitoring. The experimental group is denoted by the abbreviation: (EG) and the Control group is denoted by the abbreviation: (CG).

Tab. 1: Somatic indicators: boys (EG)

Name	Body height (cm)	Weight (kg)	BMI	Age (years)
D.O.	138	28	14,7	10
D.O.	133	31	17,5	11
J.O.	139	34	17,6	11
K.H.	133	29	16,4	11
D.M.	130	28	16,6	11
J.H.	130	32	18,9	12
D.M.	130	30	17,8	11
M.H.	128	29	17,7	11
A.M.	132	30	17,2	13
A.O.	148	37	16,9	13

Tab. 2: Somatic indicators: girls (EG)

Name	Body height (cm)	Weight (kg)	BMI	Age (years)
D.O.	133	28	15,8	11
J.M.	130	24	14,2	10
B.M.	130	25	14,8	11
K.M.	145	31	14,7	11
V.M.	134	30	16,7	10
J.M.	133	24	13,6	10
L.K.	154	50	21,1	10
V.H.	135	30	16,5	10
R.O.	141	29	14,6	11
A.O.	135	33	18,1	11

Tab. 3: Somatic indicators: boys (CG)

Name	Body height (cm)	Weight (kg)	BMI	Age (years)
B.O.	139	25	12,9	12
A.O.	136	32	17,3	10
R.O.	140	34	17,3	10
A.M.	131	27	15,7	10
S.O.	134	27	15,0	10
R.M.	128	22	13,4	10
D.M.	130	30	17,8	11
A.O.	138	32	16,8	11
P.H.	153	58	24,8	13
K.O.	135	30	16,5	10

Tab. 4: Somatic indicators: girls (CG)

Name	Body height (cm)	Weight (kg)	BMI	Age (years)
D.O.	138	28	14,7	10
D.O.	133	31	17,5	11
J.O.	139	34	17,6	11
K.H.	133	29	16,4	11
D.M.	130	28	16,6	11
J.H.	130	32	18,9	12
D.M.	130	30	17,8	11
M.H.	128	29	17,7	11
A.M.	132	30	17,2	13
A.O.	148	37	16,9	13

In the following tables (tables 5, 6, 7, 8, 9, 10) we present the results of individual tests of the boys' motor skills (EG) of our monitored group. In the tables, we present an overview of the input and output values achieved at the beginning of the monitored period and at the end of the monitored period (after 8 weecG). The tables include: Average value of the achieved results ($\bar{x}$), Standard deviation (S), Maximum value of performance (Max), Minimum value of performance (Min), U-test, T-test of significance of the difference between two quantities, Variation range (Vr).

Tab. 5: Jumping over a rope in 30 s: boys (EG)

Boys (EG)	Jumping over a rope in 30 seconds		Difference
	Input	Output	
D.O.	38	58	20
D.O.	63	66	3
J.O.	22	29	7
K.H.	43	55	12
D.M.	55	67	12
J.H.	59	60	1
D.M.	51	58	7
M.H.	68	70	2
A.M.	52	53	1
A.O.	47	50	3
$\bar{x}$	49,8	56,6	6,8
S	13,28	11,60	1,68
Max	68	70	2
Min	22	29	7
U-test	32,5		N
T-test	1,22		N
Vr	46	41	

Tab. 6: Catching a hung ball in 10 attempts: boys (ES)

Boys (EG)	Balls 10 attempts		Difference
	Input	Output	
D.O.	4	4	0
D.O.	1	6	5
J.O.	0	0	0
K.H.	0	2	2
D.M.	2	5	3
J.H.	1	7	6
D.M.	0	3	3
M.H.	0	1	1
A.M.	3	3	0
A.O.	0	2	2
$\bar{x}$	1,1	3,3	2,2
S	1,44	2,21	0,77
Max	4	7	3
Min	0	0	0
U-test	20		V
T-test	2,63		V
Vr	4	7	

Tab. 7: Test „Flamingo“: boys (EG)

Boys (EG)	Flamingo (number of mistakes)		Difference
	Input	Output	
D.O.	12	6	6
D.O.	2	1	1
J.O.	12	12	0
K.H.	3	3	0
D.M.	8	6	2
J.H.	9	6	3
D.M.	9	5	4
M.H.	9	8	1
A.M.	12	10	2
A.O.	12	11	1
$\bar{x}$	8,8	6,8	2
S	3,67	3,48	0,19
Max	12	12	0
Min	2	1	1
U-test	32		N
T-test	1,25		N
Vr	10	11	

Tab. 8: Catching the ball on the bench: boys (EG)

Boys (EG)	Catching the ball on the bench (cm)		Difference
	Input	Output	
D.O.	139	90	49
D.O.	60	40	20
J.O.	80	80	0
K.H.	80	90	-10

D.M.	120	90	30
J.H.	140	120	20
D.M.	168	100	68
M.H.	143	70	73
A.M.	143	125	18
A.O.	141	131	10
$\bar{x}$	121,4	93,6	27,8
S	35,50	27,43	8,07
max	168	131	37
min	60	40	20
U-test	26,5		N
T-test	1,96		N
Vr	108	91	

Tab. 9: Running to bases: boys (EG)

Boys (EG)	Running to bases (seconds)		Difference
	Input	Output	
D.O.	9,25	8,86	0,39
D.O.	9,76	8,15	1,61
J.O.	10,47	9,87	0,60
K.H.	9,30	8,90	0,40
D.M.	12,23	8,22	4,01
J.H.	8,66	8,35	0,31
D.M.	8,96	8,00	0,96
M.H.	8,44	8,29	0,15
A.M.	8,13	8,10	0,03
A.O.	11,08	10,45	0,63
$\bar{x}$	9,62	8,71	0,91
S	1,28	0,82	0,46
Max	12,23	10,45	1,78
Min	8,13	8,00	0,13
U-test	24		N
T-test	1,88		N
Vr	4,1	2,45	

Tab. 10: Jump to accuracy: boys (EG)

Boys (EG)	Jump to accuracy (cm)		Difference
	Input	Output	
D.O.	7	12	-5
D.O.	1	1	0
J.O.	12	10	2
K.H.	8	15	-7
D.M.	6	10	-4
J.H.	20	11	9
D.M.	15	15	0
M.H.	12	3	9
A.M.	8	10	-2
A.O.	7	6	1
$\bar{x}$	9,6	9,3	0,3
S	5,31	4,66	0,65
Max	20	15	5
Min	1	1	0
U-test	49		N
T-test	0,13		N
Vr	19	14	

In the previous tables (tables 5, 6, 7, 8, 9, 10), we presented the results of individual tests of the motor skills of boys (EG) from the elementary school in Lomnička, where we also present the following information: In the "Jump rope" test, one of the best results were obtained by the boy D.O., who improved his performance by 20 repetitions in the exit test. Also the boy K.H. and the boy D.M. improved their jump rope performance by 12 repetitions. The best results in this test were achieved by the boy M.H., who had the most repetitions. In the next test "Ball for 10 attempts", the boys achieved the following results: boy J.H. caught the most balls in the cup and he managed to do it 7 times out of 10 attempts. He improved his score by 6 catches over the entrance tests. The worst was the boy J.O., who did not improve at all and had zero catches during the entry and exit. Second best boy D.O. had an improvement of 5 attempts where he had 1 catch in the entry testing and 6 catches in the exit testing. In this

"Ball for 10 tries" test, we noted statistical significance at the 2.63 level.

The "Flamingo" test for this group of boys (EG) was weaker in terms of performance, because the number of errors in one minute was high. The boys who did the worst: J.O., A.M., A.O., considering that their number of mistakes was over 10 attempts. This test turned out to be statistically insignificant, even though we recorded improved performance in all boys (EG). The test "Catching the ball on the bench" was for the boy K.H. bad at the exit test, because it worsened in response by 10 cm. The best results of this test were the boys: D.M., M.H. and D.O. Although this test came out statistically insignificant - we noted improved performance in this test here. In the next test "Running to bases", the boy D.M. recorded the best performance and also achieved the shortest time. The boys who also did very well: D.O. and A.M. The "Jump to accuracy" test turned out to be the weakest in terms of results, and here we noted deteriorated results in several boys, where the boy K.H. worsened the result by 7 cm, boy A.M. by 2 cm, boy D.M. by 4 cm and a boy D.O. by 5 centimeters.

In the following tables (tables 11, 12, 13, 14, 15, 16) we present the results of the individual tests of the girls' motor skills (EG) of our monitored group. In the tables, we present an overview of the input and output values achieved at the beginning of the monitored period and at the end of the monitored period (after 8 weeks). The tables include: Average value of the achieved results ($\bar{x}$), Standard deviation (S), Maximum value of performance (Max), Minimum value of performance (Min), U-test, T-test of significance of the difference between two quantities, Variation range (Vr).

Tab. 11: Jumping over a rope: girls (EG)

Girls (EG)	Jumping over a rope in 30 seconds		Difference
	Input	Output	
D.O.	60	63	3
J.M.	26	31	5
B.M.	60	67	7
K.M.	66	66	0
V.M.	57	62	5
J.M.	45	50	5
L.K.	56	56	0
V.H.	65	75	10
R.O.	64	69	5
A.O.	60	70	10
$\bar{x}$	55,9	60,9	5
S	12,08	12,70	0,62
Max	66	75	9
Min	26	31	5
U-test	31		N
T-test	0,9		N
Vr	40	44	

Tab.12: Catching a hung ball in 10 attempts: girls (EG)

Girls (EG)	A ball in 10 attempts		Difference
	Input	Output	
D.O.	1	2	1
J.M.	2	4	2
B.M.	0	2	2
K.M.	0	1	1
V.M.	1	2	1
J.M.	0	2	2
L.K.	0	1	1
V.H.	2	2	0
R.O.	0	0	0
A.O.	0	1	1
$\bar{x}$	0,6	1,7	1,1
S	0,84	1,05	0,21
Max	2	4	2
Min	0	0	0
U-test	21		V

T-test	2,57		V
Vr	2	4	

Tab. 13: Flamingo: girls (EG)

Girls (EG)	Flamingo (number of mistakes)		Difference
	Input	Output	
D.O.	13	7	6
J.M.	8	7	1
B.M.	10	9	1
K.M.	3	1	2
V.M.	1	0	1
J.M.	6	6	0
L.K.	1	0	1
V.H.	2	2	0
R.O.	0	0	0
A.O.	1	0	1
$\bar{x}$	4,5	3,2	1,3
S	4,50	3,61	0,89
Max	13	9	4
Min	0	0	0
U-test	37,5		N
T-test	0,71		N
Vr	13	9	

Tab. 14: Catching the ball on the bench: girls (EG)

Girls (EG)	Catching the ball on the bench (cm)		Difference
	Input	Output	
D.O.	110	90	20
J.M.	120	80	40
B.M.	156	110	46
K.M.	130	112	18
V.M.	130	105	25
J.M.	103	78	25
L.K.	148	70	78
V.H.	112	86	26
R.O.	80	70	10
A.O.	143	60	83
$\bar{x}$	123,2	86,1	37,1
S	22,99	18,00	4,99
Max	156	112	44
Min	80	60	20
U-test	10,5		V
T-test	4,02		V
Vr	76	52	

Tab. 15: Running to bases: girls (EG)

Girls (EG)	Running to bases (seconds)		Difference
	Input	Output	
D.O.	10,74	9,02	1,72
J.M.	9,96	8,98	0,98
B.M.	10,75	9,22	1,53
K.M.	11,91	11,21	0,70
V.M.	12,25	10,17	2,08
J.M.	10,48	10,12	0,36
L.K.	11,47	10,47	1,00
V.H.	10,21	9,03	1,18
R.O.	12,34	10,63	1,71
A.O.	8,87	8,54	0,33
$\bar{x}$	10,89	9,73	1,16
S	1,10	0,88	0,22
Max	12,34	11,21	1,13
Min	8,87	8,54	0,33
U-test	21		V
T-test	2,59		V
Vr	3,47	2,67	

Tab. 16: Jump to accuracy: girls (EG)

Girls (EG)	Jump to accuracy (cm)		Difference
	Input	Output	
D.O.	11	12	-1
J.M.	13	9	4

B.M.	17	3	14
K.M.	8	7	1
V.M.	8	10	-2
J.M.	8	7	1
L.K.	8	13	-5
V.H.	6	5	1
R.O.	7	12	-5
A.O.	8	8	0
$\bar{x}$	9,4	8,6	0,8
S	3,33	3,23	0,10
Max	17	13	4
Min	6	3	3
U-test	46		N
T-test	0,54		N
Vr	11	10	

In the previous tables (tab. 11, 12, 13, 14, 15, 16) we presented the results of individual tests of the motor skills of girls (EG) from the primary school in Lomnička, where we also present the following information: the tested group of girls (EG) achieved better results in terms of statistical significance, compared to boys, because we recorded statistically significant results in only three tests, namely: "Running to basis", "Catching the ball on the bench and then stopping it" and the "Ball for 10 attempts" test. The best performance in the "Jump rope" test was achieved by the girl V.H. who had up to 75 repetitions in 30 seconds. The second most successful girl A.O. had 70 repetitions and improved her jump by 10 repetitions compared to the entrance tests.

In the "Catching a ball for 10 attempts" test, the tested girls (EG) recorded weaker performances, but the test result turned out to be statistically significant. We recorded the best result with the girl J.M. (4 catches of the ball). The worst performance was recorded by the girl R.O., who did not catch the ball even once. Our girls (EG) performed better in the "Flamingo" test than the tested group of boys (EG) because they made fewer mistakes. The highest number of errors among girls in the entrance tests was 13, but in the exit tests there were only 9 errors. The girl R.O. did the best, because she had zero errors together with the girl V.M.

Another test "Catching the ball on the bench and then stopping it" turned out to be statistically significant for our girls (EG). The best improvement was achieved by the girl A.O., who improved her performance by 83 cm and at the same time was the best of the group of girls. Tab (15) showed us that the girls had a faster and better reaction, because each group improved their time. The girl V.M. improved her time by 2.08 seconds. and the least girl A.O. by 0.33 sec. The "Jump to accuracy" test was almost at the same level as for the boys, where four students worsened their result in the exit test. Girls: D.O., V.M., L.K. and the girl R.O. worsened their exit tests by 5 to one centimeter. The best result was the girl B.M., who missed the accuracy by only 3 cm.

In the following tables (tab. 17, 18, 19, 20, 21, 22) we present the results of individual tests of the boys' motor skills (CG) of our monitored group. In the tables, we present an overview of the input and output values achieved at the beginning of the monitored period and at the end of the monitored period (after 8 weeCG). The tables include: Average value of the achieved results ($\bar{x}$), Standard deviation (S), Maximum value of performance (Max), Minimum value of performance (Min), U-test, T-test of significance of the difference between two quantities, Variation range (Vr).

Tab. 17: Jumping over a rope: boys (CG)

Boys (CG)	Jumping over a rope in 30 seconds		Difference
	Input	Output	
B.O.	55	60	5
A.O.	57	60	3
R.O.	43	45	2
A.M.	60	63	3

S.O.	55	61	6
R.M.	51	51	0
D.M.	58	62	4
A.O.	26	28	2
P.H.	61	65	4
K.O.	15	18	3
$\bar{x}$	48,1	51,3	3,2
S	15,63	16,24	0,61
Max	61	65	4
Min	15	18	3
U-test	34		N
T-test	0,45		N
Vr	46	47	

Tab. 18: Catching a hung ball in 10 attempts: boys (CG)

Boys (CG)	A ball in 10 attempts		Difference
	Input	Output	
B.O.	3	0	-3
A.O.	0	3	3
R.O.	1	2	1
A.M.	2	2	0
S.O.	1	2	1
R.M.	0	1	1
D.M.	2	2	0
A.O.	0	1	1
P.H.	1	1	0
K.O.	0	1	1
$\bar{x}$	1	1,5	0,5
S	1,05	0,84	0,21
Max	3	3	0
Min	0	0	0
U-test	34,5		N
T-test	1,17		N
Vr	3	3	

Tab. 19: Flamingo: boys (CG)

Boys (CG)	Flamingo (number of mistakes)		Difference
	Input	Output	
B.O.	9	4	5
A.O.	15	7	8
R.O.	6	6	0
A.M.	11	4	7
S.O.	12	6	6
R.M.	8	6	2
D.M.	5	3	2
A.O.	5	4	1
P.H.	11	9	2
K.O.	7	4	3
$\bar{x}$	8,9	5,3	3,6
S	3,31	1,82	1,49
Max	15	9	6
Min	5	3	2
U-test	16,5		V
T-test	3,01		V
Vr	10	6	

Tab. 20: Catching the ball on the bench: boys (CG)

Boys (CG)	Catching the ball on the bench (cm)		Difference
	Input	Output	
B.O.	100	85	15
A.O.	119	75	44
R.O.	96	90	6
A.M.	98	90	8
S.O.	87	80	7
R.M.	97	100	-3
D.M.	145	125	20
A.O.	98	90	8
P.H.	145	120	25
K.O.	116	100	16
$\bar{x}$	110,1	95,5	14,6
S	20,67	16,23	4,44

Max	145	125	20
Min	96	75	21
U-test	30		N
T-test	1,76		N
Vr	58	50	

Tab. 21: Running to bases: boys (CG)

Boys (CG)	Running to bases (seconds)		Difference
	Input	Output	
B.O.	8,33	8,11	0,22
A.O.	8,26	8,33	0,07
R.O.	8,72	8,52	0,20
A.M.	9,99	7,87	2,12
S.O.	8,92	8,51	0,41
R.M.	7,95	7,70	0,25
D.M.	8,92	8,62	0,30
A.O.	9,42	10,37	-0,95
P.H.	9,39	9,01	0,38
K.O.	9,39	8,78	0,61
$\bar{x}$	8,92	8,58	0,34
S	0,63	0,74	0,11
Max	9,99	10,37	0,38
Min	7,95	7,70	0,25
U-test	32,5		N
T-test	1,12		N
Vr	2,04	2,67	

Tab. 22: Jump to accuracy: boys (CG)

Boys (CG)	Jump to accuracy (cm)		Difference
	Input	Output	
B.O.	5	0	5
A.O.	9	6	3
R.O.	8	5	3
A.M.	7	1	6
S.O.	7	5	2
R.M.	9	2	7
D.M.	8	6	2
A.O.	6	0	6
P.H.	7	4	3
K.O.	10	2	8
$\bar{x}$	7,6	3,1	4,5
S	1,50	2,37	0,87
Max	10	6	4
Min	5	0	5
U-test	4		V
T-test	5,06		V
Vr	5	6	

In the previous tables (tab. 17, 18, 19, 20, 21, 22) we presented the results of individual tests of the motor skills of boys (CG) from the elementary school in Lomnička, where we also present the following information: the boys (CG) achieved good results in the motor tests, but not as good as boys (EG). The results in the "Jump rope" test were weaker in boys (CG) than in boys (EG). The best improvement in this test was by the boy B.O. and only by 5 jumps, but the boy D.O. in the experimental group (EG) had an improvement in this discipline by 20 jumps. The results in the "Ball for 10 attempts" test were also worse for boys (CG) and the test came out as statistically insignificant. The best score had the student A.O. (three catches of the ball in the cup). Also, the results of boys (CG) in the "Flamingo" test were also worse compared to boys (EG). If we compare the arithmetic average, we can see an improvement of 1.6 average. Student A.O. was the most successful, improving the number of mistakes (by 8 less). The second boy S.O. had an improvement (6 fewer errors) and the boy B.O. (5 errors less). However, the T-test was statistically significant.

The results in the test "Catching the ball on the bench" were realized by the boys (CG) without major changes. The best results were achieved by the boy A.O., who improved his reaction by 44 cm, and the student P.H. by 25 cm. The "Running to the bases" test was statistically insignificant, due to the fact

that only one boy (CG) improved by more than one second and the other boys by less than one second. The worst was the boy A.O., who worsened his performance by 0.95 seconds. Boy A.M. improved his performance by 2.12 seconds, which was the best performance of the entire control group of boys (CG).

In the "Jump to accuracy" test, according to the average, the results were better in boys (CG) by 0.5 cm than in boys (EG). The best results were achieved by boys: B.O. and A.O., who reached exactly zero - that is, they were able to jump to the marked line exactly.

In the following tables (tabs. 23, 24, 25, 26, 27, 28) we present the results of individual tests of the movement skills of girls (CG) of our monitored group. In the tables, we present an overview of the input and output values achieved at the beginning of the monitored period and at the end of the monitored period (after 8 weeks). The tables include: Average value of the achieved results ($\bar{x}$), Standard deviation (S), Maximum value of performance (Max), Minimum value of performance (Min), U-test, T-significance test of the Difference of two quantities, Variation range (Vr).

Tab. 23: Jumping over a rope: girls (CG)

Girls (CG)	Jumping over a rope in 30 seconds		Difference
	Input	Output	
D.O.	55	60	5
K.Ž.	58	59	1
A.H.	63	69	6
D.O.	47	64	17
E.G.	43	45	2
N.O.	65	66	1
K.D.	61	66	5
N.O.	45	51	6
S.O.	47	70	23
T.O.	46	56	10
$\bar{x}$	53	60,6	7,6
S	8,31	8,08	0,23
Max	65	70	5
Min	43	45	2
U-test	24,5		N
T-test	2,07		N
Vr	22	25	

Tab. 24: Catching a hung ball in 10 attempts: girls (CG)

Girls (CG)	A ball in 10 attempts		Difference
	Input	Output	
D.O.	3	3	0
K.Ž.	0	1	1
A.H.	0	3	3
D.O.	0	1	1
E.G.	2	2	0
N.O.	1	1	0
K.D.	1	1	0
N.O.	0	0	0
S.O.	2	2	0
T.O.	0	1	1
$\bar{x}$	0,9	1,5	0,6
S	1,10	0,97	0,13
Max	3	3	0
Min	0	0	0
U-test	32,5		N
T-test	1,29		N
Vr	3	3	

Tab. 25: Flamingo: girls (CG)

Girls (CG)	Flamingo (number of mistakes)		Difference
	Input	Output	
D.O.	15	10	5
K.Ž.	9	9	0
A.H.	11	7	4
D.O.	7	4	3

E.G.	8	5	3
N.O.	5	7	-2
K.D.	5	5	0
N.O.	0	0	0
S.O.	12	9	3
T.O.	10	5	5
$\bar{x}$	8,2	6,1	2,1
S	4,23	2,96	1,27
Max	15	10	5
Min	0	0	0
U-test	32		N
T-test	1,28		N
Vr	15	10	

Tab. 26: Catching the ball on the bench: girls (CG)

Girls (CG)	Catching the ball on the bench (cm)		Difference
	Input	Output	
D.O.	103	110	-7
K.Ž.	125	120	5
A.H.	140	90	50
D.O.	95	110	-15
E.G.	99	92	7
N.O.	103	100	3
K.D.	102	100	2
N.O.	77	83	-6
S.O.	110	85	25
T.O.	133	128	5
$\bar{x}$	108,7	101,8	6,9
S	18,95	15,01	3,94
Max	140	128	12
Min	77	83	6
U-test	38		N
T-test	0,9		N
Vr	63	45	

Tab. 27: Running to bases: girls (CG)

Girls (CG)	Running to bases (seconds)		Difference
	Input	Output	
D.O.	9,37	9,12	0,25
K.Ž.	10,65	9,60	1,05
A.H.	8,95	8,85	0,10
D.O.	9,67	9,30	0,37
E.G.	9,39	9,23	0,16
N.O.	8,57	8,53	0,04
K.D.	11,58	10,04	1,54
N.O.	8,95	8,69	0,26
S.O.	8,84	8,13	0,71
T.O.	10,95	10,42	0,53
$\bar{x}$	9,69	9,19	0,5
S	1,01	0,69	0,41
Max	11,58	10,42	1,16
Min	8,57	8,13	0,44
U-test	35		N
T-test	1,28		N
Vr	3,01	2,29	

Tab. 28: Jump to accuracy: girls (CG)

Girls (CG)	Jump to accuracy (cm)		Difference
	Input	Output	
D.O.	10	10	0
K.Ž.	11	7	4
A.H.	3	3	0
D.O.	9	7	2
E.G.	6	1	5
N.O.	12	9	3
K.D.	13	9	4
N.O.	12	12	0
S.O.	7	5	2
T.O.	15	14	1
$\bar{x}$	9,8	7,7	2,1
S	3,61	3,97	0,36

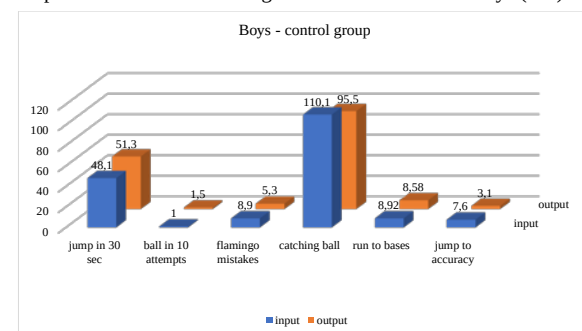
Max	15	14	1
Min	3	1	2
U-test	34		N
T-test	1,24		N
Vr	12	13	

In the previous tables (tables 23, 24, 25, 26, 27, 28) we presented the results of individual tests of the motor skills of girls (CG) from the primary school in Lomnička, where we also present the following information: girls (CG) were in the test results "Jump rope" better, because according to the average they had a better improvement in the number of jumps. Girl S.O. and the girl D.O. best improved their test performance. The other girls also had an improvement, but less. The results in the "Ball for 10 attempts" test turned out badly, because the improvement did not occur in 6 girls, which is 60% of the whole group. The best results were achieved by the girl A.H., who improved her successful attempts from 0 to 3. In the "Flamingo" test, girls (CG) achieved better results than girls (EG). We recorded the best results with the girl N.O., who had 0 errors in the input and output tests. Girls (CG): K.Ž., K.D. N.O. did not improve at all, because their difference was zero. They improved their maximum number of errors in this "Flamingo" test by 5.

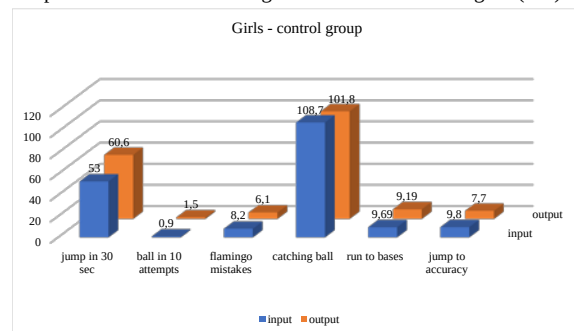
When observing the results in the test "Catching the ball on the bench and then stopping it", we note that the girls' results worsened: D.O. by 7cm, another girl also with the initials D.O. worsened by 15 cm, girl N.O. worsened by 6 cm. The best results were achieved by the girl A.H., who improved her catching reaction by 50 cm. In the "Running to the bases" test, girls (CG) achieved better results by an average of 0.66 seconds. Girl N.O. improved the least in this test by only 0.04 seconds. The best improvement was achieved by the girl K.D., because her output performance improved by 1.54 seconds, and the girl K.Ž. improved by 1.05 sec. The other girls improved by under one second. In the last test "Jump to accuracy" girls (CG) improved on average by 2.1 cm compared to girls (EG) who achieved an improvement of 0.8 cm. The best improvement was achieved by the girl K.Ž. and girl K.D. The girls did not improve at all in this test: D.O., A.H., and girl N.O.

In the following graphs (1, 2) we present the results of the average values in the motor tests of the group of children we monitored: boys and girls of the control group (CG).

Graph 1: The results of average values in motor tests: boys (CG)

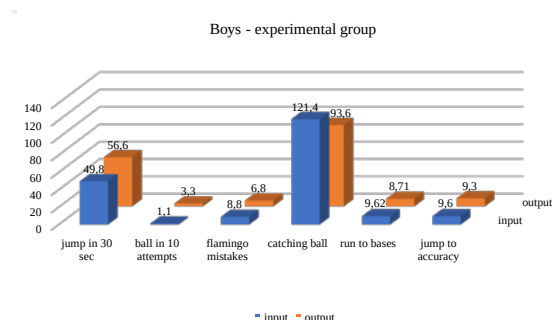


Graph 2: The results of average values in motor tests: girls (CG)

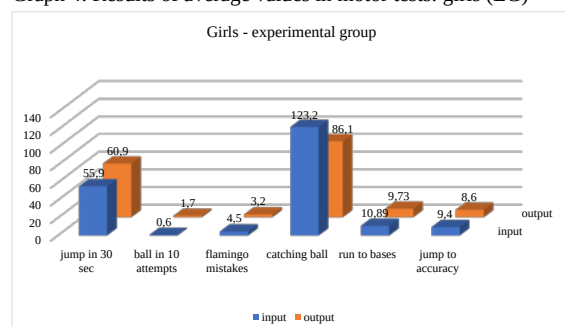


In other graphs (3, 4) we present the results of the average values in the motor tests of the group of children monitored by us: boys and girls of the experimental group (EG).

Graph 3: Results of average values in motor tests: boys (EG)



Graph 4: Results of average values in motor tests: girls (EG)



In the results of our motor tests presented in the graphs (1, 2, 3, 4), we noted alternately improved and worsen performances in these motor tests. We do not find a fully adequate explanation for this fact, but we believe that the results in the motor tests were influenced by the shorter duration of the experiment, as well as the smaller sample of probands - our children (40). At the same time, we add that despite some positive changes in the motor tests, we encounter statistically significant results, but also statistically insignificant results. The weakest results are found in each group, but in a different form. We present some of the following findings: Boys (EG) improved little in the "Run to the bases" test - only by 0.91 sec. Girls (EG) improved on average by only 0.8 cm in the "Jump to accuracy" test. Boys (CG) ended the worst in the "Run to the bases" test, where we recorded a small improvement, but only by an average of 0.34 sec. Girls (CG) achieved the smallest improvement in the "Running to the bases" test - only by 0.5 seconds.

4 Conclusion

In our article, we tried to describe the changes in coordination skills in children of younger school age due to the influence of movement games. 40 children from the Roma settlement at the Primary School in Lomnička in the Stará Ľubovňa district in the eastern part of Slovakia participated in our research. The goal of the paper was to implement the motor tests of coordination skills selected by us in the experimental and control groups of children in the 4th year of primary education. At the same time, evaluate the body weight and body height of children with the simultaneous calculation of the Body Mass Index (BMI). We evaluated the obtained results based on Student's T-test and Mann-Whitney U test. Our experiment lasted 8 weeks, and we performed measurements for both groups at the beginning and at the end of the monitored period. We recorded the best performance improvements in both the experimental and control groups in the "catching the ball and then stopping it" test and in the "jumping over the jump rope" in 30 s test. We note that these disciplines posed the least problem for them, since the ball in the family and the jump rope is a common thing for this group of students. However, we must take into account that the tested

children come from a disadvantaged environment, so they only had opportunities to improve their coordination in physical education and sports during school classes.

Due to the increased interest in testing among children from the Roma settlement of Lomnička, we recommend conducting testing at this elementary school more often. The achieved results show alternating improved and worsen performances in the motor tests determined by us. We do not find a fully adequate explanation for this fact, but we believe that the results in the motor tests were influenced by the shorter duration of the experiment, as well as the smaller sample of probands - our children (40). We dare to state that, despite some positive changes in motor tests, not all test results are statistically significant. At the same time, we recommend that the teachers of these children in the Roma settlement in Lomnička lead the children to exercise more and try to motivate them in all aspects to sports and develop their movement abilities and skills in physical and sports education classes. It is also important to lead these children to a healthy lifestyle and to show them the benefits of movement and sports, and at the same time to do more frequent input and output measurements in this school, which met with a positive response from these children.

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