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Original Article

Contribution to the fruitfulness of personal development windows in terms of physical and motor development at 9–10 years old of age

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Abstract
Knowing the particularities of 9–10-year-old children, we believe that intervention with appropriate methods and means can be useful in bringing to fruition some opportunities that these developmental windows offer at this age. We performed a classic pedagogical experiment with two groups (an experimental group and a control group) in the 2021–2022 school year, in which 36 third- and fourth-grade students were involved (9–10 years old). The psycho-motor activities were performed within the afterschool program, 3 times a week, taking into account the global project elaborated by us. Through the activities performed in the Ș.D.Ș. system, the aim was to integrate the acquisition of a psycho-motor nature into specific actions that would strengthen the state of health, prevent the onset of deficiencies, develop the general motor capacity, and increase the effort capacity. Both at the beginning of the research and at its end, we applied a series of tests and control samples to subjects from the experimental control groups, with the help of which we determined the level of physical development, mortuary capacity, and morpho-functional indices. Comparing the results of the two groups, we obtained significantly better values for the subjects from the experimental group in a series of tests and trials, i.e., in the "Ruffier Test" for girls and in the "Hexagon Test" and endurance running for boys. The achieved progress suggests that the psychomotor activities performed in the S.A.S system and the completion of the compulsory physical education hours, considerably contribute to the physical development and the capacity for effort.
Keywords: psycho-motor activity, after school, physical development, motor capacity

Introduction

The countries of the European Union show greater concern about aspects aimed at health education through sports. Researchers have discovered that certain areas of the brain develop at different times and rates, and that at certain times, a series of "windows of opportunity" are open that can facilitate the development of various skills and competencies that may be useful later (Richardson D. , 2008, p. 16). Physical activity and sports are important attributes of an individual's lifestyle which contains integrity of standards, values, and physical and social behaviour of the individual (Vala R., Valova M.,Drazdilova P., Litschamnnova M., 2022, p. 1086). Knowing the particularities of 9–10-year-old children, we believe that intervention with appropriate methods and means can be useful in bringing these opportunities to fruition. Dragnea A. (1999, p. 138) states that at this age (9–10 years old), the psycho-physical characteristics, which are extremely favorable for the acquisition of new motor structures and that will be able to be consolidated and perfected later, must be exploited to the maximum. The psychological and physiological peculiarities of 9–10-year-old children predispose them to acquire simple and complex motor activities, correct and sustainable learning skills, if the training methodology is correct (Mihăilescu L., Mocanu A., 2010, p. 93). During this period, the growth and morpho-functional development of schoolchildren are faster and generally more uniform than in the previous stages. Bones develop much faster than muscle tissue, and possible calcium deficiencies result in incorrect postures,which lead to vicious attitudes and then to deficiencies (Lupu R., 2013, p.1, https://www.scribd.com/doc /154284635/Motricity). Postural disorders must be understood as deviations of the spine in the sagittal and frontal planes (Nosk M., Razumeyk N., Yermakov S., Yermakov T., 2016, p.988) to prevent posture deficiencies, development exercises (i.e., harmonious physical exercises that constantly aim to strengthen the paravertebral muscles) must be performed as often as possible.

Children's participation in physical activity in early childhood is considered to be extremely important. A low level of physical activity and, conversely, a high level of sedentary behavior, are increasingly threatening the well-being of the satiated part of the world population (Shulruf B., Shachaf M., Yanovich E., Shoval E., 2022, p.914). At this age (9–10 years old), general motor activity develops and improves, and motor skills develop as a result of physical exercise. It is the age when children easily learn to ride a bicycle, swim, skate, ski, etc. The motor learning capacity is remarkable to fix some movements, a systematic repetition is needed (Dragnea A., Bota A., 1999, p.136). At the age of approximately 9–10 years old, children become stronger and begin to be aware of the breaks in rhythm when running (Dragnea A., Bota A., 1999, p.139). Dumitrecu M. (2012, p.3) states that at this age, strength improves especially in the lower and upper limbs and in the back.In

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addition, resistance can significantly improve; the suggested exercises include those for increasing volume rather than intensity. Pre-pubescent children are fit for aerobic training, but their anaerobic capacity for effort is reduced (Hangu S., 2013, p. 71). To harness the positive effects of physical activity, exercises must be performed with a heart rate intensity of 60–80%, for 15–20 min, at least three times a week (Gunar M. E., 2016, p.206). The Ș.D.Ș. system also works in Romania according to OME 5349/2011

(http://ismb.edu.ro/documente/Ed_permanenta/2021/ordinul_5349_2011_metodologie_scoala_dupa_scoala.pdf), and in recent years, it is increasingly appreciated and requested. Unfortunately, the number of hours allocated to physical education at school in Romania is small (1–2 hours/week) in relation to the needs of young people and in relation to the hours provided in other European countries. The initiative to approach the ED system through the lens of psycho-motor activities intended for 9–10-year-old children requires the implementation of a new design model based on specific skills that mainly have the role of supplementing those existing in physical education curriculum for grades III–IV. According to Diniz et al., (2006, p.13), the good aspect of the initiative is the recognition and importance of the family, school, and community intervention in the physical activities performed by young people. The World Health Organization (WHO) guidelines for young children (2019) state that children should have opportunities to participate in a range of developmentally appropriate, safe and enjoyable play-based physical activities (Saakslahti A, Niemisto D.,2021,p. 463).Countries like Slovakia are willing to invest in prevention and ensure the optimal development of students by emphasizing extracurricular activities through optional subjects such as "Sports and extracurricular games" or "Movement, games and physical training" (Slovakova et al., 2022).

Effective, new, and attractive activities (e.g., step aerobics, dance, rhythmic gymnastics, relays, and games) increase children's interest in sports (Andrieieva et al., 2021). Research in the field shows us that the lack of physical activity among children and adolescents is a global health problem. One of the indicators of a healthy lifestyle is the time allocated to motor activities because it contributes to the development of muscle groups and improves cardiovascular and respiratory capacity (Rybolko et al., 2021). In 2018, only 20–40% of children aged 5–17 years in Europe met the WHO recommendations of 60 min of moderate-to-vigorous physical activity (Sallen et al., 2022). International results show that, unfortunately, a third of school-age children do not comply with these recommendations (Hellin et al., 2019). Daily physical activity can be any type of movement that increases heart rate and helps maintain an active lifestyle. Intervention in overweight and obese adolescents improves body composition, particularly in reducing body fat (Medina-Rebolo D., Fernandez-Gavira J., Alcaraz-Rodriguz V.).

The assessment of the somatic, functional, and motor potential of the school population in Romania shows us the maintenance of the trend of exceeding the height and weight values of the current generation compared to the previous generations, of exceeding the value of the body mass index that exceeds the optimal level for maintaining the state of health (Ciolcă, 2015); the main causes for this issue are insufficient time allocated for sports, sedentary lifestyle, excessive use of technology, and inappropriate eating habits. Body mass and health are closely interdependent. Health status can positively or negatively influence body mass and vice versa, and body mass can positively or negatively influence health status (Balint et al., 2010, p.14). Ciolcă, C., (2015, p.6) believes that "obesity is an important health problem because it presents itself as an uncontrolled epidemic worldwide". In these cases, negative effects such as cardiovascular diseases, diabetes, or high blood pressure, do not take long to appear (https://www.doc.ro/controlul-greutatii-supraponderalitate-obezitate/obezitatea-ce-este-cauze-complicatii-tratament).

The Ș.D.Ș system favors the formation of general and specific skills of formal physical education through the complementarity of motor activities designed and performed within the activities carried out in the timetable of Ș.D.Ș school units; the program of motor activities is centered on the prevention of overweight and obesity, on harmonious physical development, on the development of mental health, and the cultivation of proactive social behavior; the program favors the fruition of the personal development windows of 9–10-year-old children. The purpose of this research is to achieve the optimal fruition of the windows of personal development of 9–10-year-old children in terms of physical development and effort capacity through the program of motor activities performed in the Ș.D.Ș system.

Methods

The research methods used included the documentary, observation, measurement and assessment, pedagogical experiment, and statistical-mathematical methods with the help of which we determined the arithmetic mean (MA), standard deviation (SA), coefficient of variation (CV) and performed Student's t-test (TT). To determine the level of physical development, we measured (in m) and weighed (in kg) the subjects, and using a Tanita BC 731 scale, we determined the percentage of fat in their bodies.

The Polar Vantage V watches, worn by the subjects from the experimental group during the psycho-motor activities, allowed us to analyze the dynamics of the effort by determining the following indicators: duration of the activity (min), distance covered (km), minimum and maximum heart rate and the number of calories burned (kcal).

To determine the motor capacity, the subjects were subjected to a series of tests and control tests: 25 m speed run, "Hexagon" speed/agility test, "Flamingo" balance test, raising of the trunk from the supine position,

trunk extension from lying position with the face down (the number of executions per 30 s was recorded), standing long jump, endurance running (the running time of the subjects was recorded), and the Ruffier test, which provides us with information about the body's resistance to effort and about its ability to recover after effort (a value qualified as good must be between 5 and 10) (https://www.superfit.ro/proba-ruffier/).

Study participants

A total of 36 3rd and 4th grade students (9–10 years old) were involved in our research; the control group included 12 subjects, and the experimental group included 24 subjects. The results of the tests performed at the beginning of the research showed us that there were no significant differences between the subjects in the two groups, and their level of development was similar (Tables 1, 2). The subjects from the experimental group benefited from 3 h of psycho-motor activities/week in addition to the 2 h of physical education in the school program, which took place at the school's sports grounds between 12:00 and 13:00.

The proposed general competence (C.G.) was in the integration of psycho-motor abilities acquired within the activities provided in the Ș.D.Ș program and in specific actions that strengthen the general state of health, prevent the onset of deficiencies, develop general motor capacity, and outline a proactive socio-emotional behavior. Through the exercises and games performed during the hours provided in the Ș.D.Ș program, the development of age-specific general motor skills was aimed at the harmonious development and maintaining of health, adaptation of general motor capacity, motor qualities, and general motor skills depending on the specifics and particularities of the child, and at shaping and developing of psycho-motor skills through play. Emphasis was placed on the development of capacity for spatial-temporal orientation and general and segmental coordination (elements of rhythmic gymnastics), on the development of capacity for dynamic balance (cycling), on the development of general coordination (practicing skateboarding), and on the development of specific coordination and ability to combine movements (step aerobics). Taking into account the age of the subjects and wanting the classes to be as pleasant and attractive as possible, the main means used in the educational process were motor games, relays, and application courses.

Statistical analysis

We determined the typical indicators, i.e., the arithmetic mean (MA), standard deviation (SD), and coefficient of variation (CV) for the results recorded in the tests and the applied assessment samples, to which we added Student's t-test (t), a significance inducer of differences, which is used to compare two or more values measured in the same subjects. In this study, Student's t-test was applied to compare the results of the initial and final evaluation between the eight groups and to compare the differences between the groups. At the beginning of the research, using Student's t-test, we determined that there were no significant differences between the results obtained by the two groups, both in the level of physical development and motor capacity (p-value > 0.05).

Results and discussion

Level of physical development

To determine the level of physical development, the girls (F) and boys (M) in the experimental group (Gr. E) and those in the control group (Gr. C) were measured and weighed, and using the body analyzer Tanita BC 731, their body fat percentages were determined. These determinations were made at the beginning (TI) and at the end (TF) of the research. The statistical indicators for girls are shown in Table 1 and those for boys are shown in Table 2.

Table 1. Comparative results between statistical indicators for physical development TI and TF, Gr. E and Gr. C–F

Determinations	Statistical indicators Gr. E						Statistical indicators Gr. C						t-test for TI	t-test for TF
	MA		AS		CV%		MA		AS		CV%			
	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF		
Height (m)	1.36	1.38	0.05	0.05	3.45	3.45	1.41	1.43	0.06	0.07	4.36	4.67	t = −1.664 p = 0.058 > 0.05	t = −0.293 p = 0.387 > 0.05
Body mass (kg)	30.70	32.82	3.25	3.21	10.60	9.78	33.70	37.33	3.50	3.81	10.13	10.21	t = −1.691 p = 0.055 > 0.05	t = −2.599 p = 0.010 < 0.05
Body fat percentage (%)	18.06	16.29	3.92	3.20	21.68	19.63	21.83	24.85	3.03	2.53	13.39	10.19	t = −2.058 p = 0.068 > 0.05	t = −5.635 p=2.372 > 0.05

The statistical indicators for height show us that the girls in both groups grew in height by an average of 0.2 cm; both groups were homogeneous; the coefficient of variation is 3.45 for the experimental group and 4.67 for the control group. Comparing the two groups, we notice that the differences in height are not significant; the p-value is 0.387 < 0.05. This result is obtained because in the interval between the tests, the height growth of the 9–10-year-old children cannot be predicted well. Weight gain was greater in girls in the control group; their weight increased from 33.70 to 37.33 kg (an increase of 3.63 kg), while the weight of the girls in the experimental group increased from 30.70 to 32.82 kg (an increase of 2.12 kg.). Both groups are homogeneous; the coefficient of variation is small; the value of t at $p < 0.05$ allows us to state that at TF the difference between the two groups is statistically significant. In the case of body fat percentage, we noticed a difference between the two groups. The initial testing placed all girls in the high-risk group in terms of body fat percentage (18.06 – experimental group and 21.83 – control group); the results of the final testing show a decrease in the average body fat percentage in the experimental group (16.29) and an increase in the control group (24.85). Thus, after the final testing, the girls in the experimental group are in the moderate risk group. However, the control group is more homogeneous (CV – 10.19%) than the experimental group (CV – 19.63%). For this determination, the differences are insignificant.

Table 2. Comparative results between statistical indicators for the physical development TI and TF, Gr. E and Gr. C–M

Determinations	Statistical indicators Gr. E								Statistical indicators Gr. C					
	MA		AS		CV%		MA		AS		CV%		t-test for TI	t-test for TF
	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF		
Height (m)	1.46	1.48	0.09	0.09	6.44	6.36	1.38	1.40	0.03	0.03	2.15	2.39	t = 1.853 p = 0.81 > 0.05	t = 2.352 p = 0.015 < 0.05
Body mass (kg)	38.32	40.42	12.27	12.48	32.04	30.86	36.43	39.80	3.64	3.79	9.99	9.52	t = 0.482 p = 0.317 > 0.05	t = 0.156 p = 0.438 > 0.05
Body fat percentage (%)	24.88	23.40	8.76	7.27	35.22	31.09	24.62	26.60	2.68	3.30	10.88	12.42	t = −0.236 p = 0.404 > 0.05	t = −0.973 p = 0.171 > 0.05

For the boys, we used the same approach and tabulated the statistical indicators for the two tests. Although the subjects from the experimental group were taller than those in the control group, in both cases, the results of the final test indicate an average increase of 2 cm for both groups. In addition, both groups are homogeneous; the coefficient of variation is between 2.15% and 6.44%. As in the case of the girls, the results are normal; the ameliorative intervention did not accelerate an increase in the height. In both cases, the body mass average is near the recommended upper limit for 9–10-year-old children. A weight gain was recorded in both groups in the final test, i.e., 2.1 kg for the experimental group subjects and 3.3 kg for the control group subjects; however, the differences between the tests are not significant. We see a better homogeneity in the control group sample (9.52%) compared to that in the experimental group (30.86%).

In both groups of boys, according to the percentage of fat in the body considered to be optimal, we noticed that the values were higher than 18, which falls into a high degree of risk category. From the final tests, in the experimental group, we noticed a slight decrease in the mean from 24.88 to 23.40; however, in the control group, we observed an increase from 24.62 to 26.60. The control group is more homogeneous, and the difference in TF is clear but insignificant.

Level of motor ability.

To determine the motor capacity of the subjects and to evaluate the efficiency of the instructional–educational process performed through the psycho-motor activities within the Ș.D.Ș program, we compared the level of the statistical indicators determined in each evaluation sample. They were applied to all students both in

the experimental and control groups at the beginning of the research (TI, January 2022) and at the end of the period of the program implemented by us (TF, June 2022). The results of the statistical indicators are recorded in Tables 3–5; Table 5 presents the values of Student's t-test for the differences between the two groups.

Table 3. Statistical indicators – motoral capacity, F, Gr. E

Statistical indicators		25 m speed run (s)		Hexagon test (s)		Flamingo test (min)		Raising of the torso from laying position (nr. rep.)		Stretching of the body (nr. rep.)		Long jump (m)		Ruffier index		Resistance run (min)	
		TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF
MA		6.18	5.39	7.95	7.61	0.38	0.56	22.36	23.36	26.18	28.45	1.22	1.39	11.88	10.84	3.55	5.20
AS		0.55	0.32	0.73	0.65	0.22	0.32	2.20	1.69	2.52	1.85	0.19	0.17	1.33	1.25	1.53	2.12
CV%		8.88	5.95	9.20	8.54	58.12	56.51	9.85	7.23	9.64	6.55	15.30	12.21	11.16	11.57	42.94	40.87
t-test	t	5.690		2.094		−1.748		−3.027		−4.338		−7.644		4.386		−5.180	
	p	0.000 < 0.05		0.031 < 0.05		0.055 > 0.05		0.06 < 0.05		0.000 < 0.05		8.743 > 0.05		0.000 < 0.05		0.000 < 0.05	

Table 4. Statistical indicators – motoral capacity, F, Gr. C

Statistical indicators		Speed run (s)		Hexagon test (s)		Flamingo test (min)		Raising of the torso from laying position (nr. rep.)		Stretching of the body (nr. rep.)		Long jump (m)		Ruffier index		Resistance run (min)	
		TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF
MA		5.90	5.47	9.05	8.83	0.32	0.39	21.50	22.17	27.00	28.67	1.26	1.32	13.02	12.63	3.18	3.59
AS		0.55	0.25	2.54	2.31	0.14	0.07	2.17	2.14	2.28	2.42	0.06	0.07	1.24	1.15	1.00	1.04
CV%		9.35	4.58	28.07	26.20	45.55	19.74	10.08	9.64	8.45	8.45	5.00	5.14	9.53	9.13	31.35	28.91
t-test	t	1.689		1.632		−1.808		−3.162		−3.952		−3.237		1.578		−4.365	
	p	2.015 > 0.05		0.081 > 0.05		0.065 > 0.05		0.012 < 0.05		0.005 < 0.05		0.011 < 0.05		0.087 > 0.05		0.003 < 0.05	

Table 5. Comparative results between Gr. E and Gr. C for determining motoral capacity

Statistical indicators		25 m speed run (s)		Hexagon test (s)		Flamingo test (min)		Raising of the torso from laying position (nr. rep.)		Stretching of the body (nr. rep.)		Long jump (m)		Ruffier index		Resistance run (min)	
		TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF
t-test-inter groups (TF)	t	−0.498		−1.264		1.684		1.274		−0.202		1.129		−2.898		1.722	
	p	0.312 >0.05		0.130 >0.05		0.058 >0.05		0.11 >0.05		0.421 >0.05		0.138 >0.05		0.005 <0.05		0.052 >0.05	

Comparing the TF results of the two groups, we notice that in the case of the girls in the 25 m sprint, there is an improvement in both groups; however, the difference at the end of the experiment is not statistically significant (a decrease from 5.90 to 5.47 s), while the difference obtained by the subjects from the experimental group is 0.79 s (a decreased from 6.18 to 5.39 s). The obtained results are normal considering that at this age, speed is a quality that can be developed over time; the studied age group is the golden age of development in all its forms of manifestation, and the program focused more on the aspects of harmonious physical development and social integration. The results of the agility/speed test do not show any clear improvement in any of the groups. However, there is a difference in the degree of homogeneity of the groups; the experimental sample is more homogeneous (8.54% at TF) than the control one (26.20%). Regarding the "Flamingo" balance test, we note that the results did not significantly improve in any group at the end of the research; both groups are

heterogeneous in this test, and the difference between groups in TF is not significant. Progress on lifting the torso from the dorsal position and the extension of the torso from the facial supine position is on average one repetition in each group. Recorded values are clustered around the average, and the standard deviation is small. There were no significant differences between the groups. However, at the end of the study, the degree of homogeneity of the experimental group considerably increased in both samples, while it remained the same in the control group. A difference of 7 cm is recorded between the two groups at TF in the standing long jump test; the progress of the experimental group is 17 cm (from 1.22 to 1.39 m), and that in the control group is somewhat smaller (an increase from 1.26 to 1.32 m). The homogeneity of both groups is good. The ameliorative intervention in the experimental group led to an improvement in horizontal relaxation in this group. The Ruffier test results indicate a satisfactory effort and recovery capacity for both groups, both at the initial and final testing stage. At the end of the experiment, there was a significant difference between the groups for $p < 0.05$. The values of both groups are clustered around the average, and the homogeneity of the groups is good. In the case of the endurance running test, we found that at TF, the experimental group increased its running time, on average, by 2.35 min from 3.55 min to 5.20 min. The control group had a better TI time than the experimental group, but improved its performance by only 0.31 min, from 3.18 to 3.59 min. There was a large difference between groups in TF, of 2.20 min, but it was insignificant.

We proceeded in the same way with the boys; the quantitative results are presented in Tables 6–8.

Table 6. Statistical indicators – motoral capacity, M, Gr. E

Statistical indicators		25 m fast run (s)		Hexagon test (s)		Flamingo test (min)		Raising of the torso from laying position (nr. rep.)		Stretching of the body (nr. rep.)		Long jump (m)		Ruffier index		Resistance run (min)	
		TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF
MA		5.95	5.52	8.34	7.82	0.32	0.83	21.08	21.08	25.77	27.08	1.31	1.48	12.10	11.42	5.85	8.30
AS		0.47	0.39	1.58	1.34	0.30	0.56	2.33	3.07	2.39	3.77	0.12	0.11	1.54	1.32	1.83	2.32
CV%		7.95	7.09	18.91	17.10	94.72	66.62	11.04	14.55	9.26	13.94	9.21	7.56	12.71	11.53	31.38	27.94
t-test	t	6.901		3.472		−4.929		0		−2.029		−6.927		2.403		−5.001	
	p	8.233 > 0.05		0.002 > 0.05		0.000 > 0.05		0.5 > 0.05		0.032 < 0.05		7.939 > 0.05		0.016 < 0.05		0.000 < 0.05	

Table 7. Statistical indicators – motoral capacity, boys, Gr. C

Statistical indicators		25 m fast run (s)		Hexagon test (s)		Flamingo test (min)		Raising of the torso from laying position (nr. rep.)		Stretching of the body (nr. rep.)		Long jump (m)		Ruffier index		Resistance run (min)	
		TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF
MA		5.67	5.46	8.87	9.39	0.45	0.62	21.33	23.00	25.00	26.83	1.28	1.36	11.22	11.63	4.76	5.15
AS		0.44	0.30	1.27	1.68	0.37	0.33	1.75	0.63	1.26	0.75	0.15	0.15	2.12	1.65	1.34	1.60
CV%		7.79	5.51	14.37	17.85	81.80	52.90	8.21	2.75	5.06	2.81	12.09	11.23	18.89	13.37	28.08	31.10
t-test	t	3.265		−0.785		−0.944		−2.988		−3.378		−4.381		−0.885		−3.073	
	p	0.011 < 0.05		0.233 > 0.05		0.194 > 0.05		0.015 < 0.05		0.009 < 0.05		0.003 < 0.05		0.208 > 0.05		0.013 < 0.05	

Table 8. Comparative results between Gr. E and Gr. C for determining the motoral capacity M

Statistical indicators		25 m fast run (s)		Hexagon test (s)		Flamingo test (min)		Raising of the torso from laying position (nr. rep.)		Stretching of the body (nr. rep.)		Long jump (m)		Ruffier index		Resistance run (min)	
		TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF	TI	TF
t-test-inter groups (TF)	t	0.315		−2.198		0.884		−2.162		0.223		1.198		−0.317		2.993	
	p	0.378 > 0.05		0.021 < 0.05		0.194 > 0.05		0.024 > 0.05		0.413 > 0.05		0.031 < 0.05		0.377 > 0.05		0.004 < 0.05	

The final speed run test shows an improvement from 5.95 s to 5.52 s (difference of 0.43 s) in the experimental group, and the group is homogeneous (the coefficient of variation is 7.09%−7.95%). The control group does not have a clear improvement in the average time for 25 m run (from 5.67 to 5.46 s). The causes are the same as those formulated in the intergroup analysis for the girls. The time difference at TF is 0.06 s in favor of the control group, which is a statistically insignificant difference. In the Hexagon speed/agility test, the execution time decreased in both groups on average by 1 s; the homogeneity of the groups is good, and we noticed a significant difference between the final tests of the two groups ($p < 0.05$). The ability to maintain balance was also improved but was insignificant; the homogeneity of both groups is improved, but the values remain high. We recorded progress in TF both in raising the trunk from supine position and in trunk extension from face lying position in both groups, but the result was insignificant. The degree of homogeneity in the control group increased in TF compared to that in the experimental group, the values recorded by both groups are clustered around the mean, and the standard deviation is small. We recorded a significant difference in TF between the two groups in the standing long jump; the progress of the experimental group was 17cm and that of the control group was 8 cm. The standard deviation is small, the values are clustered around the mean, and the homogeneity of both groups is good. The results of the Ruffier test indicate for both groups a satisfactory effort and recovery capacity, both in the TI and TF stages. The difference between groups in TF is statistically insignificant, but the experimental group becomes more homogeneous in TF than the control group. In the case of the endurance running test, we found that at TF, the experimental group increased its running time on average by 2.45 min from 5.85 min to 8.30 min, and the control group increased its running time on average by 0.39 s (from 4.76 s to 5.15 s). At TF, the experimental group is more homogeneous than the control group; however, in both cases, the coefficient of variation is high, and the homogeneity of both groups is low.

Determination of the level of effort and functional parameters in the experimental group

To better monitor the subjects from the experimental group, during the experimental research, the children took turns wearing Polar Vantage V watches while performing the psycho-motor activities. The watch provided data on the duration of a lesson, the distance covered by the subject/time, the number of calories burned, and the minimum and maximum values of the heart rate (HR) recorded during the physical effort. The recorded values and the determined statistical indicators are shown in Tables 9-10, separately for the girls and boys.

Table 9. Results of the morpho-functional indicators obtained using the POLAR watch and statistical indicators for Gr. E–F

Nr. crt.	Name and surname	Time/duration (min)	Distance (km)	Number of burnt calories (kcal)	Medium minimal value of the heart rate	Medium maximal value of the heart rate
Statistically determined indicators						
M.A.		45.63	2.20	206.73	148.09	185.64
A.S.		1.26	0.36	26.90	10.62	11.17
C.V.%		2.76%	16.34%	13.01%	7.17%	6.30%

Table 9 shows that the average monitoring time in a lesson/activity performed during the afterschool program by the girls from the experimental group is 45.63 min, and the distance traveled by them is on average 2.20 km. The motor activities in which they participated were diverse both in terms of the content and intensity of effort. The obtained results show that the average number of calories burned was 206.73/lesson, and the heart rate was between a minimum of 148.09 and a maximum of 185.64. From this information, we can determine that the intensity of the effort was constant during the lesson; thus, the metrical density of the lesson was increased. The standard deviation was higher for the number of calories burned, i.e., 26.90; however, in all 5 target categories, the coefficient of variation is relatively small, and the groups are homogeneous.

Table 10. Results of the morpho-functional indicators obtained using the POLAR watch and statistical indicators for Gr. E–M

Nr. crt.	Name and surname	Time/duration (min)	Distance (km)	Number of burnt calories (kcal)	Medium minimal value of the heart rate	Medium maximal value of the heart rate
Statistically determined indicators						
MA		45.90	2.39	220.15	145.46	188.15
AS		0.97	0.22	18.56	8.42	8.81
CV%		2.11%	9.39%	8.43%	5.97%	4.68%

The information recorded by the boys in the experimental group shows that the average time of wearing the watch in a lesson was 45.90 min, and the distance traveled was longer than that of the girls, i.e., 2.39 km. The

number of calories burned is slightly higher in their case, i.e., 220.15. As with the girls group, owing to the intense physical activities performed during the lesson, the heart rate was between a minimum of 145.46 and a maximum of 188.15. The highest deviation of the data is also recorded in the number of calories burned, while the homogeneity of the group is good.

Discussion

A) The results of the physical development assessment have shown us the following.

Regarding the physical development of the girls from the experimental group, for 2 of the 3 determinations made (height and % body fat), the difference between TI and TF is insignificant; however, the difference for body mass is statistically significant; the girls from the control group gained 3.63 kg between TI and TF, and the girls from the experimental group gained only 2.12 kg. In the case of body fat percentage, we observed a difference between the two groups; in TF, the girls in the experimental group are placed in the moderate risk group.

For boys, in TF, an increase in the height of approximately 2 cm is observed, and both groups are homogeneous. The weight gain was different; the boys from the control group weighed 3.3 kg more in TF than in TI, and the boys from the experimental group weighed 3.3 kg more than in TI; the percentage of body fat for the boys from the experimental group was also lower in TF compared to that in TI (a change from 24.88% to 23.40%).

B) The results of the motor capacity assessment allow us to conclude the following:

The level of motor capacity for the girls was significantly improved in TF compared to that in TI, in the experimental group in 6 out of 8 determinations made and in the control group in 4 out of 8. Comparing the TF of the 2 groups, we recorded a significant difference in the Ruffier test, which confirms a better adaptation of the strength capacity in the experimental group than that in the control group. In the case of the boys, the level of motor ability was significantly improved in TF compared to that in TI, in the experimental group in 4 out of 8 determinations made and in the control group in 5 out of 8. However, comparing the TF of the 2 groups, we recorded a statistically significant difference in the Hexagon test, in the standing long jump, and in endurance running. The speed and agility of the subjects from the experimental group improved, the length of the jump increased by 17 cm in TF, and the anaerobic capacity increased; the boys managed to run for 8.30 min.

In addition to the control group, the subjects from the experimental group received 3 additional lessons per week (135 min of physical activity/weekly), and the Polar Vantage V watches recorded an average of 6.6 km traveled by the girls and 7.17 km by the boys. During these psycho-motor activities, the girls burned 618 calories per week and, the boys burned 660 calories per week.

C) Determination of the level of effort and functional parameters in the experimental group:

Table 9 shows that the average monitoring time in a lesson/activity performed within the Ș.D.Ș program by the girls from the experimental group is 45.63 min, and the distance traveled by them is on average 2.20 km. The motor activities in which they participated were diverse both in terms of the content and intensity of effort. The recorded results show us an average number of calories burned of 206.73/lesson, and the heart rate was between a minimum of 148.09 and a maximum of 185.64. From this information, we can deduce that the intensity of the effort was constant throughout the lesson; thus, the motor density of the lesson was also increased. The standard deviation was higher for the number of calories burned (i.e., 26.90); however, in all 5 targeted categories, the coefficient of variation is relatively small, and the group is homogeneous.

The information recorded by the boys from the experimental group shows that the average time of wearing the watch in a lesson was 45.90 min, and the distance traveled was greater than that of the girls (i.e., 2.39 km). The number of calories burned is somewhat higher for the boys from the experimental group (i.e., 220.15). In addition, the value of the standard deviation is the highest, i.e., 18.56. The difference between the girls and boys, expressed in the number of km traveled and in the number of calories burned, results from the fact that, during the lesson, in addition to the common activities performed, they had to perform different tasks (girls/boys) at certain moments of the lesson. One such example is allocating the last minutes of the lesson to different sports games, boys – football and girls – basketball; the sizes of the courts are different; thus, the boys covered a greater distance. As in the case of the girls, due to the intense physical activities performed during the lesson, the heart rate was between a minimum of 145.46 and a maximum of 188.15.

The greatest deviation of the data is also recorded for the number of calories burned, while the homogeneity of the group is good.

Conclusion

In addition to the control group, the subjects in the experimental group received 3 additional lessons per week (135 min of physical activity/weekly), and the Polar Vantage V watches recorded an average of 6.6 km traveled by the girls and 7.17 km travelled by the boys. During these psycho-motor activities, the girls burned 618 calories per week and the boys burned 660 calories per week.

The systematic participation of the experimental group subjects in the sports activities performed during the afterschool program had some influence on them; specifically, the subjects gained less weight and decreased the percentage of body fat. Due to these additional psycho-motor activities, there have been some improvements in the physical development (especially in the body mass in the girls from the experimental group), and there

was progress shown by the results obtained in tests aimed at determining motor capacity (Hexagon test, standing long jump, and endurance running).

It is clear that the more time children of this age spend doing sports and avoiding sedentary activities, the less overweight they become, and the foundation is laid for harmonious physical development and optimal effort capacity. The classes of psycho-motor activities performed in the afterschool program successfully contribute to the development of children both in short and long term.

This research partially confirms the hypotheses described at the beginning of the study. Specifically, the afterschool program favors the formation of general and specific competences in formal physical education in conjunction with motor activities designed and performed within the school schedule. The afterschool program provides psycho-motor activities centered on overweight and obesity problems, harmonious physical development, psychological development, development of social proactive behavior, and favors the exploitation of the windows of opportunities of personal development of 9–10-year-old children.

The results of our research highlight the importance of early action on all abovementioned levels and suggest that, by taking advantage of the fact that at this age children have a series of open windows of opportunities for personal development, we can successfully intervene through similar programs to train healthy young people, who are physically, mentally, and emotionally adjusted to the future life.

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