

# The Effect of Dynamic Games on the Harmonious Physical Development of Primary Students

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**ABSTRACT.** In the context of a modern society, where the health of the population is affected by a sedentary lifestyle, the harmonious physical development of children becomes an essential priority. Physical development represents both the result and the process aimed at ensuring a healthy and balanced growth of the body, expressed through proportional morphological and functional indicators, which are as close as possible to the values considered normal for a healthy body. **Research hypotheses.** 1. Regular implementation of dynamic games in “Play and Movement” lessons contributes to harmonious physical development, highlighted by the increase in the corresponding somatic indices of primary school students; 2. Active participation in dynamic games in “Play and Movement” lessons determines the improvement of motor qualities, highlighted by the increase in the indices of speed, strength and skill of primary school students. **Methods and means.** For this research, primary school students from the “Mihai Viteazul” Secondary School in Câmpia Turzii participated. The working sample consisted of 55 students (24 boys and 31 girls), who were subjected to motor measurements and testing in two stages during the 2024-2025 school year. For the measurements of motor qualities, a battery of tests was used: 5x5m shuttle, Matorin test, standing long jump. All statistical analyses were performed using the SPSS Statistics program with a significance level of 5%. Data distribution was verified using the Shapiro-Wilk test, and means were compared using tests based on distribution. **Results.** The average time decreased significantly for both groups (boys and girls) in the 5x5m shuttle, indicating an

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improvement in speed and effort capacity. A significant increase in the distance in the standing long jump was observed in both groups ( $p < 0.001$ ), signaling a development of muscle strength. Significant improvement was present in both groups, indicating a positive evolution in terms of coordination and general balance through the Matorin test. **Conclusion.** Dynamic games are a valuable teaching strategy, effective both in developing motor skills and in supporting balanced and attractive physical development for young school-age children.

**Keywords:** *dynamic games, harmonious physical development, primary school, play and movement*

## INTRODUCTION

In the context of modern society, where public health is increasingly affected by sedentary lifestyles, fostering the harmonious physical development of children has become a fundamental priority. The subject “*Play and Movement*”, designed for primary school pupils, plays a significant role in this process by contributing to the formation of healthy habits and the adoption of an active lifestyle.

The curriculum of “*Play and Movement*” is structured according to an innovative curricular design model, with competencies at its core. Its aim is to support the development of the educational profile of primary school pupils (Balint, 2009). From the perspective of this subject, a competence-based approach allows for a stronger emphasis on the practical dimension in shaping pupils’ personalities.

Through “*Play and Movement*”, a similar objective is pursued to that of physical education lessons: engaging pupils in activities that channel their energy constructively, preventing its diversion toward violent behaviors. The organization of motor activities contributes to the establishment of healthy social habits and to the balanced development of personality (Dragnea et al., 2006).

Physical development represents both the outcome and the process directed toward ensuring a healthy and balanced growth of the organism, expressed through proportional morphological and functional indicators that approximate the values considered normal for a healthy body.

This involves two main categories of indicators (Cârstea, 2002):

- **Somatic/morphological indicators**, which can be directly observed or measured, such as height, weight, body segment dimensions, perimeters, and diameters.

- **Functional/physiological indicators**, which are not visible to the naked eye but constitute the organism's functional foundation and are assessed through measurements such as pulse, respiration, respiratory capacity, and blood pressure.

Growth and development are influenced both by genetic factors (heredity) and by external factors (environment, living conditions, nutrition). Somatic development determines increases in body mass, as well as the evolution of tissue and organ structure and functionality. Physical activity plays a crucial role in this process by stimulating the locomotor system, respiration, and blood circulation (Bompa, 2001).

Dynamic games represent engaging activities with a predominantly motor structure, involving constant interaction among participants (Scarlat, E. & Scarlat, B., 2006; Stănescu, 2012). They stimulate teamwork, initiative, and active participation, serving as an effective means of developing motor abilities (Neacșu et al., 2010).

At younger grade levels, emphasis should be placed on consolidating correct execution rather than on speed-oriented competitions, in order to reduce the risk of injury. Dynamic games should be frequently diversified to ensure pupils' comprehensive and varied development (Rață, G. & Rață, B., 2006). Coordination exercises included in dynamic games contribute to the development of balance, courage, self-control, attention, reflexes, and spatial perception, while also strengthening skills that are useful in everyday life (Cristea et al., 2002; Cârstea, 2000).

### **Research Hypothesis**

1. The regular implementation of dynamic games within "Play and Movement" lessons contributes to a harmonious physical development, as evidenced by improvements in the somatic indices appropriate to pupils in primary education;
2. Active participation in dynamic games during "Play and Movement" lessons leads to enhanced motor abilities, as reflected in increased levels of speed, strength, and coordination among pupils in primary education.

### **Research objectives**

1. To evaluate the impact of dynamic games on the harmonious physical development of pupils in primary education by measuring and analyzing changes in somatic indicators (weight, height, and body mass index – BMI);
2. To analyze the influence of dynamic games on the improvement of motor skills (speed, coordination, and strength) among pupils in primary school.

## MATERIAL AND METHODS

For this research, pupils from the primary education cycle at “Mihai Viteazul” Gymnasium School in Câmpia Turzii participated. The working sample consisted of 55 pupils (24 boys and 31 girls), who were subjected to anthropometric measurements and motor ability testing in two stages: Stage I – October 2024, and Stage II – February 2025. During this period, pupils followed the regular “Play and Movement” program, in accordance with the requirements of the official curriculum tailored to their age. All lesson objectives and topics were addressed through the use of dynamic games.

The “Play and Movement” lessons were conducted in the school gymnasium of “Mihai Viteazul” Gymnasium School in Câmpia Turzii, once per week, with each session lasting 50 minutes. The intervention program consisted of the systematic implementation of dynamic games, selected by the teacher according to the specific themes and objectives pursued.

### Research instruments

Anthropometric measurements were carried out in the school’s medical office, using a scale (for measuring body weight) and a stadiometer (for measuring height).

For the assessment of motor abilities, a battery of tests was applied, including: the 5x5 m shuttle run, the Matorin test, and the standing long jump.



Fig. 1. Shuttle run 5x5m



Fig. 2. Standing long jump

### Statistical Analysis

All statistical analyses were performed using SPSS Statistics (v.17; SPSS, Inc., Chicago, IL) with a significance level set at 5% ( $p < .05$  considered statistically significant). The distribution of the data was verified using the Shapiro–Wilk test, and the means were compared by applying appropriate tests according to the distribution.

## RESULTS

Following the collection and processing of the data obtained from the conducted measurements, the results were analyzed according to the two measurement stages (M1 and M2). To compare the means between these two stages, the paired-samples *t*-test was applied, as the data were normally distributed.

**Table 1.** Comparison of means for the Shuttle Run, Long Jump, Matorin Test for M1 and M2

		Paired Samples Statistics						
		N	Mean	Std. Deviation	Mean	t	df	Sig. (2-tailed)
Pair 1	<b>SR_B_M2</b>	24	12.13	1.16				
	<b>SR_B_M1</b>	24	12.82	1.17	-0.69	-17.681	23	.000
Pair 2	<b>Jump_B_M2</b>	24	157.54	13.09				
	<b>Jump_B_M1</b>	24	147.81	12.20	9.73	17.262	23	.000
Pair 3	<b>Matorin_B_M2</b>	24	22.57	3.90				
	<b>Matorin_B_M1</b>	24	24.53	3.75	-1.96	-16.341	23	.000
Pair 4	<b>SR_G_M2</b>	31	12.32	1.17				
	<b>SR_G_M1</b>	31	12.91	1.12	-0.59	-20.718	30	.000
Pair 5	<b>Jump_G_M2</b>	31	162.97	11.11				
	<b>Jump_G_M1</b>	31	155.37	11.53	7.60	18.867	30	.000
Pair 6	<b>Matorin_G_M2</b>	31	22.98	5.76				
	<b>Matorin_G_M1</b>	31	24.54	5.87	-1.56	-15.761	30	.000

The data in Table 1 show significant progress across all motor ability tests for both boys and girls.

- **5x5 m Shuttle Run (Speed):**

Boys improved their average time from 12.82s (SD=1.17) at M1 to 12.13s (SD=1.16) at M2 ( $t = -17.681$ ;  $p < 0.001$ ). Girls also recorder a significant decrease, from 12.91s (SD=1.12) to 12.32s (SD=1.17;  $t = -20.718$ ;  $p < 0.001$ ).

These findings indicate a marked improvement in speed and effort capacity in both groups.

· **Standing Long Jump:**

Boys increased their average performance from 147.81cm (SD=12.20) to 157.54cm (SD=13.09;  $t = 17.262$ ;  $p < 0.001$ ). Girls showed similar progress, from 155.37cm (SD=11.53) to 162.97cm (SD=11.11;  $t = 18.867$ ;  $p < 0.001$ ). The results confirm the efficiency of dynamic games in developing muscular strength.

· **Matorin Test:**

Boys improved from 24.53<sup>0</sup> (SD=3.75) at M1 to 22.57<sup>0</sup> (SD=3.90) at M2 ( $t = -16.341$ ;  $p < 0.001$ ). Girls recorded an increase from 24.54<sup>0</sup> (SD=5.87) to 22.98<sup>0</sup> (SD=5.76;  $t = -15.761$ ;  $p < 0.001$ ). These results demonstrate a significant enhancement in coordination and balance, confirming the contribution of dynamic games to motor skill development.

The overall improvements across all three tests validate the initial hypothesis that dynamic games significantly enhance pupils` speed, strength and coordination in primary education.

**Table 2.** Comparison of means for the variables Weight, Height, BMI for MI and M2

		Paired Sample t test																																																																		
		N	Mean	Std. Deviation	Mean difference	t	df	Sig. (2-tailed)																																																												
Pair 1	<b>Weight_B_M2</b>	24	38.63	5.61	-0.25	-0.239	23	.813																																																												
	<b>Weight_B_M1</b>	24	38.88	5.90					Pair 2	<b>Weight_G_M2</b>	31	36.45	5.14	1.00	12.450	30	.000	<b>Weight_G_M1</b>	31	35.45	5.35	Pair 3	<b>Height_B_M2</b>	24	144.92	5.16	2.29	2.676	23	.014	<b>Height_B_M1</b>	24	142.63	4.44	Pair 4	<b>Height_G_M2</b>	31	142.81	5.83	2.61	29.382	30	.000	<b>Height_G_M1</b>	31	140.19	6.05	Pair 5	<b>BMI_B_M2</b>	24	18.33	2.00	-0.74	-1.516	23	.143	<b>BMI_B_M1</b>	24	19.07	2.55	Pair 6	<b>BMI_G_M2</b>	31	17.79	1.69	-0.16	-3.613	30
Pair 2	<b>Weight_G_M2</b>	31	36.45	5.14	1.00	12.450	30	.000																																																												
	<b>Weight_G_M1</b>	31	35.45	5.35					Pair 3	<b>Height_B_M2</b>	24	144.92	5.16	2.29	2.676	23	.014	<b>Height_B_M1</b>	24	142.63	4.44	Pair 4	<b>Height_G_M2</b>	31	142.81	5.83	2.61	29.382	30	.000	<b>Height_G_M1</b>	31	140.19	6.05	Pair 5	<b>BMI_B_M2</b>	24	18.33	2.00	-0.74	-1.516	23	.143	<b>BMI_B_M1</b>	24	19.07	2.55	Pair 6	<b>BMI_G_M2</b>	31	17.79	1.69	-0.16	-3.613	30	.001	<b>BMI_G_M1</b>	31	17.95	1.84								
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The anthropometric data presented in Table 2 reflect both natural biological growth and the influence of physical activity during the intervention.

- **Weight:**

Boys' weight values remained stable between M1 (38.88kg) and M2 (38.63kg;  $p = 0.813$ ), suggesting a balanced growth process. In contrast, girls recorded a significant increase, from 35.45kg to 36.45kg ( $t = 12.450$ ;  $p < 0.001$ ), which may be associated with a faster biological maturation specific to this age.

- **Height:**

Both groups showed a statistically significant increase in height. Boys grew from 142.63cm (SD=4.44) at M1 to 144.92cm (SD=5.16) at M2 ( $t = 2.676$ ;  $p < 0.014$ ), while girls increased from 140.19cm (SD=6.05) to 142.81cm (SD=5.83;  $t = 29.382$ ;  $p < 0.001$ ). These values confirm normal developmental processes consistent with primary school age.

- **Body Mass Index (BMI):**

Boys recorded a decrease from 19.07 (SD=2.55) to 18.33 (SD=2.00) but, this was not statistically significant ( $p = 0.143$ ). Girls showed a small yet statistically significant decrease from 17.95 (SD = 1.84) to 17.79 (SD=1.69;  $t = -3.613$ ;  $p = 0.001$ ). These results suggest that dynamic games contributed to maintaining a balanced body composition, especially among girls.

The anthropometric results confirm that pupils experienced harmonious physical development during the intervention, with height increases reflecting natural biological growth and BMI values indicating healthy balance between weight and stature.

## DISCUSSIONS

The results obtained from the application of the dynamic games program to primary school students largely confirm the hypotheses initially formulated and support the idea that these activities contribute both to harmonious physical development and to the formation of essential motor skills.

Regarding anthropometric parameters, the data revealed a significant increase in height in both groups, which is consistent with the normal growth process specific to this age. Interestingly, only girls recorded a significant increase in weight, which may be attributed to a more accelerated pace of biological maturation during this period. BMI values remained within normal

limits, reflecting a balance between weight and height, and indicating a harmonious development. These findings are consistent with those reported by Lubans et al. (2010), who emphasize that regular participation in structured physical activities contributes to maintaining a healthy body composition and supports overall physical development in children. At the same time, the present results are in agreement with national studies, such as (Sopa, 2017; Hora, 2023), which highlight the role of motor activities – especially those based on play – in regulating both physical and psychomotor development in students.

The results related to motor development (speed, strength and coordination) show clear progress in both groups of students, directly confirming the effectiveness of dynamic games as a teaching method. These findings are consistent with the conclusions of Logan et al. (2012), whose meta-analysis demonstrates that structured motor interventions lead to significant improvements in fundamental movements skills in children. Similarly, Robynson et al. (2015) underline that the development of motor competence at early ages is strongly associated with improved physical fitness and increased engagement in physical activity. From a national perspective, these results also support the conclusions of Milcu (2017), who states that dynamic games are among the most effective methods for simultaneously developing motor qualities and personality traits.

Another important aspect observed in this study is the reduction of initial differences between boys and girls in certain motor performance. This finding suggests that dynamic games create an inclusive and balanced learning environment, offering equal development opportunities regardless of gender. This perspective is supported by (Pesce et al., 2013; Barnett et al., 2016), who show that well-structured physical activity programs can reduce disparities in motor competence among children.

Therefore, the present study confirms both national and international perspectives, emphasizing that dynamic games contribute not only to motor development but also to the formation of a balanced, active, and socially integrated lifestyle. Their use in primary education proves to be an effective, accessible, and attractive strategy, aligned with the current demands of modern education and with children's real needs for movement, interaction, and personal development.

## **CONCLUSIONS**

The study clearly highlights that the integration of dynamic games represents an effective approach to supporting the harmonious development of primary school students. Their inclusion in the educational process produced

beneficial effects on physical development, contributing both to increases in height and to the maintenance of a balanced body mass index (BMI). At the same time, notable improvements were observed in fundamental motor skills such as speed, strength, and coordination, confirming their value as an active and efficient teaching method.

An important outcome of the research is the reduction of initial differences between boys and girls in terms of certain somatic characteristics and motor performance, suggesting that dynamic games provide an inclusive and equitable environment for development. The findings are consistent with current trends in the specialized literature, which emphasize the multifaceted role of such activities – not only in motor development but also in fostering children’s social, emotional, and educational growth.

Overall, dynamic games, emerge as a valuable pedagogical tool that is accessible, and highly effective. They successfully address both curriculum requirements and children’s genuine needs for movement, interaction and self-expression.

These results strongly support the main research hypothesis, confirming that dynamic games represent a modern and effective teaching strategy for promoting balanced and motivating physical development in young school-age children.

#### **AUTHOR CONTRIBUTIONS**

Radu Adrian Rozsnyai, Paul Ovidiu Radu, Dumitru Rareș Ciocoi-Pop, Maria Daniela Macra-Oșorhean and Vasile Septimiu Ormenișan contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript. All authors have read and agreed to the published version of the manuscript.

#### **CONFLICT OF INTEREST**

The authors declare no conflict of interest.

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