

# Differences in balance and coordination of children of younger school age

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**Abstract:** *How important is the time a child spends doing physical activity and how does it affect the child's motor skills? Research results explain that children with the best coordination are also the most active, and that children with motor problems participate less in regular physical activities. The sample of respondents consisted of 40 students who were divided into two subsamples of 20 each. The choice of variables was made in accordance with the goal and problem in this research, and on the basis of which relevant indicators of differentiation between ages can be found, based on the investigated motor dimensions. By looking at the obtained parameters, a statistically significant difference was found in all coordination tests between seven-year-olds and nine-year-olds. While in the space of balance there were no statistically significant differences between the students of the tested samples aged 7 and 9. The obtained results are significant from the aspect of higher quality planning and programming of the content of elementary games that are implemented as part of physical education classes for this age group.*

**Keywords—** motor ability, differences, test, flamingo, ball

## 1. INTRODUCTION

The growth and development of a child is a process that includes physical, cognitive and emotional-social development that permeate each other (Nourbakhsh, 2006). In this paper, the emphasis is on the coordination and balance of younger school children. Cognitive, physical, emotional and social development of a child in middle childhood was described by Jean Piaget, a pioneer of child psychology whose work had the greatest impact on the study of child development (Vasta, Haith, Miller, 2005). Motor development, as part of overall development, refers to the development of movement with age (Aaltonen et al. 2015). According to Malina, Bouchard and Bar-Or (2004), the acquisition of motor skills during childhood is an important developmental task for every child, because through the development of motor skills the child acquires movement patterns and skills, and through movement the child discovers the world and gains first experiences, especially in the first three years of life.

The seventh year of a child is a critical year in a child's life. Although psychological development is closely related to the child's physical condition, the main characteristic of this age is significant life changes, which occur under the influence of endogenous and exogenous factors. The mental capacity of seven-year-olds is supported by a temporary halt in physical development, so that the ossification of the organism and its movement in width can be carried out better, which enables unhindered psychological development. Enjoying relative inner peace, the child can more easily cope with difficulties imposed by the outside world (Bezić, 1973).

Around the age of 9, various tics may appear or recur if the child had them before. Because of their liveliness and recklessness, children then often die in various accidents

(traffic accidents, drowning, falls, broken arms, legs, etc.). The motor skills of nine-year-olds are similar to the motor skills of seven-year-olds, but in all the mentioned areas, they make more progress because they are physically more developed. The more active time is spent with the nine-year-old, the better his physical development will be and he will prefer to play sports. Until these years, there was no major difference in motor skills between the sexes, but now the distinction is starting, primarily due to biological influence due to changed physical development (Marković, Vasić, Bjelica & Zelenović, 2022).

The goal of the research is to determine whether there are differences in the manifestation of motor skills of coordination and balance between students of younger school age.

## 2. METHOD

### 2.1 A sample of respondents

The sample for this research was derived from the population of students chronologically aged 7 and 9 years. The sample of 40 respondents was divided into two samples of 20 respondents in relation to the mentioned age group to which it belongs. The sample of respondents was taken from the Elementary School in Pale, Republika Srpska.

### 2.2 A sample of measuring instruments

*Assessment of coordination:*

- steps to the side (MKUS),
- foot slalom with two balls (MSNL),
- guiding the ball with the hand (MVLR).

*Balance Assessment:*

- walking forward on a low beam (MHNG),
- flamingo test (MFTR).

### 2.3 Statistical data processing

T-test for independent samples confirmed the difference in coordination and balance between seven-year-old and nine-year-old.

## 3. RESULTS WITH DISCUSSION

On the basis of the basic central and dispersion parameters, indicators of normality of distributions and a graphic representation of the grouping of entities around the arithmetic mean in the form of a histogram, which graphically illustrates the frequencies of the observed results of the respondents on a linear measuring scale by grade level with an integrated normal Gaussian curve of the distribution of expected frequencies, the basic characteristics were determined analyzed characteristics, and evidence of the fulfilled conditions for data processing and analysis with parametric statistics was presented.

**Table 1.** Descriptive statistics between 7- and 9-year-old students in coordination and balance

Var.	Sample	N	Min.	Max.	Mean	SD
MKUS	7 year	20	27.73	45.76	34.58	4.10
	9 year	20	10.90	63.80	24.84	11.76
MSNL	7 year	20	59.93	154.40	98.69	22.96
	9 year	20	19.80	131.10	67.93	31.62
MVLRL	7 year	20	16.10	56.40	26.91	8.78
	9 year	20	7.90	38.50	18.86	6.11
MHNG	7 year	20	.50	4.50	2.30	.93
	9 year	20	1.00 am	5.00	2.43	1.10
MFTR	7 year	20	.01	22.00	10.07	4.93
	9 year	20	.00	14.00	9.57	3.78

By looking at the obtained results of coordination and balance of 7-year-old students, and within the descriptive statistics, a very high level of homogeneity of the researched motor skills can be observed. Given that the entire analyzed manifest space is dominated by variables with homogeneous characteristics, we can generally state that the selected sample is a good representative of the researched population. A slightly more pronounced epicurtic asymmetry, which is based on the dominance of the subjects in the zone of lower values,

was recorded by the variables for assessing coordination with the tests of pulling and skipping and guiding the ball with the hand (MVLRL). Since the coordination tests are timed, this is desirable information because more children have better results than average values,

By inspecting the asymmetry coefficient of the distribution, as an indicator of deviation to the left or right side in relation to the arithmetic mean, we can notice that two variables from the coordination space and one variable from the balance space tend to be more asymmetric, but within satisfactory limits of normality.

In 9-year-old students, the coordination variables with a more pronounced asymmetry occurred in the tests of side steps (MKUS) and guiding the ball with the hand (MVLRL) and have a positive sign, which indicates that a greater number of students have a better time than the overall average of the tested children, while the balance variable with the flamingo test (MFTR) has a negative sign and tends to the right with a higher number of students above the average value.

**Table 2.** Differences between 7- and 9-year-old students in coordination and balance - Ttest

Var.	Sample	N	Mean	Test	df	Sig
MKUS	7th year	20	34.57	4.28	39	.00
	9th year	20	24.83			
MSNL	7th year	20	98.69	4.31	39	.00
	9th year	20	67.93			
MVLRL	7th year	20	26.91	4.12	39	.00
	9th year	20	18.86			
MHNG	7th year	20	2.30	-0.47	39	.63
	9th year	20	2.42			
MFTR	7th year	20	10.06	0.44	39	.66
	9th year	20	9.56			

The t-test for independent samples (Table 2) was applied in order to determine the difference in coordination and balance between students of the chronological age of 7 and 9 years. A statistically significant difference was tested up to the level of  $p = 0.05$ , that is, up to 95% confidence, where the value of the t-test is a marginal 1.96. Looking at the given parameters, we see that there was a statistically significant difference in all coordination tests between seven-year-olds and nine-year-olds, at a statistically stricter level of  $p = 0.01$  and 99% confidence with high t-test values. In the area of balance, there were no statistically significant differences between the students of the tested samples aged 7 and 9.

Younger school age is a very important period for the overall development of a child, especially for the development of fundamental locomotor skills such as running, jumping, throwing, hitting, etc. (Rodić & Buišić, 2011). Fundamental locomotor skills are considered the basis for later easier

mastering of more advanced movements and for successful participation in physical activity, such as sports (Zrnzević, 2006). It is a misconception that children naturally develop fundamental locomotor competencies through the maturation process (Winnick, 2005), but they also need practice and instruction that help them learn and develop motor skills. Younger school age is a very suitable period for acquiring a large number of "gross" motor movements that will stabilize into "fine" motor movements at a later stage (e.g. around 10 years). Enriching motor information through stimulation with various movement challenges during the period of intensive child development affects the improvement of motor skills, and thus the easier mastering of everyday movement challenges either in play or in organized physical activity. Stimulation of the development of coordination and balance should be extremely intensive precisely in the period from the 6th year of life, but according to the results of the research and adequately dosed.

#### 4. CONCLUSION

By looking at the obtained parameters, a statistically significant difference occurred in all coordination tests between seven-year-olds and nine-year-olds, at a statistically stricter level of  $p = 0.01$  and 99% confidence with high t-test values. In the area of balance, there were no statistically significant differences between the students of the tested samples aged 7 and 9. Based on the results obtained, it can be concluded that children's coordination can be reliably measured, and that tests for checking balance must be more precisely defined, in order to obtain satisfactory metric characteristics and better result values in a repeated study.

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