



## SPECIFIC CHARACTERISTICS OF THE PHYSICAL ABILITY OF 11-12-YEAR-OLD STUDENTS

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### ABSTRACT

The aim of the present study is to improve the teaching of physical education and sports by revealing the peculiarities of the physical ability of the students. The object of research are the main signs of the students' physical ability. The research contingent are 58 students (29 boys and 29 girls) from the 5th grade of the "Panayot Volov" Secondary School (Shumen). To solve the PURPOSE and tasks of the research, the following METHODS were used: theoretical analysis of specialized literature and sports-pedagogical testing. The used test battery is borrowed from the System for evaluating the physical performance of students from the 1st to the 12th grade and includes 5 indicators. The RESULTS of the research were subjected to mathematical-statistical processing through: variation analysis and Student's t-test. The comparative analysis proves that in four of the five investigated characteristics the observed differences in both sexes are insignificant and can be explained by random reasons. The only exception is observed regarding the level of development of the explosive power of the lower limbs, which gives us reason to assume that, in general, physical education and sports training had a similar impact on the physical performance of students of both sexes.

**Key words:** students, physical ability, assessment

### INTRODUCTION

Physical education and sports, as a specific type of motor activities, play an important role in human life. Their social role is particularly important, which is aimed at the harmonious development of adolescents and their proper preparation for full realization in life through work. Moreover, physical education and sports instill a positive attitude towards motor activity and, thanks to them, students acquire self-confidence and self-esteem habits (1).

The school years are the most decisive period for the general tempering, the development of the basic motor functions, physical qualities and the entire motor culture of the student. Therefore, this period should be used most rationally to introduce

and teach adolescents to systematic activities with physical exercises and sports. By naturally engaging the imagination, abilities and interests

of children, physical education and sport contribute to the full physical, intellectual and personal development and to the formation of the practical skills of adolescents (2).

As a structural component of a harmoniously developed personality, physical capacity, by its very nature, represents a set of a person's potential opportunities for motor activity. It is determined by motor qualities, considered basic, because when they develop at a certain level, it can be assumed that a given person is physically capable of action (3). Without good physical performance, the full manifestation of human potential in one or another sphere of human life is impossible. It largely determines the health status and quality of

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life of each individual from childhood to old age (4).

Modern ideas, documents and programs give the opportunity to choose forms, means and methods, contributing to the expression and development of students' abilities in different motor activities or sports activities. In this way, there is a liberalization of the education laid down in the State Educational Requirements for the educational content of "Physical Education and Sports" (5).

In order to establish the level of motor abilities of students from the junior high school stage of the basic education level before the introduction of the new curricula in 2004, Borisov (6) conducted a longitudinal study during 4 consecutive school years with 64 students (33 boys and 31 girls) aged 11-14 years. The test battery applied for this purpose includes 6 sports-pedagogical tests borrowed from the System for Forming the Assessment in Physical Education and Sports (System for Forming the Assessment in Physical Education, 1995) in effect at the time. The results show that the current curricula have had a positive impact on the development of the motor abilities of the studied students from the V to the VIII grade. At the same time, however, the author reports some negative trends, which is why he suggests that certain adjustments be made in the new curricula.

In this sense, the study of the state and problems of control over the development of the motor quality of agility in Bulgarian schools, conducted by Zlatev (7), deserves attention. The author reports that the agility test used in our schools is modern and meets the criteria of informativeness. As a weakness of the educational system, however, the author considers the lack of more modern equipment for measuring achievements at school.

In order to meet the new requirements, a working group of specialists from the National Academy of Sciences "Vasil Levski" and the Ministry of Education and Culture is conducting a large-scale study to establish the level of the main signs of physical fitness in the various age groups of nearly 10,000 students from all parts of Bulgaria in 5 sports-pedagogical tests, which meet the requirements for validity, reliability, reliability,

objectivity and standardization and develops a normative basis for control and evaluation (8).

The selection of an adequate test battery is particularly important for sports practice. In this sense, the studies of Naydenova (9) and Naydenova, Nikolova (10) are of interest, which study the reliability of some tests for the assessment of speed qualities and balance stability in 9-10-year-old students, as well as those of Georgiev, Aleksandrović, Maltsev, Besnik (11), who investigated the reliability of basic motor tests used to assess 11-year-old female students in Macedonian schools.

We believe that collecting information on the level of development of the main signs of physical ability and processing this information with the help of reliable mathematical criteria, as well as the comparative analysis of the results of both sexes, will allow teachers to get an idea of the capabilities of each boy and girl and, on this basis, to improve their educational and training plans and more – to determine the emphasis on the individual impacts on each of the students during the future activities with physical education and sports.

#### **PURPOSE**

The purpose of the study is to improve the educational process of physical education and sports at school, by revealing the peculiarities of physical performance in 11-12-year-old students of both sexes (boys and girls).

#### **METHODS**

The research was conducted in the period September 2021 - January 2022.

The subject of research is the physical capacity of students of the 5th grade.

The object of research are the main signs of physical ability in students of both sexes.

The research contingent is 58 students (29 boys and 29 girls) from the 5th grade of the "Panayot Volov" Secondary School (Shumen).

To solve the purpose and tasks of the research, the following research methods were used: theoretical analysis of specialized literature and sports-pedagogical testing.

The used test battery includes 5 indicators and is borrowed from the System for evaluating the physical performance of students from the 1st to the 12th grade (Miladinov et al., 2019).

The results of the research were subjected to mathematical and statistical processing through: variation analysis and hypothesis testing, using the comparative Student's t-test, with a high degree of statistical reliability ( $Pt \geq 95\%$ ).

## RESULTS

The main direction of the present study is related to the establishment of the current level of performance of the studied 11-12-year-old students. This, first of all, will allow to reveal both the more developed and the motor qualities with a lower level of development in each of the studied students, which will allow the teachers to outline the emphases in the future work with each of the children. Secondly, the group average results (separately for girls and boys) obtained after appropriate mathematical-statistical processing will allow to determine the appropriate training load to be followed by teachers during physical education and sports activities. This is particularly important, since, as is known, all

students of a given class participate in activities in the Bulgarian school, i.e. boys and girls together. As stated in the research methodology, the sports-pedagogical testing was conducted according to 5 indicators borrowed from the current System for Control and Evaluation of Physical Ability in Bulgarian Schools, which collectively provide information on the functional state and motor abilities of the students.

The results of the analysis of variance presented in **Table 1** show that the boys ran the 30 m distance in an average of 5.83 s, in the long jump they reached an average of 161.45 cm, threw the solid ball an average of 3.58 m, they ran 200 m in an average of 46.70 s and covered their agility route in an average of 14.56 s.

However, considered in isolation, these achievements do not give a real idea of the level of development of the signs of physical capacity. Therefore, it is important to note here that different children showed different levels of motor abilities. From Table 1, for example, it can be seen that the best performance in the 30 m sprint is equal to 5.2 s. However, there is a boy in the group who was much slower and only managed to finish after 6.9s.

**Table 1.** Mean values and variability of the signs of physical performance of the studied boys

№	Indicators	X	S	V	min	max
1.	<i>Running 30 m</i>	5,83	0,47	8,06	6,9	5,2
2.	<i>Long jump from static position</i>	161,45	20,27	12,55	110,0	190,0
3.	<i>Throwing a solid ball (1 kg)</i>	3,58	0,69	19,27	2,5	5,7
4.	<i>200 m shuttle run</i>	46,70	5,44	11,65	60,0	38,0
5.	<i>T-test</i>	14,56	1,04	7,14	17,3	12,8

This is evidence of a very low level of development in this child of the speed of movement on the field.

Large differences are also observed regarding the level of development of the explosive power of the lower limbs (indicator 2) - the highest achievement is 190 cm, but the lowest is 80 cm weaker.

Indicator 3 (throwing a solid ball) carries information about the level of development of the explosive power of the upper limbs. Here, too, the differences in the children's achievements are

very large – the boys' results vary between 2.50 m (Xmin) and 5.70 m (Xmax).

Similar differences were observed in terms of students' general endurance (indicator 4) and agility (indicator 5).

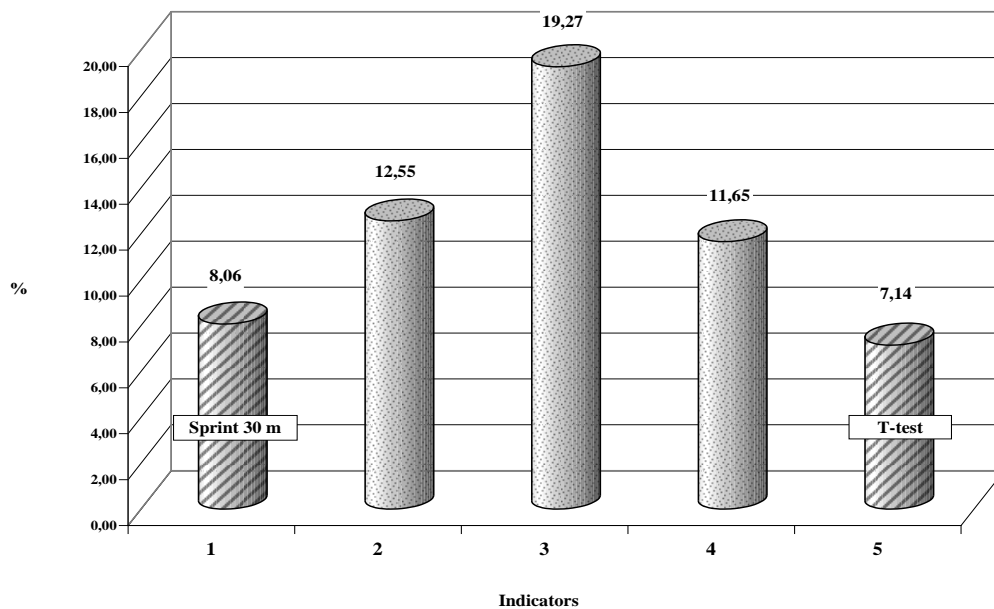
As is known from sports statistics, the observed differences between the achievements of the individual participants in the study affect the variability of the relevant indicators and determine the homogeneity of each studied population with respect to the characteristic for which the given indicator carries information. The

numerical expression of variability is the so-called coefficient of variation V (%).

Analysis of **Table 1** and **Figure 1** shows that the within-case dispersion around the arithmetic means for boys is between 7.14% and 19.27%.

Two of the indicators (1st and 5th) are within the limit of 10%. This, according to the norms of sports statistics, means that the studied population of boys is homogeneous in terms of the speed and agility of the students included in it.

For the other three indicators, however, the V values range between 10 and 30%, which is evidence of their relative stability and, therefore, of the relative homogeneity of the group of boys. The results of the variance analysis of the baseline data from the girls' sports-pedagogical testing are presented in **Table 2**. The table shows that the mean results of the girls are lower than those of the boys, which is quite natural. **Figure 2** provides a good visual representation of the observed differences.



**Figure 1.** Dispersion of the indicators of the physical ability of boys under study

**Table 2.** Average values and variability of the signs of the physical capacity of the studied girls

Nº	Indicators	X	S	V	min	max
1.	<i>Running 30 m</i>	6,09	0,53	8,70	7,0	5,1
2.	<i>Long jump from static position</i>	150,00	20,87	13,91	100,0	200,0
3.	<i>Throwing a solid ball (1 kg)</i>	3,38	0,50	14,80	2,5	4,5
4.	<i>Shuttle run 200 m</i>	49,24	7,05	14,32	72,0	42,0
5.	<i>T-test</i>	15,29	1,75	11,45	19,0	12,9

In the analysis, it is clear that the girls were slower to move around the field and covered test 1 (30 m sprint) in an average of 6.09 s, compared to an average of 5.83 s for the boys. There was also a lower level of development of explosive power in both the lower and upper limbs, as evidenced by the fact that the average achievement of girls in indicator 2 was 11.45 cm lower, and that in indicator 3 – 20 cm lower.

Similar results were observed in terms of general endurance and agility (indicators 4 and 5).

The comparative analysis of the homogeneity of the two studied populations (**Figure 3**) shows that the group of boys is more homogeneous than that of girls with regard to 4 of the 5 examined signs of physical performance.

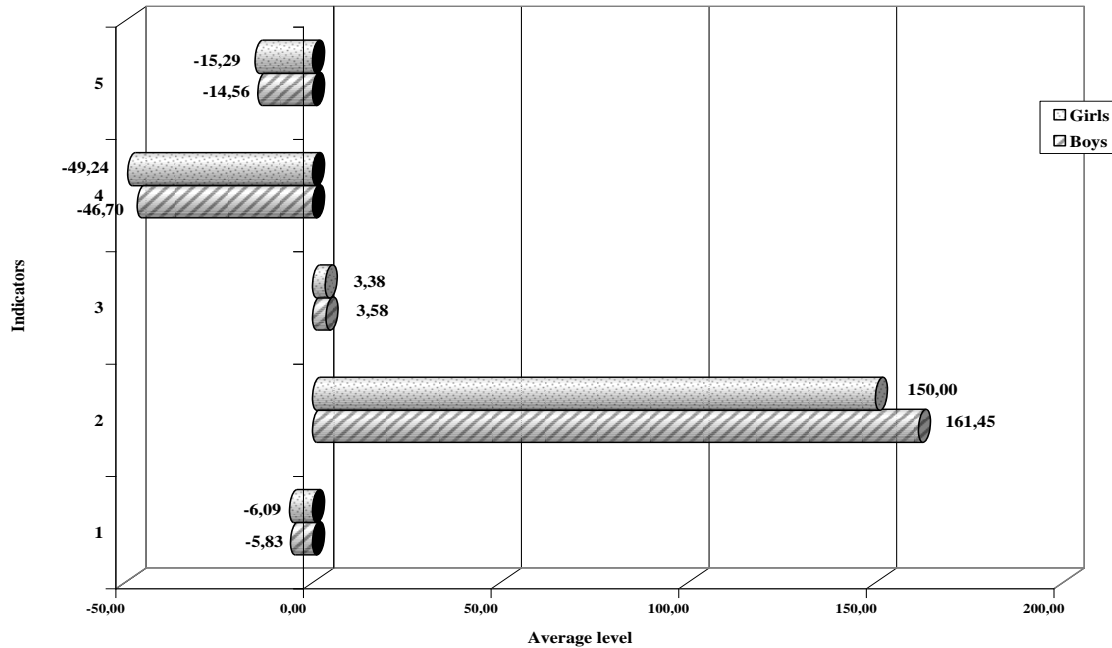


Figure 2. Comparative analysis of the average levels of indicators under study

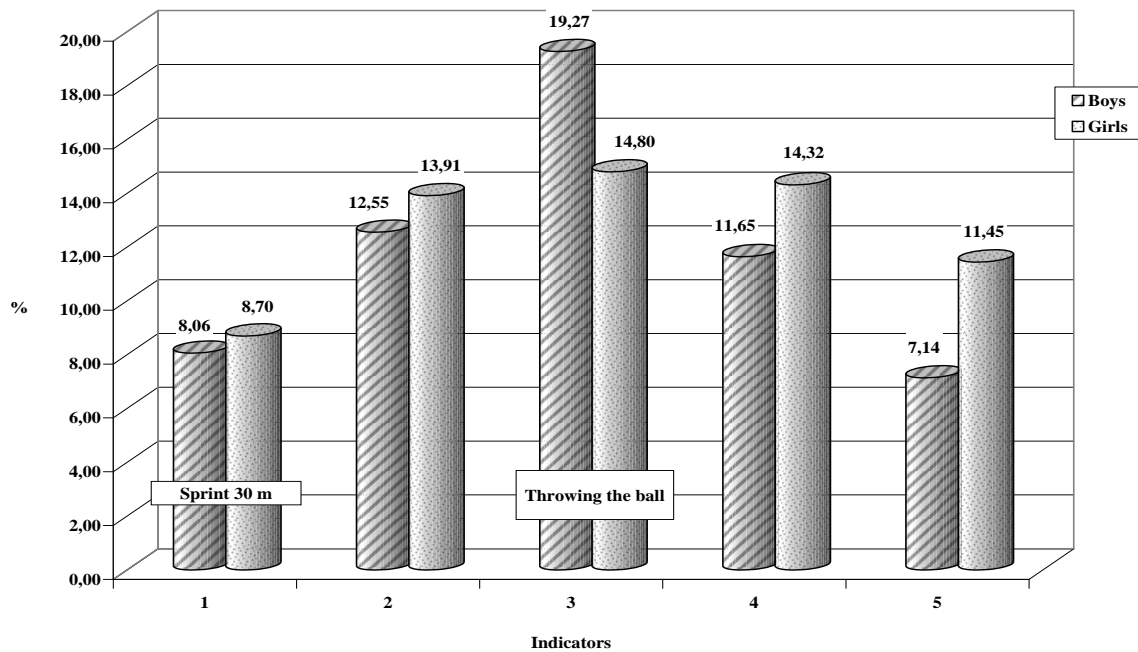


Figure 3. Comparative analysis of the homogeneity of two groups under study

However, as can be seen from the figure, the differences between the values of the coefficients of variation  $V$  in the two sexes are small and the scatter zones are identical in both groups. An exception is noted for the last 5th indicator, the results of which show that the group of boys is homogeneous and that of girls is relatively homogeneous in terms of the level of

development of dexterity of the studied 11-12-year-old students.

It is also necessary to note that the only indicator in which the group of girls is more compact is indicator 3 (throwing a solid ball).

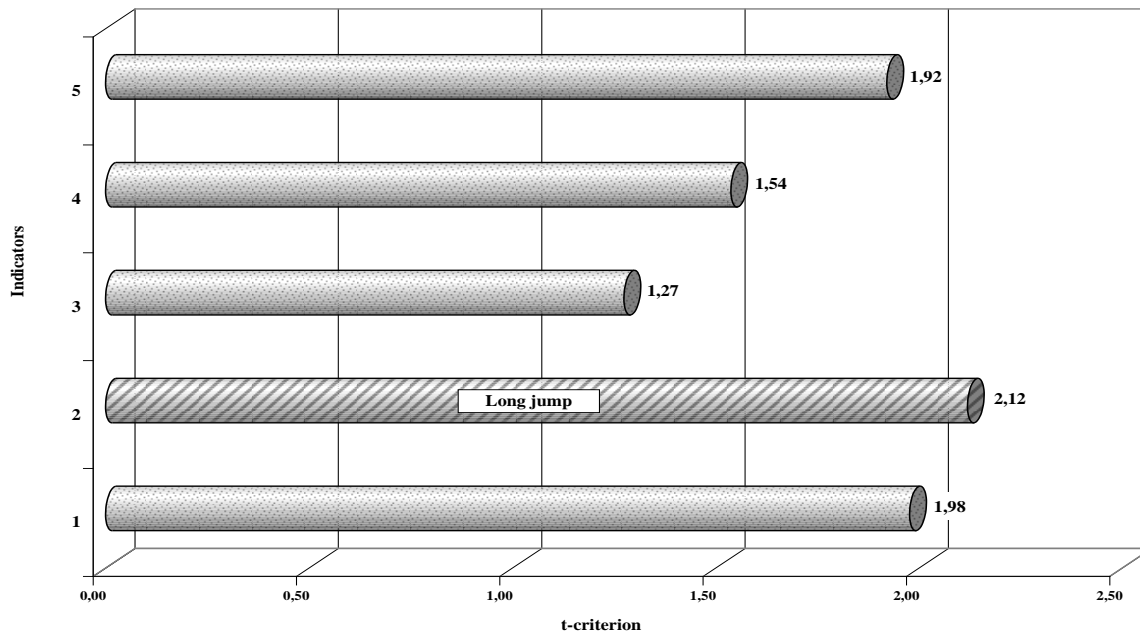
The analysis of the homogeneity of the studied populations, in general, gives reason to consider

that the dispersion within the groups is not very large and teachers can safely use the group approach when performing exercises during physical education and sports classes.

However, there still remains the question of the effectiveness of working in mixed classes. As it became clear above, for all investigated signs of physical activity, boys have higher average results, and this could affect the effect of the

applied training tools, if the physical education teacher works without taking into account the level of girls and the boys.

In order to establish the significance of the observed differences between the average levels of the studied signs in both sexes, the comparative Student's t-test was applied. Its results are presented in **Figure 4**.



**Figure 4.** Significance of the differences between the average levels of the indicators under study on the boys and girls

The analysis of the figure shows that the values of the comparative criterion (at a high level of statistical confidence -  $Pt \geq 95\%$ ) range between - 1,27 for indicator 3 (throwing a solid ball) and 2.12 for indicator 2 (long jump). The calculated critical value of t (temp), according to Masalgin's table, is 2.00. Therefore, the results of our research give reason to consider that, in general, the observed differences in the levels of physical activity of the studied boys and girls of the V class are insignificant. The only exception is observed in indicator 2, which shows that boys significantly outperform girls of the studied age group in terms of the level of development of the explosive power of the lower limbs.

## DISCUSSION

The question of the state of the physical capacity of students has been studied many times, but nevertheless it has not lost its relevance and significance (12). In this sense, the research

conducted by us is timely and of high practical value for the observed contingent.

The results of our research give reason to believe that, in general, the observed differences in the levels of physical activity of the studied boys and girls of the 5th grade are insignificant and joint work in physical education and sports classes is fully justified. The only exception is observed with regard to the level of development of the explosive power of the lower limbs. That is why we believe that one of the emphasis in the future work with girls (within the physical education and sports activities in the 6th grade) should be aimed at developing this motor quality. Moreover, as noted by Simeonova (13), in order to improve the individual results and increase the motor activity of the students, it is necessary to make a correct selection of the means and methods for developing explosive power.

Mavrudiev and Nedelchev (14) provide proof of the effect of specialized work on developing the explosive power of the lower limbs in the specified age period, according to which 12-year-old girls have a significantly higher level of development than 11-year-olds in the explosive power of the lower limbs both in vertical and horizontal muscle efforts and more - in the static strength of the comfortable upper limb.

It is a positive fact that, in general, the dispersion within the populations we studied (boys and girls) is not very large (within stability and relative stability) and teachers can safely use the group approach when performing the exercises during classes in physical education and sports.

Borisov's studies (6) show that the physical education and sports curricula operating during the research period have a positive effect on the development of the motor skills of the studied students from V to VIII grades. At the same time, however, the author reports some negative trends, which is why he suggests that certain adjustments be made in the new curricula.

In this sense, the results of our research will allow teachers to improve their educational and training plans and, moreover, to determine the emphasis on individual impacts on each of the students during future physical education and sports activities.

## CONCLUSION

The comparative analysis of the homogeneity of the two studied populations shows that the group of boys is characterized by a higher homogeneity than that of the girls with regard to 4 of the 5 investigated signs of physical performance. However, the established differences between the values of the coefficients of variation in the two sexes are too small, and the scatter zones are identical in both groups.

In general, the observed differences in the levels of development of signs of physical ability in the studied boys and girls are insignificant and can be explained by chance reasons.

Emphasis in future work on developing physical performance in both groups should be directed primarily at increasing the level of explosive power of the upper limbs. More active work to develop speed, explosive power of the lower

limbs and general endurance will also have a positive impact on general physical performance. Efforts made to develop agility will not have the same building effect on physical performance.

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