

## The Effect of Speed and Strength Training on the Indicators of Attention Stability of Children Aged 13-14 Years with different Typologies

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### **Abstract**

#### **Background**

The study aimed to determine the effect of speed-strength training on the indicators of attention stability of children aged 13-14 years with different nervous system strengths.

#### **Materials and Methods**

This case-control study lasted for three months (January 12 to March 20, 2020). All physical education classes at school number 60 in Kirov, Russia, were held twice a week for 40 minutes. According to the standard program, 20 children from the control group were engaged in physical education. Schoolchildren from the experimental group, 20 boys and girls-additionally performed a set of exercises to develop speed and strength abilities. All schoolchildren performed two control standards: The tapping test (assessment of the nervous system's strength), Bourdon test (assessment of the stability of attention).

#### **Results**

Results showed that after the pedagogical experiment, the attention stability in schoolchildren from the control group with a robust nervous system improved by 4% ( $p>0.05$ ), and in children with a weak nervous system, the indicators became higher by 3% ( $p>0.05$ ). In the experimental group, the attention stability improved in schoolchildren with a robust nervous system by 18% ( $p<0.05$ ) and in children with a weak nervous system by 14% ( $p<0.05$ ).

#### **Conclusion**

Based on the results, the indicators of speed and strength abilities and the indicators of the stability of children's attention will improve.

**Key Words:** Attention stability, Children, Physical education, Speed abilities, Strength abilities.

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## 1- INTRODUCTION

All over the world, the health and physical development of preschool and school-age children are relevant. School plays a significant role in physical development and physical training, namely physical education classes. Under the teacher's influence, schoolchildren can perform a wide variety of motor actions, learn new elements of exercises, and form motor skills. The importance of a physical education lesson at school can hardly be overestimated (1-3). Younger schoolchildren are more often engaged in outdoor games, while middle-level schoolchildren are increasingly performing speed and strength exercises since the sensitive period of development of these qualities is favorable for this time. The age of 13-14 years is essential for the purposeful development of physical qualities, such as speed and strength abilities (4-6).

In an earlier study, we were able to prove the effectiveness of using a set of physical exercises to develop the speed and strength abilities of children aged 13-14 years. The use of such a complex and standard physical education program at school (7) will significantly increase the development of speed-power abilities in schoolchildren of this age. Previously, the effectiveness of the differentiated approach has been proven. An adequate criterion for differentiating schoolchildren into subgroups is the typological criterion, namely, the strength-weakness of the nervous system in the process of arousal (8). In this article, we need to know how a set of physical exercises aimed at developing speed and strength abilities affects the indicators of attention stability of children aged 13-14 years with different nervous system strengths. It is an absolute fact that physical exercise positively affects a person's mental processes, as many studies have shown (9-11). The study aimed to determine the effect of

speed-strength training on the indicators of attention stability of children aged 13-14 years with different nervous system strengths.

## 2- MATERIALS AND METHODS

### 2-1. Study design and population

In this case-control study, 40 schoolchildren aged 13-14 took part in the pedagogical experiment. Namely, 20 schoolchildren from class 7a (control group-CG) (12 boys and 8 girls); and schoolchildren from class 7b (experimental group-EG) in the number of 20 people (12 boys and 8 girls). The study was conducted at the ordinary school number 60 in Kirov, Russia. All the children who took part in the study were healthy and had an introductory or preparatory health group and were admitted to physical education classes.

### 2-2. Methods

The new experiment lasted for three months (January 12 to March 20, 2020). Physical education classes were held in the gym. Each lesson lasted 40 minutes, two times a week. A total of 20 lessons were conducted in each class. In 7a and 7b, classroom lessons of physical culture during the study period took place on the same day and at the same time (CG – Tuesday 8:50-9:30, Friday 9:40-10:20), (EG – Tuesday 9:40-10:20, Friday 8:50-9:30).

CG schoolchildren engaged in a standard program of physical culture in the school (7). In the EG, after the warm-up, the children performed a set of physical exercises aimed at developing speed and strength abilities. The load was differentiated, taking into account the strength of the nervous system. Schoolchildren with a robust nervous system performed more exercises, but the number of series was less than that of schoolchildren with a weak nervous system. The primary method for



### 3- RESULTS

Before the beginning of the pedagogical experiment, all children performed a tapping test. According to the tapping test results, two subgroups were formed in the CG (10 children with a weak nervous system and ten children with a

robust nervous system), the same situation was in the EG with ten children in each subgroup. The indicators of attention stability of children aged 13-14 years in the beginning and the end of the experiment are shown in **Table.2**.

**Table-2:** Indicators of attention stability of schoolchildren aged 13-14.

Groups	Nervous system	Before Mean $\pm$ SD	After Mean $\pm$ SD	%	P-0,05
Control (12 boys, 8 girls)	Strong	3,3 $\pm$ 0,2	3,4 $\pm$ 0,2	+4%	>0.05
	Weak	3,5 $\pm$ 0,3	3,6 $\pm$ 0,3	+3%	>0.05
Experimental (12 boys, 8 girls)	Strong	3,4 $\pm$ 0,3	4,1 $\pm$ 0,3	+18%	<0.05

SD: Standard deviation.

**Table.2** shows that the schoolchildren of both groups were able to improve their attention stability indicators in 3 months, but the changes occurred differently in each subgroup. In CG, schoolchildren with a robust nervous system improved from 3.3 $\pm$ 0.2 to 3.4 $\pm$ 0.2, and children with a weak nervous system improved by 3%. Despite the improvements in the indicators, the schoolchildren did not manage to reach the grade "4" in terms of attention stability both in the general and subgroups. Such a slight increase in the indicators of schoolchildren's attention's stability can indicate the effectiveness of the standard physical education program at school and the natural development of children of this property in a certain period. In the EG, the indicators of attention stability improved from 3.4 $\pm$ 0.3 to 4.1 $\pm$ 0.3 in schoolchildren with a robust nervous system, and the indicators of children with a weak nervous system were 14% higher. The children were able to qualitatively increase the level of attention stability, as they came out on the test with a score of "3" to a score of "4". These results indicate the effectiveness of implementing a set of physical exercises aimed at developing speed and strength

abilities for schoolchildren aged 13-14 years for physical education lessons.

### 4- DISCUSSION

The study aimed to determine the effect of speed-strength training on the indicators of attention stability of children aged 13-14 years with different nervous system strengths. Results showed that in the experimental group, the indicators of attention stability improved in schoolchildren with a robust nervous system by 18% ( $p < 0.05$ ), and in children with a weak nervous system by 14% ( $p < 0.05$ ). Most modern research authors talk about the problems of children's health, their successful development, emphasizing the importance of physical exercise, sports work, and, of course, physical culture, especially in school years (1-3). In the course of the study, the first evidence worth emphasizing is the effectiveness of the standard physical education program at school in Russia. Since the children from the CG during the study period, without performing any additional exercises, improved their performance in attention stability, albeit not significantly. It is also worth noting the many studies that link physical activity with mental activity, that is, people's intellectual abilities. Of course, there is no

disputable fact – this is the benefit of physical activity for physical development and mental perfection (9-11, 13-14). It is also important to note the effectiveness of the differentiated approach in physical education lessons at school in working with children aged 13-14 years. Most authors agree with this position (15-17). This approach allows you to develop the schoolchildren's abilities comprehensively, to exhaust as much as possible his inner potential. The study results in the EG allow us to conclude that a set of exercises aimed at developing speed and strength abilities, taking into account the strength of the nervous system, can have a positive impact on the development of attention stability in children aged 13-14 years. Since the indicators of attention stability from the beginning to the end of the pedagogical experiment in schoolchildren in the EG were significantly higher than those of schoolchildren from the CG in both subgroups. For the first time, the influence of speed and strength abilities on attention stability indicators in children aged 13-14 years with different typologies was revealed. This study's purpose was achieved, and the results of the study confirmed the effectiveness of the exercise complex. After a preliminary warm-up, at each lesson in physical culture, you should perform a set of physical exercises aimed at developing speed and strength abilities. The components of the load for schoolchildren aged 13-14 years should be differentiated considering the strength of their nervous system.

## 5- CONCLUSION

Based on the results, the indicators of speed and strength abilities and the indicators of the stability of children's attention will improve. The study is relevant and promising for studying children's physical and mental development engaged in physical culture or sports.

**6- CONFLICT OF INTEREST:** None.

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