**Pharmacophore**

ISSN-2229-5402

Journal home page: http://www.pharmacophorejournal.com

# INFLUENCE OF SPEED-STRENGTH TRAINING ON THE CONCENTRATION INDICATORS OF SCHOOLCHILDREN AGED 13-14 YEARS WITH DIFFERENT TYPOLOGY

**Georgiy Georgievich Polevoy[1-3*]**

1. ***Department of Physical Education, Moscow Aviation Institute (National Research University), Moscow, Russia.***
2. ***Department of Physical Education, Moscow Polytechnic University, Moscow, Russia.***
3. ***Department of Physical Education, Vyatka State University, Kirov, Russia.***

**ARTICLE INFO**

**Received:**
27 Aug 2021
**Received** in revised form:
29 Nov 2021
**Accepted:**
08 Dec 2021
**Available online:**
28 Dec 2021

***Keywords:*** Concentration, Speed/power qualities, Schoolchildren, Physical culture

**ABSTRACT**

The present article aimed to investigate the effect of speed-strength classes on the concentration indicators of thirteen- to fourteen-year-old students with diverse typologies. The study period was three months. All physical education classes were held for 40 minutes and twice a week. Students from the control class (20 children) studied based on the common program, and students from the special group (20 children) further carried out a set of speed and strength exercises. All students performed the tapping test (strength of the nervous system) and the Bourdon test (concentration of attention). After a special study, the concentration values in the control class in kids with a strong nervous system improved by 5% ($p>0.05$) and with a weak one - by 6% ($p> 0.05$). In the experimental class, concentration indicators increased by 13% ($p<0.05$) in schoolchildren with a strong nervous system and with a weak one - by 16% ($p<0.05$). It is necessary to perform a group of physical exercises that affect the development of strength and speed abilities in physical education classes at school. Physical activity for students aged 13-14 years should be differentiated considering the strength of the nervous system. As a result, the indicators of strength and speed qualities will improve and the indicators of students' concentration.



**To Cite This Article:** Polevoy GG. Influence of Speed-strength Training on the Concentration Indicators of Schoolchildren Aged 13-14 Years with Different Typology. Pharmacophore. 2021;12(6):15-8. https://doi.org/10.51847/oCGvk8tmjd

## Introduction

In recent years, the topic of physical development and physical training of children in schools has become increasingly relevant. An important role is given to physical education lessons at school [1-3], Next to the teacher in class, children learn new exercises better and perform more complex motor actions elements. However, suppose in primary school age the actual topic is the level of development of coordination abilities, then in the middle level. In that case, the speed and strength training of schoolchildren comes to the fore. Since 13-14 years of age is favorable for the enhancement of speed and strength abilities from a physiological point of view [4-6].

The aim of the previously studied exercises was to develop the strength and speed qualities that have shown their effectiveness [7]. The quality of classes will be higher. The efficacy of the differentiated method of quality development, which is based on the typology of students [8], was proved. Through this procedure, you can use the body reserves of each schoolchild to the maximum values.

However, at this stage of the study, we had to find out how this set of exercises affects the concentration indicators of schoolchildren with different typologies.

It is known that motor activity and thought processes are interconnected [9-11].

The present research aimed to investigate the impact of strength and speed training on the concentration indicators of thirteen to fourteen-year-old schoolchildren with diverse nervous system strengths.

**Corresponding Author:** Georgiy Georgievich Polevoy; Department of Physical Education, Moscow Aviation Institute (National Research University), Moscow, Russia. E-mail: g.g.polevoy@gmail.com.

## Materials and Methods

*Participants*

The research participants were girls and boys from class 7a (20 people: 8 girls and 12 boys) and class 7b (20 people: 8 girls and 12 boys), from school number 60 in Russia. The schoolchildren participating in the pedagogical experiment were in good health, had received permission to attend physical education at school. Thus, forty 13-14 years old students participated in the study.

*Procedure*

The new study was three months, 12 Jan. - 20 Mar. 2020. All classes of physical education were held in the gym twice a week. Each lesson was 40 minutes long. There are a total of 20 lessons in each class under study. All physical education classes were held on the same day and at the same time in each class. Students of Class 7a - Tuesday 8:50-9:30 and Friday 9:40-10:20. Children of Class 7b - Tuesday 9:40-10:20 and Friday 8:50-9:30.

Before the study, grade 7a students were assigned to the control group (CG) - they were engaged in a standard program and did not perform any additional physical exercises [7].

The second group, schoolchildren from class 7b, was identified as an experimental group (EG). We worked with exercises to develop strength and speed. Physical activity in this group was different considering the schoolchildren's nervous system strength. Children with a weak nervous system carried out each exercise longer, and the number of sets of one exercise was greater than that of students with a strong nervous system. The exercises most often used are pull-ups, push-ups, working with dumbbells, squats, running, torso turns, and many others [8].

Two tests were taken by all students:

1. Tapping test (determination of the nervous system strength by the process of arousal of children)

Procedure: the schoolchildren had to put the dots in each of the six squares on a piece of paper as quickly and consistently as possible at the teacher's command. The nervous processes strength based on the test was specified, and a special load was determined depending on the obtained indicators [8].

2. Methodic "Bourdon test" (determining the concentration of attention of schoolchildren).

Procedure: Numbers 1-9 **(Table 1)**.

**Table 1.** Bourdon Test's Fragment

| |
|---|
| 4 3 2 1 3 2 1 6 4 9 8 7 9 8 4 3 1 3 2 3 2 2 4 3 4 3 4 3 6 7 9 7 9 8 6 5 8 2 8 2 1 7 3 2 5 4 3 1 2 5 3 2 7 1 7 9 1 9 6 5 6 4 9 8 7 9 8 7 6 5 1 7 3 |
| 2 1 3 7 6 7 9 7 9 7 5 7 2 4 5 3 2 3 4 3 4 6 4 6 8 2 2 8 5 7 5 4 5 4 5 4 1 4 1 2 4 1 4 6 5 4 5 6 4 7 4 7 6 5 7 4 5 7 4 8 9 4 9 8 4 9 8 3 2 7 1 7 1 |
| 8 6 3 1 9 6 7 8 4 9 7 4 4 5 1 7 2 3 7 6 8 6 5 4 8 9 7 9 8 4 5 6 4 1 3 1 3 1 6 4 9 8 7 9 8 7 4 5 1 3 2 1 6 5 9 9 5 6 4 7 3 1 7 3 1 9 7 3 1 2 9 3 2 |
| 9 7 3 2 9 4 3 2 7 9 3 8 9 2 8 7 6 8 2 7 8 6 8 2 6 8 8 5 4 2 9 5 4 2 6 8 6 4 9 8 7 9 8 7 6 5 1 7 3 2 1 3 7 6 7 9 7 9 7 5 7 2 4 5 3 2 3 4 3 4 6 4 8 |
| 5 0 3 7 2 5 9 6 |

Within two minutes, cross out the numbers mentioned by the teacher. Indicators of students' concentration are determined by the formula: A= (B1 - B2 - B3): B x 100%

A - concentration of attention, B1 – the number of digits crossed out correctly; B2 – Number of missing digits; B3-the Sum of digits that were crossed out incorrectly; B – the Total number of digits in the viewed rows to cross out.

Scale for assessing the concentration of attention:

Excellent result – 81-100%; Good result – 61-80%; Medium result – 41-60%; Poor result – 21-40%; Very bad result – 0-20%.

Statistical analysis of the results of the study was carried out using the Excel program. The average value, standard deviation, the percentage of efficiency are determined.

## Results and Discussion

After the "Tapping test" test, ten schoolchildren with strong and weak nervous systems were differentiated according to the arousal process in CG and EG. The results of the beginning and end of the research on the students' attention concentration indicators are presented in **Table 2**.

**Table 2.** Indicators of Concentration of Attention 13-14

| Class | Nervous system | Before research | After research | % | P |
|---|---|---|---|---|---|
| Control | Strong | 72,3±8,3 | 75,9±8,8 | +5% | p>0,05 |
| | Weak | 69,6±9,8 | 73,8±10,4 | +6% | p>0,05 |
| Experimental | Strong | 72,1±6,8 | 83,6±7,9 | +13% | p<0,05 |
| | Weak | 71,4±6,1 | 85,0±7,3 | +16% | p<0,05 |

**Table 2** shows that students having a strong nervous system increased their concentration from 72.3±8.3 to 75.9±8.8 (p>0,05), while students with a weak nervous system improved their concentration by only 6% (p>0,05). In both subgroups, the indicators remained at the level of "Good." Such indicators of concentration of attention can indicate quite a good efficiency of the usual physical education program, in which schoolchildren are engaged.

However, in comparison with CG, the indicators in EG indicate a greater efficiency of using the complex of strength and speed capabilities, considering the typology of children. In students with a strong nervous system, concentration indicators improved from 72.1±6.8 to 83.6±7.9 (p<0.05). And for the weak - by 16% (p < 0.05). In both subgroups, students improved their concentration indicators from "Good" to "Excellent."

At the beginning of the article, we talked about the benefits of physical culture for developing children's physical abilities; of course, many authors agree with this point of view. Only sports training can be more effective than a physical education lesson at school. However, not every schoolchild is engaged in sports [1-3].

The results that we received in this article in CG suggest that the usual method of physical education at school, which is relevant for Russian schoolchildren, is quite good. We can guess that physical education lessons using this technique positively affect the concentration of students' attention. The opinion that physical culture positively affects many mental processes is confirmed by some experimental methods [9-13].

The impact of a distinguished procedure in working with students of both primary and secondary school age is considered, previous studies confirm this hypothesis [14-16].

The results of the study in the EG give us information that students' speed and strength qualities have a positive effect on the concentration of children's attention, especially if the load was taking into account their nervous system since the indicators of schoolchildren from the EG were significantly higher at the end of the study than those shown by both subgroups' schoolchildren from the CG.

In this study, the effect of the speed-strength capabilities on the concentration indicators in 13-14 years old schoolchildren was revealed for the first time considering their nervous system strength. The results of this study prove the influence of implementing a group of exercises aimed at investigated qualities. Thus, the goal of the study was achieved.

## Conclusion

In a regular school, during physical education classes at school, after a little warm-up and stretching exercises, it is necessary to perform a group of physical exercises that create strength and speed qualities. Physical activity for thirteen to fourteen-year-old schoolchildren must be differentiated, taking into account the nervous system strength. Thus, speed and strength abilities indicators, as well as students' concentration indicators, will improve.

**Acknowledgments:** The author thanks all participants of the study, the head of the school and the children who took part in the pedagogical research.

**Conflict of interest:** None

**Financial support:** None

**Ethics statement:** None

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