



SPEED-STRENGTH TRAINING INFLUENCE ON THE INDICATORS OF THE VOLUME OF ATTENTION OF SCHOOLCHILDREN WITH DIFFERENT TYPOLOGY

Georgiy Polevoy^{1-3*}

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

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ABSTRACT

The study aims to determine the effect of speed-strength training on the indicators of the attention span of schoolchildren with different strengths of the nervous system. The study was carried out in a normal school in the city of Kirov in Russia and lasted for 3 months. Physical education classes were held 2 times a week for 40 minutes. 20 schoolchildren from the control group were engaged in a standard physical education program. 20 other schoolchildren from the experimental group additionally performed exercises to develop speed and strength abilities. The strength of the nervous system was determined by the Tapping test, and the amount of attention was determined by the test «Schulte Tables». After the end of the pedagogical experiment, the indicators of attention volume in the control group in children that have a strong nervous system improved from 31.3±2.2 seconds to 30.4±2.2 seconds ($P>0,05$), and in children with a weak nervous system improved by +6% ($P>0,05$). In the experimental group, the indicators of attention volume in schoolchildren with a strong nervous system improved from 30.9±2.2 seconds to 26.0±1.9 seconds ($P>0,05$), and in children with a weak nervous system by 19% ($P>0,05$). If at each physical education lesson, you perform a set of physical exercises aimed at developing speed and strength abilities, considering how strong the schoolchildren's nervous system is, then the indicators of attention span will significantly improve. At the same time, the load for schoolchildren with different nervous systems should be differentiated.

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Introduction

At school, the education of children on the subject of «physical culture» comes to the fore, children, under the supervision of a teacher, learn new physical exercises, strengthen their body and harden their will [1-3].

Primary school children, as a rule, perform more motor exercises in physical education classes to develop their coordination abilities [4, 5]. More often, these are outdoor games that increase not only the effectiveness of the lesson but also increase the emotional mood of schoolchildren and their motivation for physical education lessons. At the same time, in the middle level, children have already mastered many elements and bundles of physical exercises, they begin to actively acquire muscle mass, can perform more rapid movements. A favorable period for developing speed-power abilities is the age of 13-14 years, and this is usually the 7th grade [6-8].

In the previous study, we proved the effectiveness of using a set of physical exercises aimed at developing speed and strength abilities for schoolchildren aged 13-14 [9]. In addition to the usual physical education program for school [10], such a complex significantly increases the level of development of speed-power abilities.

It should also be noted the effectiveness of using a differentiated approach in physical education lessons at school [11, 12], [13]. The criteria for differentiating children into subgroups in the course of a lesson can be very diverse. However, in our opinion, the most promising is to take into account the criterion for the typological features of the manifestation of the

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

properties of the nervous system, namely, the strength – weakness of the nervous system in the process of excitation (Typology) [9].

In the new study, we had to find out the possible impact of a set of physical exercises aimed at the development of speed and strength abilities on the indicators of the volume of attention of 13-14-year-olds with different strengths of the nervous system.

It should be noted that the fact of the influence of physical activity on different mental processes of a person is proved by some experts [14-16].

The study aims to evaluate the influence of speed-strength training on the indicators of the attention span of schoolchildren with different strengths of the nervous system.

Materials and Methods

Participants

The study involved schoolchildren aged 13-14 years who studied at the regular school number 60 in the city of Kirov in Russia. 20 schoolchildren from class 7a were identified in the control group (CG). 20 schoolchildren from class 7 and class were identified in the experimental group (EG). Of the 40 participants in the pedagogical experiment, there were 12 boys and 8 girls in the CG and 12 boys and 8 girls from the EG. All schoolchildren were healthy and allowed to take physical education classes (they had a basic and preparatory health medical group).

All procedures met the ethical standards of the 1964 Declaration of Helsinki. Informed consent was obtained from all parents of the children included in the study.

Procedure

From January 12 to March 20, 2020, the pedagogical experiment continued. For 3 months, all physical education classes were held 2 times a week for 40 minutes each lesson, all classes were held in a large gym.

It is important that during the period of the pedagogical experiment, the schedule of classes was stable:

schoolchildren from class 7a were engaged on Tuesday at 8:50-9:30 and on Friday at 9:40-10:20

schoolchildren from class 7b were engaged on Tuesday 9:40-10:20 and Friday 8:50-9:30

schoolchildren from class 7a were engaged in physical education according to the usual physical education program for schoolchildren in Russia [10].

schoolchildren from class 7b also studied according to the standard program, but after a short warm-up and muscle relaxation exercises, they performed a set of speed-strength exercises at each lesson. At the same time, the load was differentiated considering how strong the schoolchildren's nervous system is. Children that have a weak nervous system did less exercise than children with a strong nervous system. However, the number of episodes in the subgroup of children with weak nervous systems was higher. The complex included such exercises as running in different directions, sharp turns of the trunk, push-ups, squats, working with dumbbells and pull-ups, and some other exercises [9].

Before and after the pedagogical experiment, all schoolchildren took tests:

1. The strength of the nervous system was determined by the «Tapping test». Procedure: at the command of the teacher on a sheet of A4 paper, schoolchildren should consistently put dots in each of the six squares at the maximum speed. Then the nervous systems' strength was evaluated and the corresponding load was selected [9].
2. The amount of attention of schoolchildren was determined by the test «Schulte Tables» A sheet of A4 paper shows 25 squares on both sides. In the squares, the numbers are in a different order from 1 to 25 (**Table 1**) [17].

Table 1. Schulte Tables

21	9	17	2	13	15	8	23	2	5
14	23	8	11	7	21	10	12	19	25
3	20	1	15	22	1	24	17	7	20
18	4	16	24	6	9	13	3	22	14
25	10	5	19	12	16	4	11	18	6
Option 1					Option 2				

Procedure: At the teacher's signal, all schoolchildren must quickly cross out the numbers from 1 to 25 in each square. If a mistake is made, the test starts again. The result is the time taken to complete the test.

Statistical analysis was carried out using the Microsoft Excel program. The average values of attention indicators were determined, as well as the standard deviation from the average indicator. The percentage increase in indicators in each subgroup from the beginning to the end of the pedagogical experiment was revealed. The student's T-test was used.

Results and Discussion

Before the beginning of the pedagogical experiment, all 40 schoolchildren performed a tapping test, according to the results of which the children in the EG were differentiated into 2 subgroups (schoolchildren with a strong nervous system and schoolchildren with a weak nervous system). According to the results of the tapping test, 10 children from the CG were considered to have a strong nervous system, and 10 with a weak nervous system. The same distribution was found in the EG. The results of the indicators of the volume of attention of schoolchildren aged 13-14 years during the study period are shown in **Table 2**.

Table 2. Indicators of the volume of attention of schoolchildren aged 13-14

Groups	Nervous system	Before	After	%	P
Control	Strong	31,3±2,2	30,4±2,2	+3%	>0,05
	Weak	28,2±2,5	26,5±2,3	+6%	>0,05
Experimental	Strong	30,9±2,2	26,0±1,9	+16%	<0,05
	Weak	28,1±2,3	22,8±1,8	+19%	<0,05

Table 2 shows that the indicators of the volume of attention of all subgroups of schoolchildren during the period of the pedagogical experiment in 3 months improved. In CG, the indicators did not change significantly. Children with a strong nervous system improved their performance in the process of arousal from 31.3±2.2 seconds to 30.4±2.2 seconds ($P>0,05$), while children with a weak nervous system improved their attention span by only 6% ($P>0,05$). Not a large increase in the indicators of attention volume indicates fairly good effectiveness of the standard methodology for physical culture and the natural and gradual development of the attention volume of children aged 13-14 years.

In EG, the amount of attention in children that have a strong nervous system increased significantly. Thus, in the subgroup of children with a strong nervous system, the indicators increased from 30.9±2.2 seconds to 26.0±1.9 seconds, which was +16% ($P>0,05$) of the initial result. In children in the subgroup with a weak nervous system, the indicators improved by 19% ($P>0,05$). Such results give a stable assumption about the effectiveness of the applied set of exercises used in physical education lessons at school, considering the strength of the nervous system of children aged 13-14 years.

At the beginning of the article, we emphasized the importance of the subject of physical education in school and this is not accidental [1-3]. The results obtained in the course of the study confirm the opinion of some authors that physical activity and exercise have a positive effect on brain functions, including the amount of attention [14-16, 18, 19].

The study tested the effectiveness of the standard work program in physical education at school and its impact on the amount of attention of schoolchildren. As it turned out, the impact was positive, but not significant enough, this is indicated by the results in the CG.

The value of a differentiated approach for school-age children is very high. Including in physical education classes at school, when children can be differentiated into subgroups taking into account any attribute [10-12]. It is proved and confirmed that the use of the typological criterion (the strength of the nervous system in the process of arousal) as a criterion for differentiating schoolchildren into subgroups has a high result.

The results of the study obtained in the EG indicate that a set of exercises aimed at the development of speed and strength abilities had a positive effect on schoolchildren aged 13-14 years with a strong and weak nervous system. Since the indicators in both subgroups increased in 3 months by 16% and 19%, respectively.

Thus, for the first time, the influence of the speed-strength abilities of schoolchildren with different nervous system strengths on the indicators of attention volume was determined. The results of the study allowed us to achieve the goal and determine the effectiveness of the new study.

Conclusion

If you perform a set of exercises aimed at developing speed and strength abilities in children aged 13-14 at each physical education lesson at school, then the indicators of attention span will improve. The load should be differentiated for children that have strong and weak nervous systems. For children that have a strong nervous system, an intensive load will be relevant, and for children with a weak nervous system – a volume load (fewer exercises, but more series). The new research is promising for further discoveries in the field of physical culture and sports.

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