



CHILDREN AGED 13-14 YEARS WITH DIFFERENT NERVE SYSTEM STRENGTHS AND THE EFFECTS OF SPEED-STRENGTH TRAINING ON THEIR VESTIBULAR STABILITY.

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ABSTRACT

Schoolchildren with different nervous systems were examined for vestibular stability after speed-strength exercises. Students from grades 8a and 8b, ages 13-14, took part in the study. Class 8b participants were exercising speed-strength exercises alongside their usual program, while class 8a participants were treated as the control group. The strength of the nervous system of students in grade 8b was analyzed based on a tapping test that was administered. The test of "Turns on the gymnastic bench" was used to determine schoolchildren's vestibular stability. A Student's T-test was performed on the data. All subgroups of schoolchildren improved their vestibular stability after the pedagogical experiment, but in different ways. There was only a moderate improvement in the indicators in the control group, only by 6 to 7 percent ($p < 0.05$). In the experimental groups, however, indicators improved significantly. Children with strong nervous systems improved 11% in indicators ($p > 0.05$), and children with weak nervous systems improved 18%. Children's vestibular stability indicators will improve if they perform additional strength and speed exercises at each physical education lesson. It is important to differentiate physical activity for schoolchildren according to their nervous system strength.

Key words: Speed-Strength exercises, Physical activity, Pedagogical experiment

INTRODUCTION

Many studies examine the health and inactivity problems of schoolchildren. It is of great importance to have physical education lessons at school during the school years in order to meet the need for movement. The movement skills necessary to succeed in life are taught in physical education classes by school teachers so that schoolchildren grow up knowing the entire arsenal of motor actions they will need in the future. The goal of school years is to develop a comprehensive and harmonious body (speed, strength, dexterity, flexibility, endurance) according to age (1-3). During a particular period of time (sensitive period), a planned development of physical qualities has a profound effect on these indicators. When working with younger children, coordination, speed and flexibility are the most important elements. The

improvement of strength and speed-strength abilities is more important in middle and high school (4-6).

Schoolchildren aged 13-14 also showed improved speed and strength abilities when they performed a set of physical exercises (7). It will be a great idea to use such exercises in physical education classes at school for students in grades 1-11(8). Children of different ages should also be taught physical education using a differentiated approach, especially when it comes to classes aimed at children. There have been many studies proving the effectiveness of differentiating physical education lessons (9-11). Children can also be assigned into subgroups in the lessons based on different factors such as their height, training level, physical development, etc.

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We believe that typology (strength of the nervous system) is the most effective way to separate children (7).

Additionally, it is important to note that numerous studies have examined how physical activity and movement affect mental processes. Mental and intellectual processes are improved by physical activity.

Schoolchildren with different levels of nerve strength were tested on the effects of physical exercises designed to improve speed and strength on indicators of vestibular stability

**METHODS AND MATERIALS
POPULATION AND STUDY DESIGNS**

A pedagogical experiment was conducted with 20 children. An ordinary school was selected for conducting this pedagogical experiment for three months. In each class, 10 physical education students participated in the study. Both subgroups had the same schedule of two 40-minute gym lessons each week. Children from classes 8a and 8b were randomly chosen as control and experimental groups, respectively. In each group, six boys aged 13-14 were paired with four girls. Medical professionals allowed the study participants to take physical education classes in school, and they were in good health.

It was the second lesson in the schedule for the children in CG and the third lesson in the schedule for the children in EG, while it was the third lesson in the schedule for the children in the EG on Tuesday and the second lesson on Friday.

As part of CG's physical education program, all schoolchildren attended an ordinary physical education program (8). A short warm-up was followed by strength and speed exercises for EG students (running, twists, jumps, pull-ups, push-ups, dumbbell exercises). The load in the EG was different for children with a weak nervous system and a strong nervous system. A bigger number of series and rare changes in physical exercises characterized the process of arousal for schoolchildren with weak nervous systems. There were more exercises and fewer series for children with strong nervous systems. [7]

Tools for measuring

All schoolchildren took control tests, Tapping tests were done to determine nervous system strength, and "Turns on a gym bench" tests to determine vestibular stability before the study.

Tapping Test: A tapping test requires students to quickly place pencil dots in the area with the number 1 (on the A4

sheet) at the teacher's signal, and then move on to the next square after 5 seconds and so on. To determine the strength of the nervous system, they need to draw a graph and evaluate the arousal process (7).

Schoolchildren are required to turn on the narrow bench part of the gym. As a result of the calculation, half of the rotation around the axis is taken into account. Once the student has gotten up after falling, he returns to the workout. During the test, you will have 20 seconds to complete it.

Considerations of ethics

Ethics standards established by the 1964 Declaration of Helsinki were followed in all procedures. Throughout the study, parents of the schoolchildren provided informed consent.

Analyses of data

Microsoft Excel was used to analyze the results of the pedagogical experiment. Thus, we were able to calculate the standard deposit, calculate the average rate of increase in indicators, and compute the arithmetic mean. An analysis of the student's T-test was performed to compare the CG and EG groups.

Of the 10 children in the EG tested with the tapping test, 5 had a well-developed nervous system and 5 did not. A similar differentiation was made in CG. Schoolchildren aged 13-14 years were surveyed over a two-year period to determine vestibular stability.

As shown in Table 1, both 8a and 8b schoolchildren showed improved vestibular stability. There was an increase of 4% in indicators in individuals with CG-strong nervous systems. In children having weak nervous system, the indicators raised from 6.4±1.7 to 6.8±1.7, while the increase in vestibular stability indicators was only 3%. Results indicate that the standard work program in physical fitness is ineffective in the CG

A 11% increase in indicators was observed among participants with a strong nervous system (indicators improved from 6.2±1.5 to 7.5±1.6). Participants with weak nervous systems experienced an increase of 9% in indicators (from 6.1±1.6 to 7.2±1.7). The results of this study show that speed and strength training can be incorporated into physical education classes in a significant way to increase the development of vestibular stability in schoolchildren.

Table:1 Vestibular stability indicators in CG and EG, n = 20

Groups	Nervous system	Before research <u>M+m</u>	After research <u>M+m</u>	%	P
Control	Strong	6,3±1,6	6,8±1,6	+4%	p>0.05
	Weak	6,4±1,7	6,8±1,7	+3%	p>0.05
Experimental	Strong	6,2±1,5	7,5±1,6	+11%	p<0.05
	Weak	6,1±1,6	7,2±1,7	+9%	p<0.05

DISCUSSION

Children's growth and development depend greatly on physical education at school. There are some children who play sports along with physical education, but not many (1-3) rely on the ability to participate in physical education to maintain their fitness.

Schoolchildren learn all the physical skills they will need for life as a result of the full range of movements and passing of the material. Children at a certain age are expected to develop all physical qualities as part of a holistic harmonious development. However, it should be noted that the vestibular stability of the children from CG has a natural increase between the ages of 13 and 14. There are some minor additions that need to be made to the standard program. There was an improvement in vestibular stability indicators among children in the CG by 3-4%, versus 9-11% for those from the EG. An EG's efficiency can be measured by such indicators. Exercises aimed at developing strength and speed are shown to positively affect the vestibular stability of schoolchildren aged 13-14.

Differentiated physical education lessons have been shown to be effective. As well, previous studies (9-11) have confirmed that this approach enhances physical education lessons by helping children realize their potential. Using a typological indicator, the nervous system was divided into subgroups based on its strengths and weaknesses during arousal. With the experimental group's results, this criterion was proven to be effective. Differentiated instruction in physical education-personalization of learning has also been shown to be

effective by previous studies, for example, Gavin et al., in 2017. It was proposed in 2019 that students should be given differentiated instruction in physical education based on a universal design for learning. As a means of addressing learner diversity in secondary physical education, Jarvis et al. in 2017 adopted a differentiated pedagogy (12).

It was thus possible to achieve the study's objective, namely, to determine the effects of a set of physical exercises that were designed to help children develop their speed and strength on their vestibular stability indicators based on their nervous system strength. Many modern studies confirm that this topic affects children's physical development and their health (12-16).

CONCLUSION

A variety of exercises designed to develop speed and strength should be used when teaching physical education at school. Diverse approaches should be used when working with children of different ages. Using typology (nervous system strength) as a criterion for grouping children is one of the most effective methods. A voluminous load should be applied to children with weak nervous systems, meaning they should be varied infrequently and have more sessions of each exercise, and an intense load should be applied to children with strong nervous systems. The typology of vestibular stability, speed, and strength can be improved during physical education classes by addressing the typology during exercises.

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