

ORIGINAL ARTICLE



The Effect of Physical Activity on Attention Indicators of Schoolchildren

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ABSTRACT

Background. Sedentary lifestyle of schoolchildren has a negative impact not only on physical abilities, but also on mental processes. The relationship between physical activity of schoolchildren and indicators of their attention has not been studied in depth. **Objectives.** To determine the effect of physical activity in physical education lessons on the attention indicators of children 15-16 years. **Methods.** The study was conducted in a secondary school in Russia, it was attended by ninth graders in the number of 141 schoolchildren by random sampling. The main research method was the “Trondyke Test”, which determines the level of attention development of schoolchildren. The test was used before and after the physical education lesson 1 time per month for 5 months. **Results.** Children who did not engage in physical education in the lesson were not able to significantly improve their performance in the test, which indicates a possible adaptation to the test after its first performance before the lesson. Children who were engaged in physical exercises were able to significantly increase the test results. The situation for children who were engaged in a physical education lesson. In each of the five months, the test indicators improved significantly, on average from 14.9% to 17.1% ($p < 0.05$). **Conclusions.** For the first time the results obtained determine the effectiveness of the influence of a physical education lesson at school on the indicators of children's attention 15-16 years. This study will serve as an additional motivation for children to engage in physical culture, since the impact of physical exercises has a positive effect not only on the development of physical qualities, but also on the attention of schoolchildren.

KEYWORDS: *Physical Education, Physical Exercises, Health, Mental Processes.*

INTRODUCTION

The topic of children's health and development is always relevant (1-4). From early childhood and throughout life, people try to make their health stable, stable to the effects of adverse factors. Of course, this is achieved in many ways. For example, there is such a thing as a healthy lifestyle. It includes such components as: physical activity, proper nutrition, healthy sleep, giving up bad habits, some other factors.

Such a classification is offered by a fairly large number of studies. At the same time, the percentage of components practically does not change. However, none of the researchers ranked

physical activity last in importance, noting its value for human development and health (5-9).

Unfortunately, today, children who enroll in colleges and universities after school increasingly have a preparatory or special health group. Children with the main health group, which allows them to engage in physical culture and sports without restrictions, began to meet less frequently (10, 11). At the same time, these are not only congenital problems and pathologies, most of them are acquired health problems, such as obesity, hypertension, that is, for the most part, a consequence of a sedentary lifestyle (12, 13). At

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the same time, a sedentary lifestyle since childhood leads to an increase in chronic diseases, a decrease in functional and physical fitness (14-16). Thus, it is important to form children's desire and needs for physical culture and sports from childhood (17).

At the same time, it is important to take into account the game method in physical education lessons at school (47, 48). One of the most important tasks of physical culture is the development of motor skills (18-20) and increasing the level of physical fitness (21-22). The relationship between physical activity and attention, as well as cognitive functions, is of great importance (49).

Physical education lessons at school are indispensable tools for the implementation of such a component of a healthy lifestyle as physical activity. A lesson at school is mandatory to attend and is conducted under the influence and supervision of a teacher (23). A fairly large number of studies have been presented on the benefits of physical education lessons at school for the development of physical qualities (strength, speed, motor abilities, endurance, flexibility, and others). The authors note the effectiveness of a particular methodology, school curriculum for the development of physical qualities of schoolchildren of different genders and ages (24-27).

Some studies mention that physical activity has a positive effect not only on the development of physical qualities, but also on the development of cognitive and some mental processes (28-31). It is known that physical exercises have proved to be an effective means for developing the creative abilities of schoolchildren (32-34).

The aim of our study is to determine the influence of physical activity in physical education lessons on the attention indicators of schoolchildren. Perhaps this would serve as an additional motivation for schoolchildren to take physical education classes at school, college or university.

Research hypothesis: it is assumed that the motor activity of schoolchildren at a physical education lesson has a positive effect on the indicators of schoolchildren's attention.

MATERIALS AND METHODS

Participants. The study involved ninth grade students of secondary school number 60 (Kirov, Russia), aged 15-16 years. A total of 141 students took part in the pedagogical experiment by

random sampling. The 9th grade students are graduates of the school and treated the study with maximum responsibility, all exercises and tests were performed consciously. The pedagogical study involved children regardless of gender and age, weight and height and level of physical fitness. Children with basic and preparatory health groups were admitted to physical education classes by the doctor. 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. This study was approved by Research Ethics Committee, Vyatka State University. From the record of the meeting of the ethics committee on January 17, 2022 №1.

Procedure. The study was conducted for five months (January – May 2022). According to the schedule, physical education classes in the ninth grade were held 2 times a week for 45 minutes according to the physical education curriculum at the school for children of grades (20).

The current study did not take into account the favorable period and the natural increase in attention indicators in children. Differentiation of children into control and experimental groups was not provided. In our study, the main fact was the active physical participation or non-participation of the student in the process of physical education. Therefore, only the impact of physical activity of schoolchildren on their attention indicators was considered.

All physical exercises were performed under the supervision of a physical education teacher. Before the lesson, the children sat down in a regular classroom and performed the “Trondyke test” for 2 minutes (35).

There are 70 three-digit numbers in any order in front of the student (Table 1). Within 2 minutes, the student must find and cross out the numbers given by the teacher. The numbers can be searched in any order. The numbers changed each time. There are no duplicate numbers in the main table. The test is recommended by leading experts in the field of the study of mental processes (35).

Result: the number of correctly crossed out numbers within 2 minutes.

Before the start of the physical education lesson, testing was conducted in order to assess the current level of attention. After the end of the physical education lesson, the children sat in the same class and performed this test again. After the

end of the physical education lesson, testing showed the effect of children's active activity on attention indicators. It should be noted that the time interval (before and after the lesson) was not chosen by chance, since during the day or week students carry out other activities that could affect the test results. For the accuracy of the result, the procedure was performed once in the middle of each month from January to May. All students took the test, including those who were not allowed to attend classes for one reason or another. But, as a rule, such children are simply

present at the lesson, without active participation in it. Children who were not present at school on the day of the test were not included in the results.

Statistical Analysis. All the indicators of schoolchildren according to the test results were entered in an Excel spreadsheet. The average value of the indicators before and after the study and their percentage increase were determined, the reliability of the increase in indicators was determined by the Student's T-criterion ($p>0.05$).

Table 1. Fragment of the "Trondyke test".

Find and cross out these numbers in the main table									
051	214	263	584	117	533	519	309	073	638
Main table									
573	371	672	615	714	284	179			
385	117	295	369	503	519	016			
703	649	104	491	274	439	667			
048	309	482	263	023	184	358			
561	691	316	625	653	193	082			
392	554	031	327	093	341	205			
683	129	548	416	333	073	168			
584	404	051	427	468	154	527			
259	591	137	069	145	214	447			
638	246	473	533	231	459	606			

Test Execution (Trondyke) --- Lesson --- Test Execution (Trondyke)

RESULTS

Before the beginning of the physical education lesson and after its completion, all children passed the control "Trondyke Test". The test results are presented in Table 2.

Table 2 shows that children who did not engaged, but completed the test, were able to only slightly improve their performance. This trend is observed every month. On average, the indicators improved from 1.9% to 3.1% ($p>0.05$).

Table 2. "Trondyke test" results

Month	Physical education lesson	Number of children in lessons	Test before the lesson	Test after the lesson	%	p
January	engaged	361	7.1	8.2	15.2%	<0.05
	not engaged	34	8.1	8.3	2.3%	>0.05
February	engaged	348	7.4	8.6	16.4%	<0.05
	not engaged	41	7.6	7.8	2.8%	>0.05
March	engaged	372	7.5	8.8	17.1%	<0.05
	not engaged	33	7.4	7.5	1.9%	>0.05
April	engaged	368	7.8	9.1	16.1%	<0.05
	not engaged	29	7.9	8.2	3.1%	>0.05
May	engaged	350	7.9	9.1	14.9%	<0.05
	not engaged	42	7.5	7.7	2.8%	>0.05

The situation is different for children who were engaged in a physical education lesson. In each of the five months, the test indicators improved significantly, on average from 14.9% to 17.1% ($p<0.05$).

Such results of the pedagogical experiment indicate the effectiveness of the influence of physical exercises and physical education lessons on the attention of schoolchildren.

DISCUSSION

It is assumed that the motor activity of schoolchildren at a physical education lesson has a positive effect on the indicators of schoolchildren's attention. The aim of this study was to determine the effect of physical activity of schoolchildren on their attention indicators. The main conclusion of this study is that children who were engaged in physical education were able to significantly improve their attention indicators. Of course, this indicates the effectiveness of the influence of a variety of physical exercises on attention indicators. Children who did not do physical exercises in the physical education lesson were not able to significantly improve their performance in the Thorndike test. This can probably be explained by the fact that performing the test before the start of the lesson served as some kind of training or adaptation to it, since all the children performed it again after the physical education lesson. This trend was observed throughout the study.

This study has an important physiological and psychological aspect, which is confirmed by other studies (2, 10, 12). A review of the literature on the problem shows the relevance of the issue of the health and development of children (1, 3, 36). Physical education has a great importance on the sedentary lifestyle of children (8,9,37,38). Despite the fact that a fairly large number of studies prove the effectiveness of physical education lessons for the health of children and the development of their physical qualities (24, 26, 27), there are studies that speak about the impact of physical exercise on development of cognitive processes (28, 30, 31). and creative abilities of children (32-34).

However, it is also important that physical exercises have an impact on some mental processes, which is confirmed by some studies conducted (39, 40).

In this study, for the first time, the influence of a physical education lesson at school on attention indicators is investigated. During the study period, attention indicators improved in each month, regardless of the goals and objectives of a particular lesson, whether it was athletics, endurance running, forward somersault or the use of outdoor games, or sports games as a means of physical culture in the lesson.

From a physiological point of view, in all likelihood, physical exercise increases the activity

of metabolic processes (2, 5, 41). Under the influence of physical exercises, blood circulation improves (42-44), as a result of which mental processes are mobilized.

The results obtained will serve as additional motivation for physical education classes, since in the process of motor activity not only physical qualities develop, but also the attention of children. This study is relevant and promising for further study of the health and physical activity of children at school, as well as its impact on mental and cognitive processes.

CONCLUSION

This study examines the problem of children's health, their sedentary lifestyle. The role of the physical education lesson for the health and development of schoolchildren is determined. As a result of the study, the effectiveness of the influence of physical activity of schoolchildren in the physical education lesson on the attention indicators of schoolchildren has been proved.

The limitation of the study is that the participants was involved ninth grade students who were healthy and admitted by a doctor to physical education classes. In the future, research should focus on the impact of physical activity and physical activity in physical education lessons not only on the physical qualities of schoolchildren, but also on different mental processes of children of different ages.

APPLICABLE REMARKS

- Since the topic of the health of children of different ages has always been and will continue to be very significant. It is important to take into account the influence of physical activity of schoolchildren in physical education lessons, to increase the motivation of children for physical education lessons at school, to look for new optimal methods of influence.
- Physical education classes at school should be aimed not only at the development of physical qualities, but also mental processes, such as the attention of schoolchildren. As for future research, it would be interesting to establish the possible influence of physical activity of children of different ages on other mental processes, for example, such as memory or thinking.

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AUTHORS' CONTRIBUTIONS

Study concept and design: Georgiy Polevoy.
Acquisition of data: Georgiy Polevoy. *Analysis and interpretation of data:* Georgiy Polevoy. *Drafting the manuscript:* Georgiy Polevoy. *Critical revision*

of the manuscript for important: Georgiy Polevoy.
Intellectual content: Georgiy Polevoy. *Statistical analysis:* Georgiy Polevoy. *Administrative, technical, and material support:* Georgiy Polevoy.
Study supervision: Georgiy Polevoy.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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