



## Development of Kinesthetic Differentiation of Movement Parameters of Children Aged 8-9 Years Using a Gymnastic Stick

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### ABSTRACT

An effective method of developing coordination abilities can be a gymnastic stick use in physical education at school. The development of spatial orientation was in children aged 8-9 years. 104 students took part in a study in the city of Kirov (Russian Federation). At school 60, children do physical education 2 times a week for 40 minutes. They were divided into 2 groups. The experimental group consists of schoolchildren who studied according to the usual methodology and additionally performed physical exercises on the gymnastic stick. Children from the control group were engaged in a standard program for schoolchildren of grades 1-11. The ability to kinesthetically differentiate the parameters of movements was determined using the "Hitting the ball on target" test. The Student's T-test was used to process the results. After the end of the pedagogical experiment, the indicators of children in the control group improved by 26% ( $p > 0.05$ ), the positive dynamics can be explained by a natural increase in coordination abilities at the age of 8-9 years and the effectiveness of using the standard physical education program in Russian schools. The indicators of children in the experimental group improved by 73% ( $p < 0.05$ ). Such results can be explained by the effectiveness of the implementation of a set of exercises using a gymnastic stick in physical education lessons. The indicators of kinesthetic differentiation of movement parameters will significantly improve if children aged 8-9 perform a set of physical exercises on the gymnastic stick during physical education lessons.

**Keywords:** Coordination abilities, Motor activity, Physical education, Schoolchildren.

**HOW TO CITE THIS ARTICLE:** Polevoy GG. Development of Kinesthetic Differentiation of Movement Parameters of Children Aged 8-9 Years Using a Gymnastic Stick. Entomol Appl Sci Lett. 2022;9(3):60-5. <https://doi.org/10.51847/zTI27OVMot>

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**Received:** 10/04/2022

**Accepted:** 22/08/2022

### INTRODUCTION

Physical development and health of schoolchildren are always relevant topics for research. Today, more and more children are obese [1, 2] this is a consequence of a sedentary lifestyle [3, 4]. In this case, an important role is played by a physical education lesson at school. The main purpose of the physical education lesson at school is the comprehensive harmonious development of the student, increasing the level of physical fitness, and satisfaction of motivational, mental, and motor needs [5].

The standard physical education program at schools in Russia is designed in such a way as to

emphasize the development of physical qualities in a favorable period of their development. These can be game and competitive exercises in the lower grades, a differentiated approach in the middle level, and the upper grades – an individual approach [5]. When performing physical exercises and doing physical activity, it is important to take into account sensitive periods of development of physical qualities. For example, coordination abilities are intensively developed in primary school age, speed of movement in the middle level, and strength and endurance in high school [6, 7].

In primary school age, from the first grade, it is important to use a large number of coordination exercises in physical education lessons. A good level of development of coordination abilities is

the foundation for the development of other physical qualities and the key to the rapid development of technical abilities of children in the future in a variety of sports. Coordination abilities are the ability of a person to solve motor tasks most completely, quickly, expediently, accurately, and resourcefully, in the event of complex and unexpected situations. The variety of coordination abilities is quite large [8-11]. One of the important coordination abilities for children is the ability to kinesthetically differentiate the parameters of movements – this is the ability to achieve high accuracy and efficiency of individual phases of movement and movement as a whole [12].

One of the problems in physical education of children in schools is the lack of gyms and playgrounds. The teacher must fulfill the goals and parameters of the standard physical education program at school in each lesson in each class, taking into account age, physical and other aspects. Such a problem can be solved using new methods, equipment, new physical exercises, technologies and other points. It is important that the new physical exercise does not require special preparation, the inventory does not take up much space and at the same time the result of the teacher's work was achieved. One of these items can be called a gymnastic stick. The gymnastic stick is one of the most common and effective training simulators for athletes in many sports. It is used for both individual and group classes. The gymnastic stick consists of durable nylon bands and plastic cross-sections. The number and variety of physical exercises using the gymnastic stick is quite large [13-18]. Despite the popularity and use of the gymnastic stick in various sports, we have not been able to find studies that prove its effectiveness for the development of the ability to kinesthetically differentiate movement parameters.

The aim of the study was to determine the effect of a set of exercises using a gymnastic stick on the development of indicators of kinesthetic differentiation of movement parameters in children aged 8-9 years.

## MATERIALS AND METHODS

### *Participants*

The pedagogical experiment was attended by children in junior grades 8-9 years old. The

students studied in the second grade at an ordinary school. The study involved. Of the total number of second graders (118 children), 104 schoolchildren who were healthy and admitted by a doctor to physical education lessons at school (56 girls and 48 boys) took part in the study.

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.

### *Research procedure*

The pedagogical experiment was conducted at secondary school number 60, Kirov, Russian Federation from September 1 to May 30, 2021. Students were engaged in physical education 2 times a week for 40 minutes each lesson. During the 9 months of the study, 72 physical education lessons were conducted in every second grade. Children from the control group (class 2A and 2B) – 30 girls and 22 boys were engaged in the standard school program in physical culture at school [5].

The main objectives of the physical education curriculum are:

*To achieve this goal, the following tasks are being solved*

1. Health promotion, promotion of normal physical development of children;
2. Teaching vital motor skills and abilities;
3. Development of motor abilities;
4. Acquisition of necessary knowledge in the field of physical culture and sports;
5. Education of the need and ability to engage in physical exercises independently, consciously apply them for recreation, training, improving performance, and strengthening health;
6. To promote the education of moral and volitional qualities, the development of psychological processes and personality traits;

Children from the experimental group (2B and 2G) – 26 girls and 26 boys were engaged in the same program, but in addition, for 5-6 minutes during the lesson, they performed a set of exercises on the gymnastic stick.

*An approximate set of exercises on the gymnastic stick*

1. Jumping on the cells

- The starting position is facing the gymnastic stick. Perform jumps into each cell from start to finish without touching the floor with your heels.
2. Jumping legs to the sides - legs together  
The starting position is facing the gymnastic stick. Perform a jump, spreading your legs apart, then jumping into the cage, legs together.
  3. Jumping on one leg  
The starting position is on one leg facing the gymnastic stick.  
Perform jumps on one leg in each cell without touching the floor with your heels. Then jumping on the other leg.
  4. Jumping sideways on one leg  
The starting position is on one leg sideways to the gymnastic stick. If the jump is on the right foot, then you need to stand on the right side of the gymnastic stick. Perform jumps into each cell on one leg without touching the floor with the heel.
  5. Running with a high hip lift  
The starting position is facing the gymnastic stick. Run and raise your hips high, and put your foot in the center of the cage.
  6. Running with a high hip lift sideways  
The starting position is to stand sideways to the gymnastic stick. Run right sideways with a high hip lift. Every foot must get into every cell of the gymnastic stick. Then perform the exercise with the other side.
  7. Running in every cell  
The starting position is to stand sideways to the gymnastic stick. Run by stepping on each cell with your foot.
  8. The same thing, but, backward, without touching the floor with the heel.

#### *Basic rules when performing exercises on the gymnastic stick*

1. No more than 7-8 people are engaged in each gymnastic stick at the same time to maintain the dynamics of the exercise.
2. Each physical exercise must be repeated 2-3 times.
3. The number of gymnastic stick depends on the number of children who are engaged in the lesson.
4. At each lesson, change the sequence of exercises and supplement the complex with new exercises.

5. When performing exercises, focus not only on the technique of performing exercises but also to maintain a high pace of movement for each student.

At the beginning of the pedagogical experiment and after the end of the school year, all children passed the control test "Hitting the ball on target", which determined the level of development of the ability to kinesthetically differentiate the parameters of movements.

#### «Hitting the ball on target»

There is a gymnastic carpet at a distance of 10 m from the player. There is a hoop on the carpet. There is a medical ball (2 kg) in the hoop. The child must throw a volleyball and hit the target. The ball can throw with either hand or two hands. Only 10 throws.

1. If the ball hits the gym mat, it is 1 point;
  2. If the ball hits the hoop, it's 2 points;
  3. If the ball hits the distance between the hoop and the medical ball, it is 3 points;
  4. If the ball hits the medical ball, it is 4 points.
- It is necessary to score the maximum number of points after 10 throws [12].

#### *Statistical analysis*

The results of the study were entered into the Excel program. Using the Student's T-test, we determined the mean and standard deviation. The statistical significance level was set at  $p < 0.05$ .

## RESULTS AND DISCUSSION

There were no significant differences between the groups before the study ( $p > 0.05$ ). **Table 1** shows the test results at the beginning and at the end of the study, which determines the level of development of the ability to kinesthetically differentiate movement parameters.

**Table 1.** Results of the "Hitting the ball on target" test at the beginning and the end of the study

Indicators	Before	After	%	p
Control group (n=52)	5.0±1.5	6.3±1.1	26.0	$p > 0.05$
Experimental group (n=52)	5.3±1.2	9.2±1.5	73.6	$p < 0.05$

Children from the control group who studied according to the standard program were able to improve their performance by 26%. Despite the positive dynamics of the results, the reliability of the results was insignificant ( $p > 0.05$ ). This can be

explained by the effect of the impact on students of the standard physical education program and the possible natural increase in coordination abilities at the age of 8-9 years.

In the experimental group, children's indicators improved significantly ( $p < 0.05$ ). Children who additionally performed exercises on the gymnastic stick during physical education lessons were able to improve their indicators by 73%. Such results prove the effectiveness of the implementation of the gymnastic stick in the educational process of students aged 8-9 years.

A review of the literature on the problem of health, and rejuvenation of several diseases showed that a big problem is hidden in a sedentary lifestyle [1-4]. Part of the solution to this problem is to have a physical education lesson at school. It is a compulsory discipline along with other classes. In school lessons, each teacher uses a standard physical education program at school for students in grades 1-11. It is aimed at the comprehensive development of students (physical, mental, moral, volitional, and other indicators). The physical education program is designed in such a way that in each favorable period for the development of physical qualities of schoolchildren, the most appropriate methods of influence and a set of exercises are used [5]. This is important because children's physical qualities are formed at different periods of their lives. For example, the younger school age is a favorable period for the development of coordination abilities, and it is important to pay special attention to the development of the ability to kinesthetically differentiate the parameters of movements [6, 7].

The results of the study in the control group showed the effectiveness of using the standard physical education program in Russian schools. Children who were engaged in such a program were able to improve their performance, albeit not significantly.

At the beginning of the study, we assumed that if a set of coordination exercises on the gymnastic stick were added to the process of physical education at school in working with younger schoolchildren, then the indicators of the ability to kinesthetically differentiate movement parameters would significantly improve. This hypothesis was solved by the indicators of children from the experimental group at the end of the study.

It should be noted the uniqueness of the exercises on the gymnastic stick. Performing exercises on the gymnastic stick do not require a lot of space or expensive equipment, which solves several problems at once. Coordination physical exercises are not difficult to perform, they do not require special training, and a free but differentiated approach is used in the process of performing, despite the teacher's requirements to perform correctly and quickly, each child chooses a feasible pace for himself, this is important for the health, well-being, and development of the child [19-21]. Also not unimportant is the emotional aspect of students during physical education classes, meeting not only the motivational but also the motor needs of children in primary school age. In the process of performing exercises on the gymnastic stick, children at this age tend to overtake each other and perform the exercise faster, this is one of the most important components for the development of coordination abilities [8-11].

Some studies have proven the effectiveness of using a gymnastic stick in training sessions in various sports [13-15]. However, there are no studies that show the influence of a set of exercises on the gymnastic stick on such an important coordination indicator – the ability to kinesthetically differentiate movement parameters.

Thus, despite the effectiveness of the application of the standard physical education program at school at primary school age, we recommend that you additionally perform exercises on the gymnastic stick. Of course, the study is relevant and promising for further study. For example, how exercises on the gymnastic stick affect other coordination abilities or maybe develop other physical qualities.

## CONCLUSION

In the course of the study, the literature on the topic of health and development of primary school children was studied. The problem of a sedentary lifestyle is determined and the important role of a physical education lesson at school in solving this problem is established. As a result of the study, the effectiveness of using the gymnastic stick in physical education lessons at school with children aged 8-9 years has been proven. A set of physical exercises on the

gymnastic stick is recommended to be used in every physical education lesson at school as an addition to the standard school curriculum.

**ACKNOWLEDGMENTS:** The author thanks all participants of the study.

**CONFLICT OF INTEREST:** None

**FINANCIAL SUPPORT:** None

**ETHICS STATEMENT:** 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.

### REFERENCES

- Salman H, Koca TG, Dereci S, Akçam M. Comparison of Body Composition and Body Mass Index in the Determination of Obesity in Schoolchildren. *Turk Arch Pediatr.* 2022;57(5):506-10. doi:10.5152/TurkArchPediatr.2022.21320
- Hirschler V, Edit S, Miorin C, Guntsche Z, Maldonado N, Garcia C, et al. Association between High Birth Weight and Later Central Obesity in 9-Year-Old Schoolchildren. *Metab Syndr Relat Disord.* 2021;19(4):213-7. doi:10.1089/met.2020.0127
- Gerber M, Lang C, Beckmann J, du Randt R, Long KZ, Müller I, et al. Physical Activity, Sedentary Behaviour, Weight Status, and Body Composition among South African Primary Schoolchildren. *Int J Environ Res Public Health.* 2022;19(18):11836. doi:10.3390/ijerph191811836
- de Jesus GM, de Oliveira Araujo RH, Dias LA, Barros AKC, Dos Santos Araujo LDM, de Assis MAA. Attendance in physical education classes, sedentary behavior, and different forms of physical activity among schoolchildren: a cross-sectional study. *BMC Public Health.* 2022;22(1):1461. doi:10.3390/ijerph191811836
- Kainov AN, Kuryerova GI. Working Programs. Physical Culture. Grades 1–11. Comprehensive Program of Physical Education of School Children; Teacher: Moscow, Russia. 2019:169.
- Fuentes-Barría H, Aguilera-Eguía R, González-Wong C. Motor skills, physical qualities and sensitive periods in the development schoolchildren. *Andes Pediatr.* 2021;92(6):983-4. doi:10.32641/ANDESPEDIATR.V92I6.4101
- Drouven MG, Grossmann IE. Multi-period planning, design, and strategic models for long-term, quality-sensitive shale gas development. *AIChE J.* 2016;62(7):2296-323. doi:10.1002/aic.15174
- Lyakh VI, Levushkin SP, Gierczuk D, Mikhuta IY. Trends In Conditioning And Motor Development In Schoolchildren Over 120 Years (Review Article). *Human Sports Med.* 2022;22(1):129-41. doi:10.14529/hsm220118
- Moseichuk Y, Zoriy Y, Kostashchuk O, Kanivets T, Nakonechnyi I, Koshura A, et al. Age peculiarities of the development of coordination abilities in children of primary school age in the process of physical education. *J Phys Educ Sport.* 2020;20(2):630-4.
- Guskov MV, Starodubtseva IV, Manzheley IV. Development of coordination abilities of boys in the process of mini-football. *Teor Prakt Fiz Kult.* 2022;(6):23-5.
- Ivashchenko O. Research program: Modeling of motor abilities development and teaching of schoolchildren. *Teor Meto Fizic Viho.* 2020;20(1):32-41. doi:10.17309/tmfv.2020.1.05
- Polevoy GG. Development of kinesthetic differentiation of parameters of football player's movements using exercises classic's. *Rev Bras Futsal Futeb.* 2020;12(47):75-9.
- Pradana RA, Maulang I, Gondo AA, Gondo A. A. Effect of ladder drill training toward agility level among basketball players. *J Phys Conf Ser.* 2020;1529(3). doi:10.1088/1742-6596/1529/3/032038
- Padrón-Cabo A, Rey E, Kalén A, Costa PB. Effects of Training with an Agility Ladder on Sprint, Agility, and Dribbling Performance in Youth Soccer Players. *J Hum Kinet* 2020;73(1):219-28. doi:10.2478/hukin-2019-0146
- Roopchand-Martin S, Chong RA, Facey A, Singh P, Mansing A. A pilot randomized clinical trial comparing the effect of video game dance training with ladder drills on agility of elite volleyball players. *New Zealand J Physiother.* 2018;46(1):6-11. doi:10.15619/NZJP/46.1.01

16. Alzahrani MI, Alzahrani MI, Alsolami EA, Al Sulami AH, Abdulrahman A, Alhejaili MA, et al. Evaluative role of family physician in diagnosis and management of gout in primary health care centers: A simple literature review. *Arch Pharm Pract.* 2019;10(3):126-9.
17. Gallyamova ZV, Batyukova VE, Malakhova VY, Fomenko EV. Health care system in the USSR (through the example of the Kirov region). *J Adv Pharm Edu Res.* 2019;9(4):70-5.
18. Dehcheshmeh NF, Dashti R, Moradi-Joo E, Khiavi FF. Association between social capital and quality of health services from the perspective of hospital managers. *Entomol Appl Sci Lett.* 2020;7(1):14-9.
19. Sitovskiy A, Maksymchuk B, Kuzmenko V, Nosko Y, Korytko Z, Bahinska O, et al. Differentiated approach to physical education of adolescents with different speed of biological development. *J Phys Educ Sport.* 2019;19(3):1532-43. doi:10.7752/jpes.2019.03222
20. Ezechil L. Coordinates of a differentiated approach of physical education classes in compulsory school. *J Phys Educ Sport.* 2011;11(4):443-8.
21. Arseniev DG, Bondarchuk IL, Dyachenko GB, Krasnoshchekov VV. Adaptation of foreign students to university education using differentiated approach to physical education. *Teor Prakt Fiz Kult.* 2020;2020(5):39-41.