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Development of speed endurance and coordination abilities of schoolchildren with the help of exercise Classics

*Georgiy Polevoy**

Abstract

The aim of the study is to study the influence of the exercise «Classic's» in the lessons of physical culture in school on the performance of speed endurance and coordination abilities of children 8-9 years. Material – the Study was conducted during the school year in a regular school in Kirov, Russia. The study involved schoolchildren from the second grade in the amount of 50 people. The lesson on physical culture at school lasted for 40 minutes, during the week there were two lessons. Indicators of speed endurance were determined by the test «Jumping through rope», indicators of coordination abilities were determined by the test «Shuttle run». Mathematical processing of the results of the study was carried out using programs Excel-2016, Bio-Stat-2009, T-Student, reliability at $P<0.05$. Results – after nine months of pedagogical experiment the results improved in both groups. The children in the control group improved their performance in the «Jumping through rope» test by 13.1% ($P<0.05$), and the performance in the «Shuttle run» test improved from 10.1±0.9 seconds to 9.7±0.5 seconds ($P<0.05$). The schoolchildren from the EG had significantly improved in both tests. In the test «Jumping through rope», the result has improved by 40% ($P<0.05$), and in the test «Shuttle run» the result has improved from 10.5±0.8 to 8.5 h±0.5 h ($P<0.05$). The results of the study in the EG say about the effectiveness of the use of exercises «Classic's» in physical education lessons at school. Conclusion – if at each lesson on physical culture at school schoolchildren will perform the exercise «Classic's» the level of development of speed endurance and coordination abilities will increase significantly.

Keywords: physical culture, lesson, coordination abilities, speed endurance, schoolchildren.

* Department of Physical Education, Vyatka State University, Kirov, Russia. E-mail: g.g.polevoy@gmail.com. Orcid: https://orcid.org/0000-0002-3300-3908

Desarrollo de habilidades de resistencia a la velocidad y coordinación de escolares con la ayuda de ejercicios clásicos.

Resumen
El objetivo del estudio es estudiar la influencia del ejercicio "Clásico" en las lecciones de cultura física en la escuela, en el desempeño de las habilidades de resistencia y la coordinación de la velocidad de los niños de 8 a 9 años. Material: el estudio se realizó durante el año escolar en una escuela regular en Kirov, Rusia. En el estudio participaron estudiantes de segundo grado con un total de 50 personas. La lección sobre cultura física en la escuela duró 40 minutos, durante la semana hubo dos lecciones. Los indicadores de resistencia a la velocidad se determinaron mediante la prueba "Jump by rope", los indicadores de capacidad de coordinación se determinaron mediante la prueba "Shuttle run". El procesamiento matemático de los resultados del estudio se realizó con Excel-2016, Bio-Stat-2009, T-Student, confiabilidad en P <0.05. Resultados: después de nueve meses de experimento pedagógico, los resultados mejoraron en ambos grupos. Los niños en el grupo de control mejoraron en un 13.1% (P <0.05). El rendimiento de saltar a través de la cuerda y el rendimiento de la carrera de traslado mejoró de 10.1 ± 0.9 segundos a 9, 7 ± 0.5 segundos (P <0.05). Los estudiantes de GE mejoraron significativamente en ambas pruebas. En la prueba de "Saltar a través de la cuerda", el resultado mejoró en un 40% (P <0.05) y en la prueba de ejecución de "Shuttle run" el resultado mejoró de 10.5 ± 0.8 a 8.5 h ± 0.5 h (P <0,05). Los resultados del estudio en GE nos dicen sobre la efectividad del uso de ejercicios clásicos en las clases de educación física en la escuela. Se concluye que en cada clase de cultura física en la escuela, los estudiantes realizan el ejercicio clásico, el nivel de desarrollo de habilidades de resistencia y la coordinación de velocidad aumentará significativamente.
Palabras clave: Cultura física. Habilidades de coordinación. Resistencia a la velocidad. Escuela

Desenvolvimento de habilidades de resistência à velocidade e coordenação de crianças em idade escolar com a ajuda de exercícios clássicos

Resumo
O objetivo do estudo é estudar a influência do exercício "Classic's" nas lições da cultura física na escola, sobre o desempenho das habilidades de resistência e coordenação da velocidade de crianças de 8 a 9 anos. Material - o estudo foi realizado durante o ano letivo em uma escola regular em Kirov, Rússia. O estudo envolveu escolares da segunda série no total de 50 pessoas. A lição sobre cultura física na escola durou 40 minutos, durante a semana houve duas lições. Os indicadores de resistência à velocidade foram determinados pelo teste "Saltar por corda", os indicadores de capacidade de coordenação foram determinados pelo teste «Shuttle run». O processamento matemático dos resultados do estudo foi realizado utilizando os programas Excel-2016, Bio-Stat-2009, T-Student, confiabilidade em P <0,05. Resultados - após nove meses de experimento pedagógico, os resultados melhoraram nos dois grupos. As crianças do grupo controle melhoraram em 13,1% (P <0,05) o desempenho no teste de «Jumping through rope» e o desempenho no teste "Shuttle run" melhorou de 10,1 ± 0,9 segundos para 9,7 ± 0,5 segundos (P < 0,05). Os estudantes do GE melhoraram significativamente em ambos os testes. No teste «Jumping through rope», o resultado melhorou em 40% (P <0,05) e no teste «Shuttle run» o resultado melhorou de 10,5 ± 0,8 para 8,5 h ± 0,5 h (P <0,05). Os resultados do estudo no GE dizem sobre a eficácia do uso dos exercícios clássicos nas aulas de educação física na escola. Conclui-se que, em cada aula de cultura física na escola, os alunos realizarem o exercício clássicos, o nível de desenvolvimento das habilidades de resistência e coordenação da velocidade aumentará significativamente.
Palavras-chave: Cultura física. Habilidades de Coordenação. Resistência à velocidade. Escola.

Introduction

In terms of secondary school great importance is attached to the motor mode of schoolchildren. From its correct organization depends largely on the health and performance of schoolchildren. Insufficient motor activity can cause a number of serious changes in the body of the schoolchildren. The negative consequences of insufficient motor activity are accompanied by a decrease in the resistance of the young organism to colds and infectious diseases, the prerequisites for the formation of a weak, untrained heart are created. Lesson in physical culture at school is an organized form of classes at school (Castelli, 2007; Shuba, 2016; Donnelly et al., 2016; De Giorgio et al., 2018). From primary school age should develop most of the physical abilities of schoolchildren, such as flexibility, speed and others. A favorable period for the development of speed endurance and coordination abilities is the age from seven to eleven years. Purposefully develop physical abilities better in the sensitive period, as it is in them that the greatest effect of the growth of results and higher rates of growth of indicators of developing abilities is carried out (Starosta & Hirtz, 2002; Larisa, 2006).

Coordination abilities provide economical expenditure of energy resources of children, affect the amount of their use. Coordination capabilities lead to higher density and variability of the processes of control of movements, to increase motor experiences, increase human capabilities in managing their movements (Erceg et al., 2010; Shawkat, 2014; Fernandes et al., 2016; Jaakkola et al., 2017; Čillík & Willwéber, 2018). Speed endurance is the ability of a person to perform muscular work with maximum intensity for a long time. Speed endurance to ensure the effectiveness of competitive activity in sports, in industrial and domestic motor activity (Holodov & Khuznetsov, 2009).

Realization of development of all physical abilities is put in the standard program on physical culture at school (Lyakh & Zdanevich, 2010). However, to realize the potential of schoolchildren and increase motor activity in the classroom at school is not always possible. One of the problems is the lack of a comfortable sports hall and a place for the implementation of the lesson on physical culture, in this regard, the motor activity of schoolchildren is not high, as well as the motor density of the lesson. It is possible to solve this problem if to develop and introduce in system of physical education new physical exercise which does not demand special preparation, big expenses. Exercise that does not distract from the main goals of the lesson and physically develops schoolchildren.

The hypothesis of the study is the assumption that if in a secondary school with children 8-9 years at each lesson in physical culture at school to perform the exercise «Classic's», it will significantly improve the performance of speed endurance and coordination abilities, as well as schoolchildren will increase interest in physical education, improve motor density lesson in physical culture at school.

The aim of the study is to study the influence of the exercise «Classic's» in the lessons of physical culture in school on the performance of speed endurance and coordination abilities of children 8-9 years.

Materials And Methods

Participants:

50 schoolchildren from school №60, Kirov, Russia participated in the pedagogical experiment from September to May. Boys and girls from the second grade were healthy and had medical clearance from the doctor for practical lessons. Physical education classes were held twice a week for forty minutes each lesson.

Procedure:

25 schoolchildren from grade 2A formed a control group (CG), these children were engaged in the usual program of physical culture at school (Lyakh & Zdanevich, 2010).

25 schoolchildren from 2B class formed an experimental group (EG), these children were engaged in the usual program, but in addition to each physical education lesson performed exercise «Classic's». An example of the exercise «Classic's» is presented in the form of table 1.

Table 1. Exercise «Classic's»

9	8	3		8	5	6		7	9	3
4	6	2		9	2	3		5	2	6
6	1	7		1	4	7		8	4	1
Square 1				Square 2				Square 3		

The principle of the exercise «Classic's»:

Before the lesson on the floor of the gym teacher draws three large squares, inside each square he draws nine small squares with numbers in them. The task of the schoolchild in his spare time during the lesson to overcome all three large squares, jumping is allowed in any way and start with any free square from number one to number two and so on to number nine, then jump in reverse order to number one. In case of an error, can return to the previous square.

Control tests:

1) Assessment of the level of development of speed endurance was carried out using the test «Jumping through rope» (Hirtz, 1985; Lyakh & Zdanevich, 2010).

Starting position for jumps: stand upright, throw the rope behind his back, gaze direct in front of you, and slightly bend your arms at the elbows, hands to take on 15-20 cm from the thighs. While in the starting position, start to rotate the rope. The total number of jumps within one minute is calculated.

2) Assessment of the level of development of coordination abilities was carried out using the test «Shuttle run 3x10m» (Lyakh, 2006; Polevoy, 2019).

Statistical analysis:

Excel (2016) and Biostatistica (2009) were used for mathematical and statistical processing of the results. Parametric criterion T-Student, the result was considered reliable at P<0.05 (Oldham, 1993; Khusainova et al., 2016)

Results

Before the beginning of the pedagogical experiment, all schoolchildren passed control tests, the difference in the results between the schoolchildren of 2A and 2B class was not reliable. After the study, the indicators changed in EG and CG (table 2).

Table 2. Indicators of speed endurance and coordination abilities of schoolchildren 8-9 years

Test	CG				EG			
	Before	After	%	P	Before	After	%	P
Jumping through rope (number of jumps)	59.4±8.5	67.2±5.5	13.1	P<0.05	54.2±5.3	75.9±5.7	40.0	**P<0.05**
Shuttle run (sec)	10.1±0.9	9.7±0.5	3.9	P<0.05	10.5±0.8	8.5±0.5	19.1	**P<0.05**

From table 2 it is seen that the performance of children from CG have improved, but only slightly. In the Jumping through rope test, performance improved by 13.1% (P<0.05), and the Shuttle run test improved from 10.1±0.9 seconds to 9.7±0.5 seconds (P<0.05). Such results of schoolchildren from grade 2A can talk about the effectiveness of the standard program for physical education in school, as well as the impact of the sensitive period in the development of these abilities, which provides a natural increase in the studied indicators.

Indicators in EG improved significantly from the beginning to the end of the pedagogical experiment. In the test «Jumping through rope», the result has improved by 40% (P<0.05), and in the test «Shuttle run» the result has improved from 10.5±0.8 seconds to 8.5±0.5 seconds (P<0.05). The results of the study in the EG say about the effectiveness of the use of exercises «Classic's» in physical education lessons at school.

Discussion

Low motor activity of schoolchildren is associated with intensive educational work, with a large volume of homework, additional classes after school and so on. Time is not enough for a walk and participation in outdoor games with peers. Physical education lesson differs from the usual lessons of emotion, the ability to move. (Castelli, 2007; François & Roy, 2008; Gary et al., 2012; Donnelly et al., 2016; Shuba, 2016; De Giorgio et al., 2018). It is at the lessons of physical culture at school that a whole complex of methodological approaches, recommendations, principles, means and methods of influence is realized. The standard program of physical culture includes the formation of discipline of schoolchildren, the development of physical abilities, knowledge, skills in physical culture, learning new movements. Some authors propose to replace the standard program with new techniques that have proven effective, but only in some aspects. (Chiodera et al., 2008; Gregor & Janko, 2012; Maureen et al., 2013; Dallolio et al., 2016). The solution to the problem of increasing motor activity in physical education lessons at school can be by supplementing the standard program, not replacing it. The effectiveness of the use of the

standard program for high school schoolchildren is proved by this study, as children who did not perform additional tasks during the study were able to improve the performance of speed endurance and coordination abilities.

For coaches and teachers working in the field of physical education and sports, knowledge of sensitive periods is extremely important, as a certain amount of physical activity, only in the sensitive period provides the greatest training effect. This effect in other age periods is much more difficult to achieve. The age of 8-9 years is a favorable period for the development of speed endurance and coordination abilities of children (Starosta & Hirtz, 2002; Larisa, 2006; Charles et al., 2011). The results of the study confirm this fact, as the performance of all schoolchildren improved during the pedagogical experiment.

The effectiveness of the exercise «Classic's» in the classroom for physical education at school proved by the results of the study. Children who were engaged in the standard program of physical culture and additionally performed the exercise «Classic's» significantly improved the performance of speed endurance and coordination abilities. The peculiarity of the exercise «Classic's» is its simplicity. Its implementation does not require a lot of space, special equipment or training. It is enough to start moving in any square at any time during the lesson.

One of the operating levers of activation of educational and motor activity, school schoolchildren at a lesson of physical culture at primary school is a competitive and game method. This is a method that eliminates the compulsion to learn, where there is learning through play and competition. It causes joy in children, promotes movement in learning forward. It helps to solve the main problem of physical activity of schoolchildren of any age and sexual differences (Wood & Hall, 2015). The implementation of the competitive method is noted in physical education lessons when performing the exercise «Classic's», when schoolchildren try to perform the exercise at high speed, competing with each other. This increases the emotional picture of the lesson in physical culture.

An important aspect in working with children is the use of individual and differentiated approach. The disciple should feel only joy from the results of his work, receive a sense of inner satisfaction. Correctly calculated physical activity is an important condition for the education of children confidence in their abilities, the emergence of a positive psychological attitude necessary for success. (Burke et al., 2005; Whipp et al., 2014; Kozina et al., 2015; Milić et al., 2017; Ion et al., 2018). During the study, children independently selected for themselves the load when performing the exercise «Classic's», the height and duration of jumps. Also, the time spent on the exercise and the speed of its implementation, depending on their functional and psychological state.

Conclusion

The increase in physical activity of schoolchildren is possible if the standard program of physical culture in the school is supplemented with new elements, such as the exercise «Classic's». At the same time, if you perform the exercise «Classic's» at each lesson of physical culture in school, the performance of speed endurance and coordina-

tion abilities will improve significantly. At the same time, the motor mode of pupils, motor density of a lesson and motivational need for the subsequent lessons on physical culture, thanks to introduction of new exercise will increase. The research is relevant for the modern education system. The results of the pedagogical experiment are useful for teachers of physical culture and sports of secondary and sports schools.

References

Burke, Sh., Eys, M., Carron, A., Ntoumanis, N. (2005). *Group versus Individual Approach?* A Meta-Analysis of the Effectiveness of Interventions to promote physical activity. International Review of Sport and Exercise Psychology, 2(1).

Castelli, D., Hillman, C., Erwin, H. (2007). Physical fitness and academic achievement in third- and fifth--grade students. *Journal of sport & exercise psychology*, 29(2), 239-352. https://doi.org/10.1123/jsep.29.2.239

Charles, H. Z., Megan, R. G., Robert, B. M., Jana, M. K., Nathan, A. F. (2011). Sensitive Periods. *Monographs of the society for research in child development*, 76(4), 147–162. http://doi.org/10.1111/j.1540-5834.2011.00631.x

Chiodera, P., Volta, E., Gobbi, G., Milioli, M. A., Mirandola, P., Bonetti, A., Delsignore, R., Bernasconi, S., Anedda, A., Vitale, M. (2008). Specifically designed physical exercise programs improve children's motor abilities. *Scandinavian Journal of Medicine and Science in Sports*, (18)2, 179-187. https://doi.org/10.1111/j.1600-0838.2007.00682.x

Čillík, I., Willwéber, T. (2018). Influence of an exercise programme on level of coordination in children aged 6 to 7. *Journal of Human Sport and Exercise*, 13(2), 455-465. doi:10.14198/jhse.2018.132.14

Dallolio, L., Ceciliani, A., Sanna, T., Garulli, A. (2016). Proposal for an Enhanced Physical Education Program in the Primary School: Evaluation of Feasibility and Effectiveness in Improving Physical Skills and Fitness. *Journal of physical activity & health*, 13(10). DOI: 10.1123/jpah.2015-0694

De Giorgio, A., Kuvacic, G., Milic, M., Padulo, J. (2018). The Brain and Movement: How Physical Activity Affects the Brain. *Montenegrin journal of sports science and medicine*, 7(2), 63-68. DOI: 10.26773/mjssm.180910

Donnelly, J., Hillman, C., Castelli, D., Etnier, J., Lee, S., Tomporowski, P., Lambourne, K., Szabo-Reed, A. (2016). Physical Activity, Fitness, Cognitive Function, and Academic Achievement in Children: A Systematic Review. *Medicine and science in sports and exercise*, 48(6), 1197-1222. doi:10.1249/MSS.0000000000000901.

Erceg, M., Zagorac, N., Katić, R. (2010). *The impact of football training on motor development in male children*. Collegium antropologicum, 32(1), 241-247.

Fernandes, V. R., Ribeiro, M. L. S., Melo, T., Maciel-Pinheiro, P. d. T., Guimarães, T. T., Araújo, N. B., Ribeiro, S., Deslandes, A. S. (2016). Motor coordination correlates with academic achievement and cognitive function in children. *Frontiers in Psychology*, 7, 318. doi: 10.3389/fpsyg.2016.00318

François, T., Roy, J. Sh. (2008). *School physical activity, school sports and academic performance*. The international journal of behavioral nutrition and physical activity, 5(10). https://doi.org/10.1186/1479-5868-5-10

Gary, S. G., Alysha, H., Kimberly, G., Kristi, B. A. (2012). *Physical Activity Promotion in the Preschool Years*: A Critical Period to Intervene. Environmental Research and Public Health, 9(4), 1326–1342. http://doi.org/10.3390/ijerph9041326

Gregor, S., Janko, S. (2012). Influence of the quality implementation of a physical education curriculum on the physical development and physical fitness of children. *Journal BMC public health*, 12(61). https://doi.org/10.1186/1471-2458-12-61

Hirtz, P. (1985) *Koordinative Fahigkeiten Im Schulsport*, Berlin: Volk und Wissen, Volkseigener.

Holodov, Zh. K., Khuznetsov, V. S. (2009). *Theory and methodics of physical training and sport*s. Moscow: Akademia, 480 p.

Ion, C., Serghei, S., Constantin, C. (2018). Differentiated physical training within the framework of a yearly training cycle of young footballers specialized on the position of goalkeeper. *Journal of Physical Education and Sport*, 18(1), 270-275.

Jaakkola, J., Watt, A., Kalaja, S. (2017). *Differences in the Motor Coordination Abilities Among Adolescent Gymnasts, Swimmers, and Ice Hockey Players. Human Movement*, 18(1), 44-49. DOI: https://doi.org/10.1515/humo-2017-0006

Khusainova, R. M., Shilova, Z. V., Curteva, O. V. (2016). *Selection of appropriate statistical methods for research results processing. Mathematics Education*, 11(1), 303-315. doi: 10.12973/iser.2016.21030a

Kozina, Zh. L., Prusik, Kr., Prusik, Kat. (2015). *The concept of individual approach in sport*. Pedagogics psychology; 3, 28-37. http://dx.doi.org/10.15561/18189172.2015.0305

Larisa, S. (2006). *Extremely Early High Abilities, Sensitive Periods, and the Development of Giftedness: a conceptual proposition*. High Ability Studies, 8(2), 247-258. https://doi.org/10.1080/1359813970080209

Lyakh, V. I. (2006). *Coordination abilities: diagnostics and development*. - Moscow: TVT Division, 290 p.

Lyakh, V. I, Zdanevich, A. A. (2010). *Work program on physical culture*, grade 1-4. Moscow: Education, 80 p.

Maureen, D., Heather, H., Kara, D., Rebecca, L. L. (2013). School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18. *Journal Cochrane Systematic Revie*w, 1-10. DOI:10.1002/14651858.CD007651.pub2

Milić, M., Grgantov, Z., Chamari, K., Ardigò, L. P., Bianco, A., Padulo, J. (2017). Anthropometric and physical characteristics allow differentiation of young female volleyball players according to playing position and level of expertise. *Biology of Sport*, 34(1), 19-26. https://doi.org/10.5114/biolsport.2017.63382

Oldham, J. (1993). *Statistical tests* (Part 2): parametric tests. Nursing standard, 44, 28-30. https://doi.org/10.7748/ns.7.44.28.s54

Polevoy, G. G. (2019). The influence of coordination abilities on the development of the volume of dynamic attention in children with different types of nervous system. *International Journal of Applied Exercise Physiology*, 8(1), 92–97.

Shawkat, R. (2014). The impact of development of the special coordination abilities on the general skill ability for table tennis juniors under 12 years old. *International journal of science culture and sport*, 2(2), 30-42. https://doi.org/10.14486/ijscs71

Shuba, L. V. (2016). Modern approach to implementation of health related technology for primary school children. *Pedagogics, psychology, medical-biological problems of physical training and sports,* 20(2), 66-71. https://doi.org/10.15561/18189172.2016.0210

Starosta W., Hirtz P. (2002). Sensitive and critical periods of motor coordination development and its relation to motor learning. *Journal of human kinetics*, 7, 19-28.

Whipp, P., Taggart, A., Jackson, B. (2014). Differentiation in outcome-focused physical education: pedagogical rhetoric and reality. *Journal Physical Education and Sport Pedagogy*, 19(4), 370-382. https://doi.org/10.1080/17408989.2012.754001

Wood, C., Hall, K. (2015). Physical education or playtime: Which is more effective at promoting physical activity in primary school children? *BMC Research Notes*, 8(1), 12. https://doi.org/10.1186/s13104-015-0979-1

Sobre o autor

Georgiy Polevoy

In 2006 entered the full-time form of training at the Vyatka State Humanitarian University, Kirov. Graduated with honors from the Faculty of Physical Education. Got on the list of the best graduates of VyatGGU in 2011. Since 2011, the teacher at the department of sports disciplines and methods of training, and the coach of the national football team VyatGGU. From 2011 to 2015, the coach and teacher of football in MOAU DOD Children's and Youth Sports School number 5 with children born in 2001. In 2015, was awarded the degree of Candidate of Pedagogical Sciences, specialty 13.00.04. Author of more than 30 scientific publications and manuals. Since September 1, 2015, an associate professor of the Department of Physical Education VyatGGU. And coach of the VyatGGU national football team.