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The Effectiveness of Developing Motor Skills in Older Preschool Children Within a Preschool Educational Setting

This paper presents the results of a study on the effectiveness of a comprehensive physical education programme implemented in a preschool setting. The relevance of this topic stems from the need to improve approaches to the physical education of preschool children, a stage at which the foundations of physical fitness are established and basic motor abilities begin to develop.

During the pedagogical experiment, participants were divided into an experimental group (EG) and a control group (CG). Both groups attended physical education sessions three times per week, with each session lasting 25 minutes. The control group followed the Standard Curriculum for Preschool Education and Training of the Republic of Kazakhstan, whereas the experimental group followed a specially developed comprehensive programme that included targeted play-based exercises aimed at developing key physical qualities, namely speed, strength, endurance, flexibility, and coordination.

At the beginning and end of the intervention, the physical fitness levels of children in both groups were assessed using 10 standardized tests covering the main indicators of preschoolers' physical development. The dynamics of the results obtained in both groups are presented and analysed. Comparative analysis revealed significantly greater improvements in physical fitness indicators among children in the experimental group than among those in the control group. The most pronounced improvements in the EG were observed in tests of flexibility and general coordination.

The findings confirmed the effectiveness of the proposed comprehensive programme and support its implementation in preschool physical education practice.

Keywords: pre-school children, physical education, health, physical development, physical culture, pre-school institutions.

Introduction

As an analysis of practical experience and the literature shows, one of the challenges facing physical education in pre-school educational institutions is the low effectiveness of the teaching process in developing the motor skills of pre-school children [1].

The relevance of this work stems from the lack of information on new approaches to the use of active games as a means of developing motor skills in older pre-school children within the real-world context of pre-school educational institutions [2].

Modern living conditions are characterised by an increase in physical inactivity among pre-school children, which leads to a decline in children's physical fitness.

Recent studies indicate that physical activity improves inhibitory control, working memory and cognitive flexibility by enhancing blood flow to the brain and activating neural connections [3]. In a study by Veraksa et al., conducted on a sample of 261 children aged 5-6 years, it was found that inhibitory control and working memory are positively associated with the level of physical fitness in preschoolers [4]. A number of

studies confirm that physical activity combined with cognitive tasks can have an immediate positive effect on working memory and inhibitory control in pre-school children [5, 6]. At the same time, despite the obvious importance of physical activity for the cognitive and physical development of pre-school children, the question of how to select scientifically sound methods and techniques to ensure the targeted development of children's physical abilities remains unresolved in physical education practice. Active play, being the primary form of activity in the pre-school years, represents the most natural and accessible form of physical activity; however, its educational potential is only fully realised if games are selected in a targeted manner in accordance with the specific objectives of physical education [7]. The unstructured and pedagogically unjustified use of active games, without taking into account their motor content and the degree of exertion on particular physical qualities, significantly reduces the effectiveness of the educational process. In this regard, the development of programmes integrating specially selected active games for the development of speed, strength, endurance, flexibility and coordination of movements takes on particular relevance and practical significance for the pre-school education system.

Thus, the problem outlined above determines the relevance of the research and requires a scientific justification of ways to address it within the system of physical education for pre-school children, as well as the resolution of the following contradictions:

- between the importance of physical activity for the normal physical development of pre-school children and the current state of modern approaches to the use of physical education resources and methods within the pre-school education setting;

- between the current state of children's physical development and health, the level of development of motor abilities, and the effectiveness of the use of physical education resources and methods in the context of pre-school education. The contradictions highlighted above enabled the formulation of a research problem, within the framework of which the research topic was developed.

Methods and Materials

Research focus: the process of physical education for older pre-school children within a pre-school educational setting.

Research topic: the motor skills of older pre-school children.

Research objective: to experimentally test the effectiveness of a comprehensive programme, developed using a play-based approach, for the development of motor skills in older pre-school children within a pre-school educational setting.

Materials and methods. The study involved 53 children (boys and girls) of senior pre-school age (5-6 years) from the "Akzharkyn" nursery school in Karaganda. Prior to the start of the educational experiment, written informed consent was obtained from the parents (legal guardians) of all participating children for their children's participation in the study. Parents were informed of the aims, objectives and content of the experiment. The authors guarantee that the personal data of the study participants will not be disclosed to third parties, made publicly available or published on other resources in an identifiable form. All information obtained is used exclusively for scientific purposes and is processed in a generalised, anonymous format.

The control group (CG) consisted of 24 pre-school children who attended physical education classes conducted in accordance with the Standard Curriculum for Pre-school Education and Training of the Republic of Kazakhstan. The experimental group (EG) comprised 29 preschool children who participated in physical education classes based on a comprehensive programme developed by the authors to enhance motor skills. At the start of the experiment, there were no significant differences between the experimental group and the control group in terms of motor fitness. To address the set objectives, a comprehensive programme was tested in the experimental group over the course of one academic year; its content included gymnastic exercises, relay games, as well as active games of low, medium and high intensity. In the structure of the sessions, the primary focus was on active games and relay games, which accounted for 95 % of teaching time; the remaining 5 % was devoted to gymnastic exercises, including children's stretching, yoga for children, fitball gymnastics, pilates and breathing exercises.

Physical education lessons in the EG and CG groups were held three times a week, with each session lasting 25 minutes. The programme was designed to take into account the age-related and individual characteristics of children in the older pre-school age group and comprised three interrelated modules. The first block focused on developing speed-strength qualities and agility through specially selected active games and relays. The second block aimed to develop coordination and flexibility through playful exercises incorporat-

ing elements of rhythmic gymnastics and stretching. The third block focused on developing general endurance using games involving continuous movement and moderate intensity.

The structure of each session comprised three parts: an introductory and preparatory phase (5 minutes), a main phase (15 minutes) and a concluding phase (5 minutes). The main part was dominated by the play-based method, ensuring high levels of physical activity and the children's emotional engagement in the educational process. During the same period, the control group followed the Standard Programme for Preschool Education and Training of the Republic of Kazakhstan without the use of additional play-based resources or methods.

The following motor skills were assessed using 10 tests: [8]

1. Speed abilities ("30-metre sprint", "10-second on-the-spot run")
2. Speed-strength abilities ("Standing long jump", "Medicine ball throw")
3. Strength abilities ("Push-ups", "Trunk raises")
4. Flexibility ("Forward bend", "Sideways leg spreads")
5. Endurance ("2-minute run-walk")
6. General motor skills: ("3 x 10 m shuttle run")

The data obtained in the experiment were compared with the standard requirements for assessing the general motor skills of 5-6-year-old preschoolers according to T.A. Tarasova [9].

Results and Discussion

The educational assessment carried out during the baseline phase of the experiment revealed no significant differences in the baseline data of the two groups (the experimental group and the control group), as indicated by the group results and the level-based assessment of physical development and motor skills, suggesting that the two groups were comparable. Following the formative experiment, after 9 months of sessions under our proposed programme, a final assessment of the motor skills of the preschoolers in both groups (CG, EG) was conducted.

In the control group, analysis of the test results at the end of the experiment revealed an improvement in the boys' results in the "10-second on-the-spot run" test — 21.9 %, "push-ups" — 44.4 %, "Trunk lift" — 43.8 %, "Forward bend" — 77.1 %, and "Sideways leg spread" — 141.2 %. A low increase was observed in the "30-metre run" test — 6.5 %, "Standing long jump" — 7.6 %, "Medicine ball throw" — 5.9 %, "2-minute run-walk" — 5.2 %, and coordination skills — 5.4 %. The assessment of overall motor fitness based on the sum of the tests remained unchanged and stayed low, despite the absolute improvement in individual group-average indicators.

An analysis of the trends in the percentage of boys in the control group across indicators of general motor ability revealed the following pattern at the end of the observation period. In the "30 m sprint" and "10-second on-the-spot run" tests, boys in the control group showed no high scores across the two assessment periods, whilst the average scores increased by 9.1 %. In the speed-strength test "Standing Long Jump", there were no high scores among the boys in the control group across the two assessment periods, whilst the average scores increased by 45.5 %. In the "Medicine Ball Throw" test, no high scores were recorded, and the percentage of average scores increased by 36.4 %. In the strength test "Push-ups", the proportion of high-level results among boys in the control group rose by 45.5 %, whilst the proportion of average results rose by 36.4 %. In the "Trunk Lift" test, the high-level results rose by 18.2 %, and the average level by 45.4 %. In the coordination test "3×10 m Shuttle Run", the percentage increase for boys in the control group was 5.2 %, which did not change the level of performance (average level).

In the final testing of the control group of girls, changes were evident in the improvement of results in the following tests: "10-second on-the-spot run" — 17.1 %, "Push-ups" — 39.2 %, "Trunk lift" — 50.8 %, "Side leg splits" — 62.3 %. A low increase was observed in the "30 m run" — 4.2 %, "Standing long jump" — 9.8 %, "Medicine ball throw" — 10.2 %, "2-minute run" — 4.6 %, and "3 x 10 m shuttle run" — 5.2 %. The assessment of overall motor fitness based on the sum of the tests did not change and remained at a low level, despite the absolute improvement in individual group indicators.

The trend in the percentage of girls in the control group across indicators of general motor skills was as follows at the end of the observation period. In the "30-metre run" and "10-second on-the-spot run" tests, there were no high scores among the girls in the control group across the two assessment rounds, whilst the average scores increased by 30.8 % and 7.7 % respectively. In the "Standing Long Jump" test, the girls in the control group had no high scores across the two assessment periods, whilst the average scores increased by 46.2 %. In the "Medicine Ball Throw" test, no high scores were recorded, and the percentage of average

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scores increased by 23.1 %. In the "Push-ups" test, there were no high scores among the girls in the control group, whilst the average scores increased by 76.9 %. In the "Trunk Lift" test, high scores increased by 7.7 %, and average scores by 53.8 %. In the "3×10 m Shuttle Run" coordination test, the girls in the control group showed a 5.2 % improvement in results, with scores corresponding to the average level in both assessments. Consequently, the overall assessment of general motor abilities at the end of the experiment in the control group of boys and girls did not change and remained at a low level despite the improvement in individual indicators.

An analysis of the dynamics of motor ability indicators among preschoolers in the experimental group (boys, girls) in the final testing yielded the following data. Among boys in the EG, the result in the "30 m run" test showed an increase of 11.7 %, and in the "10-second on-the-spot run" test — 37.7 %, with the assessment for both tests rising from a low to a medium level.

The assessment of speed-strength abilities (the "Standing Long Jump" and the "Medicine Ball Throw") showed an improvement of 17.8 % in the "Standing Long Jump" test, which corresponded to an increase in the rating from a low to a medium level. In the "Medicine Ball Throw" test, a 5.9 % improvement in results did not change the group rating, which remained at a low level. In strength abilities ("Push-ups" and "Trunk Lift"), the improvement in the "Push-ups" test was 102.0 %, and 55.6 % in the "Trunk Lift" test, which corresponded to an increase in the EG boys' scores in both tests from a low to a medium level. In flexibility ("Forward Bend" and "Side Stretch"), the increase in the "Forward Bend" test was 222.7 %, which corresponded to an improvement in the boys' scores from a low to a high level. In the "Side-step" test, the increase for the boys was 134.8 %, with the score rising from a low to a medium level. In endurance (the "2-minute run-walk" test), the group result for the boys in the experimental group increased by 17.1 %, and in the "3×10 m shuttle run" test by 8.4 %, with the rating rising from low to medium in both tests. Based on the total scores for general motor skills tests, 25.9 % of boys in the experimental group received high ratings, and 50.6 % received average ratings. The overall rating for general motor skills, based on the total test scores, improved from a low to a moderate level among boys in the experimental group by the end of the experiment.

In the final testing, the girls in the experimental group showed an improvement in their results in the "30-metre sprint" test (8.6 %) and the "10-second on-the-spot run" test (22.3 %), which corresponded to an increase in their performance level from low to average. In speed-strength abilities ("Standing Long Jump" and "Medicine Ball Throw"), the improvement in the first test was 19.7 %, which corresponded to a shift in the girls' assessment from a low to a medium level. In the "Medicine Ball Throw" test, the 9.1 % increase in results did not change the rating across the two assessment periods (low level). In the strength-related tests ("Push-ups" and "Trunk Lift"), performance improved by 107.8% in the first test and by 52.1% in the second, resulting in an increase from a low to a medium performance level in both tests.

In flexibility ("Forward Bend" and "Side Stretch"), the "Forward Bend" test showed an increase of 132.4 %, which resulted in the girls' group rating rising from low to high level. In the "Side-to-side leg spread" test, with a 191.3 % increase in results, the rating rose from low to medium. In endurance (the "2-minute run-walk" test), the group result improved by 29.3 %, and in the "3×10m shuttle run" test by 8.4 %, which raised the group rating from low to medium level in both tests. The overall assessment of the general motor fitness of the girls in the experimental group rose from a low to a moderate level.

A comparison of the trends in the assessment of general motor abilities among girls in the experimental group, expressed as a percentage, revealed the following changes. In the experimental group, no girls achieved high scores in the "30-metre run" test; 95.0 % of girls achieved average scores, and 5.0 % achieved low scores. In the "10-second on-the-spot run" test, 40.0 % of girls achieved high results, 50.0 % received average results, and 10.0 % received low results. In the "Standing Long Jump" test, 5.0 % of girls in the control group achieved high scores, whilst 95.0 % achieved average scores. In the "Medicine Ball Throw" test, 40.0 % of girls achieved average results, and 60.0 % achieved low results. In the strength test "Push-ups", 45.0 % of girls in the control group achieved high scores, and 55.0 % achieved average scores. In the "Trunk Lift" test, 35.0 % of girls achieved high scores, 55.0 % of girls in the control group achieved average scores, and 10.0 % achieved low scores.

In the "Forward Bend" flexibility test, 90.0 % of girls in the EG received high marks, whilst 10.0 % received average marks. In the "Sideways Leg Spread" test, 15.0 % of girls received high marks, whilst 85.0 % of girls in the EG received average marks. In the "2-minute run-walk" endurance test, 100 % of the girls in the experimental group achieved average results. Based on the combined results of the general motor skills

tests, 25.5 % of the girls in the experimental group received high scores, whilst 65.0 % received average scores.

To assess the effectiveness of the experimental programme for developing motor skills in older preschool children, an analysis was conducted of the changes in the measured indicators between the two groups (the experimental group and the control group). A comparison of group indicators and the level assessment of motor skills in boys from the EG and CG at the end of the experiment revealed a greater increase in the EG, where the maximum percentage difference was observed in the "Forward Bend" test (64.8 %), and the minimum difference in the 30-metre run test (4.8 %). The overall assessment of the studied indicators of general motor abilities at the end of the experiment for boys in the experimental group corresponded to the average level (1st assessment—low level), whilst for boys in the control group, as in the initial assessment, it corresponded to a low level (Fig. 1).

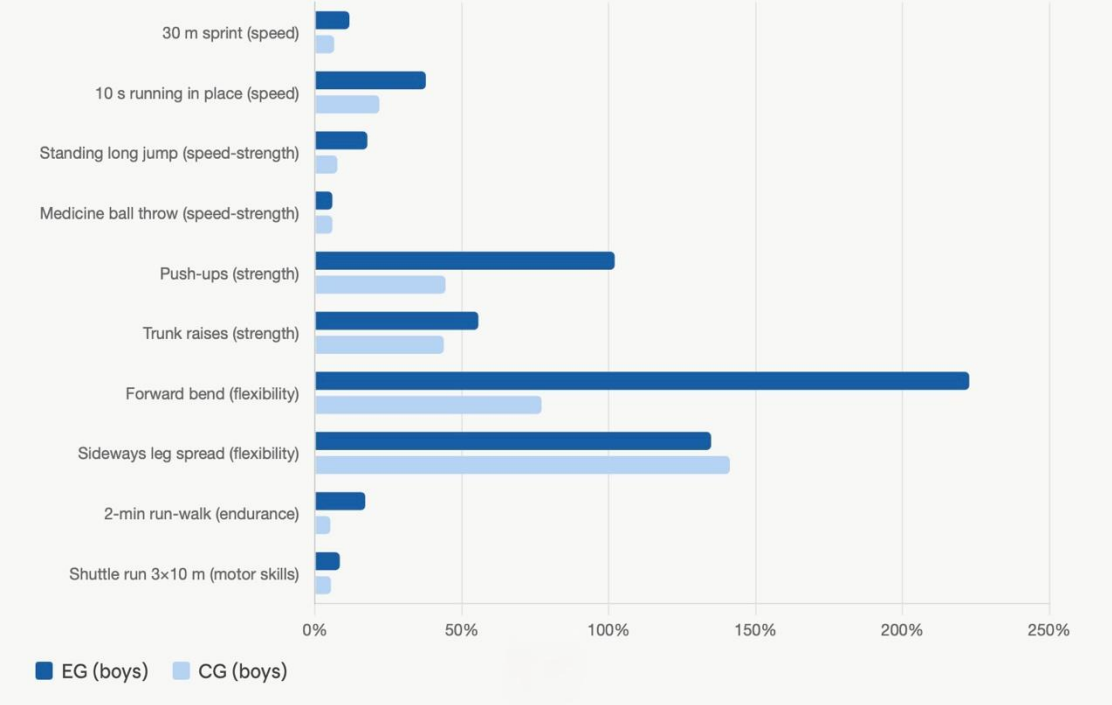

Figure 1. Percentage difference in motor ability scores between boys in the experimental group and the control group at the end of the experiment

By the end of the experiment, the girls' overall motor ability scores in the experimental group corresponded, based on the total test scores, to the average level (1st assessment—low level), whilst those in the control group corresponded to the low level. The greatest percentage difference in general motor skills was observed in the "Forward Bend" test (59.5 %), whilst the smallest difference was in the "Softball Throw" test (3.4 %) (Fig. 2).

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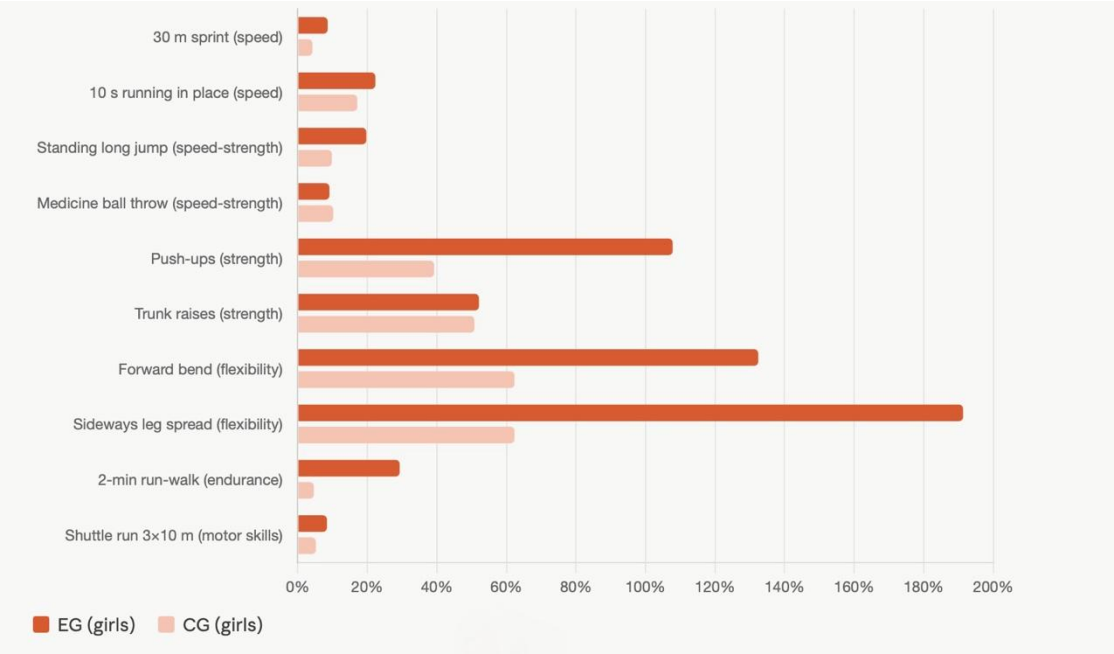

Figure 2. Percentage difference in motor ability scores between girls in the experimental group and the control group at the end of the experiment

An analysis of the percentage distribution of general motor skills within the groups (CG, EG) showed that, based on the total test scores, 25.8 % of boys in the EG received high marks in the final assessment, 50.6 % received average marks, and 23.5 % of boys received low scores; whereas in the control group, 7.1 % of boys received high scores, 40.4 % received average scores, and 52.5 % received low scores. In the final assessment based on the total test scores for general motor skills, 25.6 % of girls in the experimental group received high marks, 65.0 % received average marks, and 9.4 % received low marks, whilst in the control group there were no high marks; 44.5 % received average marks and 55.5 % received low marks.

Conclusions

The results of the final assessment showed that, compared to the control group, a higher percentage of preschoolers in the experimental group demonstrated a high level of physical fitness and a higher overall score for the motor skills indicators studied; this serves as evidence of the effectiveness of the comprehensive programme we have developed and allows us to recommend its use in practice.

Practical recommendations:

1. Focus attention on the role of preschool teachers, as the research results showed that it is systematic work in the nursery that determines children's level of physical fitness. It is recommended to: regularly conduct a variety of physical education sessions, including games, musical-rhythmic and coordination exercises; to adopt an individualised approach when selecting physical activities, taking into account the child's age, gender and level of physical development; to introduce modern health-promoting technologies and elements of children's fitness (yoga for children, breathing exercises, playful aerobics, children's stretching, fitball exercises, pilates for children).

2. As part of the study, a questionnaire survey was conducted among the parents of the children, the results of which revealed that their attitudes towards sport and physical activity were either high or moderate. However, despite the parents' positive attitude towards physical education, their practical influence on the children's level of physical fitness proved to be insufficient. In this regard, it appears necessary to strengthen cooperation between families and the pre-school organisation in this area. In particular, it is recommended to organise joint sporting events (family relays, hikes, walks); to hold educational sessions and parents' meetings explaining the role of daily physical activity, daily routines, hardening and nutrition; create information leaflets and videos featuring simple home exercises that parents can do with their children; foster in parents a clear understanding that setting a personal example of physical activity (daily walks, morning exercises, participation in sporting events) has a significant impact.

3. Create conditions for children's independent physical activity: equip physical activity corners in groups (balls, skipping ropes, gymnastic sticks, etc.); expand opportunities for outdoor walks with active games; include elements of self-monitoring and encouragement (achievement charts, badges, "health passports").

4. Introduce a system for monitoring physical fitness: conduct regular assessments of motor skills (at least twice a year) and record progress; use the assessment results to draw up individual recommendations for teachers and parents; analyse the link between family involvement and indicators of physical development in order to adjust the programmes of pre-school organisations.

5. Improve the educational programmes of pre-school institutions: supplement physical education programmes with sections aimed at fostering children's interest in sport and physical culture; integrate physical activity into other types of activities (music lessons, drama, creative activities); organise interdisciplinary health weeks, competitions and campaigns that promote the value of a healthy lifestyle.

References

1 Miklyaeva, N.V. (Ed.). (2015). *Fizicheskoe razvitie doshkolnikov. Chast 2. Formirovanie dvigatelnogo opyta i fizicheskikh kachestv* [Physical development of preschoolers. Part 2. Formation of motor experience and physical qualities]. Moscow: TC Sfera [in Russian].

2 Shkurpit, M.N. & Tkachenko, N.V. (2016). Teoriia i metodika fizicheskogo vospitaniia detei doshkolnogo vozrasta [Theory and methodology of physical education of pre-school children]. *Problemy i perspektivy razvitiia obrazovaniia v Rossii — Problems and Prospects of Education development in Russia*, 108 [in Russian].

3 Northey, J.M., Raine, L.B., & Hillman, C.H. (2025). Physical Activity and Its Effects on Executive Functions and Brain Outcomes in Children: A Narrative Review. *PMC, 15*(11), 1238.

4 Veraksa, A., Tvardovskaya, A., Gavrilova, M., Yakupova, V., & Musálek M. (2021). Associations Between Executive Functions and Physical Fitness in Preschool Children. *Frontiers in Psychology, 12*, 674746. DOI: 10.3389/fpsyg.2021.674746

5 Jia, T., Kolovelonis, A., Vazou, S., & Mavilidi M.F. (2024). Effects of Cognitively Engaging Physical Activity Interventions on Executive Function in Children and Adolescents. *Frontiers in Psychology, 15*, 1454447. DOI: 10.3389/fpsyg.2024.1454447

6 Gao, Z., Zhang, P., & Huang, C. (2025). The Effects of Acute Cognitively Engaging Physical Activity on Executive Function in Preschool Children. *Behavioral Sciences, 15*(12), 1712.

7 Bai, J., Huang H., & Ouyang, H. (2022). Effects of a group-based moderate- to vigorous-intensity physical activity intervention on executive function and motor skills in 4- to 5-year-old preschoolers. *Frontiers in Psychology, 13*, Art. 847785. DOI: 10.3389/fpsyg.2022.847785

8 Lyakh, V.I. (2006). *Koordinatsionnye sposobnosti: diagnostika i razvitie* [Coordination abilities: diagnostics and development]. Moscow: TVT Divizion [in Russian].

9 Tarasova, T.A. (2006). *Kontrol fizicheskogo sostoianiia detei doshkolnogo vozrasta: Metodicheskie rekomendatsii dlia rukovoditelei i pedagogov DOU* [Monitoring the physical condition of preschool children: Methodological recommendations for heads and teachers of preschool educational institutions]. Moscow: TC Sfera [in Russian].

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Organisational and Pedagogical Conditions for Improving the Quality of Physical Education Lessons in Secondary Schools

The article examines the organisational and pedagogical factors that contribute to improving the quality of physical education lessons in secondary schools. The study aimed to identify and analyse the conditions that enhance the effectiveness of physical education lessons. The research was conducted during the 2019-2020 and 2020-2021 academic years at Secondary School No. 61 in Karaganda, Kazakhstan, and involved students in Grades 9–11, physical education teachers, parents, and school administrators. Research methods included analysis of scientific and methodological literature, questionnaires, interviews, pedagogical observation, and analysis of students' written reflections. The findings indicate that the quality of physical education lessons depends on a combination of organisational, content-related, and methodological factors that shape students' attitudes towards the subject and their participation in physical and sport activities. The results also show that the integration of modern educational technologies, interactive teaching methods, and diverse forms of motor activity is viewed by educational stakeholders as a promising approach to improving school physical education. The findings may be used to develop programmes and organisational measures aimed at enhancing the quality of physical education lessons in secondary schools.

Keywords: physical education, lesson quality, secondary school, organisational and pedagogical conditions, modern educational technologies, interactive teaching methods, motor activity.

Introduction

Physical education is an essential component of general education, as it contributes to strengthening students' health, developing their motor abilities, and fostering a value-based attitude towards a healthy lifestyle. In the context of the ongoing modernisation of the education system in the Republic of Kazakhstan, improving the quality of school physical education has become increasingly important. Modern physical education is expected not only to ensure an adequate level of physical fitness but also to promote students' interest in physical activity, strengthen their motivation for regular exercise, and develop a conscious attitude towards health preservation [1–3].

Contemporary requirements for organising the educational process involve updating the content of school education, introducing innovative pedagogical technologies, and creating conditions for students' active participation in learning activities. However, educational practice demonstrates that physical education lessons do not always fully meet students' interests and educational needs. A considerable number of students perceive physical education merely as a compulsory school subject rather than as an opportunity for personal development, health improvement, and meaningful leisure activities [4–6].

Recent studies indicate that the quality of physical education lessons depends on a number of interrelated factors. Among the most significant are the content of the curriculum, the variety of teaching methods and instructional tools employed, the professional competence of teachers, and the extent to which students' individual interests and needs are taken into account [4, 7–11]. Consequently, increasing attention has been paid to the use of modern educational technologies, interactive teaching methods, digital educational resources, and various forms of organising motor activity [7, 9–11].

At the same time, the organisational and pedagogical conditions that ensure improvements in the quality of physical education lessons through the use of modern educational technologies and updated lesson content remain insufficiently explored. In particular, the possibilities of integrating interactive teaching methods, digital resources, and the variable component of the curriculum, as well as their influence on students' attitudes towards physical education and their involvement in physical and sports activities, require further investigation [4, 9, 11].

Thus, an analysis of scientific literature and the practice of school physical education revealed a contradiction between the need to improve the quality of physical education lessons under the conditions of educational modernisation and the insufficient development of organisational and pedagogical conditions that would make it possible to achieve this objective through modern educational technologies. This contradiction determined the choice of the present research topic.

The study aimed to identify and analyse the organisational and pedagogical conditions that contribute to improving the quality of physical education lessons in secondary schools.

The object of the study was the process of improving the quality of physical education lessons in secondary schools.

The subject of the study comprised organisational and pedagogical conditions and modern educational technologies aimed at improving the quality of physical education lessons and fostering students' positive attitudes towards the subject.

In the present study, the quality of physical education lessons was considered as a complex characteristic that includes students' attitudes towards the subject, their involvement in physical and sports activities, satisfaction with lesson content, as well as the evaluation of lessons by other participants in the educational process.

The research hypothesis was based on the assumption that the creation of organisational and pedagogical conditions involving the use of modern educational technologies, interactive teaching methods, and the expansion of the variable component of the curriculum may positively influence the quality of physical education lessons and students' attitudes towards the subject.

The following research objectives were formulated:

1. To analyse scientific and methodological literature on the problem of improving the quality of physical education lessons.
2. To investigate the attitudes of students, teachers, parents, and school administrators towards physical education lessons.
3. To assess the role of modern educational technologies and variable lesson content in improving the quality of physical education lessons.
4. To identify and substantiate organisational and pedagogical conditions for improving the quality of physical education lessons in secondary schools.

Methods and Materials

The study was conducted during the 2019-2020 and 2020-2021 academic years at Secondary School No. 61 in Karaganda, Republic of Kazakhstan. The participants included students in Grades 9–11, physical education teachers, parents, and school administrators. The main participants of the study were school students, whereas teachers, parents, and administrators acted as experts whose opinions made it possible to analyse the influence of the implemented organisational and pedagogical measures on attitudes towards physical education lessons and to assess the prospects for their application in the educational process.

The research was carried out in three stages. At the first, diagnostic stage, the initial state of the problem was examined. Students' attitudes towards physical education lessons were analysed, factors affecting lesson quality were identified, and students' interests and educational needs were determined. In addition, the opinions of teachers, parents, and school administrators regarding the organisation of physical education were investigated.

At the second stage, organisational and pedagogical conditions aimed at improving the quality of physical education lessons were identified and implemented. The educational process incorporated modern educational technologies, interactive teaching methods, sports-related video materials, digital educational resources, independent learning tasks, and various forms of motor activity. Particular attention was paid to expanding the variable component of the curriculum and creating conditions that encouraged students to participate actively in different forms of physical and sports activities.

At the final stage of the study, the outcomes of implementing the organisational and pedagogical conditions were analysed. Particular attention was given to changes in students' attitudes towards physical education lessons, their level of involvement in physical and sports activities, as well as the opinions of teachers, parents, and school administrators.

The theoretical basis of the study was formed by the analysis and generalisation of scientific and methodological literature devoted to school physical education, improvement of lesson quality, and the application of modern educational technologies in the educational process. The analysis of scientific sources made it

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possible to determine the main directions of the study, clarify the concept of the quality of physical education lessons, and substantiate the choice of organisational and pedagogical conditions implemented during the research.

To collect empirical data, questionnaires, interviews, pedagogical observation, and the analysis of students' written reflections were employed. Questionnaires were used to investigate students' attitudes towards physical education lessons, identify their interests, determine their satisfaction with lesson content, and analyse their opinions regarding the organisational and pedagogical measures implemented in the educational process. Interviews with students, teachers, and parents helped to clarify the factors affecting the quality of physical education lessons and to identify possible ways of improving them.

An additional source of information was students' essays devoted to the role of physical education in human life, their attitudes towards school physical education, and their perceptions of a modern physical education lesson. The analysis of these written reflections made it possible to identify the issues that were most significant for students and to take them into account when developing organisational and pedagogical conditions for improving lesson quality.

In the present study, the quality of physical education lessons was regarded as a complex characteristic encompassing students' attitudes towards the subject, their involvement in physical and sports activities, satisfaction with lesson content, and evaluations of lessons provided by other participants in the educational process.

The collected data were processed using qualitative and quantitative analysis methods. The results obtained from questionnaires, interviews, and pedagogical observations were systematised, compared, and interpreted in accordance with the objectives of the study, which made it possible to identify the most significant organisational and pedagogical conditions for improving the quality of physical education lessons in secondary schools.

Results and Discussion

At the initial stage of the study, special attention was paid to identifying the factors that determine the quality of physical education lessons in secondary schools. The analysis of questionnaires, interviews, and students' written reflections showed that students' attitudes towards physical education are influenced by several interrelated factors. These include lesson content, the diversity of motor activities, the organisation of the educational process, the use of modern educational technologies, and opportunities for students to demonstrate independence and initiative during lessons.

To identify the most significant factors, students' opinions were analysed. The results are presented in Table 1.

Table 1

Organisational and pedagogical factors influencing the quality of physical education lessons (according to students' opinions)

Organisational and pedagogical factor	Main findings
Lesson content	Students emphasised the need to expand the variable component of the curriculum, include modern and popular types of motor activity, and update lesson content according to their interests and needs
Organisation of the educational process	Students positively assessed opportunities to choose certain types of exercises, participate in group activities, and become more actively involved in organising educational activities
Use of modern technologies	Students expressed interest in sports-related video materials, digital educational resources, interactive tasks, and multimedia teaching tools
Independent activity	Students highlighted the importance of independent assignments and the possibility of choosing forms of physical activity outside school
Motivation for participation	Students associated increased interest in physical education lessons with lesson diversity, the use of modern technologies, and opportunities for active participation

The obtained results made it possible to identify organisational and pedagogical conditions that formed the basis for further work. These conditions included updating lesson content, using modern educational technologies, applying interactive teaching methods, promoting students' independent activity, and strengthening cooperation among participants in the educational process.

The implementation of these conditions involved the use of sports-related video materials, digital educational resources, interactive assignments, and various forms of motor activity. Based on the results of the study, the organisational and pedagogical conditions that exerted the greatest influence on improving the quality of physical education lessons were systematised (Tab. 2).

Table 2

Organisational and pedagogical conditions for improving the quality of physical education lessons

Area	Content
Updating lesson content	Expanding the variable component of the curriculum and introducing modern and popular forms of motor activity
Modern educational technologies	Using video materials, digital educational resources, and multimedia teaching tools
Interactive teaching methods	Applying group work, interactive assignments, and discussions of sports programmes and video materials
Students' independent activity	Assigning individual tasks and providing opportunities for independent choice of physical activities
Interaction among participants in the educational process	Cooperation among students, teachers, parents, and school administrators

The implementation of these conditions was accompanied by changes in attitudes towards physical education lessons among different participants in the educational process. To assess these changes, repeated questionnaires were administered to subject teachers, parents, and school administrators. The results are presented in Table 3.

Table 3

Attitudes of subject teachers, parents, and school administrators towards physical education lessons at different stages of the study

Participants	Negative attitude		Positive attitude		Neutral attitude	
	Before, %	After, %	Before, %	After, %	Before, %	After, %
Subject teachers (n = 37)	75,7	24,3	16,2	64,9	8,1	10,8
Parents (n = 34)	20,6	5,6	73,5	91,2	5,6	2,9
School administrators (n = 9)	66,7	0	22,2	88,9	11,1	11,1

The analysis demonstrated that following the implementation of the organisational and pedagogical conditions, the proportion of positive evaluations of physical education lessons increased in all groups of respondents. The most pronounced changes were observed among subject teachers and school administrators. Parents also began to perceive physical education lessons more frequently as an important component of school education and an effective means of promoting a healthy lifestyle.

Overall, the findings suggest that improving the quality of physical education lessons is associated with the creation of a comprehensive system of organisational and pedagogical conditions. These conditions include updating lesson content, using modern educational technologies, applying interactive teaching methods, and expanding opportunities for students' independent activity. The findings highlight the potential of these approaches for further improving physical education in secondary schools.

Conclusions

The present study focused on identifying and substantiating organisational and pedagogical conditions that contribute to improving the quality of physical education lessons in secondary schools. The analysis of scientific literature and the findings of the study make it possible to regard the quality of physical education lessons as a complex characteristic associated with curriculum content, lesson organisation, educational technologies employed, and consideration of students' interests and needs.

The study revealed that students associate high-quality physical education lessons with several interrelated factors, including lesson diversity, an expanded variable component of the curriculum, the use of mod-

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ern educational technologies, and opportunities for independent activity and initiative. The findings indicate that students' interest in physical education is largely determined by their involvement in the educational process and their opportunities for active participation in various forms of motor activity.

The study identified and described organisational and pedagogical conditions that can be considered as interrelated elements of a unified system aimed at improving the quality of physical education lessons. The implementation of these conditions created prerequisites for increasing students' engagement in the educational process and fostering more positive attitudes towards physical education.

The findings do not claim to provide a comprehensive solution to the problem under consideration; however, they demonstrate the relevance of further research into organisational and pedagogical mechanisms for improving the quality of physical education lessons. Future studies may focus on expanding the use of modern educational technologies, broadening the variable component of school curricula, and developing new approaches to organising students' motor activity.

Thus, the results obtained suggest that the creation of favourable organisational and pedagogical conditions may serve as one of the promising directions for improving the quality of physical education lessons in contemporary secondary schools.

References

1 (2009). *Gosudarstvennaia programma razvitiia obrazovaniia i nauki Respubliki Kazakhstan na 2020–2025 gody* [State Program of Education and Science Development of the Republic of Kazakhstan for 2020–2025]. Nur-Sultan [in Russian].

2 (2002). O zdorove shkolnikov v usloviiakh ikh obucheniia [About the health of schoolchildren and the conditions of their education]. *Press-sluzhba Ministerstva zdravoohraneniya RK // «Eskulap» (spetsialnoe prilozhenie dlia vrachei) — Press-service of the Ministry of Health of the RK // Eskulap (special supplement for doctors*), 9 (14), 2 [in Russian].

3 Doskaliev Dzh.A., Akanov A.A., & Mazhibaev K.A. et al. (2002). Struktura zabolevaemosti shkolnikov v RK v vozraste ot 12 do 18 let (po dannym ofitsialnoi statistiki i rezultatam meditsinskogo obsledovaniia v ramkakh Goda zdorovia) [A structure of morbidity of schoolchildren in the RK at the age from 12 to 18 years (according to the data of official statistics and the results of medical survey within the framework of the Year of Health)]. *Materialy Pervogo kongressa spetsialistov po zdorovomu obrazu zhizni «Problemy i perspektivy formirovaniia zdorovogo obraza zhizni» — Materials of the First congress of healthy lifestyle specialists "Problems and prospects of forming a healthy lifestyle",* 26–29. Almaty [in Russian].

4 Kingston, Ú., Adamakis, M., Lester, D., & Costa, J. (2023). A Scoping Review on Quality Physical Education Programmes and Their Outcomes on Primary-Level Pupils. *International Journal of Environmental Research and Public Health*, *20*(4), 3575. https://doi.org/10.3390/ijerph20043575

5 Ruskaeva N.S. (2001). Formirovanie interesa k fizicheskoi kulture i sportu u detei mladshego shkolnogo vozrasta [The formation of interest in physical culture and sports in children of primary school age]. *Candidate's thesis.* Almaty [in Russian].

6 Seisenbekov E.K. (2006). *Nauchno-metodicheskoe obespechenie vnedreniia novykh organizatsionnykh form fizicheskogo vospitaniia shkolnikov* [Scientific and methodical support for the introduction of new organizational forms of physical education of schoolchildren]. Almaty [in Russian].

7 Reddy, M. (2024). Physical Education Curriculum Trends: A Comparative Analysis. *Innovations in Sports Science, 1*(3), 5–10. https://doi.org/10.36676/iss.v1.i3.14

8 Marchibaeva. U.S. (2018). Fizicheskaia kultura [Physical Eucation]. *Metodicheskoe rukovodstvo — Educational and methodical guide.* Almaty: «Novaia kniga [in Russian].

9 Dudley D., Mackenzie E., Van Bergen P., Cairney J., & Barnett L. (2022). What Drives Quality Physical Education? A Systematic Review and Meta-Analysis of Learning and Development Effects From Physical Education-Based Interventions. *Front. Psychol*, 13, 799330. doi: 10.3389/fpsyg.2022.799330

10 Latino, F., Romano, G., & Tafuri, F. (2024). Physical Education Teacher's Continuing Professional Development Affects the Physiological and Cognitive Well-Being of School-Age Children. *Education Sciences*, *14*(11), 1199. https://doi.org/10.3390/educsci14111199

11 Xu, Z., Lin, J., & Xia, S. (2021). Improving Quality Physical Education: Conceptual and Practical Framework, and Barriers to Its Global Implementation. *Beijing International Review of Education*, *3*(2), 296–320.

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Integration of Kazakh National Games into the Physical Education System as a Factor in Increasing the Physical Activity of Students in Rural Schools

This article examines the potential of Kazakh national games to increase physical activity levels among students in rural schools. The study is relevant due to the growing prevalence of physical inactivity among schoolchildren, declining interest in organised physical education classes, and the need to incorporate ethnocultural elements into the educational process. The study aimed to provide a theoretical rationale for and experimentally evaluate the effectiveness of incorporating Kazakh national outdoor games into the physical education programme of rural schools. The study involved Year 5 and Year 6 students from a rural comprehensive school. Research methods included classroom observation, physical fitness testing, questionnaires, comparative analysis, and statistical analysis. The results of the pedagogical experiment demonstrated that the systematic inclusion of national outdoor games in physical education lessons increased students' physical activity levels, improved physical fitness, and fostered sustained motivation for participation in physical education. The proportion of students with low levels of physical fitness decreased, while the proportion with average and high levels increased. These findings confirm the effectiveness of integrating Kazakh national games into the physical education system for rural schoolchildren. Such games represent an effective means of developing physical abilities, promoting health, and preserving ethnocultural traditions.

Keywords: physical education, physical activity, national outdoor games, motor activity, rural school, physical fitness, ethnocultural education.

Introduction

The education system in the Republic of Kazakhstan is currently characterised by an increased focus on promoting the health of young people, encouraging sustained motivation for physical education and enhancing the quality of physical education programmes. Kazakhstan's regulatory documents emphasise the importance of improving children's and young people's health, increasing their physical activity and promoting a healthy lifestyle. These issues are particularly noticeable in rural schools, where limited access to sports facilities and equipment often makes it difficult to organise comprehensive physical education and health-related activities. The Law of the Republic of Kazakhstan "On Education" highlights the importance of creating learning conditions that support the overall development of students, safeguard their health, and encourage regular participation in physical activity. In practice, however, teachers are still seeking more effective and context-appropriate ways to increase pupils' physical engagement during school hours [1, 2].

Recent studies have reported a steady decline in the level of physical activity among school-aged children. Alongside this, researchers have pointed to a deterioration in physical development indicators and a growing prevalence of sedentary lifestyles. Motivation for regular physical education lessons also appears to be weakening. These challenges are especially evident in rural areas, where limited infrastructure, insufficient equipment, and a narrow range of extracurricular activities restrict opportunities for systematic physical activity [3–6].

At the same time, current reforms in education have placed greater emphasis on incorporating ethnocultural elements into teaching practice. In this regard, traditional Kazakh games are of particular interest, as they combine physical movement with cultural meaning and elements of folk tradition. When used in physical education lessons, such games tend to increase pupil engagement and help maintain interest in active participation throughout the class. In practice, such activities are usually perceived by pupils as more engaging than repetitive physical exercises [7, 8].

Both domestic and international researchers have examined the use of traditional games in physical education in the scientific literature. They note that traditional games contribute to the development of physical skills, coordination, reaction time, endurance and strength. They also emphasise their educational value in developing collectivism, responsibility, mutual assistance, and respect for cultural traditions [9, 10, 11].

Of particular interest are the pedagogical ideas of M. Dulaty, who considered physical education to be a vital component in the harmonious development of a child's personality. In his works, he emphasised the importance of strengthening children's health through active physical exercise, spending time outdoors and taking part in traditional outdoor games. According to the scholar, such activities contribute to the development of observation skills, dexterity, speed, and independence [11, 12].

Despite the growing number of publications devoted to folk games and ethnopedagogy, their practical implementation in rural school physical education has received considerably less attention. In particular, further research is required into the methodological support, pedagogical conditions and effectiveness of using Kazakh national games to increase student physical activity.

This study's scientific novelty lies in its theoretical substantiation and experimental verification of the effectiveness of using Kazakh national outdoor games to increase students' physical activity in rural schools with limited material and technical resources.

The study's practical significance lies in its potential to enable physical education teachers in rural schools to use the developed set of national outdoor games to organise in-class and extracurricular activities aimed at improving students' physical fitness and motor activity.

This study aims to provide a theoretical basis and experimental evidence for the effectiveness of using Kazakh national outdoor games to improve the physical fitness of students in rural schools.

Methods and Materials

An educational experiment was conducted from September 2024 to May 2025 at a comprehensive school in the Karkaraly district. Thirty-six Year 5 and Year 6 students participated in the study and were assigned to experimental and control groups. These groups were formed to ensure comparability of the study indicators during the ascertainment phase of the experiment.

Standardised educational testing methods were used to determine the students' level of physical fitness, including:

- a 60-metre run to assess speed;
- a 3x10-metre shuttle run to determine agility;
- a forward bend from a standing position to assess flexibility;
- a run 1000 metres to assess endurance;
- boys did pull-ups on a horizontal bar and girls did push-ups from a low support to assess strength.

The following methods were used in the study: analysis of scientific and methodological literature; pedagogical observation; questionnaires; pedagogical testing; comparative analysis; and mathematical statistics.

Mathematical statistics were used to analyse the results of the study, including calculating arithmetic means, percentage distribution and comparing the results of the experimental and control groups. The analysis of the indicators' dynamics was carried out at the ascertaining and control stages of the pedagogical experiment. Statistical processing of the data revealed positive dynamics in the physical fitness indicators of students in the experimental group.

Throughout the study, particular attention was paid to adhering to the pedagogical and ethical principles of the experiment. Participation in the study was voluntary for students and was carried out with the consent of parents (legal guardians) and the educational institution's administration. All diagnostic procedures took into account the age and individual characteristics of the students, as well as safety and health requirements for children during physical education and health activities. The confidentiality of the results obtained and the anonymity of the personal data of the study participants were fully maintained.

Results and Discussion

It was established that the limited material and technical resources available to rural educational institutions significantly complicate the implementation of the physical education curriculum.

In these conditions, traditional outdoor games have several advantages: they do not require complex equipment, they are accessible, and they allow students to engage in physical activity in a variety of settings.

An analysis of student medical records revealed that 40 % of students were in the primary health group and 60 % — in the preparatory group. These data suggest that a significant proportion of students have an

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insufficient level of physical fitness and highlight the importance of finding effective ways to increase physical activity.

A study of the factors contributing to hypokinesia in students found that the main reasons for declining physical activity were a lack of interest in PE classes, heavy academic workloads and limited use of traditional outdoor games in education.

Before the educational experiment began, the physical fitness indicators of students in the experimental and control groups were similar. Low levels of physical fitness were detected in 50 % of students in the experimental group and 51 % of students in the control group (Tab. 2).

Alongside the established levels of student physical fitness, the results of educational testing revealed an insufficient development of physical qualities. The most pronounced difficulties were observed in tasks requiring agility, strength, flexibility and endurance. The data obtained suggest that the current volume of physical activity undertaken by students is insufficient for these physical skills to be fully developed in a traditional physical education classroom. This indicates the need to develop additional pedagogical tools aimed at developing students' core physical skills.

The following pedagogical principles were considered when selecting national outdoor games for the study:

- comprehensive development of physical skills;
- variability of physical activity;
- the emotional appeal of game forms;
- appropriateness to the age characteristics of students;
- preservation of the ethnocultural content of the games.

The selected Kazakh national outdoor games (Tab. 1) were introduced as part of one of three weekly physical education lessons for the experimental group. The pedagogical experiment lasted one academic year. The outdoor games were incorporated into various sections of the lesson, depending on the learning objectives. The games aimed to develop students' speed, agility, flexibility, strength and endurance.

Table 1

Kazakh national outdoor games used in the experimental physical education programme for students

Direction of development of physical qualities	National outdoor games
Games primarily aimed at developing speed skills	*Qara Börik* ("Black hat"), *Aue Tayaq* ("Flying stick "), *Zhüzik Alu* ("Raise the ring"), *Tayaq Oyini* ("Playing with a stick"), *Qas Kulaq* ("A sensitive ear")
Games primarily aimed at developing dexterity and coordination of movements	*Tartys* ("Tug of war"), *Sokyr Teke* ("Blind goat"), *Töbetay Tastamaq* ("Throwing the hat"), *Oramal Tastau* "Throwing a handkerchief"), *Tau Meniki* ("My mountain")
Games primarily aimed at developing flexibility	*Aralmen* ("Between the islands"), *Toqta* ("Stop!"), *Qara Börik* ("Black hat")
Games primarily aimed at developing general endurance	*Qas Kulaq* ("A sensitive ear"), *Börik Telpek* ("Cap"), *Atshylar Zharysy* ("Horsemen's competition"), *Tekeler Urysy* ("Goat fight"), *Kögen Tartys* ("Tug of war")
Games primarily aimed at developing strength skills	*Kindik Sandyk* ("Box"), *Tört Ayaqtap Tartysu* ("Tug of war on all fours"), *Kisi Köteru* ("Raising a Man"), *Audaraspak* ("Horsemen's fight")

A comparative analysis of the results from the initial and control stages of the experiment reveals positive trends in the physical fitness indicators of students in the experimental group. The most significant changes were observed in the low physical fitness indicator, which decreased from 50 % to 13 %. Conversely, the proportion of students with moderate (increasing from 31 % to 62 %) and high (increasing from 19 % to 25 %) levels of physical fitness increased (Tab. 2). In the control group, the changes were less pronounced. These results suggest that the use of Kazakh national outdoor games has a positive impact on students' physical activity and fitness. After the completion of the educational experiment, differences between the experimental and control groups tended to be statistically significant ($p \leq 0.05$).

Table 2

Physical fitness indicators of students in the control and experimental groups before and after the educational experiment (%)

Physical fitness level	Experimental group before the experiment	Experimental group after the experiment	Control group before the experiment	Control group after the experiment
High level	19	25	17	18
Intermediate level	31	62	32	38
Low level	50	13	51	44

The results obtained suggest that the positive changes are due to the combined effects of traditional outdoor games, which are characterised by high levels of physical activity and emotional engagement, as well as being competitive. Furthermore, the game-based nature of the lessons fostered favourable conditions for enhancing students' motivation to participate in regular physical education.

During pedagogical observations, it was found that students in the experimental group demonstrated higher levels of activity, initiative and interest in completing physical exercises. Participation in traditional games contributed to the development of teamwork, responsibility, and mutual support skills.

An additional parent survey revealed increased student interest in physical education classes and sports clubs. Many parents noted that their children were becoming more proactive in organising outdoor games outside school hours.

The findings obtained during the study suggest that traditional Kazakh games may be regarded as an effective component of physical education in rural schools. When these games were introduced into physical education lessons, pupils became more actively involved in movement-based activities and showed greater interest in regular exercise. In addition, participation in traditional games helped pupils interact more actively with one another during lessons.

The practical value of such games becomes especially evident in rural schools, where the organisation of physical education is often complicated by limited material and technical resources. For many rural schools, this approach may be more useful because traditional outdoor games can serve as a practical and accessible way of organising active lessons. The accessibility, emotional appeal and cultural significance of these games make them an effective tool for modernising the physical education system.

Conclusions

The results of the study confirm that integrating Kazakh national outdoor games into the physical education curriculum in rural schools is effective. The systematic use of national games was found to contribute to increased levels of physical activity and improved physical fitness, as well as developing sustainable motivation for physical education.

The pedagogical experiment revealed positive developments in students' key physical qualities, such as speed, agility, strength, flexibility and endurance. The significant decrease in the proportion of students with low levels of physical fitness demonstrates the pedagogical effectiveness of the approach.

These results suggest that Kazakh national outdoor games could be an important component of modern physical education, offering health and educational benefits. Using them promotes the development of teamwork and communication skills, as well as respect for cultural traditions and the formation of students' ethnocultural identity.

The practical significance of the study lies in the potential application of the developed set of national outdoor games in rural schools' educational activities, during both in-class and extracurricular physical education programmes. Therefore, integrating Kazakh national outdoor games into physical education can effectively increase student physical activity and improve the educational process in rural schools.

References

1 (2007). *Qazaqstan Respublikasynyñ "Bılim turaly" Zañy* [Law of the Republic of Kazakhstan "On Education"]. Astana [in Kazakh].

2 (2012). *President of the Republic of Kazakhstan. "Qazaqstan–2050" strategıasy qalıptasqan memlekettiñ jaña sayası baǵyty" attı Qazaqstan halqyna Joldauy* [Address to the People of Kazakhstan "Strategy Kazakhstan–2050: New Political Course of the Established State"]. Astana [in Kazakh].

 ISSN 3081-0531 (Print) ISSN 3081-054X (Online)

3 Sarmantaev, A. & Ishanov, P. (2018). Bastauysh synyp oqyshylarynyñ belsendiligin arttyrudaǵy ulttyq qozǵalmal yojyndardyñ orny [The role of national active games in increasing the activity of primary school students]. *Qazaqstannyñ ǵylymy men ómiri — Science and Life of Kazakhstan, 7*(70), 117–121 [in Kazakh].

4 Imanbetov, A.N., Adanov, K.B., Sarmantaev, A.S., & Belgibaev, A.J. (2018). Bastauysh synyp oqyshylarynyñ belsendiligin arttyrudaǵy ulttyq qozǵalmal yojyndardyñ orny [The role of national active games in increasing the activity of primary school students]. *Nauka i zhizn Kazakhstana: Mezhdunarodnyi nauchnyi zhurnal — Science and Life of Kazakhstan: International Scientific Journal, 7*(70), 117–121. Astana [in Kazakh].

5 Hollis, J.L., Sutherland, R., Williams, A.J. et al. (2017). A systematic review and meta-analysis of moderate-to-vigorous physical activity levels in secondary school physical education lessons. *Int. J. Behav. Nutr. Phys. Act.*, 14, 52 https://doi.org/10.1186/s12966-017-0504-0

6 Fairclough, S. (2003). Physical Activity, Perceived Competence and Enjoyment During High School Physical Education. *European Journal of Physical Education, 8*(1), 5–18. https://doi.org/10.1080/1740898030080102

7 Sarmantaev, A.S., Ishanov, P.Z., & Toleuhanova, R.J. (2018). Ulttyq sport türleriniñ denshaulyqty nyǵaytu men salauatty ómir saltyn qalıptastyruǵa roli [The role of national sports in strengthening health and forming a healthy lifestyle]. *Qoǵamdyq sanany jañǵyrtu jaǵdaıynda bılım berw mazmúnyn jañaý — Modernization of Educational Content in the Context of Renewing Public Consciousness: conference proceedings* (pp. 392–395). Karaganda: Karaganda State University Press [in Kazakh].

8 Imanbetov, A.N., Ayaǵan, E.S., Muskunov, Q.S., Iskakov, M.I., & Sarmantaev, A.S. (2018). Bastauysh synyp oqyshylarynyñ dene tərbiesi sabagyndaǵy qozǵalmal yojyndardyñ mańyzy [The importance of active games in physical education lessons in primary school]. *PMU habarshysy. Pedagogikalyq seriya — Bulletin of S. Toraighyrov Pavlodar State University. Pedagogical Series,* (3), 155–158 [in Kazakh].

9 Alimkhanov, E.A. (2010). Teoreticheskie i pedagogicheskie osnovy kazakhskikh natsionalnykh vidov sporta i igr [Theoretical and pedagogical foundations of Kazakh national sports and games]. *Doctor's thesis*. Almaty [in Kazakh].

10 Ermenova, B.O. (2017). Narodnye igry kak effektivnoe sredstvo razvitiia fizicheskikh kachestv shkolnikov [Folk games as an effective means of developing physical qualities of schoolchildren]. *Vestnik fizicheskoi kultury i sporta — Bulletin of Physical Culture and Sports*, (17), 67–70. Bishkek [in Russian].

11 Tolegenov, E.K. (2010). Kazakhskie natsionalnye igry dlia formirovaniia u detei selskoi mestnosti navykov samostoiatelnykh zaniatii fizicheskimi uprazhneniiami [Kazakh national games for forming independent physical exercise skills in rural children]. *Candidate's thesis*. Almaty [in Russian].

12 Quanyshev, T. Sh. (1994). Ulttyq oyındardy dene shynyqtyrwdan bolashaq mugalimderdi dayarlaw quraly [National games as a means of training future physical education teachers]. *Candidate's thesis.* Almaty [in Kazakh].

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Physical Training Methodology for Boxers Aged 13–15 During the Training Phase

This paper presents the results of a study on the effectiveness of an experimental physical training programme for young boxers aged 13–15 years. The aim of the study was to develop, substantiate, and evaluate a physical training programme for boxers at the training stage. The research was conducted at the private boxing club "UPGRADE" in Moscow and involved male and female athletes aged 13–15 years. The training groups were characterised by differences in age, experience, and skill level, with novice and experienced athletes training together. To assess the effectiveness of the programme, participants completed a battery of ten standardised tests measuring general and sport-specific physical fitness. The proposed training methodology incorporated targeted exercises aimed at improving foot stiffness within the general physical training programme of young boxers. The findings demonstrated that the experimental programme contributed to improvements in the physical fitness indicators of the participants and may be recommended for use in the training process of young boxers. Following the implementation of the programme, positive changes were observed in all physical fitness indicators. The most pronounced improvements among girls were recorded in pull-ups (50%) and the 1000-m run (42.2%), whereas boys achieved the highest gains in pull-ups (43.5%) and push-ups (27.9%). The findings suggest that the proposed methodology can be effectively used in the training process of young boxers.

Keywords: boxers aged 13–15, training phase, physical training, methodology.

Introduction

Boxing is a sport classified as a speed-strength discipline characterized by maximum physical intensity. At the current stage of its development, the issue of training in youth boxing is particularly critical, as the intensity of competition in the ring increases, placing high demands on boxers' physical fitness [1, 2].

The participation of young male and female boxers in international competitions at the European and World Championship levels can lead to an accelerated training process for young athletes and an unjustified increase in time spent on specialized training at the expense of general physical conditioning, which results in one-sided development, inconsistent athletic performance, a decline in motivation, and a halt in athletic progress [2, 3].

Women's boxing has been gaining popularity and has been included in the Olympic programme since 2012. At the 2028 Olympic Games, an additional women's weight category is expected to be introduced, resulting in medal competitions across seven men's and seven women's weight classes. The works of E.P. Sharina, V.V. Chumash, L.V. Lagutenko, E.P. Krestovnikova, T.V. Chala, O.V. Domuladzhanova, E.V. Gapesina, V.P. Stroshkov, A.M. Gladkikh, R.R. Magomedov, and others point to a lack of research dedicated to the training of young female boxers [4, 5, 6, 7].

Research Objective. To justify, develop, and verify the effectiveness of a physical training methodology for boxers aged 13–15 during the training phase.

Methods and Materials

The study was conducted at the "UPGRADE" private martial arts club in Moscow, specifically in the boxing section, one of the nine martial arts disciplines practiced at the club.

Six boxers aged 13–15 participated in the study—two girls and four boys—with athletic qualifications ranging from 2nd-class athletes to candidates for Master of Sports. Of the boxers who participated in the study, two girls have been members of the Russian junior national team since 2025, and one boy is a member of the Moscow city team.

A distinctive feature of the training process in the boxing department of a private club is the heterogeneous composition of training groups, where beginners and fairly experienced athletes train at the same time, and there is a high turnover of participants. The age composition of the groups is also heterogeneous, with boys and girls training together.

To validate the experimental methodology for assessing the physical fitness of boxers aged 13–15, the subjects underwent physical fitness testing consisting of 10 standardized tests designed to evaluate their general and sport-specific physical fitness: 10-meter sprint, 3 × 10-meter shuttle run, standing long jump, 1000-meter run, bench press, push-ups, pull-ups on a high bar, half-squats with a barbell on the shoulders, sit-ups from a lying position in 1 minute, and the number of punches on a punching bag in 1 minute.

An analysis of video recordings of boxing matches involving boxers of different weight classes and ages, both men and women, was also conducted, and pedagogical observation of the subjects was carried out.

Results and Discussion

To incorporate exercises for developing foot muscle strength into a general physical training program, we conducted a study whose results revealed the significant role of foot stiffness—particularly that of the transverse arch—in increasing the striking power of boxers [8–11].

We hypothesized that as an athlete's weight increases, maximum acceleration increases; consequently, punching power increases, and the need to enhance foot rigidity—particularly that of the transverse arches—becomes all the more critical.

To validate the experimental methodology, we also measured the foot length of the subjects at the beginning of the study while standing in a relaxed position and while contracting the intrinsic foot muscles ("short foot").

Figure 1 shows the difference in foot length between the relaxed standing position and the "short foot" position (with the internal foot muscles tensed) in female boxers using a right-handed stance, expressed as a percentage.

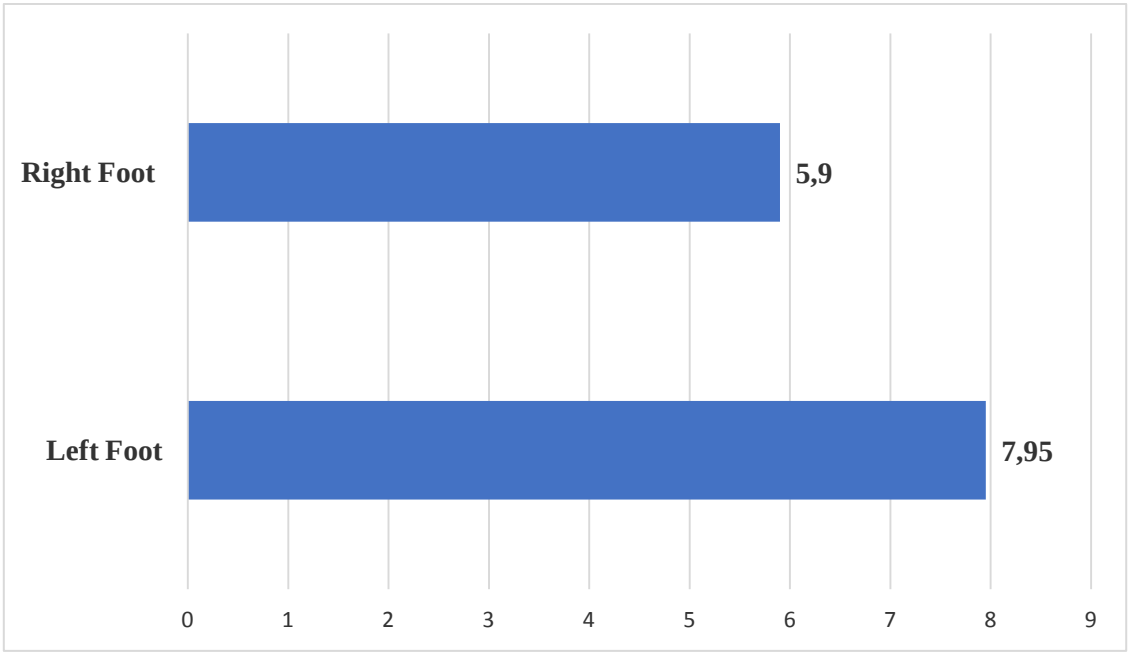

Figure 1. Difference in foot length when standing at rest (1*)
and when the intrinsic foot muscles are contracted (2**) in young women %

The analysis revealed that among the subjects—both female and male boxers who fight in a right-handed stance—the difference between 1* and 2** of the left leg was higher in percentage terms, while for athletes boxing in a southpaw stance, the difference in foot length when standing at rest and when contracting the intrinsic foot muscles was greater on the right leg.

Based on the data obtained, exercises were developed to strengthen the foot muscles and build their strength, specifically to strengthen the metatarsophalangeal transverse arch and the intrinsic foot muscles, which were incorporated into the experimental physical training program for boxers aged 13–15.

List of exercises:

Exercises for strengthening and stabilizing the feet (barefoot):

- balancing on a hemisphere on one leg;
- jumping on the balls of the feet toward oneself;
- juggling tennis balls while standing on a platform at a 45° angle;
- moving across a hard surface by flexing the toes (“caterpillar”);
- walking on the outer edge of the foot 1 set of 5 minutes.

Core exercises (core muscles):

- plank;
- side plank;
- abdominal exercises (lower, upper, and oblique abs).

Exercises to improve coordination:

- forward rolls;
- backward rolls;
- trunk rotation around its axis + shadow boxing;
- 360° jumps;
- forward somersaults;
- walking on hands once;
- juggling a tennis ball.

Exercises to develop strength:

- Half-squat with a barbell on the shoulders onto a bench;
- Bench press;
- Barbell front raises.

To verify the effectiveness of the experimental physical training methodology for 15- to 16-year-old boxers, the subjects’ fitness was tested, after which the developed methodology was implemented in the training process of the boxing division of the private fighting club “UPGRADE” in Moscow from October 2024 to December 2025.

Upon its completion, retesting was conducted, the results of which are presented in Figure 2.

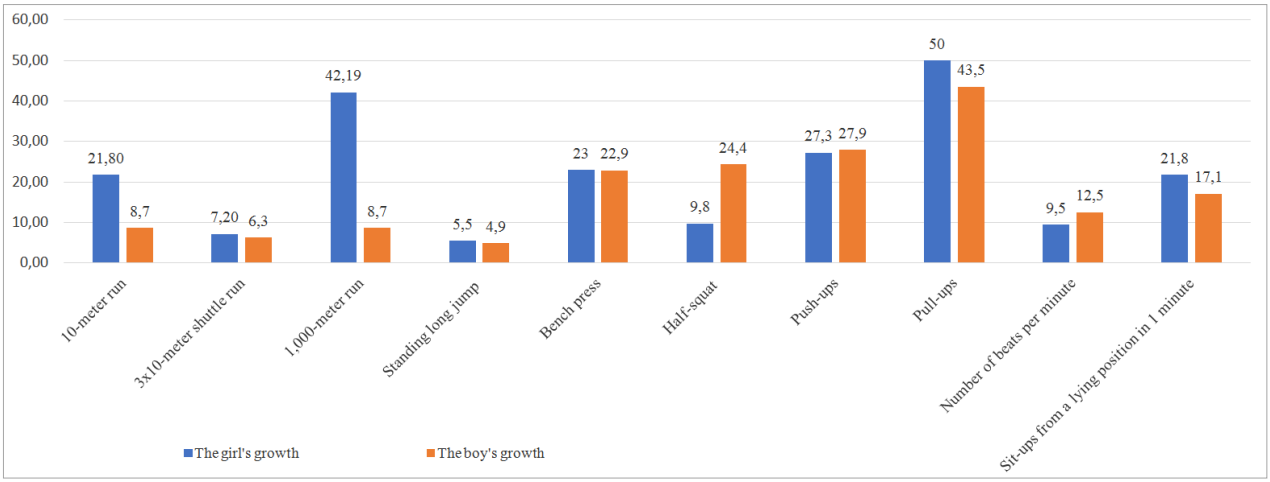

Figure 2. Percentage increase in results for boys and girls at the conclusion of the study

Among the girls, the greatest improvement in performance was seen in pull-ups (180 %), followed by the 1000-meter run. — 42.19 %; in the push-up test, the result increased by 27.3 %; in the bench press, there

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was a 23 % increase; in sit-ups in 1 minute — by 21.8 %, in the barbell shoulder press, the result increased by 9.8 %, the number of punches on the punching bag in 1 minute increased by 9.5 %, speed abilities (10-meter dash) improved by 9.3 %, and the smallest increase occurred in the standing long jump, where the result increased by 5.5 %.

Among the boys, pull-up results improved by 43.5 %; the push-up test ranked second in terms of growth rate, with a 27.9 % increase; in the half-squat with a barbell on the shoulders, performance increased by 24.4 %; in the bench press, results increased by 22.9 %; in the 1-minute sit-up test, results increased by 17.1 %; and the number of punches on the punching bag in 1 minute increased Performance in the 10-meter dash and the 1,000-meter run increased by 8.7 %, and the result in the 3x10-meter shuttle run improved by 6.3 %. And, just as with the girls, the smallest increase was in the standing long jump test, which improved by 4.9 %.

It should be noted that among the young men, the greatest improvement in performance was observed in tests of strength and strength endurance, with gains ranging from 17.1 % to 43.5 %.

A separate study was conducted to evaluate the effectiveness of a set of exercises designed to strengthen the feet.

At the initial stage of the study, foot stiffness was assessed by measuring foot length in a relaxed standing position and during contraction of the intrinsic foot muscles.

During the mesocycle from October 13, 2025, to November 4, 2025, the exercise program was incorporated into the training regimen of boxers aged 13–15. To strengthen the foot muscles and develop their strength, specifically to strengthen the metatarsophalangeal transverse arch and the intrinsic foot muscles, these exercises were included in the experimental physical training program for boxers aged 13–15.

During the study period, 50 training sessions were conducted, of which 14 sessions (28 %) were dedicated to strengthening the foot muscles, 5 training sessions (10 %) were conducted to develop strength, 5 sessions (10 %) to develop strength endurance, 5 sessions (10 %) to develop speed, and 4 sessions each (8 % each) were conducted to develop coordination and general endurance.

The list of exercises is provided above.

At the conclusion of the study, the results of changes in foot length while standing at rest and with the foot's intrinsic muscles contracted are presented in Table 1.

Table 1

Difference in foot length measurements at the conclusion of the study

№	Athlete	Right foot (cm)		Left foot (cm)		Difference (cm) and % Right foot		Difference (cm) and % Left foot	
		1*	2**	1	2				
1	Athlete 1 Weight: 60 kg Candidate for Master of Sports	26	24,7	26	24,1	1,3	5	1,9	7,3
		26	24,8	26	24,3	1,2	4,6	1,7	6,5
2	Athlete 2 Weight: 57 kg Candidate for Master of Sports	22	20,5	22	20,1	1,5	6,8	1,9	8,6
		22	20,6	22	20,1	1,4	6,4	1,9	8,6
3	Athlete 1 Weight: 80 kg Candidate for Master of Sports	26	23,6	26	23,9	2,4	9,2	2,1	8,1
		26	23,8	26	23,9	2,2	8,5	2,1	8,1
4	Athlete 2 Weight 57 1st class	24	21,5	24	21,1	2,5	1,1	2,9	12,1
		24	21,5	24	21,3	2,5	1,1	2,7	11,25
5	Athlete 3 Weight 66 1st class	25	23,2	25	23,5	1,8	7,2	1,8	7,2
		25	23,2	25	23,5	1,8	7,2	1,8	7,2
6	Athlete 4 Weight 57 2nd class	24,5	23,2	24,5	22,5	1,3	5,3	2,0	8,2
		24,5	23,2	24,5	22,5	1,3	5,3	2,0	8,2

An analysis of the results revealed that, following the incorporation of exercises designed to increase foot stiffness into the experimental protocol, changes occurred in a number of athletes, while for other participants, the results remained unchanged from the beginning of the study. An increase in foot stiffness was observed in male and female athletes boxing in a right-handed stance, primarily on the right leg. In our opinion, three weeks (one mesocycle) is insufficient to achieve positive results, and the duration of the intervention must be extended.

Conclusions

An analysis of available sources of information has shown that the number of exercises designed to train the feet in athletes across various sports is quite limited, and specifically, there are virtually none targeting the transverse arch.

In the physical training program for boxers aged 13–15, exercises aimed at strengthening the muscles of the feet and trunk (core) were included in training sessions at the end of the main part, accounting for 28 % of the total number of sessions. A pedagogical experiment to increase foot rigidity showed that 3 weeks are insufficient to achieve positive results and that the duration of the intervention must be increased.

An indirect indicator of the effectiveness of the experimental methodology can be considered the successful performance of the athlete who participated in the study, who took first place in the 60 kg weight class at the European Youth Boxing Championships in Novo Pozar, Serbia. Another athlete won a bronze medal in the 57 kg weight class at the 3rd CIS Games held from September 28 to October 10, 2025, in Ganja, Azerbaijan. Based on the above, it can be concluded that the experimental physical training methodology for boxers aged 13–15 has demonstrated sufficient effectiveness and can be utilized in the training process for boxers during the preparatory phase.

References

1 Kubiyeva, S., Syzdykov, A., Botagariyev, T., Makunina, O., Mambetov, N., & Aralbayev. A. (2025). Improving the functional status of young boxers in the preparatory period of training with biofeedback. *Sci Rep.,* 15(1), 39812. doi: 10.1038/s41598-025-23663-y. PMID: 41233551; PMCID: PMC12615792.

2 Cioffi, R. & Lubetzky, A.V. (2023). BOXVR Versus Guided YouTube Boxing for Stress, Anxiety, and Cognitive Performance in Adolescents: A Pilot Randomized Controlled Trial. *Games for Health Journal, 12*(3), 259–268. doi:10.1089/g4h.2022.0202

3 Kim, B. & Kang, S. (2020). Regular Leisure-Time Physical Activity is Effective in Boosting Neurotrophic Factors and Alleviating Menopause Symptoms. *International Journal of Environmental Research and Public Health*, *17*(22), 8624. https://doi.org/10.3390/ijerph17228624

4 Vertadier, N., Trzepizur, W., & Faure, S. (2022). Overuse of Short-Acting Beta-2 Agonists (SABAs) in Elite Athletes: Hypotheses to Explain It. *Sports*, *10*(3), 36. https://doi.org/10.3390/sports10030036

5 Gapeshina, E.V. & Stroshkov, V.P. (2020). Primenenie pedagogicheskikh tekhnologii v tekhniko-takticheskoi podgotovke zhenshchin, professionalno zanimaiushchikhsia boksom [The Application of Pedagogical Technologies in the Technical and Tactical Training of Female Professional Boxers]. *Voprosy pedagogiki — Issues in Pedagogy*, 12-2, 69–73 [in Russian].

6 Domuladzhanova, O.V. (2018). Adaptatsiia funktsionalnogo rezerva trenirovannosti zhenshchin-bokserov razlichnoi kvalifikatsii k trenirovochnym nagruzkam tsentralizovannoi podgotovki [Adaptation of the functional fitness reserve of female boxers of various skill levels to the training loads of centralized training]. *Vestnik sportivnoi nauki — Bulletin of Sports Science, 1,* 8–10 [in Russian].

7 Krestnikova, E.P. & Chalaya, T.V. (2021). Osobennosti podgotovki devushek bokserov 16–18 let [Features of training for female boxers aged 16–18]. *Teoriia i praktika sovremennoi nauki — Theory and Practice of Modern Science, 4*(70), 212–215 [in Russian].

8 SHarina, E.P., Chumash, V.V, & Lagutenko, L.V. (2018). Metodika fizicheskoi i tekhnicheskoi podgotovki yunykh bokserov (devochek) na osnove sovremennykh fitnes-tekhnologii [Methods of physical and technical training for young female boxers based on modern fitness technologies]. *Vestnik Adygeiskogo gosudarstvennogo universiteta — Bulletin of Adyghe State University*, *1*(213), 189–193 [in Russian].

9 Shustova, E.V., SHustov, A.A., & Kolbunov, A.A. (2025). Vliianie zhestkosti stopy na effektivnost skorostno-silovykh trenirovochnykh i sorevnovatelnykh dvigatelnykh deistvii [The influence of foot stiffness on the effectiveness of speed-strength training and competitive motor actions]. *Integratsiia teorii i praktiki v obshchem, dopolnitelnom i professionalnom fizkulturnom obrazovanii. Materialy VII Natsionalnoi nauchno-prakticheskoi konferentsii s mezhdunarodnym uchastiem — Integration of Theory and Practice in General, Supplementary, and Professional Physical Education. Proceedings of the VII National Scientific and Practical Conference with International Participation* (pp. 141–144) [in Russian].

10 Ping Y., Xu C., Xu L., Liao G., Zhou Y., Deng C., Lan Y., Yu F., Shi J., Wang L., Xiao Y., & Li X. (2020). Prioritizing Gene Cascading Paths to Model Colorectal Cancer Through Engineered Organoids. *Front. Bioeng. Biotechnol*, 8, 12. doi: 10.3389/fbioe.2020.00012

11 Sha, L. & Chiu, W.H. (2026). Wearable Sensor-Based Analysis of Punch Acceleration and Plantar Pressure Distribution in Boxing. *Sensors*, *26*(9), 2707. https://doi.org/10.3390/s26092707

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