https://doi.org/10.31489/3081-0531/2026-2-4/4-10
UDC 373.21 Received: 28.03.2026 | Accepted: 22.04.2026 | Published online: 30 June 2026

L.S. Kuznetsova[1], S.I. Dyubanova[2*]

[1, 2]*Buketov Karaganda National Research University, Karaganda, Kazakhstan*
[*]*Corresponding author's e–mail: dyuba.svetlana@gmail.com*

[1]*ORCID 0009-0000-9658-284X*
[2]*ORCID 0009-0009-4694-2371*

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

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

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).

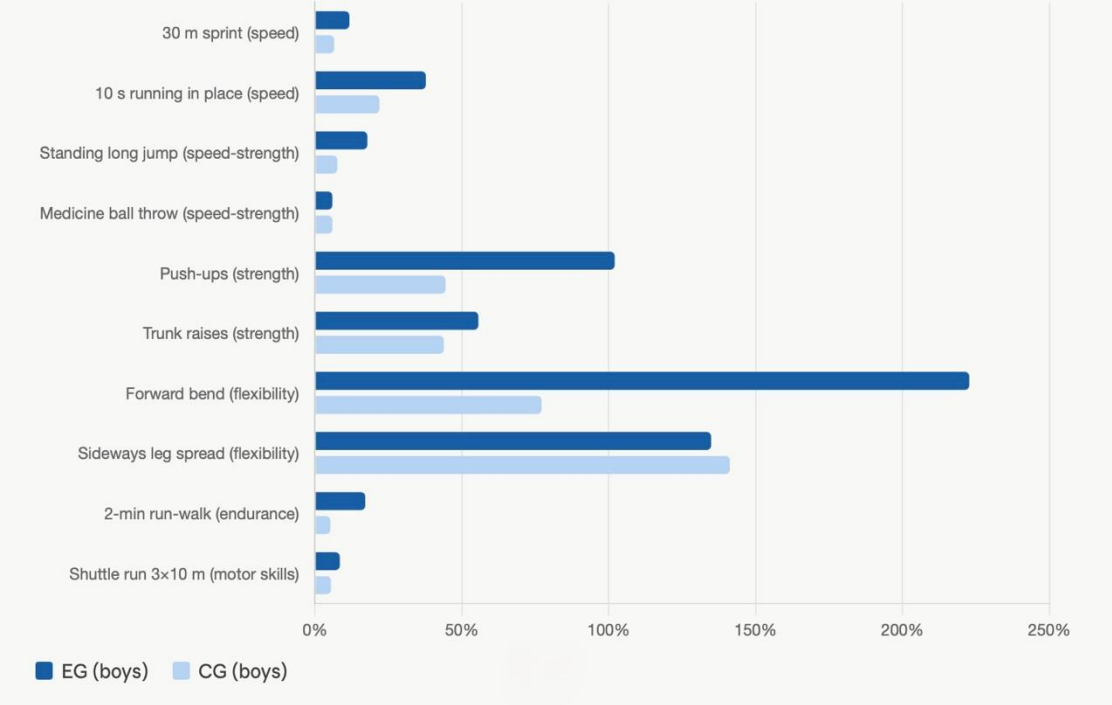

Figure 1. Percentage difference in motor ability scores between boys in the experimental group and the control group at the end of the experiment

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).

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

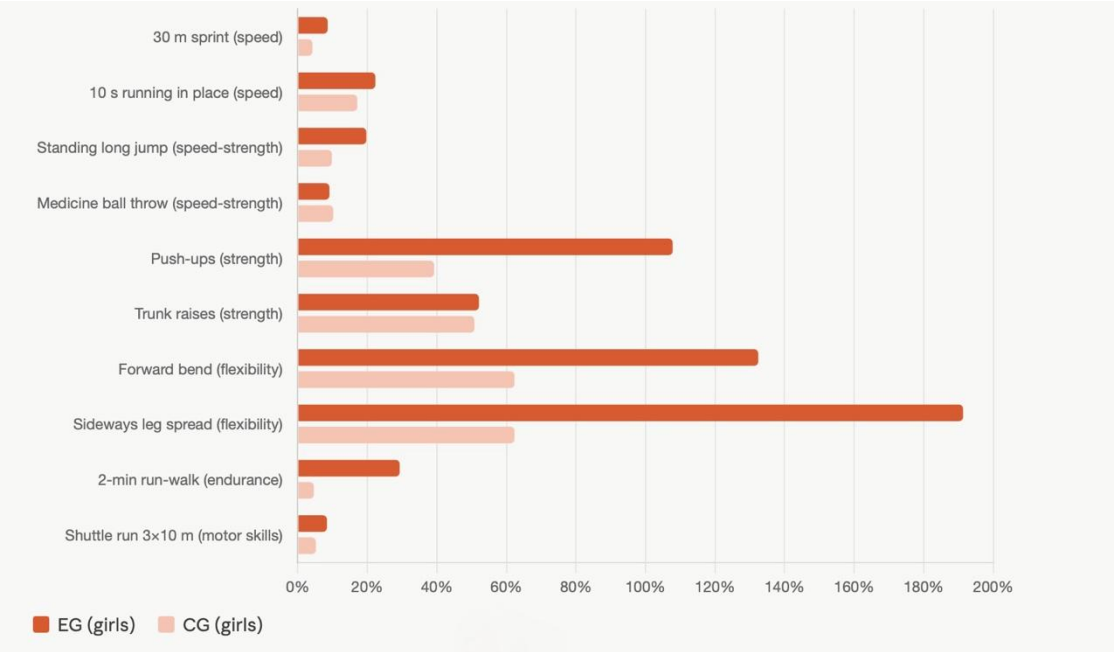

Figure 2. Percentage difference in motor ability scores between girls in the experimental group and the control group at the end of the experiment

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].

Information about the authors

Kuznetsova Luydmila Sergeevna — Candidate of Biological Sciences, Assistant Professor, Buketov Karaganda National Research University, Karaganda, Kazakhstan; e-mail: kuznecova.48.48@mail.ru; ORCID ID: 0009-0000-9658-284X

Dyubanova Svetlana Ivanovna (contact person) — Master of Pedagogical Sciences, Lecturer, Buketov Karaganda National Research University, Karaganda, Kazakhstan; e-mail: dyuba.svetlana@gmail.com; ORCID 0009-0009-4694-2371