

## OPTIMIZING THE PHYSICAL CONDITION OF HIGH SCHOOL STUDENTS THROUGH THE USE OF SPECIFIC ATHLETICS MEANS

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**Abstract:** The present study aims to evaluate the effectiveness of an experimental physical education program based on athletics-specific means in optimizing the physical condition of seventh-grade students. The research was conducted in the 2024–2025 school year and included an experimental group and a control group, monitoring the development of the main motor skills: speed, strength, endurance and coordination. The experimental program was implemented over a period of 14 weeks, structured in two progressive modules and integrated into regular physical education lessons. Research methods: scientific documentation, observation, experiment, physical testing and mathematical-statistical analysis. Physical condition was assessed using standardized tests used in the initial and final stages of the study. The results revealed significant and homogeneous improvements in motor performance in the experimental group compared to the control group, which followed the standard school curriculum. The most pronounced improvements were observed in speed, explosive strength, aerobic endurance and coordination. The study's conclusions confirm the effectiveness of athletics-specific means introduced in physical education classes, underlining their value as a methodological alternative for optimizing the general physical condition of middle school students.

**Introduction:** In assessing the overall development of students, physical education plays a fundamental role, and in the context of current societal concerns regarding health and physical fitness levels, optimizing the physical condition required for high school entrance exams has become a priority educational objective [11]. Scientific literature highlights the importance of the school period for the

harmonious development of personality and for establishing the functional foundations of the body [14]. Numerous studies indicate that regular physical activity positively influences both physical and mental health, contributing to their maintenance and improvement [4]. In this regard, comprehensive school physical activity programs (CSPAP) extend movement opportunities beyond traditional lessons, involving school, family, and community environments [13]. Recent research demonstrates the effectiveness of personalized physical education interventions, including adapted sports programs, in increasing physical engagement, motivation, and performance, especially among adolescents with obesity [15]. At the same time, establishing age-appropriate training guidelines is essential for reducing the risk of injury and improving athletic performance [9]. Athletics and school sports play an important role not only in physical development, but also in academic motivation, social integration, and academic performance. Research indicates that student-athletes do not demonstrate lower academic performance compared to non-athletes and that participation in physical activities is associated with improved academic outcomes [2, 3, 7, 12]. Participation in school sports is also linked to the development of self-esteem and positive social behaviors [1, 10, 16]. In this context, general fitness aims at developing a balanced physical condition, based on strength, endurance, and cardiovascular capacity [5], while recent research highlights the need to optimize these components through modern training methods [6]. In parallel, the continuous professional development of physical education teachers represents a key factor in adapting the educational process to the demands of contemporary society [8].

**Material-method:** Research hypothesis: It is assumed that the implementation of a structured physical education program, based on athletics-specific means, will lead to the optimization of the general physical condition (speed, strength, endurance and coordination) among seventh grade students, compared to their initial level of physical training. Purpose of the study: The main purpose of the research is to evaluate the effectiveness of athletics-specific means in optimizing the physical condition of seventh grade students, as well as to identify the most appropriate ways to integrate these means into the instructional-educational process. Research objectives: The research aims to achieve the following objectives: Determining the initial level of physical condition of seventh grade students; Designing and implementing an experimental physical education program based on athletics-specific means; Evaluating the effects of the program applied on motor skills by comparing the results obtained in the initial and final assessments; Analyzing the effectiveness of different athletics training tools, to identify the most suitable exercises for developing each motor quality. Research Methods: Scientific documentation method; Observation method; Experimental method; Testing method; Mathematical-statistical method; Tabular and graphical method. Inclusion criteria: The inclusion criteria for participation in the study were the following: Adequate health status for involvement in physical activities; Regular participation in physical

education lessons; Absence of medical conditions or contraindications that could limit physical effort; Informed consent from both students and their legal guardians, in accordance with the ethical principles of educational research; Relatively homogeneous initial level of physical condition, to ensure comparability of results. The research was conducted at the "Tiberiu Crudu" Junior High School, located in Tudora, Botoșani County, in the 2024-2025 school year. The study was structured in two experimental modules, each lasting seven weeks, with the aim of progressively and systematically monitoring the development of physical fitness in seventh grade students. Duration of the experiment: The motor program was implemented over a total period of 14 weeks, divided into two modules of seven weeks each:

Module I (7 weeks)-preparatory phase and initial evaluation;

Module II (7 weeks)-application phase and final evaluation.

Main Objectives: Adapting students to physical exertion; Familiarizing with athletic exercise techniques; Establishing the initial level of performance.

**Table 1. Module I-Preparatory and familiarization phase-7 weeks**

<b>Week</b>	<b>Main Exercises and Training Means</b>
1	General warm-up; light running for 5-10 minutes; coordination exercises (slalom, small jumps); instruction on sprinting and jumping techniques.
2	Short-distance sprinting, 20-30 m; standing long jumps; light ball throws; technical monitoring and error correction.
3	Agility course with cones; jumps through hoops or over small obstacles; lightly paced running; introduction of combined exercises.
4	Sprint running with signal start; vertical jumps; light medicine ball throws; development of segmental strength.
5	Combined circuit: 50 m run - jumps - throws (repeated twice); introduction of competitive athletics games (relay races).
6	Individual motor tests: speed, short-duration endurance, jumping; observation and recording of progress.
7	Consolidation of circuit exercises; technical review; verification of correct execution for each type of exercise.

Main objectives: Progressive increase in exercise intensity; Synergistic development of speed, strength, endurance and coordination; Administration of final tests to assess performance progress.

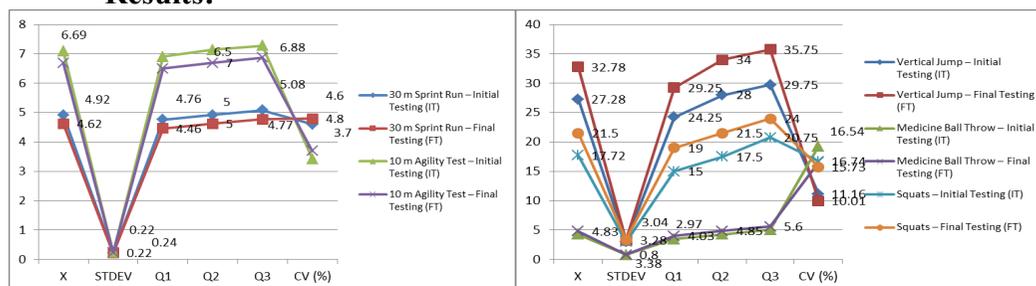
**Table 2 Module II-Applied phase and motor skills development-7 weeks**

<b>Week</b>	<b>Main Exercises and Training Means</b>
1	Sprint running over longer distances 30–40 m with fast starts; running long jumps; medicine ball throws 1–2 kg; lightly paced running over 200 m.
2	Combined circuit: 20 m sprint vertical jumps - 400 m endurance run; introduction of relay-type athletics games.
3	Bodyweight strength exercises: squats, push-ups, lunges; jumps over obstacles; short runs with changes of direction.
4	Accelerated and progressive running 50–60 m; agility courses with obstacles; accuracy throwing at targets.
5	Mixed circuit: 100 m run - jumps - throws - coordination course; emphasis on technique and error correction.

6	Repetition of intermediate motor tests; evaluation of individual progress; adjustment of exercise intensity.
7	Final testing (FT): 30 m sprint, vertical and long jumps, medicine ball throw, endurance run (600–800 m), coordination course; analysis of results.

**Program Features:**Progressiveness: the difficulty and intensity of the exercises gradually increased; Individualization: the exercises were adapted to the developmental level of each student; Variety: the combination of running, jumping, throwing and coordination courses contributed to maintaining the motivation and interest of the students; Continuous evaluation: constant observation and monitoring, complemented by initial testing (IT) and final testing (FT); Safety: all exercises were performed under supervision and using appropriate equipment. The experimental program, implemented over two modules, allowed for the harmonious development of the students' physical condition, leading to improvements in speed, strength, endurance and coordination, and provided clear evidence of the effectiveness of means specific to athletics in the middle school cycle.

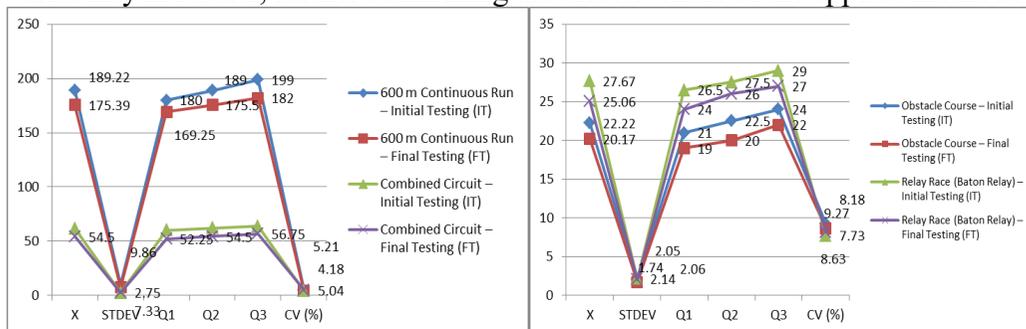
### Results:



**Fig.1. Effects of an athletics-specific training program on physical fitness performance**

In the 30 m sprint test, the mean time decreased from 4.92s to 4.62s, indicating a significant improvement in speed among students in the experimental group. The standard deviation remained relatively low 0.22-0.22, suggesting homogeneous results, with most students showing similar progress. The coefficient of variation remained almost constant 4.60%-4.80%, confirming the uniformity of the improvement. The quartiles indicate a shift of the entire group towards faster times, with lower Q1, Q2 and Q3 values at post-test. In the 10 m agility test, the mean time decreased from 7.10s to 6.69s, reflecting an improvement in coordination and speed during direction changes. The slightly increased standard deviation 0.24-0.24 indicates minor individual variation, while the coefficient of variation increased marginally 3.43%-3.70%, but remained low, suggesting a uniform distribution of results. The quartiles Q1, Q2 and Q3 decreased significantly, showing that most students achieved better times in the final test. In the vertical jump test, the mean value increased from 27.28cm to 32.78cm, indicating a significant improvement in the explosive strength of the lower limbs. The standard deviation remained relatively constant, suggesting a homogeneous progression among the students. The coefficient of variation decreased slightly 11.16%-10.01%, confirming the uniformity of the

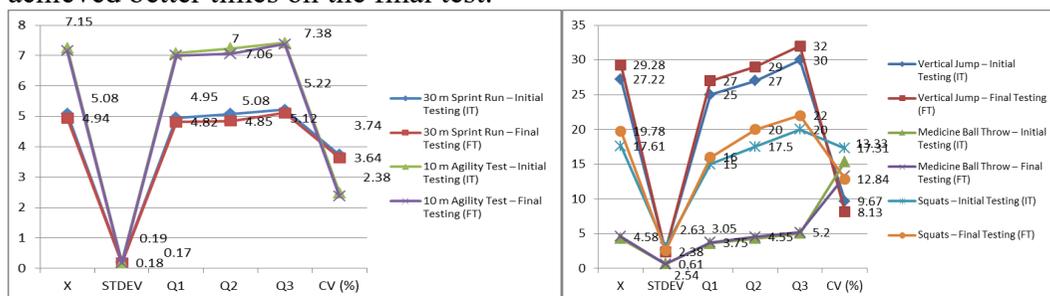
results. The quartiles Q1, Q2 and Q3 moved towards higher values, demonstrating a positive evolution within the entire group. In the medicine ball throw test, the mean distance increased from 4.28 m to 4.83 m, reflecting improvements in segmental strength of the upper limbs and trunk. The slightly lower standard deviation at the final test indicates a more homogeneous distribution of performances. The coefficient of variation decreased significantly 19.29%-16.54%, showing that most students made similar progress. The quartile values further confirm that most students achieved better results. In the squat test, the average number of repetitions increased from 17.72 to 21.50, indicating improvements in overall strength and muscular endurance. Although the standard deviation increased slightly, the coefficient of variation decreased 16.74%-15.73%, demonstrating uniform progress within the group. The quartiles shifted towards higher values, confirming the overall positive evolution of the students. Most students progressed homogeneously, with low variability in results, further confirming the effectiveness of the applied methodology.



**Fig. 2. Effects of the experimental program on endurance and complex motor performance**

In the 600 m continuous running test, the average time decreased from 189.22s representing 3:09min. to 175.39s representing 2:55min, indicating a significant improvement in aerobic endurance and sustained effort capacity. The standard deviation decreased from 9.86s to 7.33s, suggesting a greater homogeneity of the results, with most students achieving faster times. The coefficient of variation decreased from 5.21% to 4.18%, confirming the uniformity of progress. The quartiles Q1, Q2 and Q3 moved towards lower values, highlighting an overall improvement in performance. In the combined circuit test, the mean time decreased from 61.83s to 54.50s, indicating an increase in overall endurance and the ability to sustain mixed effort (running, jumping, and throwing). The standard deviation increased slightly from 2.46 to 2.75, showing that some students progressed more than others; however, the coefficient of variation remained low from 3.97% to 5.04%, suggesting that the results remained relatively homogeneous. The quartile values show that most students reduced their execution time, confirming the effectiveness of the experimental program. In the obstacle course test, the mean time decreased from 22.22s to 20.17s, indicating improvements in coordination, speed, and fine motor skills. The standard

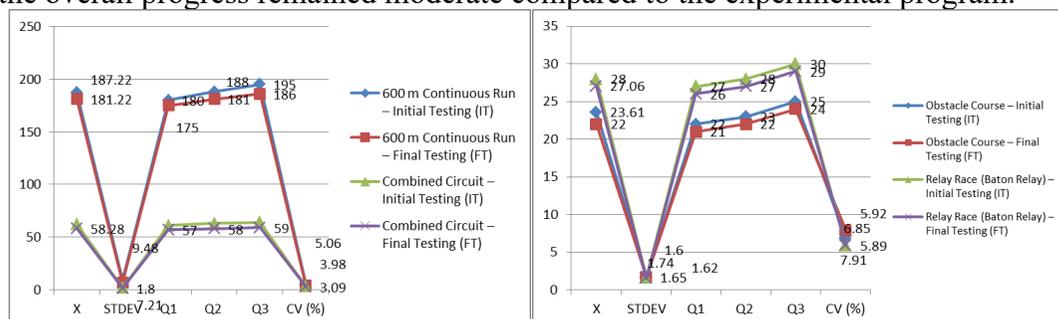
deviation decreased from 2.06s to 1.74s, suggesting more uniform performance across students. The coefficient of variation decreased from 9.27% to 8.63%, confirming that most students made similar progress. The quartiles Q1, Q2, and Q3 shifted toward lower values, demonstrating consistent overall progress. In the baton relay event, the average time decreased from 27.67s to 25.06s, reflecting improvements in coordination, reaction speed, and teamwork. The standard deviation remained almost constant, indicating a homogeneous distribution of progress. The coefficient of variation increased slightly from 7.73% to 8.18%; however, the results remained relatively consistent across students. The quartile values confirm that most students achieved better times on the final test.



**Fig.3. Effects of the standard physical education program on physical performance**

In the 30 m sprint test, the mean time decreased from 5.08 s to 4.94 s, indicating a moderate improvement in speed among students in the control group. The standard deviation remained low 0.19-0.18, suggesting relatively homogeneous results. The coefficient of variation remained low 3.74%-3.64%, confirming the uniformity of progress. The quartiles show a slight shift towards lower values, indicating a group improvement, although less pronounced than in the experimental group. In the 10 m agility test, the mean time decreased slightly from 7.24s to 7.15s, reflecting a limited improvement in coordination and speed during changes of direction. The standard deviation and coefficient of variation remained low, indicating homogeneous results. The quartiles show moderate progress, again less pronounced than in the experimental group. Overall, students in the control group achieved moderate and less pronounced improvements compared to the experimental group, suggesting that the standard teaching method applied according to the national curriculum has a limited impact on speed and agility. In the vertical jump test, the mean value increased from 27.22cm to 29.28cm, indicating a moderate improvement in lower limb explosive strength. The standard deviation and the coefficient of variation decreased slightly, suggesting relatively homogeneous results. The quartiles indicate a slight improvement in the entire group, but to a lesser extent than in the experimental group. In the medicine ball throw test, the mean distance increased from 4.30m to 4.58m, reflecting improvements in segmental strength of the upper limbs and trunk, although the progress remained moderate. The standard deviation and the coefficient of variation decreased, indicating a more uniform progression. The

quartiles confirm that most students improved, but with lower values compared to the experimental group. In the squat test, the mean number of repetitions increased from 17.61 to 19.78, indicating improvements in overall strength and muscular endurance, although less pronounced than in the experimental group. The standard deviation decreased slightly and the coefficient of variation decreased significantly, indicating more homogeneous post-test results. The quartiles shifted towards higher values, but the overall progress remained moderate compared to the experimental program.



**Fig. 4. Effects of the standard physical education program on endurance and coordination performance**

In the 600 m continuous run test, the average time decreased from 187.22s representing 3:07 to 181.22s representing 3:01, indicating a moderate improvement in aerobic endurance. The standard deviation decreased from 9.48s to 7.21s, demonstrating a more homogeneous distribution of the results. The coefficient of variation decreased 5.06%-3.98%, confirming the uniformity of the progress. The quartiles Q1, Q2 and Q3 decreased slightly, demonstrating an overall improvement in performance, although less pronounced than in the experimental group. In the combined circuit test, the average time decreased from 62.33s to 58.28s, indicating a moderate increase in overall endurance and the ability to sustain mixed effort. The standard deviation decreased slightly and the coefficient of variation remained low 3.37%-3.09%, indicating uniform performance. The quartile values confirm the group's progress, but the results remain higher than those of the experimental group, suggesting a reduced impact of the standard method. Overall, students in the control group showed moderate improvements in endurance, which were less pronounced compared to the experimental group, supporting the effectiveness of the athletics-specific program applied in the experimental group. In the obstacle course test, the mean time decreased from 23.61s to 22.00s, indicating a moderate improvement in coordination and speed during complex motor tasks. The standard deviation increased slightly 1.62-1.74, suggesting that some students progressed more than others. The coefficient of variation increased 6.85%-7.91%, indicating a slightly greater variability in progress, although the results remained relatively homogeneous. The quartiles show an overall improvement in performance, although less pronounced than in the experimental group. In the relay race, the average time decreased slightly from 28.00s to 27.06s, suggesting improvements in team coordination and

cooperation. The standard deviation and coefficient of variation remained almost constant, indicating homogeneous results among the students. The quartile values confirm a modest improvement, again less pronounced than in the experimental group.

**Discussions:** The results reported in the study [17] highlight the fact that optimizing physical fitness through physical education cannot be achieved through a single, universal model, due to the lack of standardized criteria and the influence of age-related and typological differences. In this context, the development of adapted programs, oriented towards specific objectives, such as improving motor capacity, improving health status or increasing functional capacities, becomes essential. Furthermore, research indicates that the prioritized use of athletics-specific means produces positive effects on respiratory, cardiovascular and muscular parameters. The study [18] reports an increase in physical fitness levels from average to above average, with final values of 9.1% in women and 3.2% in men, compared to the absence of such levels at the beginning of the experiment. In addition the article, [12] highlight the significant contribution of physical education and school sports to cardiovascular fitness, assessed by the 20 m running test, confirming the importance of structured interventions in the development of health-related physical fitness.

**Conclusions:** The implementation of a structured experimental program, based on athletics-specific training tools, in seventh grade students led to a significant optimization of the general physical condition, manifested by obvious improvements in speed, strength, endurance and coordination. Compared to the control group, which followed standard lessons in accordance with the national school curriculum, the experimental group achieved significantly superior results, confirming the effectiveness of the applied intervention. In terms of speed and agility, students in the experimental group recorded significant and homogeneous improvements in the 30 m sprint and 10 m agility tests, highlighting the effectiveness of sports exercises aimed at developing speed and the ability to change direction. The progress observed in the control group was moderate, further highlighting the advantages of the experimental method. The results obtained in the muscular and segmental strength tests (vertical jump, medicine ball throw and squats) demonstrated that the use of athletics-specific means effectively contributes to the development of strength capabilities, especially in the lower and upper limbs. In contrast, the control group showed limited improvements, confirming the superiority of the experimental program. In the mixed endurance and effort tests (600 m continuous run and combined circuit), the experimental group recorded significant reductions in execution time, indicating a clear increase in aerobic endurance and sustained effort capacity. Although the control group also showed progress, the level achieved remained lower than that of the experimental group. Tests targeting coordination, reaction speed and team cooperation revealed consistent and homogeneous improvements among students in the experimental group. Statistical analysis using standard deviations and coefficients

of variation revealed a high degree of homogeneity of progress within the experimental group, compared to the control group, where variability was more pronounced. This finding confirms that the experimental method ensures a more uniform development at the group level.

### References:

1. C. E., Byrd & Ross, S. M. (1991). The Influence of Participation in Junior High Athletics on Students' Attitudes and Grades. *Physical Educator*, 48(4), 170–176.
2. C. K., Fox, D., Barr-Anderson, D., Neumark-Sztainer, & Wall, M. (2010). Physical activity and sports team participation: Associations with academic outcomes in middle school and high school students. *Journal of school health*, 80(1), 31-37. <https://doi.org/10.1111/j.1746-1561.2009.00454.x>
3. Coleman, J. S. (1961). Athletics in high school. *The Annals of the American Academy of Political and Social Science*, 338(1), 33-43. <https://doi.org/10.1177/000271626133800105>
4. Сироватко, З. В., & Єфременко, В. М. (2021). Optimization of motor activity of student youth with the use of sports games in the educational process. *Науковий часопис Українського державного університету імені Михайла Драгоманова. Серія 15, (11 (143))*, 18-20. [https://doi.org/10.31392/NPUnc.series15.2021.11\(143\).04](https://doi.org/10.31392/NPUnc.series15.2021.11(143).04)
5. E. Vizitiu Lakhdari, & Scheuleac, A. (2025). Fitness pentru sănătate și performanță, Editura RISOPRINT, CLUJ-NAPOCA, ISBN978-973-53-3331-7, p.284
6. E. Vizitiu, & Scheuleac, A. (2023). Optimizing the fitness level in adults through the circuit method, *Sport. Olympism. Health. VIIIth Edition*, Chisinau, Moldova, 28-30 September, 2023, <https://doi.org/10.52449/soh23.60>
7. E.R., Pestana, W.R.G., de Carvalho, L.A.de Menezes Nunes, *et al.* (2018). Sports practice and factors associated with school performance in grade and high school: comparison between athletes and non-athletes. *Sport Sci Health* 14, 639–644. <https://doi.org/10.1007/s11332-018-0478-6>
8. G. Agache, & Vizitiu Lakhdari, E. (2022). Mentalitatea profesională a profesorului de educatie fizică și sport. In: *Formarea continuă a specialistului de cultură fizică în conceptul acmeologic modern*, Ed. 3, 1 decembrie 2022, Chișinău. Chișinău, Republica Moldova: Departamentul Sporturi de Lupte și Gimnastică al USEFS, 2022, Ediția 3, pp. 5-10. ISBN 978-9975-68-473-6
9. G.D., Myer, A. D., Faigenbaum, D. A., Chu, J., Falkel, K. R., Ford, T. M., Best, & Hewett, T. E. (2011). *Integrative Training for Children and*

- Adolescents: Techniques and Practices for Reducing Sports-Related Injuries and Enhancing Athletic Performance. *The Physician and Sportsmedicine*, 39(1), 74–84. <https://doi.org/10.3810/psm.2011.02.1854>
10. Jable, J. T. (1986). High School Athletics: History Justifies Extracurricular Status. *Journal of Physical Education, Recreation & Dance*, 57(2), 61–68. <https://doi.org/10.1080/07303084.1986.10606046>
  11. Li, D. (2025). Research on Optimization of Sports Training Scheme for Senior High School Entrance Examination Based on Sports Quality Transfer. *Frontiers in Sport Research*, 7(1). <https://doi.org/10.25236/FSR.2025.070107>
  12. M. W., Beets, & Pitetti, K. H. (2005). Contribution of physical education and sport to health-related fitness in high school students. *Journal of School Health*, 75(1), 25-30. <https://doi.org/10.1111/j.1746-1561.2005.tb00005.x>
  13. M. W., Metzler, T. L., McKenzie, van H., der Mars, S. L., Barrett-Williams, & Ellis, R. (2013). Health Optimizing Physical Education (HOPE): A New Curriculum for School Program-Part 1: Establishing the Need and Describing the Model. *Journal of Physical Education, Recreation & Dance*, 84(4), 41–47. <https://doi.org/10.1080/07303084.2013.773826>
  14. O. Blagii, V. Berezovskyi, L. Balatska, O. Kyselytsia, Y. Palichuk, & Yarmak, O. (2018). Optimization of psychophysiological indicators of adolescents by means of sport orienteering. <https://doi.org/10.7752/jpes.2018.s175>
  15. O. Slimi A. Muscella S. Marsigliante M. Bahloul G. Badicu A.F., & Alghannam Yagin F., H.(2025). Optimizing athletic engagement and performance of obese students: an adaptive approach through basketball in physical education. *Front Sports Act Living*. 2025 Jan 28;6:1448784. <https://doi.org/10.3389/fspor.2024.1448784>. PMID: 39936002; PMCID: PMC11811087
  16. R. Eric Eide & Ronan, N. (2001). Is participation in high school athletics an investment or a consumption good?: Evidence from high school and beyond, *Economics of Education Review*, Volume 20, Issue 5, p. 431-442, ISSN 0272-7757, [https://doi.org/10.1016/S0272-7757\(00\)00033-9](https://doi.org/10.1016/S0272-7757(00)00033-9)
  17. S.P., Levushkin & Son'kin, V.D. (2009). The problem of optimization of the physical state of school students by means of physical education. *Hum Physiol* 35, 58–65 <https://doi.org/10.1134/S0362119709010101>
  18. T. Dukh, I. Bodnar, I. Pavlova, Y. Svyshch, & Pavlos, O. (2019). Perspectives of using athletics means for improving the level of physical health of students. In *Society. Integration. Education. Proceedings of the International Scientific Conference*(Vol. 4, pp. 123-133). <https://doi.org/10.17770/sie2019vol4.376>