

Influence of elective disciplines on physical fitness and somatic health of students

Evgeniya N. Kopeikina^{1,1}, *Victor L. Kondakov*^{1,2}, *Ludmila N. Voloshina*¹, *Valentina N. Kormakova*¹, *Natalya V. Balysheva*¹

¹ Belgorod National Research University, Belgorod, Russia

² Belgorod Law Institute of Ministry of the Interior of the Russian Federation named after I.D. Putilin, Belgorod, Russia

Abstract. The aim of the study is to assess the impact of classes within the framework of the discipline "Elective disciplines in physical education and sports" on physical fitness and somatic health of students. Methodology: 300 students participated in the study. Research methods: study, analysis, comparison of scientific and methodological literature data on the studied problem of domestic and foreign scientists, testing of physical qualities, the index method, functional tests, methods of mathematical statistics. The results of our research allow us to assert that practicing one type of motor activity within the framework of the subject does not allow us to realize most of the tasks that must be solved in the course of classes in this discipline. Such classes do not have a comprehensive impact on physical fitness, unlike academic physical education classes, which include various sports. In this regard, we recommend considering the possibility of applying individual programs for self-organization of students' motor modes in the educational space of the university. Conclusion. Our study showed that one academic lesson per week does not significantly affect the physical fitness of students, but at the same time contributes to a significant improvement in the level of health in most experimental groups.

Keywords. students, physical fitness, somatic health, elective disciplines in physical culture and sports

1 Introduction

Elective disciplines (from Latin *electus* – selective) are the academic disciplines selected for mastering by students from the presented list in accordance with personal interests and mandatory for mastering. «Elective disciplines on physical culture and sport» are mandatory for students of educational programs of bachelor's and specialist full-time studies of universities of the Russian Federation [1,2].

«Elective disciplines in physical culture and sport» are courses that students can choose to study within the curriculum. The content of elective disciplines is aimed at achieving and

¹ Corresponding author: kopeikina@bsu.edu.ru

maintaining an optimal level of physical development, physical fitness and functional capabilities of the students' organism [3,4,5,6,7]. Their purpose is to expand and consolidate knowledge, skills and abilities in the field of physical culture and sport, and also contribute to the formation of students' positive attitude to systematic physical exercise and various types of motor activity to maintain health and improve the quality of life, the development of team spirit, leadership skills and the ability to work in a team [8,9,10]. In general, elective disciplines in physical education and sports play an important role in the formation of a healthy lifestyle and active life position of students [11,12].

The aim of the study is to evaluate the impact of academic classes within the discipline «Elective disciplines in physical education and sports» on the physical fitness and somatic health of students.

2 Materials and Methods

The study was conducted from September 2023 to January 2024. The study involved 300 1st-2nd year students of the Belgorod National Research University, including 150 girls (75 basic health group, 75 special medical health group) and 150 boys (75 basic health group, 75 special medical health group). 20 groups were formed (10 groups of students of the special medical group (from 1 to 5), 10 groups of students of the basic medical group (from 6 to 10)). Each group within the framework of the discipline «Elective disciplines in physical culture and sports» practiced a selected sport: EGG₁, EGG₉, EGB₅, EGB₇ were engaged in types of motor activity of aerobic orientation (athletics, swimming, aerobics); EGG₃, EGG₇, EGB₄, EGB₈ – sports games; EGG₂, EGG₈, EGB₁, EGB₉ – athletic gymnastics, Pilates; EGG₅, EGG₆, EGB₂, EGB₆ – practiced independently at home; EGG₄, EGG₁₀, EGB₃, EGB₁₀ – intellectual sports (chess, checkers, darts). All classes were held within the framework of the educational process, according to the schedule once a week.

Research methods: study, analysis, comparison of data of scientific and methodological literature on the problem under study of domestic and foreign scientists, testing of physical qualities, method of indices, functional tests, methods of mathematical statistics.

3 Results

Our research allowed us to determine the impact of the chosen sport on the physical fitness and somatic health of students engaged in the chosen type of motor activity (sport) within the framework of the subject «Elective disciplines in physical education and sport». The results of the conducted research are presented in Tables 1 and 2.

The results of the study presented in Table 1 indicate that not all selected types of motor activity (sports) influenced the indicators of students' physical fitness to the same extent.

The students of EGG₁ and EGB₇, who within the discipline «Elective disciplines in physical culture and sports» were engaged in types of motor activity of aerobic orientation (athletics, swimming, aerobics) significantly improved the indicators characterizing strength qualities ($p \leq 0,05$ by Student's t-criterion). No reliable changes were found in female students of EGG₉.

The strength qualities have significantly improved in students who chose different types of sports games for their electives: EGG₃, EGG₇, EGB₈. In girls of EGG₃, EGB₇ speed and strength qualities significantly improved, in EGG₇ coordination abilities increased. In boys EGB₈ there was a significant increase in flexibility ($p \leq 0,05$ by Student's t-criterion).

Athletic gymnastics and Pilates classes influenced the growth of speed and strength qualities in students belonging to the main health group (EGG₈ and EGB₉), and in girls EGG₈ and strength qualities ($p \leq 0,05$ by Student's t-criterion).

Among the students who practiced physical training independently at home (as they were trained in distance mode), girls had significantly improved strength indicators, and girls belonging to the special medical group (EGG₃) also had improved indicators of speed, strength and coordination qualities. In boys of the special medical group of health (EGB₂) reliable changes occurred only in indicators of speed and strength qualities ($p \leq 0,05$ by Student's t-criterion). The young men of the main health group (EGB₆) had no reliable changes.

Intellectual sports (chess, checkers, darts) affected physical qualities of girls only: in EGG₄ strength and coordination abilities improved, and in EGG₁₀ – speed and strength abilities ($p \leq 0,05$ by Student's t-criterion). In young men (EGB₃, EGB₁₀) no reliable changes were found.

Table 1. Dynamics of physical fitness indices of students of experimental groups before and after a series of laboratory experiments

| Group (n=15) | physical fitness indicators of girls (M ± m) | | | | | |
|----------------------|--|--------------|-------------------|---|-------------|-------------------|
| | flexion and extension of arms in a supine position (number of times) | | | torso lift from lying on the back (number of times) | | |
| | M±m | M±m | t _{calc} | M±m | M±m | t _{calc} |
| EGG ₁ | 5,53±1,67 | 10,13±2,51 | -2,98* | 46,93±4,68 | 50,93±5,32 | -2,24* |
| EGG ₂ | 7,27±1,36 | 7,47±1,28 | -0,49 | 44,80±3,06 | 44,07±3,24 | 0,53 |
| EGG ₃ smg | 8,67±1,23 | 10,93±1,42 | -2,46* | 44,53±4,40 | 44,53±5,14 | 0 |
| EGG ₄ | 6,64±1,65 | 8,93±1,87 | -1,19 | 48,27±3,84 | 62,43±5,68 | -2,48* |
| EGG ₅ | 10,0±2,09 | 12,47±2,63 | -1,93 | 37,27±1,48 | 43,27±1,55 | -5,86* |
| EGG ₆ | 7,60±1,33 | 10,93±1,47 | -2,72* | 61,93±6,81 | 65,53±8,49 | -0,56 |
| EGG ₇ | 8,40±1,32 | 12,40±1,81 | -2,27* | 52,73±7,10 | 67,80±7,66 | -2,84* |
| EGG ₈ mmg | 7,87±1,13 | 12,07±1,46 | -3,76* | 67,07±4,86 | 80,27±6,30 | -3,06* |
| EGG ₉ | 6,40±1,32 | 7,87±1,79 | -0,86 | 53,40±3,67 | 62,53±4,70 | -1,85 |
| EGG ₁₀ | 7,13±1,34 | 7,80±1,12 | -0,65 | 52,13±4,60 | 53,67±3,37 | -0,48 |
| | holding a half squat with support (sec) | | | long jump (cm) | | |
| | M±m | M±m | t _{calc} | M±m | M±m | t _{calc} |
| EGG ₁ | 87,98±17,34 | 91,23±15,68 | -0,28 | 158,0±4,12 | 162,67±5,06 | -2,11 |
| EGG ₂ | 35,50±3,58 | 36,45±3,75 | -0,25 | 167,27±5,06 | 167,60±4,38 | -0,34 |
| EGG ₃ smg | 42,40±5,23 | 45,56±4,77 | -1,74 | 168,13±3,36 | 168,07±2,98 | 0,04 |
| EGG ₄ | 62,42±9,30 | 67,64±10,57 | -0,27 | 156,86±4,72 | 164,13±3,90 | -1,18 |
| EGG ₅ | 75,96±15,56 | 98,59±13,63 | -1,92 | 153,07±6,37 | 153,67±6,17 | -0,26 |
| EGG ₆ | 67,82±8,61 | 69,21±4,44 | -0,16 | 161,47±4,16 | 166,67±3,97 | -1,89 |
| EGG ₇ | 96,47±14,89 | 104,19±18,90 | -0,44 | 168,93±4,57 | 176,80±4,21 | -2,02 |
| EGG ₈ mmg | 104,61±16,54 | 106,01±20,25 | -0,08 | 174,07±5,61 | 180,80±4,66 | -2,44* |
| EGG ₉ | 67,88±10,86 | 76,22±12,74 | -0,73 | 156,40±3,91 | 168,47±6,78 | 1,85 |
| EGG ₁₀ | 47,36±4,61 | 58,63±10,01 | -1,21 | 163,73±5,0 | 169,0±6,57 | -0,89 |
| | 10 squats for time (sec) | | | bench incline (cm) | | |
| | M±m | M±m | t _{calc} | M±m | M±m | t _{calc} |
| EGG ₁ | 10,37±0,28 | 10,13±0,30 | 1,47 | 9,40±3,10 | 9,33±2,71 | 0,03 |
| EGG ₂ | 10,97±0,22 | 10,77±0,35 | 1,05 | 7,53±1,56 | 9,13±1,76 | -2,02 |
| EGG ₃ smg | 10,96±0,33 | 10,23±0,28 | 2,24* | 10,33±1,30 | 10,80±1,22 | -0,63 |
| EGG ₄ | 10,66±0,29 | 11,15±0,59 | -0,98 | 10,33±1,17 | 12,92±0,51 | -2,01 |
| EGG ₅ | 11,95±0,31 | 11,27±0,35 | 2,57* | 3,73±3,89 | 5,00±3,48 | -1,23 |
| EGG ₆ | 10,06±0,15 | 10,0±0,22 | 0,26 | 14,01±2,44 | 14,80±2,52 | -1,14 |
| EGG ₇ | 10,67±0,46 | 9,62±0,24 | 2,32* | 12,87±1,75 | 13,45±1,87 | -0,58 |
| EGG ₈ mmg | 11,55±0,42 | 10,13±0,35 | 3,68* | 11,73±1,65 | 12,20±1,51 | -0,80 |
| EGG ₉ | 10,83±0,31 | 10,69±0,25 | 0,64 | 8,87±1,31 | 10,39±0,98 | -1,34 |
| EGG ₁₀ | 11,10±0,28 | 10,61±0,37 | 2,22* | 9,07±1,34 | 10,35±1,51 | -0,93 |
| | Yarotsky test (sec) | | | Romberg test (sec) | | |
| | M±m | M±m | t _{calc} | M±m | M±m | t _{calc} |
| EGG ₁ sm | 5,58±0,73 | 6,47±1,23 | -0,61 | 16,71±3,26 | 17,24±3,33 | -0,25 |
| EGG ₂ g | 3,08±0,44 | 3,74±0,39 | -1,46 | 8,62±1,55 | 10,75±1,51 | -1,64 |

| | | | | | | | | |
|---|--------------------|-------------|--------------|--|--------------|-------------|--------------------|--|
| EGG ₃ | | 3,45±0,59 | 4,53±0,91 | -0,96 | 14,50±4,57 | 18,80±2,25 | -0,87 | |
| EGG ₄ | | 4,09±0,35 | 6,04±0,70 | -2,22* | 16,31±2,61 | 17,28±3,60 | -0,25 | |
| EGG ₅ | | 4,13±0,65 | 5,23±1,11 | -1,52 | 10,90±3,67 | 19,62±4,68 | -3,72* | |
| EGG ₆ | | 28,79±6,37 | 32,97±6,25 | -0,61 | 9,53±1,01 | 10,75±1,21 | -0,75 | |
| EGG ₇ | mm g | 6,25±1,02 | 10,17±1,83 | -2,35* | 14,45±2,67 | 16,64±2,61 | -0,90 | |
| EGG ₈ | | 8,84±1,33 | 10,58±1,96 | -1,07 | 17,01±4,41 | 21,84±6,65 | -0,71 | |
| EGG ₉ | | 4,90±0,52 | 6,40±0,65 | -1,63 | 14,19±2,38 | 14,03±2,51 | 0,09 | |
| EGG ₁₀ | | 4,21±0,65 | 4,91±0,87 | -0,62 | 13,08±3,20 | 13,04±2,75 | 0,01 | |
| physical fitness indicators of boys (M ± m) | | | | | | | | |
| flexion and extension of arms in a supine position (number of times) | | | | torso lift from lying on the back (number of times) | | | | |
| | | M±m | M±m | t _{calc.} | M±m | M±m | t _{calc.} | |
| EGB ₁ | sm g mm g | 8,80±1,60 | 10,13±1,70 | 0,82 | 51,33±6,02 | 55,20±6,56 | 1,11 | |
| EGB ₂ | | 8,13±0,96 | 9,93±1,42 | 1,48 | 53,27±4,81 | 59,20±5,25 | 1,10 | |
| EGB ₃ | | 43,60±2,61 | 45,33±2,13 | 1,81 | 77,13±4,49 | 77,53±4,36 | 1,0 | |
| EGB ₄ | | 8,33±1,65 | 9,27±1,81 | 0,47 | 51,13±6,06 | 56,80±6,41 | 2,07 | |
| EGB ₅ | | 24,60±6,03 | 24,87±5,98 | 0,19 | 47,87±2,70 | 51,60±4,44 | 0,66 | |
| EGB ₆ | | 43,0±2,66 | 46,07±2,60 | 1,77 | 65,13±5,01 | 68,67±5,65 | 1,36 | |
| EGB ₇ | | 51,20±2,16 | 51,0±2,26 | 0,43 | 64,53±2,31 | 69,73±1,59 | 2,93* | |
| EGB ₈ | | 13,47±1,85 | 14,53±2,37 | 1,42 | 68,0±5,82 | 71,47±6,30 | 2,69* | |
| EGB ₉ | | 39,20±6,91 | 39,20±6,34 | 0 | 54,0±9,56 | 56,67±10,26 | 1,54 | |
| EGB ₁₀ | | 41,0±4,78 | 44,20±4,98 | 1,22 | 44,60±6,60 | 48,33±7,14 | 1,77 | |
| holding a half squat with support (sec) | | | | long jump (cm) | | | | |
| | | M±m | M±m | t _{calc.} | M±m | M±m | t _{calc.} | |
| EGB ₁ | sm g mm g | 47,96±7,08 | 60,80±11,67 | 1,14 | 223,33±4,52 | 223,47±4,56 | 0,02 | |
| EGB ₂ | | 70,04±10,98 | 80,66±22,27 | 0,78 | 197,87±20,91 | 233,80±4,39 | 1,55 | |
| EGB ₃ | | 76,71±7,08 | 78,68±6,61 | 1,75 | 229,40±4,17 | 232,0±3,21 | 1,40 | |
| EGB ₄ | | 53,19±7,48 | 63,45±11,33 | 0,87 | 222,73±5,16 | 226,27±4,46 | 0,57 | |
| EGB ₅ | | 49,70±7,47 | 50,39±6,41 | 0,17 | 224,47±4,82 | 223,53±5,66 | 0,12 | |
| EGB ₆ | | 61,94±7,36 | 60,13±5,52 | 0,46 | 239,13±4,21 | 240,80±4,40 | 0,38 | |
| EGB ₇ | | 69,32±5,52 | 69,26±5,87 | 0,03 | 233,20±4,91 | 234,27±4,49 | 0,41 | |
| EGB ₈ | | 83,24±10,62 | 114,73±20,97 | 2,04 | 240,67±3,59 | 242,40±3,87 | 1,56 | |
| EGB ₉ | | 71,43±11,70 | 104,38±21,73 | 2,12 | 203,54±21,26 | 239,47±3,80 | 1,58 | |
| EGB ₁₀ | | 64,56±6,95 | 69,42±7,02 | 1,28 | 227,73±6,62 | 229,33±5,58 | 0,25 | |
| 10 squats for time (sec) | | | | bench incline (cm) | | | | |
| | | M±m | M±m | t _{calc.} | M±m | M±m | t _{calc.} | |
| EGB ₁ | sm g mm g | 9,27±0,14 | 9,26±0,10 | 0,05 | 5,13±1,74 | 5,67±1,92 | 0,81 | |
| EGB ₂ | | 9,89±0,16 | 9,47±0,16 | 2,81* | 6,93±2,34 | 9,87±2,08 | 1,36 | |
| EGB ₃ | | 9,60±0,25 | 9,51±0,22 | 1,19 | 6,20±1,23 | 7,13±0,98 | 1,79 | |
| EGB ₄ | | 9,44±0,19 | 9,32±0,13 | 1,14 | 6,20±1,81 | 6,67±1,95 | 0,70 | |
| EGB ₅ | | 9,68±0,16 | 9,57±0,13 | 0,47 | 3,60±3,02 | 4,80±3,08 | 1,99 | |
| EGB ₆ | | 14,07±2,0 | 14,43±2,16 | 0,20 | 6,07±3,64 | 7,87±3,51 | 0,88 | |
| EGB ₇ | | 9,29±0,27 | 9,29±0,24 | 0,02 | 8,47±1,12 | 9,60±1,36 | 0,71 | |
| EGB ₈ | | 9,10±0,22 | 9,23±0,23 | 0,81 | 6,47±2,18 | 7,80±2,18 | 2,39* | |
| EGB ₉ | | 9,39±0,18 | 9,18±0,14 | 2,42* | 10,93±1,91 | 11,07±1,62 | 0,18 | |
| EGB ₁₀ | | 9,70±0,23 | 9,59±0,22 | 0,95 | 3,47±2,53 | 4,33±4,33 | 0,54 | |
| Yarotsky test (sec) | | | | Romberg test (sec) | | | | |
| | | M±m | M±m | t _{calc.} | M±m | M±m | t _{calc.} | |
| EGB ₁ | sm g | 3,29±0,41 | 3,44±0,39 | 0,36 | 12,04±3,01 | 13,05±3,01 | 0,24 | |
| EGB ₂ | | 3,70±0,53 | 3,60±0,31 | 0,25 | 8,80±2,92 | 11,17±2,66 | 0,56 | |
| EGB ₃ | | 4,92±0,53 | 5,23±0,64 | 1,0 | 12,81±3,01 | 12,95±3,17 | 0,03 | |
| EGB ₄ | | 2,85±0,34 | 3,14±0,35 | 0,96 | 12,42±2,96 | 13,06±2,99 | 0,15 | |

| | | | | | | | |
|-------------------|----|------------|------------|------|------------|------------|------|
| EGB ₅ | | 4,07±0,38 | 4,08±0,42 | 0,03 | 13,65±3,70 | 17,86±4,25 | 0,66 |
| EGB ₆ | | 28,25±5,76 | 32,25±7,12 | 1,41 | 10,57±1,69 | 11,15±1,34 | 0,37 |
| EGB ₇ | mm | 5,64±0,72 | 6,01±0,70 | 0,98 | 12,07±2,90 | 16,30±2,91 | 0,95 |
| EGB ₈ | | 5,58±0,62 | 7,74±2,69 | 0,91 | 9,49±1,0 | 10,12±0,93 | 0,38 |
| EGB ₉ | g | 17,21±5,79 | 20,0±7,44 | 1,25 | 10,36±1,61 | 12,60±2,10 | 1,12 |
| EGB ₁₀ | | 4,38±0,70 | 4,74±0,63 | 0,79 | 9,18±1,38 | 15,65±3,06 | 1,90 |

*- differences are reliable according to Student's criterion ($p \leq 0,05$)

The level of somatic health significantly improved in girls belonging to the special medical health group, who were engaged in aerobic motor activities (athletics, swimming, aerobics) (EGD₁), athletic gymnastics and Pilates (EGD₂). The improvement of somatic health in girls, the main health group, was observed in those who practiced sports games (EGD₇), athletic gymnastics and Pilates (EGD₈) and intellectual sports (chess, checkers, darts) (EGD₁₀). These improvements are reliable ($p \leq 0,05$ by Student's t-criterion).

Table 2. Dynamics of somatic health indicators of students of experimental groups before and after a series of laboratory experiments (according to Apanasenko G.A.)

| Group (n=15) | Overall health assessment (points) | | | | | | | |
|-------------------|------------------------------------|-----------|-------------------|------------------|-------------------|-----------|-------------------|--------|
| | Girls | | | Group (n=15) | Boys | | | |
| | M±m | M±m | T _{calc} | | M±m | M±m | T _{calc} | |
| EGG1 | 2,27±0,74 | 5,27±0,61 | -4,86* | EGB ₁ | 2,47±0,89 | 4,47±0,87 | 2,24* | |
| EGG2 | 4,07±0,40 | 4,27±0,46 | -0,72 | EGB ₂ | 4,07±0,75 | 4,60±0,96 | 0,53 | |
| EGG ₃ | smg | 2,87±0,80 | 3,27±0,85 | -0,47 | EGB ₃ | 2,60±0,55 | 3,80±0,66 | 1,24 |
| EGG ₄ | | 4,07±0,42 | 4,20±0,75 | -0,18 | EGB ₄ | 3,67±0,39 | 6,73±0,40 | 10,21* |
| EGG ₅ | | 1,33±0,81 | 2,93±0,81 | -2,48* | EGB ₅ | 4,93±0,82 | 7,13±0,89 | 4,10* |
| EGG ₆ | | 4,13±0,45 | 3,47±0,45 | 1,21 | EGB ₆ | 3,87±0,77 | 5,67±0,87 | 1,74 |
| EGG ₇ | | 1,40±0,84 | 5,80±0,70 | -6,20* | EGB ₇ | 3,67±0,73 | 4,73±0,76 | 0,93 |
| EGG ₈ | mmg | 2,27±0,73 | 4,27±1,05 | -2,54* | EGB ₈ | 3,67±0,51 | 6,73±0,55 | 5,0* |
| EGG ₉ | | 2,13±0,63 | 3,40±1,11 | -1,12 | EGB ₉ | 4,27±0,54 | 6,47±0,69 | 2,95* |
| EGG ₁₀ | | 3,07±0,78 | 6,87±0,52 | -5,29* | EGB ₁₀ | 3,13±0,80 | 5,13±0,89 | 1,87 |

*- differences are reliable according to Student's criterion ($p \leq 0,05$)

In young men of the special health group, a reliable increase in the level of somatic health was found in those students who were engaged in aerobic motor activity (athletics, swimming, aerobics) (EGB₅), sports games (EGB₄) and athletic gymnastics (EGB₁). Among the students in the basic health group, only those who practiced athletic gymnastics (EGB₉) had significant improvements in somatic health. These improvements are reliable ($p \leq 0,05$ by Student's t-criterion).

4 Discussion

Many specialists believe that «Elective disciplines on physical culture and sports» provide an effective educational process that allows solving a set of problems related to physical development, physical fitness, functional capabilities of the body and health of students [2,13,14,15].

According to M.A. Gnezdilov, the experimental material accumulated so far in the framework of this problem indicates that the introduction of elective courses on physical culture in the educational process of higher education institution allows to create conditions for the inclusion of students in such types of activities, in which, on the one hand, the development of their independence, self-organization is carried out, their interests and needs are realized, on the other hand, interpersonal interaction in groups on sports preferences is carried out, which, as a result, can help to improve the quality of physical education [1,16,17,18].

At the same time, the results of our research allow us to assert that one type of motor activity (sport) within the framework of the subject «Elective disciplines in physical culture and

sport» does not allow to realize most of the tasks that should be solved in the process of academic classes in this discipline, In particular, such classes do not have a comprehensive impact on physical fitness, unlike academic classes in the discipline «Physical Education», which includes various types of sports. In this regard, we recommend to consider the application of individual programs of self-organization of students' motor modes in the educational space of higher education institution [19].

5 Conclusion

Our study to assess the impact of academic classes within the discipline «Elective disciplines in physical culture and sport» on physical fitness and somatic health of students showed that one academic class per week, during one semester, the selected type of motor activity (sport) does not significantly affect the physical fitness of students, but at the same time contributes to a significant improvement in the level of health in most experimental groups.

Acknowledgments: The article is published with the support of the Russian National Science Foundation grant No. 23-28-00643 «Innovative environment for optimizing the motor modes of students»

References

1. M.A. Gnezdilov. Concept. 31, 686-690 (2017)
2. Y.A. Mitrokhin, Y.I. Teplukhin, D.S. Yudin, A.Y. Samsonov. International Research Journal, 11(125) (2022). Accessed on: September 09, 2023. [Online]. Available: <https://doi.org/10.23670/IRJ.2022.125.67>
3. V.I. Bocharova, V.L. Kondakov, E.N. Kopeikina, D.E. Smirnova, L.V. Verzunova, I.A. Shumakov. Probl Sotsialnoi Gig Zdravookhranennii Istor Med. 29(5), 1138-1143 (2021). doi: 10.32687/0869-866X-2021-29-5-1138-1143. PMID: 34665550.
4. S.I. Filimonova, A.S. Grachev, D.E. Egorov, D.V. Shcherbin. Teoriya i Praktika Fizicheskoy Kultury. 6, 58–61 (2023)
5. S.E. Goginava, V.L. Kondakov, E.N. Kopeikina, A.S. Grachev, S.S. Iermakov, V. Potop. Journal of Physical Education and Sport. 20(2), 1235 – 1241 (2020) DOI: 10.7752 / jpes.2020.s2172
6. P. Acs, J. Bergier, F. Salonna, J. Junger, M. Gyuro, A. Simonugron, Z. Welker, A. Makai. Studia Universitatis Babeş-Bolyai. 62(1), (2017)
7. A. Alidadi, H. Taheri, A. Jalili. Int. J. Pharm. Biol. Sci. Arch. 7, 18-23 (2019)
8. A. Alhadabi, A.C. Karpinski. International Journal Adolesc. 25(1), 519-535 (2020)
9. B. Behzadnia, F. Mollaei Zangi, F. Rezaei, M. Eskandarnejad. Journal of Sport and Exercise Psychology. (2023) Accessed on: Jul 21, 2023. [Online]. Available: <https://doi.org/10.1080/1612197X.2023.2237051>
10. C. Fernández-Espínola, B.J. Almagro, J.A. Tamayo-Fajardo, P. Sáenz-López. Front. Psychol. 11, 1535 (2020)
11. A.V. Leifa, Y.D. Zheleznyak. Physical education of students. 21, 244 (2017)
12. V.G. Fotynyuk. Physical education of students. 21, 17-21 (2017)
13. Yu.N. Ermakova, E.A. Osokina, Yu.V. Tikhomirov. Modern problems of science and education, 5. (2017) Accessed on: Jul 21, 2017. [Online]. Available: <https://science-education.ru/ru/article/view?id=26814>
14. L.M. Lukyanova. Science. 5(41), 87-91 (2020)
15. A. Hanssen-Doose, C. Albrecht, S.C.E. Schmidt, A. Woll, A. Worth. German Journal of Exercise and Sport Research. 48(4), 530-543 (2018)

16. D. Garcia-Alvarez, R. Faubel. *International Journal of Environmental Research and Public Health*. 17(18), 15 (2020)
17. R. Guthold, G.A. Stevens, L.M. Riley, F.C. Bull. *Lancet Global Health*. 6(10), E1077-E1086 (2018)
18. M.S. Kim, B.J. Cardinal. *Journal of American College Health*. 67(3), 207-214 (2019)
19. S. Sukys, V.J. Cesnaitiene, A. Emeljanovas, B. Mieziene, I. Valantine, Z.M. Ossowski. *Perceptual and Motor Skills*. 126(6),1084-100 (2019)
20. A.S. Sheplyakov, V.L. Kondakov, E.N. Kopeikina, N.V. Balysheva. *Teoriya i Praktika Fizicheskoy Kultury*. 5, 51-53 (2023).