

## Orienteering in the system of recreational and health-improving activity of student youth

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### Abstract

The research presents the results of the pedagogical experiment that was performed during the academic year 2017-2018; the study enrolled 48 students aged 18-19 years (n=48). The objective of our research was to identify the impact of means of orienteering during recreational and health-improving activity on the morpho-functional state, psychophysiological state and physical fitness of the young men and girls aged 18-19 years.

We found out that at the end of the pedagogical experiment, the positive dynamics of most of the studied indicators was observed. The indicators of the cardiorespiratory system improved significantly ( $p < 0.05$ ;  $p < 0.01$ ). Significant changes ( $p < 0.05$ ;  $p < 0.01$ ) were observed in the indicators of the short-term memory capacity, of the volume of the processed information, of the attention span, and the number of mistakes made. In boys and girls, the latent period of the simple visual-motor reaction was significantly reduced ( $p < 0.01$ ) by 6.6 % and 6.1 %. Significantly ( $p < 0.01$ ), the latent period of a complex visual reaction decreased by 7.4 % in the young men, and in women - by 6.7 %. Recreational trainings in orienteering had a positive effect on physical fitness. In boys and girls, the significant changes ( $p < 0.05$ ;  $p < 0.01$ ) occurred during the performance of the motor tests: running 100 m race, shuttle running 4x9 m, standing long jump, running 3,000 m and 2,000 m race.

**Key words:** orienteering, recreational and health-improving activity, student youth.

### Introduction

Over recent years it was observed that physical health, physical development, physical fitness and performance of today's student youth are characterized by significant deviations from sex and age norms. Such negative changes only progress in the course of time. Primarily mental workload and sedentary lifestyle of students cause these changes. A significant increase in the amount of information, constant intensification of students' work, and implementation of the latest technologies into the educational process are features of the present stage of the higher education development. These changes require young people to have physical, mental and psycho-emotional potential (Bolotin, 2015; Yarmak, 2017; Kozhokar, 2018; Galan, 2018).

The statistical data on student youth morbidity indicate a steady negative trend every year (Yarmak, 2015). Frequent diseases cause temporary disability and a decrease in the function of protective-compensatory mechanisms. Under such conditions, recreational and health-improving activity of students take on special importance and become a priority. Considering the topicality of the development of actions aimed at the physical health improvement, the search for comprehensive means of effectively solving the problem under study is in the sphere of scientific interests of Ukrainian and foreign specialists (Bolotin, 2016; Andrieieva, 2017; Pityn, 2017; Kashuba, 2017; Bolotin, 2017; Denysova, 2018; Sirakov, 2018; Imas, 2018; Paliichuk, 2018).

The analysis of scientific publications enabled stating that recreational and health-improving programs with means of orienteering (Galan, 2016) have a positive impact on the psycho-physiological state of schoolchildren. Orienteering has a health-improving and training effect, while by its physiological characteristics it is close to the active motor activity. The results of the research show that means of orienteering have a positive effect on the morpho-functional state, psychoemotional state, cognitive functions, physical fitness, and performance (Korol, 2013; Midtbø, 2014; Eccles, 2015; Khimenes, 2016; Selcuk, 2017; Rosen, 2018).

The universality of orienteering in terms of physical and intellectual training, as well as the importance of this sport for recreational and health-improving activity, determine the relevance of this study.

### Materials and Methods

The article uses a set of interrelated research methods: a theoretical analysis of the scientific and methodological literature; anthropometric, physiological, psychophysiological and pedagogical methods;

methods of mathematical statistics. The analysis and synthesis of scientific and methodological literature was carried out in order to find the material on modern approaches to recreational and health-improving activity of the students. Anthropometric measurements were carried out in compliance with the current requirements for conducting this study. Body weight was determined with an accuracy of 0.01 kg. Body length was determined with an accuracy of 1 mm. To determine the functional state of the cardiovascular and respiratory systems, we studied the heart rate at rest, blood pressure, lung capacity, breath-holding tests, and determined the response of the cardiovascular system to the dynamic load. In the process of determining the psychophysiological status of the subjects, the well-known methods and tests were used, which had been tested for validity, reliability, and informativeness. We determined the time of simple and complex reaction to the stimulus. We used the methods to determine the short-term memory capacity, the amount of the processed information and the attention span. To determine physical fitness, we used motor tests and standards for the annual assessment of physical fitness of the population of Ukraine.

The study involved 48 students, including 30 boys and 18 girls aged 18-19 years, who study at Yuriy Fedkovych Chernivtsi National University.

## Results

The implementation of the recreational program was carried out outside the school time, it is designed for 10 months, with 6 hours per week. The main focus during the theoretical and practical classes was on the mastery of general skills, methods of orienteering, beginning at the same time to master the basics of orienteering. We gradually increased the number of trainings devoted to mastery of specific techniques particular for this sport. Practical exercises were conducted in the open air, taking into account various forms of relief and weather conditions.

Analysis of the morpho-functional state of the young men and girls aged 18-19 years old at the end of the pedagogical experiment indicates a positive dynamics of a significant number of indicators, which are presented in Table 1.

Table 1. Dynamics of morpho-functional parameters of the young men and girls aged 18-19 years old at the beginning and at the end of the pedagogical experiment (n = 48)

Indicators under study	Before the pedagogical experiment		After the pedagogical experiment		±Δ, %	p
	$\bar{x}$	S	$\bar{x}$	S		
Young men (n=30)						
Body length, cm	178.1	9.22	178.7	7.14	0.3	>0.05
Body weight, kg	70.4	11.51	70.9	10.26	0.7	>0.05
HR <sub>rest</sub> , beats /min <sup>-1</sup>	87.6	7.32	78.4**	5.12	11.7	<0.01
SBP, mmHg	117.8	18.45	119.8	6.81	1.7	>0.05
DBP, mmHg	67.15	6.63	75.2**	5.22	10.7	<0.01
VC, l	3360	321.88	3680.9	256.18	8.7	<0.05
Shtange test, sec	41.1	14.55	44.6	6.46	7.8	<0.05
Genchi test, sec	22.2	15.42	25.1**	2.46	11.6	<0.05
Ruffier index, nominal units	10.1	2.13	8.4**	1.32	20.2	<0.01
Girls (n=18)						
Body length, cm	165.2	4.27	165.8	5.12	0.4	>0.05
Body weight, kg	63.7	10.76	61.4	8.26	3.7	>0.05
HR <sub>rest</sub> , beats /min <sup>-1</sup>	88.4	11.26	80.4**	5.36	10.0	<0.01
SBP, mmHg	112.6	8.33	114.5	7.54	1.7	>0.05
DBP, mmHg	74.5	7.65	70.2*	6.11	6.1	<0.05
VC, l	3150	356.87	3380	234.72	6.8	<0.05
Shtange test, sec	35.8	5.51	40.7	8.31	12.0	<0.05
Genchi test, sec	19.3	6.33	23.0**	2.05	16.1	<0.01
Ruffier index, nominal units	10.6	3.18	8.6**	1.37	23.3	<0.01

Note: ± Δ, % - the difference at the end of the pedagogical experiment;

Note: \* the difference is statistically significant at the level of p <0.05;

\*\* the difference is statistically significant at the level of p <0.01

In the young men the average results of heart rate decreased by 11.7 % (p <0.01), in the girls - by 10.0 % (p <0.01). In the young men, the average group indicator of vital lung capacity increased by 8.7 % (p <0.05,) in the girls - by 6.8 % (p <0.05). The indices of the Shtange and Genchi breath holding tests also had significant positive changes. In the young men the average group result of the Shtange test increased by 7.8 % (p

<0.05), in the girls - by 12.0 % (p <0.05); in the young men the average group result of the Genchi test increased by 11.6 % (p <0.05) and in the girls - by 16.1 % (p <0.05). The biggest positive changes in the percentage equivalent occurred in the indicators of the Ruffier index, in the young men the average group result improved by 20.2 % (p <0.01) and in the girls - by 23.3 % (p <0.01).

We believe that the positive impact on the cardiovascular and respiratory system of student youth is due to an increase in the volume of physical activity of varying intensity in the open air under different weather conditions.

One of the important indicators of the effectiveness of the implementation of orienteering means is positive dynamics of indicators of psycho-emotional state of students; the results are presented in Table 2.

A comparative analysis of the results indicates that the young men and girls of 18-19 years old significantly (p <0.05; p <0.01) improved indicators of cognitive functions, in particular: the young men's short-term memory capacity increased by 51.1 % (p <0.01), the volume of processed information increased by 26.3 % (p <0.01); the attention span - by 58.4 % (p <0.01), and the number of errors made decreased by 47.8 % (p <0.01).

In the girls, the short-term memory capacity increased by 58.0 % (p <0.01); the volume of the processed information increased by 26.1 % (p <0.01); the attention span increased by 38.2 % (p <0.01), and the number of errors made decreased by 46.6 % (p <0.01). The positive dynamics of the results of the cognitive functions of student youth is due to the fact that practical training in orienteering is focused on mastering the skills of working with various sources of information. While performing the tasks, the students needed to monitor the terrain, to read the map, and to make the necessary decisions quickly. Training activity in orienteering contributed to the development of attention, concentration, and also to the mental activity enhancement.

Analysis of the neurodynamic functions at the end of the pedagogical experiment, indicates a positive dynamics of the studied parameters. In the young men, the latent period of the simple visual-motor reaction decreased by 6.6 % (p <0.01), in the girls it decreased by 6.1 % (p <0.01). The latent period of the complex visual-motor reaction in the young men decreased by 7.4 % (p <0.01), in the girls - by 6.7 % (p <0.01). The average time rate of motor reaction in the young men improved by 9.8 % (p <0.01), in the girls - by 10.7 % (p <0.01). The indicators of the sharpened Romberg test have changed positively. In the young men, the average group result increased by 26.6 % (p <0.01), in the girls - by 27.7 % (p <0.01).

Table 2. Dynamics of indicators of the psychophysiological state of the young men and girls aged 18-19 years at the beginning and at the end of the pedagogical experiment (n = 48)

Indicators under study	Before the pedagogical experiment		After the pedagogical experiment		±Δ. %	p
	$\bar{x}$	S	$\bar{x}$	S		
Young men (n=30)						
Short-term memory capacity (STMC),%	25.7	9.31	52.6**	5.87	51.1	<0.01
Volume of the processed information (VPI), bit	229.6	78.57	311.6**	25.73	26.3	<0.01
Attention span, points	3.2	2.26	7.7**	1.02	58.4	<0.01
Number of mistakes	13.6	5.83	9.2**	1.12	47.8	<0.01
Simple visual-motor reaction, millisecond	423.8	51.18	397.5**	49.33	6.6	<0.01
Complex visual-motor reaction, millisecond	411.6	49.25	383.2**	45.61	7.4	<0.01
Reaction time, millisecond	97.4	14.87	88.7**	12.27	9.8	<0.01
Sharpened Romberg test, second	12.4	6.41	16.9**	3.21	26.6	<0.01
Girls (n=18)						
Short-term memory capacity (STMC),%	19.8	10.64	47.1**	8.19	58.0	<0.01
Volume of the processed information (VPI), bit	318.9	87.55	431.8**	41.22	26.1	<0.01
Attention span, points	4.2	1.84	6.8**	0.45	38.2	<0.01
Number of mistakes	12.9	5.44	8.8**	1.04	46.6	<0.01
Simple visual-motor reaction, millisecond	420.8	48.75	396.5**	44.82	6.1	<0.01
Complex visual-motor reaction, millisecond	406.5	49.77	380.8*	43.12	6.7	<0.01
Reaction time, millisecond	95.9	11.53	86.6**	6.26	10.7	<0.01
Sharpened Romberg test, second	13.6	7.22	18.8**	2.18	27.7	<0.01

Note: ± Δ, % - the difference at the end of the pedagogical experiment;

Note: \*\* the difference is statistically significant at p <0.01

The long-term training activity in orienteering had a positive impact on basic motor skills. The average results of motor tests obtained at the end of the pedagogical experiment are presented in Table 3 and indicate significant statistical changes (p <0.05; p <0.01).

Table 3. Dynamics of indicators of physical fitness of the young men and girls aged 18-19 years at the beginning and at the end of the pedagogical experiment (n = 48)

Indicators under study	Before the pedagogical experiment		After the pedagogical experiment		±Δ. %	p
	$\bar{x}$	S	$\bar{x}$	S		
Young men (n=30)						
Running 100 m, sec	14.2	2.16	13.7	0.98	3.6	<0.01
Shuttle running 4 × 9 m, sec	10.6	1.45	9.6	0.76	10.4	<0.01
Bending forward from the sitting position, cm	5.8	2.89	6.0	2.65	3.3	>0.05
Standing long jump, cm	227.9	44.12	239.4	34.12	4.8	<0.05
Running 3,000 m race, min sec	14.39	1.29	14.01	0.93	2.7	<0.05
Girls (n=18)						
Running 100 m, sec	16.4	1.22	15.9	0.87	3.1	<0.05
Shuttle running 4 × 9 m, sec	11.4	1.93	10.6	0.58	7.5	<0.01
Bending forward from the sitting position, cm	12.7	6.19	13.2	5.33	3.8	>0.05
Standing long jump, cm	173.7	28.32	192.4	21.65	9.7	<0.01
Running 2,000 m race, min sec	11.42	1.04	11.07	0.96	3.2	<0.05

Note: ± Δ, % - the difference at the end of the pedagogical experiment;

Note: \* the difference is statistically significant at the level of p <0.05;

\*\* the difference is statistically significant at the level of p <0.01

Analysis of the results of running 100 m race in the young men, points to a positive dynamics of the average result, which was improved by 3.6 % (p <0.01); in the girls, this indicator was improved by 3.1 % (p <0.05). The development of speed was facilitated by the use of practical exercises in running with acceleration, running for short distances at different speeds, and shuttle run.

Significant changes can be traced in the motor test “shuttle run 4x9 m”, in the young men, the average result improved by 10.4 % (p <0.01); in the girls this indicator improved by 7.5 % (p <0.01). The development of dexterity was promoted by the use of practical running with various obstacles; exercises on balance in motion and in a static position.

Analysis of the average result in the motor test “Standing long jump” indicates a positive trend in both gender and age groups. In the young men, the result improved by 4.8 % (p <0.05), in the girls - by 9.7 % (p <0.01).

During the pedagogical experiment, the average result in running 3,000 m race for young men and 2,000 m for girls underwent some positive changes. In the young men, this indicator improved by 2.7 % (p <0.05); in the girls - by 3.2 % (p <0.05). The improvement of speed-strength qualities and endurance can be explained by the application in practical classes of motor tasks for overcoming natural obstacles with various forms of relief.

## Discussion

Orienteering is an accessible type of recreational and health-improving activity that does not require complex and expensive tools and equipment to practice. Due to its specificity, this type of motor activity has a health-improving effect. Practical classes are held, mainly in park and recreational areas, it performs a positive effect on the psycho-emotional state of students.

Analysis of the scientific and methodological literature indicates that recreational training activity in orienteering helps to improve the functional state of the cardio-respiratory system, strengthen the muscles of the lower limbs, speed in actions and thinking, more efficient development of physical qualities, in particular endurance (Berezovskiy, 2016; Galan, 2016). Unlike cross-country running, orienteering is characterized by a lack of monotony, which from a psychological point of view is an important factor for physical performance improvement (Menshchikov, 2007).

The organization of amateur competitions in orienteering does not involve large financial costs. The task includes the ability to find quickly and accurately control points on the ground and make a mark on the card, which then they give at the finish. For participants such competitions turn into a fascinating emotional cross. Orienteering means successfully combine physical and mental loading on the background of positive emotions. Equable or interval running in parks and recreational areas has a positive impact on the respiratory system, blood circulation and cardiac activity in general.

The obtained results of our own research confirm the data (Galan, 2015) that as a result of the implementation of orienteering means in recreational activity, there is a positive trend in cardio-respiratory system indicators. We confirmed the data on positive impact of orienteering means on the development of motor

skills in schoolchildren and students, in particular: speed, agility, endurance and motor coordination (Korol 2013; Blagii, 2018; Galan, 2016; Berezovskiy, 2016).

The results of our research complement the data on the positive impact of orienteering means on mental and neurodynamic functions of schoolchildren and young people (Creagh, 1997; Slonov, 2003; Rattray, 2012; Kirihianen, 2014; Fedorova, 2014; Korol 2015; Blagii, 2018; Galan, 2016; Celestino, 2015;).

### Conclusions

In the young men and girls, the response of the cardiovascular system to dynamic loading improved by 20.2 % (p <0.01) and 23.3 % (p <0.01), respectively. The average results of the heart rate at rest in the young men and in the girls decreased by 11.7 % (p <0.01) and 10.0% (p <0.01), which indicates an increase in the efficiency of the cardiovascular system. Under the influence of training activity, the average statistical results of the Shtange and Genchi breathing tests and vital lung capacity in both gender groups increased significantly (p <0.05; p <0.01).

We found out that under the impact of orienteering means, in the framework of recreational and health-improving activity the vast majority of the studied indicators of the morphological and functional state, psychophysiological state and physical fitness in the young men and the girls aged 18-19 years, improved with a significant difference (p <0.05; p <0.01).

### Competing Interests

The authors declare that they have no competing interests.

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