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Original Article

Assessment of the impact of outdoor activities at leisure facilities on the physical activity of 15-year-old schoolchildren during the COVID-19 pandemic

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Abstract
Introduction. Given the steady decline in physical activity among all categories of Ukrainian citizens, due to quarantine restrictions caused by the Covid-19 pandemic, there is a threatening trend of declining levels of their physical health. In the last period of time, the world has undergone significant changes, namely the emergence of the Covid-19 virus, which has altered human life. During the pandemic Covid-19, fitness is essential in preventing physical and mental health problems among schoolchildren. This requires the development of preventive measures aimed at increasing the body's resistance to disease. *Material and methods*. The study was conducted on the basis of the Municipal Institution in the Lviv Regional Council "Lviv Regional Center for Local Lore, Excursions and Tourism of Student Youth". 51 students participated in the experiment, including 32 boys and 19 girls aged 15. Drawing on their health condition, they were allocated to main medical group. The group of experts included 27 qualified specialists familiar with the issues of children's and youth tourism and physical education. The following methods were used during the research: study, systematization and generalization of literature and best pedagogical experience, expert assessment method, anthropometric, physiological research methods, pedagogical testing, Framingham method of motor activity assessment, methods of mathematical statistics. *Results.* Among the programmes aimed at high school students, their health and recreation in the framework of out-of-school educational institutions, comprehensive programmes that include lessons of theoretical and practical nature are the most effective. Thus, we offered the programme based on walking tourism. It was aimed at high school students and was introduced within the framework of the out-of-school educational institutions of tourism and local lore. The study proves the changes in the daily activities of adolescents regardless of gender. Comparing to the beginning of the experiment in the structure of their daily motor activity the time spent on a sedentary level has significantly ($p<0.05$) decreased at the end of the experiemnt. In addition, in all groups the volume of motor activity of medium and high levels statistically ($p<0.05$) increased. There were positive changes in the indicators of the cardiovascular and respiratory systems, indicators of physical health and fitness. *Conclusions.* The obtained results testify to the effectiveness of the proposed programme of lessons based on walking tourism with 15-year-old students within the framework of out-of-school educational institutions of tourism and local lore. Therefore, the proposed programme should be included in the organizational and methodological support of health and recreational activities in educational institutions as a part of extracurricular activities focused on tourism and local lore.
Key words: pandemic, efficiency, high school students, health and recreation activities, walking tourism

Introduction

Against the background of the development of modern technologies, there is a decrease in the level of physical health of the population in general, and the younger generation, in particular (Tomenko, 2013; Goncharova & Butenko, 2015; Hakman et al. 2017; Galan et al. 2019; Leonenko et al. 2019). Experts attribute this negative trend to a sharp decline in physical activity of student youth due to a radical change in the lifestyle of adolescents in a developed information society. Since the early 2010s, the specially organized physical activity of most adolescents was 40 minutes per day at a hygienic rate of 12-15 hours per week (Global Physical Activity Questionnaire, 2018). Hypodynamia as a completely new social phenomenon, born in the era of digital civilization, when most people, including children and young people, significantly reduce the need for personal communication, live communication with friends and leisure and outdoor entertainment. There is every reason to believe that the situation has not changed for the better in recent years, but has only worsened. Analyzing the dynamics of leisure activities for adolescents, the number of children who prefer passive recreation has significantly increased against the background of decreasing number of children engaged in active recreation (Krutsevich & Bezverkhnya, 2010; Dutchak & Trachuk, 2012; Palchuk, 2012; Krutsevich et al. 2019; Kozhokar et al. 2019). Modern technical facilities promote free access to the Internet, and uncontrolled engagement with computer games and unregulated communication via social networks in no way contribute to overcoming negative trends, but rather only exacerbate existing problems.

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Currently, the situation is only exacerbated by quarantine restrictions due to the spread of the Covid-19 pandemic that has caused the biggest education failure in human history, affecting nearly 1.6 billion students in more than 200 countries. The closure of schools, institutions and other educational facilities has affected more than 94 % of schoolchildren worldwide.

This has brought far-reaching changes to all aspects of our lives (Pokhrel & Chhetri, 2021). The United Nations General Assembly resolution calls for the inclusion of sport and physical activity in post-COVID-19 recovery plans in national sustainable development strategies, given the contribution that sport and physical culture make to health. The main strategy for a healthy lifestyle during quarantine restrictions is regular exercise in a safe environment, which includes outdoor activities. Therefore, currently, the attention of experts is focused on improving the health and recreational physical activity of student youth and their social activity (Chan et al. 2021; Hortigüela-Alcalá et al. 2022).

Investigating the feasibility of using orienteering in physical education for children aged 13-14, we emphasize the importance of its impact in regards to children's tourism, a large amount of time spent outdoors, in recreational areas, and natural areas of the regional landscape (Berezovskyi, 2016; Andrieieva et al. 2017; Blagii et al. 2018; Paliichuk et al. 2018; Andreeva & Blystiv, 2019; Galan et al. 2022). Studying the impact of tourism on the formation of young students' motivation for a healthy lifestyle, among the benefits, we have analysed the following: increased physical activity and physical training, as well as the disclosure of individual abilities and children's socialization, the opportunity to choose from the range of various types of tourism (walking, cycling, skiing, water, mountain, speleology), the opportunity to participate in tourism activities starting from the age 10-12 years and organize their own active and meaningful leisure on a high-quality level (Kobenok & Kozinenko, 2010; Blystiv & Blagiy, 2018).

Thus, to date, experts have developed theoretical knowledge about the peculiarities of the use of active tourism in the health and recreational activities of student youth. However, one of the most important tasks when organising health and recreational activities of high school students in out-of-school educational institutions is the content of lessons. According to the analysis of literary sources and personal experience, so far not so many scientific approaches have been suggested. Thus, the issues of planning physical culture and mass events, designing a programme for high school students in the leisure institution of tourism and local lore based on walking tourism remain relevant and need further solutions, especially during the Covid-19 pandemic.

Material and methods

Participants

The research was conducted in the Municipal Institution of the Lviv Regional Council "Lviv Regional Center for Local Lore, Excursions and Tourism of Student Youth". The experiment involved 51 students, including 32 boys and 19 girls. At the beginning of the pedagogical experiment, following a medical examination, all the participants were assigned to the main medical group.

The study aimed at measuring the motor activity of adolescents who participated in the experiment, as well as establishing the effectiveness of pedagogical influence.

Procedures

The design of the suggested educational programme introduced to high school students at the leisure institution of tourism and local lore was preceded by the generalization of data from modern literature and advanced pedagogical experience. At the same time, the method of expert assessments was used to identify the most effective activities and interesting topics for high school students. The group of experts included 27 qualified practitioners familiar with the organization of the educational process as regards youth tourism and physical education. A scientific study was conducted to determine the content of lessons with adolescents in out-of-school educational institutions. First of all, we agreed on the lessons that had to be included in the programme.

Therefore, each of the 27 qualified professionals familiar with the topic of children's and youth's tourism and physical education, with over 10 years of experience in the pedagogical area, was asked to choose five topics from the list that could possibly interest teenagers. Taking into account the numerous achievements of scientists (Yarmak et al. 2017; Galan et al. 2018; Krutsevich et al. 2019), in the list of theoretically-oriented topics, we included the following: characteristics of active tourism; safety precautions in active tourism lessons; the impact of active tourism on physical condition; features of organizing and conducting trips; characteristics of recreational areas in Lviv region; computer technologies in tourism; optimization problems in tourism; features of recreational and physical culture and sports activities among children in Ukraine; the impact of tourism on the formation of students' motivation for a healthy lifestyle; innovative health and recreational technologies. In general, the list of practically-oriented topics, given the positive practical experience of specialists and their own observations, included the following: computer modelling of the travel route; optimization of the walking route; working with Google map; strategies for overcoming natural obstacles; topography and basics of orienteering; designing quests and participating in them; team-building games with the use of ropes and tourist equipment;

tourist trips and mass tourist and sports events; making a campfire in different weather conditions; setting up a tent, organizing a bivouac.

The study lasted ten months. During this period high school students in the leisure institution of tourism and local lore were engaged in the proposed programme which contained theoretical and practical sections and was implemented during leisure time, with a weekly load of 6 hours. The main focus of theoretical and practical lessons was on mastering general tourist skills, orienteering methods, bivouac, etc. Gradually the number of lessons dedicated to mastering the specific techniques specific to this type of tourism increased. Practical lessons were conducted during the Covid-19 pandemic in the fresh air in various natural locations, taking into account the peculiarities of landforms and weather conditions.

Methods

To achieve the research goals we used the following research methods: systematization and generalization of literature with the focus on the best pedagogical practices, method of expert assessments, pedagogical experiment, pedagogical testing, anthropometric, physiological research methods, Framingham method of assessing motor activity, methods of mathematical statistics. Estimation of the the participants' daily motor activity was carried out according to the Framingham method, which is based on measuring various motor activities during the day.

The application of this technique involved the sequential recording of segments of motor activity of high school students per day. All types of activities, as well as inactivity, and activities lasting more than 5 minutes were recorded. According to the intensity of motor activity, activities are divided into the following levels: basic (sleeping, lying down); sitting (eating, doing homework, reading, drawing, board games and computer games, conversations by the campfire); low (hygienic procedures, commuting, school lessons (except for physical education lessons), medium (morning hygienic gymnastics, walking, excursions), high (specially organized exercise lessons, intensive training, participation in competitions, etc.).

Data analysis

The examination results were processed using traditional methods of estimating the consistency of experts' opinions by calculating the concordance coefficient W and checking its statistical significance using the criterion $\chi 2$ and the 5.0 % value ($p<0.05$) (Byshevets, Sergienko & Golovanova, 2018; Byshevets, Goncharova, & Sergienko, 2020; Byshevets et al. 2020).

We used the Shapiro-Wilk test to test the hypothesis that the sample parameters corresponded to the normal distribution law during the data analysis. Comparative analysis of indicators that determine the level of the 15-years-old boys and girls' motor activity before and after the experiment was carried out using statistical criteria. Students' parametric criterion for coherent samples was used in the case of subordination of the original data to the normal distribution law, and the non-parametric Wilcoxon test - in the opposite case. The value of the statistical significance was 0.05. Mathematical data processing was performed using the programme "STATISTICA 13.0" and spreadsheets "Excel 2019" (Microsoft, USA).

Results

After applying the method of expert assessments, according to the agreed opinion of experts ($W = 0.75$; $\chi^2 = 182.44$; $p <0.05$ for theoretical topics and $W = 0.89$; $\chi^2 = 217.0$; $p <0,05$ for practical lessons), we were able to decide on the content of the programme of extracurricular activities. With the help of experts we found out that the majority in the extracurricular activities are practical lessons: 70.3 % (n=19) respondents believe that the number of practically-oriented lessons should be more than 10 times the number of theoretically-oriented lessons.

Before implementing the programme and after its implementation, we tested its effectiveness. The criterion of the effectiveness of the proposed approach to organizing health and recreational activities of high school students was taken as the level of their physical activity, physical health and physical fitness. At the first stage of the study it was found that the indicators of motor activity did not meet the physiological norms and the WHO recommendations. Moreover, due to quarantine restrictions in the absence of physical education lessons, motor activity of moderate and high intensity was absent.

The average weekly duration of medium and high level of physical activity of Ukrainian school-age children during quarantine in 2021 was 57.4 minutes / week lower than in the 2020 study (Yelizarova et al. 2022). Previous studies have shown a relationship between the level of physical activity and the presence or absence of disease. At insufficient level of motor activity the probability of having a diseases increases by 20.0 %, in comparison with average and high levels. In turn, it increases the likelihood of low levels of physical activity almost twice (Yelizarova et al. 2020).

Therefore, we developed the indicators of students' physical health and physical fitness before and after implementing the curriculum (Table 1). Comparative analysis of the respondents' motor activity indicates significant positive changes that have occurred under the influence of the proposed programme.

Table 1. Dynamics of the indicators of the 15-years-old boys and girls' physical health at the beginning and at the end of pedagogical experiment (n = 51)

Researched indicators	Before conducting the pedagogical experiment		After conducting the pedagogical experiment		±Δ, %	p
	$\bar{x}$	S	$\bar{x}$	S		
	Boys (n = 32)					
Dynamometry of the right hand, kg	33.9	7.11	34.9	8.55	2.9	>0.05
Dynamometry of the left hand, kg	28.6	9.23	29.8	8.32	4.2	>0.05
HR_{sp}, beats · min. $^{-1}$	85.7	4.39	78.4*	3.11	8.5	<0.05
$BP_{syst.}$, mmHg.	113.9	8.04	118.2	5.36	3.8	>0.05
$BP_{diast.}$, mmHg	72.0	6.19	71.2	5.34	1.1	>0.05
Vital capacity, ml.	2862.1	593.06	3122.2*	409.18	9.1	<0.05
Stange test, s	41.1	14.55	45.1*	5.52	9.7	<0.05
Hench test, s	22.2	15.42	25.2*	2.53	13.5	<0.05
Vital capacity, ml · kg $^{-1}$	45.2	8.17	55.1	6.25	21.9	<0.05
Strength index, %	51.6	11.03	53.2	10.18	3.1	>0.05
Robinson's index, cu	102.2	9.23	94.4*	6.28	7.6	<0.05
Rufier's index, cu	12.5	1.67	9.8*	1.10	21.6	<0.05
Running 60 m, s	9.6	0.87	9.6	0.51	0.0	>0.05
Shuttle run 4x9 m, s	11.4	0.81	10.8*	0.25	5.3	<0.05
Tilting torso forward from a sitting position, cm	6.5	4.54	6.7	4.55	3.1	>0.05
Long jump from a place, cm	209.1	12.59	218.1	15.25	4.3	<0.05
Running 2000 m, min. s.	9.55	0.88	8.58*	0.51	10.2	<0.05
	Girls (n = 19)					
Dynamometry of the right hand, kg	27.4	3.58	28.2	3.12	2.9	>0.05
Dynamometry of the left hand, kg	22.9	4.81	24.4	2.15	6.6	>0.05
HR_{sp}, beats · min. $^{-1}$	89.7	10.36	77.2**	4.71	13.9	<0.01
$BP_{syst.}$, mmHg.	112.2	9.28	113.4	6.54	1.1	>0.05
$BP_{diast.}$, mmHg	68.4	11.61	67.1	6.24	1.9	>0.05
Vital capacity, ml.	2515.3	244.18	2812.1*	129.47	11.8	<0.05
Stange test, s	35.8	5.51	38.4*	8.10	7.3	<0.05
Hench test, s	19.3	6.33	23.2*	3.14	20.2	<0.05
Vital capacity, ml · kg $^{-1}$	44.5	3.47	52.6	3.12	18.2	<0.05
Strength index, %	46.4	5.63	47.2	4.42	1.7	>0.05
Robinson's index, cu	101.1	27.15	85.4*	9.11	15.5	<0.05
Rufier's index, cu	12.7	2.19	8.9**	1.11	29.9	<0.01
Running 60 m, s	10.4	0.73	10.1	1.25	2.9	>0.05
Shuttle run 4x9 m, s	11.7	0.68	11.1*	0.42	5.1	<0.05
Tilting torso forward from a sitting position, cm	11.2	5.77	12.1	5.12	8.0	>0.05
Long jump from a place, cm	159.4	16.35	171.2**	10.24	7.4	<0.01
Running 2000 m, min. s.	8.50	0.55	8.39*	1.12	1.3	<0.05

Note: * the difference is statistically significant at the value p<0,05; ** the difference is statistically significant at the value p<0.01

After the experiment, the functional indicators of the schoolchildren's cardiovascular system improved. The average heart rate significantly (p<0.05) decreased by 7.3 beats per minute^{-1}, which is 8.5 % less compared to the initial data, girls - by 12.5 beats per minute $^{-1}$, which is 13.9 %. There were positive changes in the indicators of the respiratory system: HR, Stange and Hench tests. The boys' VC increased by 9.1 % (p<0.05), the Stange test increased by 9.7 % (p<0.05), the Hench test increased by 13.5 % (p<0.05), the girls' VC increased by 11.8 % (p<0.05), the Stange test by 7.3 % (p<0.05), and the Hench test by 20.2 % (p<0.05). At the end of the experiment, no students with low health indicators were identified, but the percentage of those in the group with average health indicators increased. Thus, integrating walking tourism brought a positive effect on the level of physical fitness of high school students. We noted a significant (p<0.05; p<0.01) growth of most of the indicators. The boys had a range of positive changes in control exercises - up to 3-10 % increase; girls demonstrated better results too - up to 3-8 %. Lessons in the outdoor format helped to improve schoolchildren's physical health and fitness, increase the level of children's resistance to disease, which can serve as a preventive measure during the Covid-19 pandemic.

Statistically significant (p<0.05) differences were observed in the sedentary level of motor activity. Thus, the time 15-year-old boys allotted for a sedentary level of motor activity decreased by 110.6 min, and girls - by 114.6 min. Particularly noticeable changes occurred in terms of medium and high levels of motor activity. We observed a statistically significant (p<0.05) increase in the average level of motor activity. (Fig. 1).

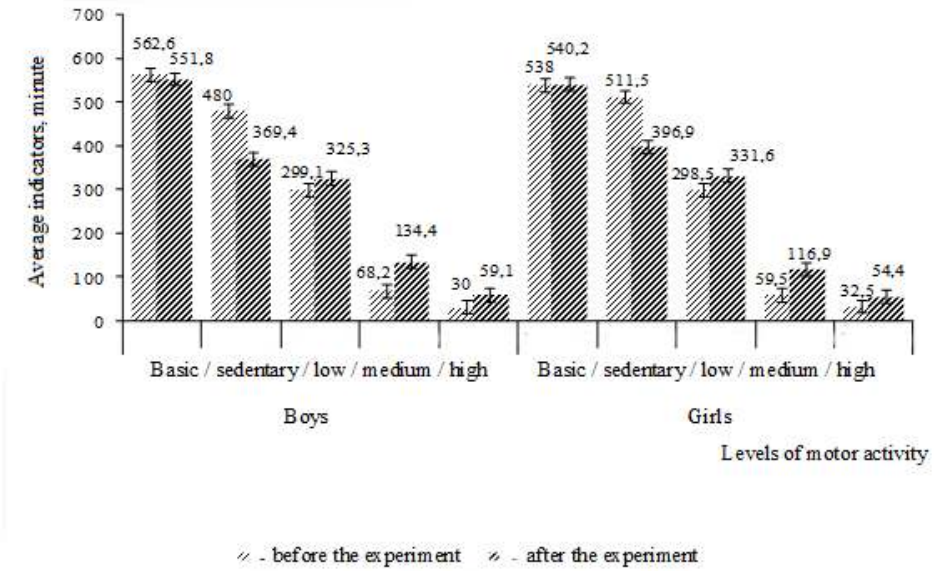

Fig. 1 Dynamics of 15-year-old boys and girls' motor activity at the beginning and at the end of the experiment (n-51)

This feature can be explained by the fact that in the content of the walking tourism programme in the section "Physical training" much attention was paid to the development of basic motor skills necessary for students to participate in a one-to-three-day hiking trips. At the same time, it is worth to mention that in contrast to girls, boys' indicators of medium and high levels of motor activity grew at an accelerated rate. In our opinion, the results are due to boys' greater motivation to participate in hiking trips, which proved the accelerated pace of development of certain motor skills, including endurance and speed-strength abilities.

The results of the study testify to the effectiveness of the proposed hiking-based programme aimed at high school students in out-of-school educational institution of tourism and local lore. The research showed contributed to the necessity to incorporate this programme to the organizational and methodological basis of health and recreation activities in relevant out-of-school educational institutions during the Covid-19 pandemic.

Discussion

The problem of a steady growth of hypodynamics particular to the younger generation is becoming a threat to national security. Many scientists, scholars and educators-practitioners argue about how to solve the problem of developing effective coverage of various types of health and recreational physical activity and involving student youth in an active lifestyle (Andrieieva et al. 2017; Ivashchenko et al. 2017; Pasichnyk et al. 2018; Hakman et al. 2018; Galan, Andrieieva, Olenayarmak, 2019; Kozhokar et al. 2019; Yakimishin, 2021).

Many studies have shown a significant decrease in motor activity during the spread of coronavirus infection among different populations (Titze et al. 2014; Andrieieva et al. 2019). At the same time, it emphasizes the need to develop preventive measures to increase the body's resistance (Yelizarova et al. 2022). It has been proven that physical activity is a necessary component of children's physical health and helps prevent non-communicable diseases in adulthood (Poitras et al. 2016). We have confirmed a number of studies that show an increase in schoolchildren's physical activity during the pandemic only in when it is organised in a proper way (Schmidt et al. 2020; Bu et al. 2021). Motor activity is important in reducing the anxiety and depression that many experience in the wake of the COVID-19 pandemic (Andrieieva et al. 2019; Piestrzyński et al. 2019). Priority is given to those types of physical activity that are carried out in a safe environment, in the fresh air, including tourism and orienteering (Dotsenko, 2013; Galan et al. 2022). Among high school students, a popular type of physical activity is tourism, which is an affordable type of health and recreational activities that are implemented in the natural environment and do not require significant investment, while meeting the need to communicate with others (Galan et al. 2022).

Consistent efforts of tourism club leaders to take into account stimulating and limiting factors regarding the mechanisms of involvement, based on individual motivation of adolescents to physical activity, unfortunately, do not have a systemic nature and a positive practical solution. As a result, involving students in regular health and recreation activities and programs through walking tourism is rapidly declining to critical levels.

We share the opinion of experts that the health and recreation activities aimed at high school students in leisure facilities are designed to overcome the deficit of their physical activity. Integrating walking tourism is perhaps the most engaging for 15 years-old high school students. According to (Agippo & Bondar, 2014; Hastuti

et al. 2021), the best way to organise walking tourism is and health and recreational activities in general is by exploiting the facilities of out-of-school educational institutions located in places that are environmentally friendly for children. Effective extracurricular recreational activities in educational institutions include mass physical culture and sports work. Among the main tasks of extracurricular activities, the author points out the necessity to meet the needs of students in regular PE lessons and the opportunity to show their physical potential in various competitions. We agree with the author's conclusions, that the most important task of health and recreational activities is also teaching students to learn to organize their own leisure activities and expand the idea of the close relationship between physical activity and physical health.

In order to overcome the deficit of adolescents' motor activity, a programme has been designed for the development of their motor activity while participating in extracurricular activities (Vaskan et al. 2016; Norman et al. 2018). Achieving the optimal motor mode, which ensures regular functioning of all organs and systems of the student's body, involved the use of exercise, games, entertainment, natural and hygienic factors for active recreation, and alternation of various activities. In fact, this study proves that the vast majority of lessons with students in out-of-school educational institutions of tourism and local lore should be practical lessons in the natural environment and integrated into the teaching process through walking tourism and other active tourism. However, theoretical lessons also have a practical value as they are the basis of motivational and educational activities and serve as injury preventive instruments. Theoretical lessons stimulate adolescents to get more involved in healthy and recreational activities. Some lessons allow them to realize the need to follow safety regulations in active tourism lessons, and others acquaint students with the characteristics of recreational areas and educational facilities in the Lviv region, thus cultivating love to the native land.

The study proves that lessons with students in out-of-school educational institutions of tourism and local lore have a positive effect on physical activity, cardio-respiratory system, physical performance, fitness and health. The experiment expands the data on the impact of the programme aimed at students in the educational institutions of tourism and local lore during the Covid-19 pandemic (Andrieieva et al. 2021).

Conclusions

Organizing schoolchildren's leisure in health and recreational areas is widely discussed by experts and confirms the effectiveness of out-of-school educational institutions. Given the threats to Ukraine's national security and the implementation of state policy in the field of education, out-of-school educational institutions are designed to help stabilize and overcome the problem of the reduced level of physical activity of the younger generation through implementation of modern health and recreation programmes.

A component of the methodological support was a health and recreational programme based on walking tourism during the Covid-19 pandemic. It is determined that the content of theoretical lessons contains the following topics: characteristics of active tourism; safety precautions in active tourism lessons; the impact of active tourism on the level of physical condition; features of organizing and conducting trips; characteristics of recreational areas of Lviv region. The content of practical lessons includes the following topics: techniques for overcoming natural obstacles; topography and basics of orienteering; development of quests and participation in them; game team-building technologies with the use of ropes and tourist equipment; tourist trips and mass tourist and sports events. We also offered an hourly thematic plan of lessons.

Comparative analysis of the motor activity of the 15 years-old adolescents before and after the experiment revealed significant positive changes in the structure of daily physical activity, which occurred due to the integration of the proposed program. The scope of motor activity at medium and high levels statistically significantly ($p<0.05$) increased due to a statistically significant ($p<0.05$) decrease in the scope of motor activity at the sedentary level. Positive dynamics was also observed in terms of physical health, efficiency and physical fitness, as well as cardio-respiratory system. This result proves the feasibility of introducing the proposed programme aimed at high school students and based on walking tourism to the organizational and methodological support of health and recreation activities in out-of-school educational institutions of tourism and local lore during the Covid-19 pandemic.

Conflict of interest

Authors state no conflict of interest.

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