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Professional Physical Training of Future Border Guards

Ivan MARIONDA[1],
Lyudmila ROMANISHYNA[2],
Oleksandr STARCHUK[3],
Yurii LISNICHENKO[4],
Oleh MASLII[5],
Oleksandr TORICHNYI[6],
Svyatoslav DYAKOV[7],
Roman NANIVSKYI[8],
Alexander GALUS[9],
Vasyl OLLO[10],
Serhii SINKEVYCH[11],
Oleksandr KAPINUS[12]

[1] Uzhhorod National University, Uzhhorod, Ukraine, ivan.marionda@uzhnu.edu.ua
[2] Khmelnytsky Humanitarian Pedagogical Academy, Khmelnytsky, Ukraine, romanyshyna43@ukr.net
[3] S. P. Koroliov Zhytomyr Military Institute, Zhytomyr, Ukraine, starchuk72@ukr.net
[4] Military Academy, Odesa, Ukraine, lisnichenkoy@gmail.com
[5] Odesa Military Academy, Odesa, Ukraine, mon2369@ukr.net
[6] Bohdan Khmelnytskyi National Academy of the State Border Guard Service, Khmelnytsky, Ukraine, torichn10@gmail.com
[7] Hetman Petro Sahaidachnyi National Army Academy, Lviv, Ukraine, djakow1@mail.ru
[8] Hetman Petro Sahaidachnyi National Army Academy, Lviv, Ukraine, roman_nani@ukr.net
[9] Khmelnytsky Humanitarian Pedagogical Academy, Khmelnytsky, Alex.halus@ukr.net
[10] "Odesa Training Center No 14» under Administration of the State Penitentiary Service of Ukraine in Odesa Region (No

Abstract: The improvement of professional military education is the most important part of reforming state power departments. One of its components is the professional training of cadets in higher military educational institutions. One of the key places in this process belongs to the physical training of cadets, which is aimed at forming their readiness to achieve tasks of professional military training. Therefore, the current research aims to theoretically justify and verify the effectiveness of the programme for professional and personal physical training of future border guards. Based on the results of the initial survey, two groups of cadets were formed (only 419 individuals). The control group (210 individuals) and the experimental group (209 individuals) included cadets with approximately identical indices of a functional state. After conducting pedagogical research based on the designed model for increasing physical readiness of future border guards for professional activity, the proposed programme for professional and personal physical training of future border guards was proved to be highly effective. Indeed, 94% of cadets completed the programme, successfully passed an annual medical examination and met the established standards of physical training during the covered period of training. A vital index increased by 10.8%, overall working capacity (based on the results of a step-test) – by 18.7%, maximum voluntary ventilation – by 20.1%, heart rate recovery – by 19.4%.

Keywords: *health, motor skills, military students, functional capabilities.*

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14), Odesa, Ukraine, ollovp@gmail.com
[11] Bohdan Khmelnytskyi National Academy of the State Border Guard Service, Khmelnytsky, Ukraine, sinkevich76@i.ua
[12] Hetman Petro Sahaidachnyi National Army Academy, Lviv, Ukraine, oskap@ukr.net

Introduction

Good physical and athletic training of officers allows them to sustain professional efficiency and effective management of subordinates in stressful situations, physical and mental strain, which they may face while serving on the state border almost daily. Therefore, it is important to optimize professional and personal physical training of cadets and prepare them to perform tasks of professional military training.

All tasks of physical training are divided into general and special by functions. General tasks reflect general requirements of educational and service activities for the physical condition of all categories of military personnel and are divided as follows: ones aimed at ensuring the necessary development level of elements of military officers' physical readiness for a professional career; ones aimed at teaching military officers appropriate skills which can allow them to increase their activity, consciousness and competency during physical training; ones highlighting the importance of physical training in developing physical qualities of other military officers (Marionda, 2010a; 2010b; Ovcharuk, 2008). Special tasks take into account the features of professional activity for cadets and include developing general and strength endurance, agility, speed and strength, coherence of collective actions.

Some studies (Astrand, 1952; Aspy, 1972) indicate that professional and personal physical training incorporates different systems of psychoregulation (autogenic and mental training). It directly refers to health-improving psychophysical training, massage and various types of cold training (rub-down, dousing with water, bathing).

The content analysis of special literature on the use of different physical and health-improving systems for various applications (Apanasenko, 1999; Halaidiuk et al., 2018; Maksymchuk et al., 2018; Plisko, 2004; Raievskyi, & Khalaidzhi, 2006) makes it possible to distinguish two main areas, namely a health-promoting one and martial arts. These areas were implemented based on such didactic principles as purposefulness; accessibility; systematicity, continuity and consistency; taking into account age and individual characteristics of cadets; the value of acquired knowledge, skills and abilities.

The main areas of education development are its intellectual, physical and social aspects. This statement is also confirmed by the current research. Physical development, as one of the components of education, implies a well-developed physical culture of the individual and society. The obtained findings are partly agreed with the conclusions of scholars (Antoshkiv, 2005;

Boiko, 1987) that the level of psychophysical training of those who study is decreasing, which is due to various reasons: the increasing information and emotional stress; the insufficient digitalization of the educational process in secondary schools; little attention paid to physical education in secondary schools. Similar studies show that pedagogy has not yet revealed the true nature of physical training, has not formulated its values and goals in the system of intellectual, moral and physical development of the individual (Antoshkiv, 2005; Zakorko, 2001).

Besides, scientific works prove that the shift from medical, biological and pedagogical aspects to psychological and sociological ones in the study of physical training is an attempt to overcome a highly specialized approach to studying cultural phenomena. Traditional criteria for evaluating the content of such courses as "Physical Education", "Personal Safety and Use of Force", "Fire Training" in higher military educational institutions are correlated with the requirements for military officers (Ovcharuk, 2008).

There are also scientific studies which prove that the system of future officers' physical training is influenced by certain objective factors. Non-specific factors include the following: the level of political, economic and social development of the country; the development of science and technology; the prospects of scientific and technological progress; the content of the state's military doctrine and the concept of combat and physical training of military officers, the status of scientific justification and scientific and methodological support of physical training in higher military educational institutions. The tasks of physical training for future border guards are determined by specific factors, namely the content of physical training, which involves physical exercises, theoretical knowledge, organizational and methodical skills and abilities; the requirements of guideline documents for physical readiness of military officers; the characteristics of organization and deployment of a certain power department of the country; physical condition of conscripts. Thus, the last statement most accurately explains the current research since the characteristics of physical training are determined by the need to sustain a sufficient level of physical development and a high level of physical readiness for professional activity; to improve specific motor skills which contribute to effective professional performance.

One organized and implemented physical training of military officers using general and partial methods of training. General methods involve training sessions of the same duration, their similar tasks and content of individual parts, as well as some other general methods and techniques of

physical training. Partial methods include special methods and techniques suitable for a particular training session.

Special tasks of physical training rely on the specifics of professional activities of research and teaching staff at the State Border Guard Service of Ukraine. The authors of the article have developed a model of teaching activity of physical education teachers to increase the efficiency of the educational process. It consists of such components as types of activity (educational and research activities, advanced training); technologies methods, and tools of teaching activity. The effectiveness of teaching activity directly depends on pedagogical conditions increasing the effectiveness of the educational process. They are as follows: improving workplace management as a functional duty of every teacher; comprehensive improving workplace management through consistent solving of individual partial tasks; ensuring collective participation of teachers in the organized creative search for ways to improve their activities.

The results obtained from surveying the leadership of the National Academy of the State Border Guard Service of Ukraine shows that 64.5% of respondents indicate a significant role of profession-oriented physical training for cadets; 79.5% of them mention the low applicability of the traditional system of physical training. This proves the importance and relevance of the problem of future officers' physical training.

Today's higher education puts forward new requirements for an individual. It fully expresses human potential in the context of personal development strategy as a priority of education. Besides, it shapes pedagogical concepts and paradigms underlying modern education (Bakhmat et al., 2019; Bezliudnyi et al., 2019; Nerubasska, & Maksymchuk, 2020; Gerasymova et al., 2019; Sitovskyi et al., 2019; Sheremet, Leniv, Loboda, & Maksymchuk, 2019; Petrova, 2017; Kaletnik, Zabolotnyi, & Kozlovskyi, 2011). In this regard, it becomes relevant to identify the priorities of personal development through educational activities, designed to activate the individual's essential intrinsic properties.

The relevance of the research is reinforced by certain contradictions in the educational process in higher military educational institutions: between the growing level of requirements for the physical condition of military officers and the level of their readiness to perform professional tasks; between the need to organize the educational process based on the principles of humanization and the status of moral and psychological climate in military teams; between the need to strengthen the practical focus of physical training based on personality-oriented approach and capacity of

higher military educational institutions to create conditions for the individualization of the educational process.

The relevance of the research problem, lack of appropriate findings and existing contradictions have determined the aim of the research, that is to theoretically justify and verify the effectiveness of the programme for professional and personal physical training of future border guards.

Materials & methods

The author's programme for professional and personal training of future border guards includes two areas: the first one is aimed at strengthening the health of the participants, taking into account their initial individual indicators, correction and stabilization of the basic functions of the body, development of its aerobic capacity; the second one is aimed at forming and improving vital and applied motor skills necessary for future professional activities. This programme consists of five blocks.

Block I involves the content and structural components of the programme for professional and personal physical training of future border guards. The use of the data on physical training of cadets in the interests of professional military selection and training is one of the requirements of military officers' training. The content of the programme is focused on the characteristics of structural components and methods for determining the basic physical characteristics of cadets. The programme's structure included testing physical condition and physical development, assessing physical capacity, functional capabilities and health, oxygen consumption, aerobic capacity, risk of diseases, somatic health and health self-assessment.

Block II includes the main indices of future border guards' physical condition. The block takes into account the requirements for standards of cadets' physical training. A relevant technology for standardizing and assessing physical activity during training sessions was designed and justified to implement standards. It is rather easy to train cadets for running 3 km distance since it requires low endurance and aerobic capacities of the human body. Therefore, it was important to choose available methods for standardizing physical activity based on the registration of maximum oxygen consumption. In the current research, the main criterion for physical load during professional and personal physical training is its volume determined by the total volume of performed work or energy expenditure. The pulse and energy rates of physical load (volume and intensity) were taken into account when preparing individual tasks for cadets. The energy expenditure per week should be no less than 8380-10475 kJ to successfully master the

military profession (Yu. Demianenko). These indices correspond to the proposed volume of motor activity per week. Special attention was also paid to physical and sports interests of cadets. Cadets were offered some approximate parameters of intensity and volume of physical load for male cadets aged between 18 and 20 with different levels of aerobic endurance.

Block III presents methodical recommendations for increasing physical readiness of future border guards for professional activity.

This block involved designing a technology for standardizing physical load during health-improving training sessions, determining aerobic endurance, types and modes of training, calculating the intensity of training sessions, energy consumption for one training session and a total load per week and predicting results to implement a personality-oriented approach to increasing physical readiness of future border guards for professional activity.

This task was solved based on the determination of individual indices of a functional state. The main parameters for individual indices of the functional state were used to standardize physical load in terms of volume and intensity and select the most optimal physical exercises, which contribute to solving the set tasks. The recommendations for diet and rest were given, too. Cadets were offered to stick to an individual weight loss schedule to control their weight.

Block IV ensures the individualization of professional and personal training for future border guards.

Based on the proposed parameters and values of physical load, individual programmes for cadets with different levels of aerobic endurance and previous experience of physical education and sports were designed. Each cadet was entitled to modify training plans, number and intensity of exercises based not only on the indices at the initial stage but also on the advice of the teacher. Cadets recorded all indices in individual diaries, drew curves on the effectiveness of training and outlined new indices for the future.

Block V offers methodical principles of future border guards' physical training. In the course of the research, the authors determined the possibility of applying methodical principles to professional and personal physical training.

The main ones are the following: rational productivity of professional and personal physical training (it requires reasonable sufficiency of physical loads in the organization of pedagogical influences, balanced with individual characteristics); systematicity and consistency (they ensure consistent and gradual development of physical exercises corresponding to aerobic capacities of the body); the integrated influence of physical training methods on the body (aimed at using various means of profession-oriented

physical training and pedagogical techniques of their application at the initial stage); the optimal correlation between health-improving means and applied character of professional and personal physical training (it is based on pedagogical expediency and validity of conducting physical training sessions both under the supervision of the teacher and independently).

The effectiveness of such training is a result of the process individualization, adaptation to personal achievements of cadets and planning of possible changes in physical training.

During the formative stage, the need for a thorough initial examination of cadets was one of the characteristics of preparation and conduct of the pedagogical research. The very pedagogical research consisted of three stages. The first stage included surveying using specially developed questions after medical examination, including anamnesis. Cadets needed to be examined based on a full or simplified programme. The second stage included measuring their weight and height, spine flexibility, vital capacity, breath-holding in the sitting position and assessing visual and motor response (catching the ruler). All measurements were also recorded in the individual diary. The third stage consisted of performing test exercises (the Ruffier test) with the registration of the dynamics of heart rate recovery, taking tests on strength endurance of different muscle groups and coordination of movements. The final part of the examination included the most difficult step test.

Testing physical fitness. Physical activity is an external manifestation of physical fitness, namely, the development level of physical qualities (strength, speed, endurance, agility), motor skills and abilities necessary for the successful implementation of certain activities. Physical fitness of military officers can be identified with the help of different tests. This research employs the following: 100-metre dash (s); pull-ups (repetitions); 1- and 3-kilometre running (min, s); 50- or 100-metre swimming (min, s), running broad jump.

Some other tests were used to assess cadets' physical fitness more comprehensively. They are as follows: push-ups on bars (repetitions); crunches with hands behind head, legs fixed for 30 sec (repetitions); 12-minute dash – walking (the Cooper test) (m).

The main indicators of cadets' physical development were assessed based on the scale shown in Table 1.

Table 1. *The scale for assessing indicators of cadets' physical development*

Tests	Grade

	5	4	3	2	1
Body weight (kg)	G*±3.0	G±5.0	G±8.0	G±10.0	G±12.0
Hand strength (kg)	9.0 i >	8.9–7.5	7.4–6.4	6.3–5.5	5.4 i <
Strength index (%)	85 i >	84–80	79–75	74–70	45 i <
Vital capacity**	95 i >	94–85	84–75	74–65	64 i <

Notes:
1. * – ideal weight (kg);
2. ** – determined by the ratio of actual vital capacity to proper one (%).

Aerobic body capacity depends on by the value of maximum oxygen consumption (MSC). MSC is determined in conditions of hard work for at least 5 minutes (Utenko, 1986). This value of MSC is the limit by the level of oxygen consumption per unit time (1 min) and, therefore, is also called "oxygen ceiling". Cadets' general fitness was assessed using the Harvard step test. Lately, this test has been widely used in physical education and sports practice. It serves as an informative indicator for assessing the level of cadets' fitness and the impact of physical training on them.

The authors of the article used ASCORS, an automated (computer-based) system for quantitative risk assessment of main pathological syndromes and conditions, to assess cadets' health (Landa, 2004). This system is intended for use during the first stage of preventive examination, in the dynamics of the next dispensary observation with the use of formalized questionnaires containing questions about complaints and anamnestic, genetic and psychological data, as well as characteristics of the service, nutrition.

Cadets' somatic health was assessed following the method proposed by Apanasenko (2000). This method is based on a biological pattern, i.e. there is an evolutionary threshold of the biosystem's energy potential (body reserve), above which there are almost no endogenous risk factors or chronic somatic diseases.

The self-assessment of cadets' health involved completing special questionnaires (Veidner-Dubrovina, 1992).

The test results were processed on computers and recorded in an individual conclusion, which determined the differentiated assessment of the psychophysical condition of the body, the development level of physical skills, aerobic capacities and the integrated assessment of physical conditions at the beginning of the research. In terms of organization and methodology for conducting training sessions, particular attention was paid to the

measures aimed at preventing overload and exhaustion. The programme was designed as physical and pedagogical influence both on the control group (CG) and the experimental group (EG). In the CG, training effects were oriented towards physical education. The physical condition of cadets was monitored at the end of each month of training sessions.

In EG, all cadets clearly followed medical recommendations. Individual indices of their physical condition were determined at the initial stage of professional training. They were divided into CG and EG with an approximately homogeneous structure. Based on this, the appropriate means of pedagogical influence and medical and biological monitoring of this influence were selected.

The National Uzhhorod National University, Khmelnytsky Humanitarian Pedagogical Academy, S. P. Koroliov Zhytomyr Military Institute, Military Academy, Odesa Military Academy, Bohdan Khmelnytskyi National Academy of the State Border Guard Service, Hetman Petro Sahaidachnyi National Army Academy, "Odesa Training Center No 14" under Administration of the State Penitentiary Service of Ukraine in Odesa Region (No 14) were chosen as the base of the research. The results of the initial examinations were used to form two groups of cadets from the mentioned establishment (419 individuals). The first group (CG – 210 individuals) and the second group (EG – 209 individuals) included cadets with approximately the same parameters of individual indices of a functional state. All the cadets of these groups were able to meet the defined standards of physical training (good and satisfactory scores).

In the CG, cadets trained individually 2-3 times per week using traditional methods. The objective monitoring of physical condition was conducted monthly.

Results

The dynamics of the indices presented in Figure 1 shows that the average values of the basic parameters of CG cadets' physical condition during the period under study tend to insignificant growth, which is explained by the natural course of the educational process.

In the CG, there were some progressive changes in the indices, which characterize aerobic performance and reserve capacity of the body (heart rate, life expectancy, overall working capacity, oxygen consumption, heart rate recovery, etc.).

The results of the conducted research indicate that the effectiveness of traditional modes of cadets' motor activity and the established

standardization of physical activity have not contributed to a statistically significant ($p<0,05$) increase in the level of cadets' physical training.

The experimental group was characterized by lower parameters of physical condition. The indices of individual parameters differed distinctly. The average values of 3 km running and pull-ups were on the verge of "satisfactory" and "good" scores. Physical exercises were used as the main means, including 1, 3 and more km running at a slow and moderate pace; overcoming natural and artificial obstacles; movement and sports games; simulation exercises, etc.

The results of the pedagogical research prove the pronounced effectiveness of the health-improving approach to organizing professional and personal pedagogical influence. Based on the dynamics of the average values of a functional state, one can speak of statistically significant ($p=0.05$) positive changes in the parameters which characterize their aerobic performance. Thus, a vital index increased by 10.8%, overall working capacity (based on the results of a step-test) – by 18.7%, maximum voluntary ventilation – by 20.1%, heart rate recovery – by 19.4%.

Specific attention should be paid to the convergence of the average values of different indices, which may indicate some levelling of the reserves of various functional systems of the body in the EG.

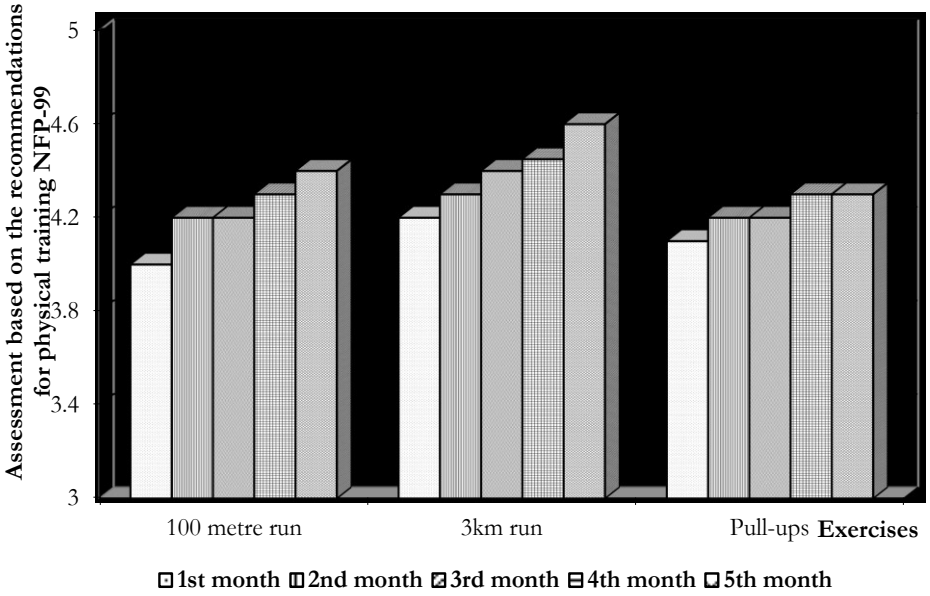

Fig. 1. *The dynamics of the average values of performing exercises by CG cadets*

There also appears to be the decrease in fluctuations within the most average values, which makes it possible to indicate some levelling in the indices of cadets' physical condition in the EG. Moreover, this was mainly due to the improvement of functional indices. A similar situation is observed in the performance of exercises, whose average results are higher than "good" by the end of the research (see Figure 2).

The most significant positive changes occurred in terms of running 3 km distance, pull-ups and overcoming obstacles, which was the result of purposeful pedagogical influence on the development of aerobic endurance. However, the fluctuation in the indices for performing these exercises has significantly decreased. This indicates the effectiveness of the selected movement modes and standardization of physical load during professional and personal physical training.

The results of the survey conducted at the end of the pedagogical research show that cadets are highly satisfied with physical exercises, which made them more confident about their physical and functional readiness at the initial period of training, accelerated the process of adapting to the conditions of higher military educational institutions.

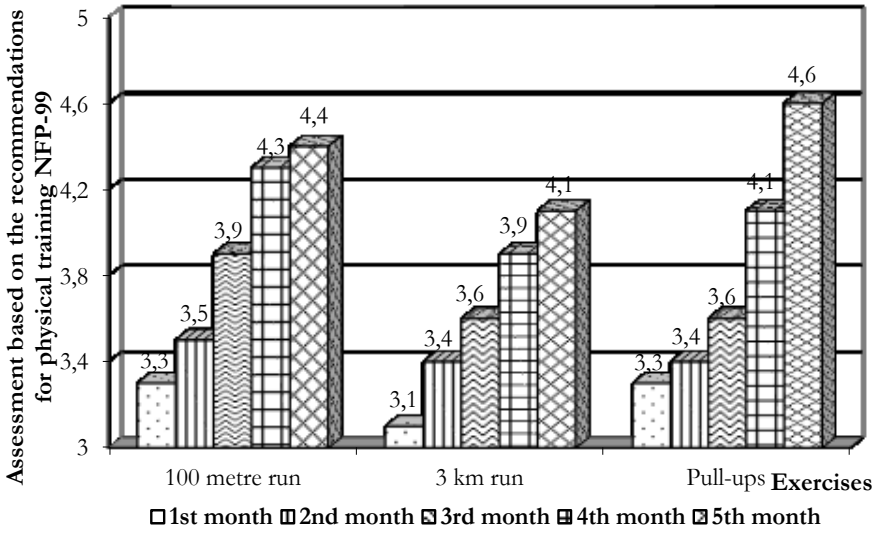

Fig. 2. *The dynamics of the average values of performing exercises by EG cadets*

The obtained results show that the effectiveness of traditional modes of cadets' motor activity and the established standards for physical activity have not contributed to a statistically significant ($p<0.05$) increase in the level of cadets' physical fitness.

Discussion & conclusion

The scientific value of the research is as follows:

- for the first time, the author's programme for professional and personal physical training has been implemented into the content of such courses as "Physical Education", "Personal Safety and Use of Force" and "Fire Training" intended for future border guards; its structural blocks are the content and components of the programme, the main indices of future border guards' physical condition, methodical recommendations for increasing physical readiness in future border guards for professional activity, the individualization of professional and personal physical training, methodical principles of future border guards' physical training; its implementation has increased physical readiness of future border guards for professional activity;

- the essence, content and structure of professional and personal physical training for future border guards have been specified; the methods for standardizing physical load of cadets during physical training have been clarified;

- the criteria- and diagnostics-related tools of future border guards' physical readiness for professional activity have been further developed.

The practical value of the obtained results lies in implementing methodical recommendations for using the author's programme and proposed forms and methods for standardizing physical load of cadets during physical training in the practice of higher education institutions.

The study on the main indices of physical training in applicants for higher military educational institutions shows that their compliance with the established requirements is largely due to aerobic properties and sports experience. Their level of physical training does not meet the requirements for future military officers. At the same time, the current system of physical training and education in higher military educational institutions does not sufficiently improve the quality of future specialists' physical training.

The peculiarities of future border guards' physical training within such courses as "Physical Education", "Personal Safety and Use of Force" and "Fire Training" include the organization of classes, taking into account

educational tasks by stages: double-quick physical training; physical exercises when driving vehicles; physical field exercises.

One standardizes physical activity based on a level of aerobic endurance. It allows regulating and controlling the improvement of physical fitness and a functional state of the body at the initial stage of training in higher military educational institutions and throughout the training period. Physical load of health-improving exercises corresponds to an individual level of aerobic endurance of future border guards. Such exercises help to increase versatile physical fitness, reduce fatigue and improve professional performance.

One uses the criteria- and diagnostics-related tools of future border guards' physical readiness for professional activity to determine aerobic endurance, identify types and modes of training. Also, it makes it possible to calculate the intensity of training, energy consumption per session, total energy consumption per week and predict learning outcomes. The main methods are tests on physical fitness and physical development; assessment of physical performance, functionality and health of the body; indicators of oxygen consumption; assessment of aerobic capacity of the body; risk assessment of disease and physical health; self-assessment of health.

The authors of the article have developed their own programme for professional and personal physical training and implemented it into the content of such courses as "Physical Education", "Personal Safety and Use of Force" and "Fire Training". The complex of courses is created based on some common features. The main organizational and methodological forms of professional and personal physical training of future border guards in professional military training are the following: individual physical training; health-improving training sessions organized during the hours of sports and mass work following the agenda and on weekends; training sessions in sports sections of health-improving and applied nature. The authors have also determined the content of professional and personal training sessions: cyclic, developmental and applied physical exercises aimed at developing aerobic properties in future border guards and igniting their interest in sport. Such exercises include sports and movement games, running and brisk walking, overcoming natural and artificial obstacles, orienteering, aerobic and athletic gymnastics, tourism. The programme consists of the five blocks: the content and components of the programme; the main indices of future border guards' physical condition; methodical recommendations for increasing physical readiness in future border guards for professional activity; the individualization of professional and personal physical training, methodical principles of future border guards' physical training. Finally, the

authors have specified the main methodical principles focused on professional and personal physical training: systematicity and continuity; a broad influence of physical training tools on the body of future border guards; rational productivity; selective pedagogical influence; an optimal ratio between health-improving and applied tools in the content of physical training.

The results obtained from the pedagogical research based on the designed model for increasing physical readiness of future border guards for professional activity prove very high effectiveness of the proposed programme of professional and personal physical training of future border guards. Thus, 94% of cadets completed the programme, successfully passed an annual medical examination and met the established standards of physical training during the covered period of training. The average values of running 3 km distance and pull-ups were on the verge of "satisfactory" and "good" scores.

The results of the pedagogical research prove the pronounced effectiveness of the health-improving approach to organizing professional and personal pedagogical influence. Based on the dynamics of the average values of functional state, one can speak of statistically significant ($p=0.05$) positive changes in the parameters which characterize their aerobic performance. A vital index increased by 10.8%, overall working capacity (based on the results of a step-test) – by 18.7%, maximum voluntary ventilation – by 20.1%, heart rate recovery – by 19.4%. Also, one can observe the convergence of the average values of different indices, which may indicate some levelling of the reserves of various functional systems of the body in the EG. A similar situation is observed in the performance of exercises, whose average results are higher than "good" by the end of the research.

Further research should be aimed at searching for the latest methods of improving the working efficiency of cadets and thus enhancing the organizational and pedagogical aspects of physical training in higher military educational institutions.

Such a great number of authors are associated primarily with a great number of participants in the experiment. Based on the results of the initial survey, two groups of cadets were formed (only 419 individuals). The control group (210 individuals) and the experimental group (209 individuals) included cadets with approximately identical indices of a functional state. Each author conducted research at his / her university providing the results of his /her control and / or experimental group. To obtain overall results that would represent the whole country, the National Uzhhorod

National University, Khmelnytsky Humanitarian Pedagogical Academy, S. P. Koroliov Zhytomyr Military Institute, Military Academy, Odesa Military Academy, Bohdan Khmelnytskyi National Academy of the State Border Guard Service, Hetman Petro Sahaidachnyi National Army Academy, "Odesa Training Center No 14" under Administration of the State Penitentiary Service of Ukraine in Odesa Region (No 14) were chosen as the base of the research. All authors also participated in the development of the programme of professional physical training for future border guards. This was preceded by discussions, round-table discussions, conferences, in which all the co-authors of this material participated.

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