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DYNAMICS OF THE PSYCHOPHYSICAL STATE OF FUTURE LAW ENFORCEMENT OFFICERS IN THE COURSE OF THEIR PROFESSIONAL TRAINING

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The research aimed to investigate the dynamics of indicators of physical and mental states of cadets, i.e. future law enforcement officers in the course of their training at a higher educational institution with specific learning environment. The research involved 96 male cadets aged 17–20 who entered the National Academy of Internal Affairs in 2018. The research lasted 4 years. Cadets' physical state was assessed by the indicators of their body weight, body length, age, heart rate, and blood pressure and was determined by the formula of the physical state index proposed by Ye. A. Pirohova. Cadets' mental state was assessed by the indicators of situational anxiety (methodology of Ch. D. Spielberger, Yu. L. Khanin) and well-being, activity, and mood ("WAM"). A significant improvement in cadets' physical state index during the first and second years of their training ($p < 0.05$–0.001) and an insignificant deterioration in the third training year ($p > 0.05$) was revealed. At the same time, the level of cadets' anxiety significantly ($p < 0.001$) decreases during their training, and their emotional state improves. This indicates the effectiveness of professional training of future law enforcement officers in general and physical training in particular. However, the deterioration of the physical state index in cadets during the third year of their training proves the need to improve the educational process in the academic subject area referred to as "Special Physical Training" by increasing the share of general physical training.

Key words: physical state, mental states, cadets, law enforcement officers, professional training, physical training.

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ДИНАМІКА ПСИХОФІЗИЧНОГО СТАНУ МАЙБУТНІХ ПРАВООХОРОНЦІВ ПІД ЧАС ПРОФЕСІЙНОЇ ПІДГОТОВКИ

Метою було дослідити динаміку показників фізичного та психічного станів курсантів – майбутніх правоохоронців під час навчання у закладі вищої освіти зі специфічними умовами навчання. У дослідженні взяли участь 96 курсантів-чоловіків віком 17–20 років, які вступили на навчання до Національної академії внутрішніх справ у 2018 році. Тривалість дослідження – 4 роки. Фізичний стан курсантів оцінювався за показниками маси тіла, довжини тіла, віку, ЧСС, тиску та визначався за формулою індексу фізичного стану, запропонованою Є. А. Пироговою. Психічний стан курсантів оцінювався за показниками ситуативної тривожності (методика Ч. Д. Спілбергера, Ю. Л. Ханіна) та самопочуття, активності і настрою (методика «САН»). Виявлено достовірне покращення індексу фізичного стану у курсантів під час навчання на першому та другому курсах ($p<0,05$–$0,001$) та недостовірне погіршення на третьому ($p>0,05$). При цьому рівень тривожності курсантів достовірно ($p<0,001$) знижується впродовж навчання, а емоційний стан – покращується. Це свідчить про ефективність професійної підготовки майбутніх правоохоронців в цілому та фізичної підготовки зокрема. Однак погіршення індексу фізичного стану у курсантів на третьому курсі доводить необхідність удосконалення освітнього процесу з дисципліни «Спеціальна фізична підготовка» шляхом збільшення частки загальної фізичної підготовки.

Ключові слова: фізичний стан, психічний стан, курсанти, правоохоронці, фахова підготовка, фізична підготовка.

The study is a fragment of the research project "Research on determinants of health and scientific substantiation of approaches to the organization of medical care and services to different contingents of the population in the period of development of the public health system", state registration No. 0122U201336.

Today, the law enforcement officers of the National Police of Ukraine face extremely difficult and responsible tasks, including combating crime, which is becoming more widespread and dangerous, ensuring public safety and order, protecting human rights and freedoms, as well as the interests of society and the state, providing assistance to persons who need such support for personal, economic, social reasons or as a result of emergencies. The conditions in which these tasks are performed are extreme and require constant growth of law enforcement officers' professionalism and a high level of their professional training [13, 14].

The Law of Ukraine "On the National Police" (2015) stipulates that future law enforcement officers are trained in higher educational institutions with specific learning environment based on an education contract concluded between the educational institution, the relevant police body, and the trainee. The training period is 3–4 years, depending on the specialty. The professional training of future law enforcement officers is an organized, continuous, and purposeful process of acquiring knowledge, special skills, and abilities necessary for the successful performance of service tasks and their continuous improvement [3, 4].

The training of future law enforcement officers (cadets) in higher educational institutions with specific learning environment has its peculiarities and takes place in specific conditions associated with a high volume of educational information, overloading the information sphere of cadets, and a decrease in their motor activity. Such conditions can cause a complex of functional disorders that affect the functions of the circulatory, respiratory, and musculoskeletal systems, and metabolic processes and result in a significant deterioration in the adaptive capacity of the cadet's body [7]. As a result, the cadet's body is unable to effectively withstand the complex of negative factors of modern professional training in higher educational institutions with specific learning environment. As a result, there is a phenomenon of detraining, deterioration of psychophysical state, and decrease in cadets' working capacity [8].

Physical training is one of the integral components of the professional training of future law enforcement officers and an effective means of improving their psychophysical state [9]. At the same time, the impact of physical training on the psychophysical state of future law enforcement officers in the course of their professional training in modern higher educational institutions with specific learning environment is not sufficiently studied. The results of the research will also allow us to assess the current state and effectiveness of physical training as well as the professional training of future law enforcement officers in general.

The purpose of the study was to investigate the dynamics of indicators of the physical and mental states of cadets, i.e., future law enforcement officers in the course of their training at a higher educational institution with a specific learning environment.

Materials and methods. The research was conducted at the National Academy of Internal Affairs (NAIA, Kyiv) in 2018–2022. The research involved 96 male cadets aged 17–20 who entered the NAIA in 2018. The research lasted 4 years.

Research methods: theoretical analysis and generalization of literary sources, pedagogical observation, testing, and methods of mathematical statistics.

Cadets' physical state was assessed by the indicators of their body weight, body length, age, heart rate, and blood pressure and was determined by the formula of the physical state index (PSI) proposed by Ye. A. Pirohova [1]:

PSI = (700 – 3 HR – 2.5 BPaver – 2.7 age + 0.28 body weight) / (350 – 2.6 age + 0.21 body length),

where HR is the resting heart rate in 1 minute (beats per minute);

BPaver – average arterial blood pressure (mm Hg), determined by the formula: BPaver = ((SBP – DBP) / 3) + DBP.

The level of physical state was assessed as low if the PSI was ≤ 0.375 c. u.; below average – at 0.376–0.525 c. u.; average – at 0.526–0.675 c. u.; above average – at 0.676–0.825 c. u.; high – at ≥ 0.826 c. u.

The mental state of a cadet was assessed by the indicators of situational anxiety (methodology of Ch. D. Spielberger, Yu. L. Khanin) and well-being, activity, and mood (methodology referred to as "WAM") [15]. The level of situational anxiety (SA) was assessed using a special form in which it was necessary to cross out the corresponding number on the right depending on how the cadet felt at the time of the research and was determined by the formula: SA = Σ1 – Σ2 + 50, where Σ1 is the sum of the crossed-out numbers on the form in items 3, 4, 6, 7, 9, 12, 13, 14, 17, 18; Σ2 is the sum of the crossed-out numbers on the form in items 1, 2, 5, 8, 10, 11, 15, 16, 19, 20. The level of cadets' anxiety was assessed as low if the SA was 30 points or less, average (optimal) – at 31–45 points, high – at 46 points or more.

According to the "WAM" methodology, it was necessary to evaluate cadets' state by selecting adjectives that were opposite in meaning. The methodology contains 10 pairs of signs for each of the characteristics of the dominant psycho-emotional state. The assessment of the characteristics of the psycho-emotional state was carried out on a 9-point scale.

The significance of the difference between the studied indicators was determined by means of Student's t-test. The significance for all statistical tests was set at $p<0.05$. All statistical analyses were performed with the IBM SPSS Statistics 21 software, adapted to medical and biological researches.

This study followed the regulations of the World Medical Association Declaration of Helsinki. The topic of the research was approved by the Academic Council of the NAIA (Protocol No. 5 of January 03, 2022). Informed consent was obtained from all law enforcement officers who participated in this research.

Results of the study and their discussion. The results of the assessment of the dynamics of indicators of physical and mental states of cadets, i.e., future law enforcement officers in the course of their training in a higher educational institution with a specific learning environment, are presented in Table 1.

Table 1

Dynamics of indices of the psychophysical state of future law enforcement officers in the course of their professional training (n = 96, X ± m)

Indices of psychophysical state	Research stages			
	1-st	2-nd	3-rd	4-th
HR, beats / min	72.9±0.65	71.3±0.67	69.7±0.71	70.6±0.70
SBP, mm Hg	121.5±0.52	120.9±0.55	119.8±0.54	120.4±0.56
DBP, mm Hg	73.4±0.47	72.8±0.44	72.7±0.49	72.9±0.51
BPaver, mm Hg	89.6±0.48	88.7±0.50	88.3±0.51	88.6±0.50
Age, years	17.5±0.08	18.2±0.09	18.9±0.09	20.1±0.09
Body weight, kg	73.6±0.82	73.2±0.79	72.9±0.71	74.1±0.96
Body length, cm	177.5±0.56	178.1±0.59	178.4±0.60	178.5±0.60
PSI, c. u.	0.673±0.007	0.689±0.006	0.708±0.006	0.661±0.007
SA, points	48.9±0.61	42.7±0.74	38.5±0.78	37.7±0.76
Well-being, points	6.41±0.18	7.05±0.17	7.33±0.16	7.59±0.16
Activity, points	5.96±0.22	6.12±0.20	6.71±0.19	7.10±0.18
Mood, points	6.38±0.25	7.20±0.23	7.85±0.21	8.03±0.22

Note: Legend: research stages: 1st – admission to the higher educational institution; 2nd – 1st training years; 3rd – 2nd training years; 4th – 3rd training years. X – arithmetic mean; m – standard deviation.

The reliability of the difference between the indicators of the psychophysical state of future law enforcement officers at different stages of the research is shown in Table 2.

The analysis of resting heart rate indicators showed that this parameter significantly improved by 3.2 beats / min ($p < 0.01$) during cadets' first training years and there was an unreliable deterioration by 0.9 beats / min ($p > 0.05$) in the 3rd year of their training. The difference between the indicators of the 1st and 4th stages of the research is also significant ($p < 0.05$) and amounts to 2.3 beats / min. The analysis of blood pressure indicators shows that all parameters (SBP, DBP, BPaver) showed improvement during the training of cadets in the 1st and 2nd years and a slight deterioration in the 3rd training year. However, at all stages of the research, except for SBP at the 3rd stage, no significant difference was found between the indicators ($p > 0.05$).

Table 2

Reliability of the difference between the indicators of future law enforcement officers at different stages of the research

Indices of psychophysical state	Reliability of the difference				
	p1-p2	p2-p3	p3-p4	p1-p3	p1-p4
HR, beats / min	>0.05	>0.05	>0.05	<0.01	<0.05
SBP, mm Hg	>0.05	>0.05	>0.05	<0.05	>0.05
DBP, mm Hg	>0.05	>0.05	>0.05	>0.05	>0.05
BPaver, mm Hg	>0.05	>0.05	>0.05	>0.05	>0.05
Age, years	<0.001	<0.001	<0.001	<0.001	<0.001
Body weight, kg	>0.05	>0.05	>0.05	>0.05	>0.05
Body length, cm	>0.05	>0.05	>0.05	>0.05	>0.05
PSI, c. u.	>0.05	<0.05	>0.001	<0.01	>0.05
SA, points	<0.001	<0.001	>0.05	<0.001	<0.001
Well-being, points	<0.05	>0.05	>0.05	<0.01	<0.001
Activity, points	>0.05	<0.05	>0.05	<0.05	<0.001
Mood, points	<0.05	<0.05	>0.05	<0.001	<0.001

Note: Legend: p1-p2, p2-p3, p3-p4 p1-p3, p1-p4 – reliability of the difference between the indicators of future law enforcement officers at different stages of the research: at the 1st and 2nd, 2nd and 3rd, 3rd and 4th, 1st and 3rd, 1st and 4th, respectively.

Comparison of body weight indices in cadets at different stages of the research shows that body weight decreases (by 0.7 kg) by the 3rd training year which indicates a positive effect of physical exercises

on the physical state of cadets in the process of their training. However, cadets' body weight increased by 1.2 kg ($p > 0.05$) during the 3rd training year. This value is the worst compared to other stages of the research. Although body length indicators increased by 1 cm during training, there was no significant difference between them ($p > 0.05$). The study of the PSI shows that its average value significantly improved during the 1st and 2nd training years by 0.035, but it significantly deteriorated during the 3rd training year compared to the 2nd training year by 0.047 c. u. ($p < 0.001$), which emphasizes the lack of effectiveness of physical training in senior years. Moreover, the average value of cadets' PSI during the 3rd training year was even worse than when they entered the higher educational institution by 0.012 c. u. ($p > 0.05$). At the same time, the PSI is assessed as average at the 1st and 4th stages of the research, and as above average at the 2nd and 3rd stages.

The assessment of cadets' situational anxiety shows a significant ($p < 0.001$) improvement in indicators throughout the entire period of professional training – the level of SA decreased by 11.2 points during the research period, which suggests a fairly effective system of organizing professional training in the higher educational institution with specific learning environment. At the time of admission, the level of cadets' anxiety was assessed as high and at all other stages of the research – as average (optimal). The dynamics of all indicators of the psycho-emotional state (well-being, activity, and mood) have a similar character – a significant improvement in the process of professional training, which confirms our previous conclusions about the effectiveness of the educational process.

Thus, for most of the studied indices of physical state, there is a significant improvement during the training of cadets in the 1st and 2nd years ($p < 0.05$–0.001), and there is a deterioration in the 3rd training year. At the same time, unlike other indicators, the PSI deteriorated significantly ($p < 0.001$), which indicates the insufficient effectiveness of physical training in senior training years to strengthen the body of future law enforcement officers during their professional training. The positive dynamics of mental state indicators prove the efficacy of the organization of the educational process of future law enforcement officers in the higher educational institution with specific learning environment.

Optimization of physical state, strengthening and preservation of health, comprehensive development of physical qualities, and formation of necessary skills and abilities of future law enforcement officers are entrusted to physical training [5]. The system of physical training in the National Police of Ukraine includes general and special physical training. In higher educational institutions with specific learning environment, the academic subject area referred to as "Special Physical Training" is such a discipline, which is aimed at forming special knowledge, skills, and abilities to apply physical influence measures, self-defense, and hand-to-hand combat techniques, formation and improvement of professionally important physical qualities of law enforcement officers [9]. However, scientists [10] have proved that improving professionally important physical qualities is impossible without a sufficient level of general physical fitness. Insufficient level of general physical fitness leads to deterioration of physical state and health, reduction of efficiency of educational and subsequently service activities of law enforcement officers.

Scientists in the field of physical education and sports [2] note that general physical training is the main means of training all physiological systems of the body. Systematic physical exercises cause positive training effects in the human body: morphological and functional changes observed at rest; enhancement of the maximum functional capabilities of the whole organism; increase in the efficiency of the activity of the whole organism and its organs and systems when performing a certain type of activity. Training effects occur only when training loads exceed the usual load and reach the optimal intensity, and duration and are used with a certain frequency (at least three times a week) [11]. Conducting training sessions twice a week allows only maintaining the level of physical fitness, and once a week only delays, but does not stop the disappearance of positive training effects. Therefore, to improve cadets' physical state, it is important to adhere to the principle of systematicity, which implies that physical exercise should not be reduced to episodic, scattered activities but carried out continuously and consistently Instead, the analysis of the schedule of physical education training sessions showed that the principle of systematicity is not always observed. Practical training sessions are distributed with different frequencies, on average, twice a week, but in some cases – once or not at all, which negatively affects the level of physical fitness and physical state of cadets. Given the above, it is important to engage cadets in regular independent physical training sessions on the part of the instructional staff and cadet supervising officers.

It is also important to create appropriate conditions to achieve a conscious desire of cadets to improve their physical fitness and, as a result, improve their physical state and health.

Scientists who have studied the peculiarities of youth motivation to exercise argue that only a person who is conscious of this and understands the negative consequences of low motor activity can maintain a sufficient level of physical state [6, 12].

Our results suggest that the positive dynamics of indices of the physical state of future law enforcement officers during their 1st and 2nd training years are ensured by systematic physical training, which provides a significant amount of general physical training. In addition, a higher educational institution has all the necessary conditions for independent training in gyms, sports halls, and sports grounds, which has a positive impact on the level of their physical state. In the third training year, practical training sessions in the academic subject area referred to as "Special Physical Training" are aimed mainly at developing skills in the use of physical influence measures, and less time is allocated to general physical training. As a result, the physical state of cadets deteriorates during the 3rd training year. It should be noted that the tendency to decrease the physical fitness and physical state of cadets in the senior training years is observed in almost all higher educational institutions of Ukraine with specific learning environment.

Conclusions

A significant improvement in cadets' physical state index during the 1st and 2nd years of their training ($p < 0.05–0.001$) and an insignificant deterioration in the 3rd training year ($p > 0.05$) was revealed. At the same time, the level of cadets' anxiety significantly ($p < 0.001$) decreases during their training, and their emotional state improves. This indicates the effectiveness of professional training of future law enforcement officers in general and physical training in particular. However, the deterioration of the physical state index in cadets during the third year of their training proves the need to improve the educational process in the academic subject area referred to as "Special Physical Training" by increasing the share of general physical training.

Prospects for further research. It is planned to study the dynamics of the psychophysical state of law enforcement officers in the course of their service activities after the graduation from a higher educational institution.

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