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Specifics of Physical Training of Future Border Guard Officers of Ukraine: Comparative Analysis

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Abstract: The article highlights the range of problems concerning the level of physical training of future officers of the Border Guard Service of Ukraine. The purpose of the article was to analyze the peculiarities of physical training of border guard cadets before and after the full-scale invasion. Methods: The methods used in the research were both theoretical and practical. The results of the research were processed due to the comparative analysis. Results: The recorded changes were taken into account in the content of the Draft Military Doctrine of Ukraine and in the developed Instructions for the Physical Training of Border Guard Officers; in the work educational programs devoted to physical training, personnel policy of the law enforcement agency and the quality of the relevant training sessions, improving the level of physical training of future border guard officers.
Conclusions: The connection between the quality and the content of physical training of future border guard officers in terms of the effectiveness of defensive as well as dynamics and potential of offensive operations during the war was proved subsequent to the results of the research.

Keywords: *physical training; officers; border guard service; peculiarities.*

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1. Introduction

Military-professional education in Ukraine has gained special importance. In 2022, the country found itself on the edge of aggravation not only of domestic politics, but also of international politics. Ukrainian society was not ready for the war and the course of life did not attune it to the war, although it hinted at it. Today, Ukrainian servicemen have gained a respectable status and position in society. However, such a situation did not always exist: during 2004-2013, the number of personnel of military and law enforcement formations in Ukraine decreased catastrophically, and this provoked a decrease in the quality of their professional training. The consequences were terrible, because officer training through military education and training is an important factor in Ukraine's defense capability. As a result of such ill-conceived steps on the part of the state administration of the country, the occupation of the Crimean peninsula and part of the eastern region of Ukraine took place. Corruption policies led to the fact that the best Ukrainian military technologies were illegally transferred and sold. The consequence of this was the localization of the war in the East of Ukraine, which lasted for 8 years. Considering this, the restoration of military and law enforcement formations has become the priority task of the state. The author's team decided to analyze the problem of the quality of physical training of future border guard officers (Hnydiuk & Didenko, 2015) Physical training becomes the one with highest priority among such components of professional training as combat and moral along with psychological training. Therefore, the purpose of our article is to analyze the specific peculiarities of the content of physical training of future border guard officers before and after the full-scale invasion of Ukraine. For this purpose, we compiled the main tasks of our research:

- analysis of the content of the physical training of border guard cadets before and after the start of the war;
- generalization of requirements for the physical training of servicemen of the border agency of Ukraine;
- analysis of changes in the content of the physical training under the influence of the war;
- analysis of the content of physical training of representatives of the security and defense sector of the developed countries of the world.

2. Literature Review

We analysed various scientific works from articles to dissertations in order to obtain reliable results of the presented research. Our selection of

scientific publications included works devoted to the study of physical training problems in the security and defence sector. There is already a certain amount of fresh work on the mentioned problem in Ukraine: Otkydach et al. (2021) has a scientific article on the problems of diagnosing special physical training of cadets of higher military educational institutions of Ukraine; Matveiko et al. (2022) authored a publication on determining the impact of physical training sessions on the functional state and productivity of service of military personnel who are already veterans of war; Melnyk (2019) analysed the range of problems on improving the physical training of cadets of higher military educational institutions in the field environment. These works are of particular importance to us, since they were written in the last 3 years, that is, they have not lost their relevance.

It is necessary to emphasize that all military and law enforcement formations of Ukraine require modernization and transformational changes. The war is another confirmation of this statement. We can confidently state that the Ukrainian security and defence sector will begin its development under the influence of Western trends in the respective sector, and in particular according to NATO standards. Therefore, we turned to scientific works cited in the Scopus system, namely: C. Booth (Australian army recruits in training display symptoms of overtraining) (Booth et al., 2006); Gibala (the possibility of introducing interval training into the training of servicemen and its impact on the performance of professional tasks) (Gibala et al., 2015), W. Kraemer (strength training for the war fighter) (Kraemer & Szivak, 2012), B. Nindl (operational physical performance and fitness in military women: physiological, musculoskeletal injury, and optimized physical training considerations for successfully integrating women into combat-centric military occupations) (Nindl et al., 2016), Santtila (changes in cardiovascular performance during an 8-week military basic training period combined with added endurance or strength training) (Santtila et al., 2008; Santtila et al., 2009), Sharp (the analysis of those physical loads that are accepted in the training of the US Army) (Sharp, 1998), Vantarakis (a 2-month linear periodized resistance exercise training improved musculoskeletal fitness and specific conditioning of navy cadets) (Vantarakis, 2017). The generalization of the experience of physical training of military personnel of the security and defence sector in the developed countries of the world (for example, the USA and Australia) made it possible to carry out the comparative analysis of the mentioned training in Ukraine.

It is worth noting that the article has a global impact on the content of physical training of servicemen in all countries of the world since it is obvious that the architecture of world security is changing, in which the

army will play a key role, and therefore the quality of its training. Each state has drawn its conclusion from this war, and Ukraine is now forming the experience that will be shared with friendly countries.

3. Materials and Methods

The process of researching the peculiarities of physical training of border guard cadets before and after the full-scale invasion of the country on the basis of the Bohdan Khmelnytskyi National Academy of the State Border Service of Ukraine. The facility is located in the central-western part of Ukraine, the territory of which is not involved in hostilities. The General Staff of Ukraine involves representatives of all military and law enforcement formations in the war with Russia, and border guard servicemen perform their duties along the entire border of the state. Therefore, the Border Guard Academy is responsible for the quality of officer training. Thus, it was decided to increase the staff at the Department of Physical Training and Personal Safety of the Border Guard Academy, the total number of which increased from 12 to 25 people. The scientific and pedagogical employees of the Department are represented by participants of international competitions, in particular Invictim games, candidates and masters of sports. Such personnel reforms are connected with the fact that since 2014 (the year of the start of the war with Russia), the recruitment of cadets to study at the Border Guard Academy has increased on average from 200 people to 490.

Study of the peculiarities of physical training of border guard cadets before and after the full-scale invasion of the country was carried out in the following stages:

- drawing up a set of mandatory documents (permits to conduct the experiment at the higher military educational institution, development of the research program (methodological component: theme, purpose, tasks and organizers of the experiment, scientific apparatus and methodical component: definition and calculation of the sample, justification of the research method, drawing conclusions and recommendations of the research) (*February-March 2022*);

- analysis of the indicators of the physical training of cadets of 2018, 2019, 2020 years of recruitment before the start of the war. (*March-April 2022*);

- analysis of the indicators of the physical training of cadets of 2020 recruiting year (the third year of training under the educational and professional program of "State Border Security"), who undertook enhanced

physical and combat training; processing of the obtained results (*April-May 2022*).

The selection of the research sample took place under the condition of compliance with the requirements of the pedagogical research methodology, namely: the sample must be representative (it shall correspond to the sample population according to the characteristics of the total population); taking into account the specifics of the research (taking into consideration the peculiarities of the researched process (physical training of border guard cadets). We used the method of random sampling, which provides equal opportunities to each participant in the research and experimental work. The third-year-cadets who followed the educational and professional program on "State Border Security" took part in the research, forasmuch as the training sessions in the academic discipline of "Physical training" were increased and intensified according to the curriculum of the aforementioned program of the Border Guard Service Academy. 147 cadets of one specialty (and in general, there are six specialties in this institution) undertook training in the third year of their education under the presented educational and professional program on "State Border Security". Thus, border guard cadets of the 2nd faculty (231-236 training groups) took part in the research.

The following research methods were used to achieve the set purpose, solve the tasks and test the hypothesis: *theoretical* – analysis (problematic-targeted and retrospective) according to the research topic in philosophical, sociological, psychological, pedagogical scientific literature to clarify the state of its study and relevance, determine the essence of key research concepts; generalization and clarification of scientific provisions; content analysis of the subject matter of the educational programs for the training of future border guard officers to systematize the received information on the research problem; *empirical* – prognostic (expert assessment, generalization of independent characteristics); diagnostic (questionnaires of cadets during training sessions (two types of questionnaires: open (with a total number of 8 questions) and closed (with limited answer options with a total number of 10 questions), performance of practical tasks and observational (observation, self-observation, self-assessment) in order to find out the state of the physical training of future border guard officers before and after the full-scale invasion of the country, the identification of shortcomings in the educational process regarding the implementation of the physical training; pedagogical experiment (input and output diagnosis) and its leading method was the survey method in order to compare the obtained results.

4. Results of Research

First of all, we focused our attention in our research on the conditions and terrain in which border guard officers have to fight forasmuch as this characteristic has a direct impact on the requirements for their physical training.

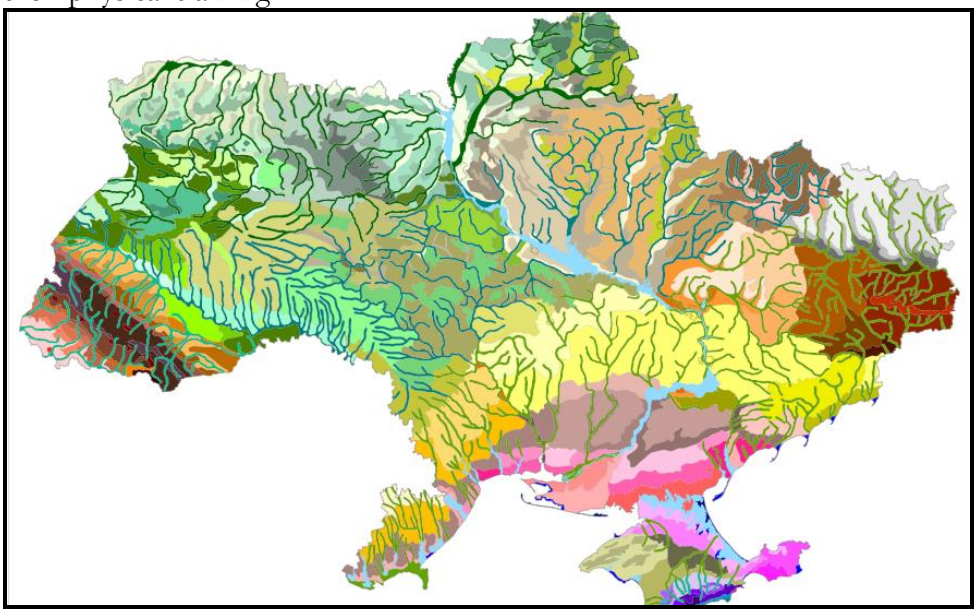


Figure 1. Landscape map of Ukraine
Source: https://geomap.land.kiev.ua/landscape.html

Figure 1 shows a landscape map of Ukraine and Figure 2 shows the current map of hostilities in Ukraine. When comparing these two maps, we see that the area of hostilities is concentrated in the south-eastern part of Ukraine. The terrain of this region is quite difficult for warfare as the territory in the south of the country is medium-steppe and slope-highland and it is highland and plain in the east. That is, this territory is characterized by both an open steppe, and slopes, and small rivers with ravines. There is a meadow-forest and swamp area closer to the north and the very north of Ukraine, where the Russian troops were located at the beginning of the war. This characteristic of the landscape allows us to state that conducting hostilities in Ukraine is extremely difficult for the Russians unlike Syria, where the steppe, desert and a completely different nature of buildings in cities are predominant.



Figure 2. Map of hostilities in Ukraine

Source: https://www.facebook.com/inukraine.official/photos/a.1448141988826234/2792331114407308/?type=3

Thus, we have identified a number of objective factors that prove the need for an appropriate level of physical training for border guard officers:

- features of the area where active hostilities are taking place
- the number of servicemen of the regular army of Russia, as well as its private military companies;
- quality and quantity of equipment and weapons of the Russian army.

Taking into account the above, the new Instruction for checking physical fitness has been introduced for servicemen of all military and law enforcement units: all servicemen will be checked every quarter from 2022. Prior to this, inspections were carried out both once a month and twice a year, it was different. General fitness will be checked now with the help of the test that will include pull-ups for men, 100 meters and 3 kilometres run for the age groups under 40. For 40-49-years-old men, there will be a 2-kilometer run, two strength exercises (pull-ups, abdominal crunches; for 45-49-years-old males, the pull-up can be replaced with push-ups) without 100 meters run checking. In addition, the age groups over 50 will be tested for a 1-kilometer run and two strength exercises — pull-ups or push-ups, abdominal crunches. For women under the age of 30, there is also a 3-

kilometer run, two strength exercises — push-ups, abdominal crunches. For 30-39-years-old women, the same two strength exercises and a 2-kilometer run. Moreover, for those who are over 40 years old – similar strength exercises and a 1-kilometre run. Also, a check of physical readiness for combat activities has been introduced into the new Instruction. It will be checked twice a year — in special and main troops. For this, physical fitness tests have been developed, which involve special exercises, and they, of course, differ from tests of general physical fitness.

The draft Military Doctrine of Ukraine outlines the main substantive aspects of special physical training. Special tasks of physical training are defined in the following way: development and improvement of professionally important and special physical qualities; mastering military-applied motor skills in overcoming natural and artificial obstacles, military-applied swimming, hand-to-hand combat, cross-country movement on foot and on skis, accelerated march, throwing grenades; character and psychological qualities development, unity of military formations (Draft Military Doctrine of Ukraine). The performance of tasks is ensured by a system of physical training, which includes: continuous physical training; creation and maintenance of the necessary initial material and technical base for physical training and sports (educational and sports base); training of physical education specialists, instructors, sports organizers, coaches, sports judges (sports bodies of active functionaries); motivation of military personnel to independently engage in physical training and sports, mastering knowledge and methods of physical improvement, maintaining a healthy lifestyle; scientific justification of the content and organization of physical training [9]. Special physical qualities are defined as the properties of the organism that ensure its resistance to the influence of certain adverse factors of military and professional activities: resistance to motion sickness (defined by the ability of the organism to withstand the impact of specific accelerations that occur in flight, on a ship, in combat vehicles), overload (the ability of the organism to resist the inertial forces of acceleration acting on it) and oxygen starvation (the ability of military personnel to act in conditions of lack of oxygen). Military-applied motor skills are practical actions brought to the point of automatism, which are performed accurately and confidently in accordance with the assigned tasks (skills in moving on foot and on skis, overcoming obstacles, throwing grenades, military-applied swimming, hand-to-hand combat).

At the Department of Physical Training and Personal Safety of the Border Guard Service Academy, in accordance with the instructions on physical training of the Ministry of Defence of Ukraine and the Draft

Military Doctrine of Ukraine, changes were made to the work program of the academic discipline of "Physical Training", in particular, an increase in the amount of contact hours, i. e. the number of training sessions, the development of new topics for training sessions and improvement of the existing ones (Draft Military Doctrine of Ukraine).

Thus, the main sections of physical training of border guard cadets include general physical training; hand-to-hand combat; special (military-applied) physical training. We would like to emphasize that all requirements for physical training at the Border Guard Service Academy have been developed taking into account the gender dimension of border guards (male and female). Let us highlight those physical exercises that are mandatory in the special physical and hand-to-hand training of future border guard officers. Hand-to-hand training includes the following exercises: unarmed combat techniques; methods of combat with a machine gun; combat techniques with an infantry entrenching tool; techniques of fighting with a knife; submission holds; throws; special hand-to-hand combat techniques for reconnaissance units. Special physical training involves the performance of special exercises for the predominant development of resistance to motion sickness and spatial orientation: rotations on a stationary gymnastic wheel; special exercises for the predominant development of resistance to overload and spatial orientation: spins on loping; special exercises for the predominant development of resistance to oxygen starvation and spatial orientation: long diving; military-applied exercises: 3 km obstacle course; 1100 m run with an obstacle course as part of a unit; accelerated march for 5, 10 km; 2 km rowing on sea yawls; general muscular endurance test on the obstacle course, 6 x 100 m shuttle run; throwing an F-1 grenade for a distance; throwing an F-1 grenade for accuracy; swimming in uniform with weapons.

So, border guard cadets are the main objects of the proposed research. Table 1 presents the average statistical indicators of border guard cadets' physical development.

Table 1 shows the average statistical indicators of border guard cadets' physical development (n = 147)

Investigated indicators	Girls			Boys		
	x ± m	Average rate	P	x ± m	Average rate	P
Height, cm	163 ± 5.86	162-170	> 0.01	178 ± 6.01	169-180	> 0.01
Body weight, kg	54.8 ± 6.95	47.1-59.2	> 0.01	68.5 ± 9.47	60.2-71.3	> 0.01
LC (lung capacity) actual, ml	2517 ± 388.9	2500-3500	> 0.01	3754 ± 618.8	3100-4600	> 0.01
LC appropriate, ml	3271 ± 275.5		< 0.01	4795 ± 427.5		< 0.01
Right hand dynamometry, kg	14.3 ± 5.35	28.3-33.8	< 0.01	32.7 ± 7.87	42.9-49.6	< 0.01
Left hand dynamometry, kg	12.2 ± 4.81	24.5-29.9	< 0.01	30.09 ± 7.94	37.8-45.4	< 0.01
Body-weight index, kg / m^2	20.6 ± 2.3	19-24	> 0.01	21.5 ± 2.92	20-25	> 0.01
Strength index, %	24.1 ± 7.99	50-60	< 0.01	46.2 ± 10.5	65-75	< 0.01
Vital index, ml / kg	46.4 ± 7.47	45-50	> 0.01	55.5 ± 9.97	50-60	> 0.01

The analysis of anthropometric data showed the following: the average height of girls was 163 ± 5.86 cm, boys – 178 ± 6.01 cm, deviations from the average rates of this age category are statistically not reliable; the average values of body weight in girls and boys made 54.8 ± 6.95 kg at the rate of 47.1-59.2 kg and 68.5 ± 9.47 kg at the rate of 60.2-71.3 kg, respectively. The average values of the lungs capacity (hereinafter referred to as LC) in female cadets were 2517 ± 388.9 ml and in male cadets 3754 ± 618.8 ml, as well as vital index indicators (respectively 46.4 ± 7.47 ml / kg and 55.5 ± 9.97 ml / kg), also do not differ significantly in terms of statistics from the generally accepted rates, but it should be noted that when calculating the appropriate indicators of LC according to the Ludwig formula: for men LC = 40 x height (cm) + 30 x body weight (kg) – 4400, for women LC = 40 x height (cm) + 10 x body weight (kg) – 3800 deviation of the actual LC from the appropriate LC in both girls and

boys is more than 15 %. In some cases, this may indicate a certain pathology. Measurement of the strength of the finger flexor muscles (dynamometry of the right and left hand) in boys and girls showed a statistically significant deviation of the average results to the worse, compared to age rates. Thus, in girls, the dynamometry of the right hand is on average 14.3 ± 5.35 kg at the rate of 28.3-33.8 kg, of the left hand – 12.2 ± 4.81 kg at the rate of 24.5-29.9 kg; respectively, in young men it is 32.7 ± 7.87 kg at the rate of 42.9-49.6 kg for the right hand and 30.09 ± 7.94 kg at the rate of 29,3 37.8-45.4 kg for the left hand. A similar correlation is observed for the indicators of the strength index, the deviation of which from the average values of the studied age category has a high degree of statistical probability: 24.1 ± 7.99 % at the rate of 50-60 % for girls and 46.2 ± 10.5 % at the rate of 65-75 % for young men (Table 2).

Table 2 shows the average statistical indicators of cadets' functional state (n = 147)

Investigated indicators	**Girls**			**Boys**		
	x ± m	**Average rate**	**P**	**x ± m**	**Average rate**	**P**
Systolic blood pressure, millimetre of mercury	112 ± 10.3	110-118	> 0.01	120 ± 10.5	112-122	> 0.01
Diastolic blood pressure, millimetre of mercury	70.5 ± 9.03	65-75	> 0.01	64.3 ± 8.88	65-78	> 0.01
Heart rate, beats per minute	81.9 ± 10.1	60-80	> 0.01	75.4 ± 10.8	60-80	> 0.01
Static balancing, s	32 ± 12.4	20-40	> 0.01	22 ± 18.2	25-45	> 0.01
Stange's test, s	58.54 ± 19.91	40-50	> 0.05	76.01 ± 23.59	50-70	> 0.05
Genci's test, s	37.8 ± 12.6	20-30	> 0.05	40.2 ± 14.7	30-40	> 0.05

The analysis of the indicators of the functional state showed that the average values of the studied contingent during measurements of blood pressure, heart rate, and static balancing did not have statistically significant deviations from the generally accepted rates for this age category of girls and

boys. The results shown by both female and male cadets during the functional tests of Stange and Genci revealed certain deviations from the generally accepted rate for the better. However, this tendency was not confirmed by statistical reliability. Thus, the analysis of the results of the study of the functional state in border guard cadets of the Border Guard Service Academy proved that most of the average statistical indicators of their physical development and functional state correspond to the generally accepted rates of the corresponding age category for both girls and boys.

It should be emphasized that we cherished the hope that the war would not start, therefore the direction of our scientific research was primarily not related to the war. To solve the experimental task, we carried out diagnostics of the level of physical training of border guard cadets twice – before and after the full-scale invasion of the country. In particular, questionnaires, tests were carried out in stages "before the start" and "after the start". This made it possible to record changes in self-attitude and self-assessment. After the start of the war, approximately in the course of the second month of the war, an increase in the stability of self-attitude and adequacy of self-assessment was noted in physical training, which ensured the possibility of developing a permanent strategy in relation to one's own "Ego", to one's own professional development, and found its manifestation both in external substantive work and in internal personality activities. We defined four levels of physical fitness of border guard cadets: proactive, active, adaptive and passive. The proactive level characterizes the cadet as a harmoniously developed person, all of whose individual and personal qualities are coordinated and testify to a certain level of physical training. The future border guard officer adequately perceives and diligently stores samples of professional activities in his / her own consciousness, models them, develops his / her own technologies, reflections of his / her own experience on the basis of knowledge of the methodological foundations of the development of physical culture and sports. It is possible to set examples to colleagues on the samples created by him / her. Such persons are characterized by the proactive orientation of professional consciousness clearly prevailing over the normative one, with a clearly expressed individual style of solving professional tasks. A proactive level of physical fitness is always an individual and creative approach in physical education and professional activities. The active level characterizes the border guard cadet with the necessary theoretical knowledge and personal qualities, who works professionally, looks for adequate ways to solve new professional problems, has a constant need for professional self-development and self-improvement; achieves high results in studies and sports activities, however,

he / she lacks manifestations of reflection at the methodological level, and therefore the activities are limited to the requirements for the profession. The adaptive level characterizes the future border guard officer, who has passed a certain stage of adaptation and identified himself / herself as a specialist, a person who successfully performs practical tasks. Such cadets have the necessary personal and professional qualities, rely on knowledge and skills in their activities, achieve certain results in education and training. However, the lack of psychological reflection, and therefore methods of objective self-knowledge, restrains the desire for professional self-improvement and self-development. As a result, participation in the professional and creative search is episodic. They do not feel a constant need for professional growth, they are satisfied with their achievements. Cadets of this level should be encouraged to self-discovery, self-analysis and further self-development. They should learn ways of self-development, the experience of others, and accumulate their own experience. Such cadets poorly distinguish the strengths and weaknesses of their personality, do not know and do not use their own potential. Most of the time, their efforts towards self-improvement are aimed at the accumulation and fixation of knowledge, and not at the development of professional qualities necessary for everyday activities. It is positive that the aforementioned level provides the cadets with the possibilities to create an individual style of professional activities adequate to their mental qualities. In the future, it remains unchanged in essence, but can change in its meaning, which is adjusted by the subject to specific conditions. The passive level is characterized by a lack of professionalism, a high intensity of emotional manifestations, a dilettante or intuitive approach to professional activities. Individuals with a passive level sometimes achieve success due to exceptional abilities and qualities. They face significant difficulties in their professional activities in the absence of such abilities. The results of the experiment proved that the value-based and activity-reflexive orientation of physical training affects the professional growth of future border guard officers, which is reflected in specific indicators: professional values of self-development are approved; the need of the future border guard officer for his / her own professional development and self-development is realized; methods of self-knowledge and self-analysis of professional experience are mastered; the ability to self-consciousness is developed, which is a necessary attribute of a professional officer; readiness and ability for professional activities is developed. Based on the results of checking the physical standards, we created the database the peculiarities of physical training of future border guard officers before and after the full-scale invasion of the country, so we will proceed to the

quantitative and qualitative analysis of the results of the experiment (Table 3). We give only relative indicators in the table.

Table 3 shows the levels of physical fitness of future border guard officers (n = 147, %)

Physical fitness Levels	Before the war		After the start of the war	
	q-ty	%	q-ty	%
passive	56	38.10	15	10.20
adaptive	50	34.01	20	13.61
active	30	20.41	63	42.86
proactive	11	7.48	49	33.33

To check the reliability of the difference in the results of the experiment, we will again use K. Pearson's χ^2 test. Data obtained: $\chi^2 = 11.07$. Comparison of empirical values with critical values at 3 degrees of freedom ($\chi^2 = 7.81$ at 95 % probability level) allows us to draw the following conclusions: the H_0 hypothesis is rejected for training groups before and after the start of the war. Therefore, the growth of results in the training groups after the war is not caused by random variables, it is statistically significant.

Thus, the dynamics of changes in the levels of physical fitness of the cadets of the Faculty of State Border Security indicate that the changes that took place in the National Academy of the State Border Guard Service of Ukraine are positive.

5. Conclusions

We should emphasize the important conclusion of the conducted research: there is an objective relation between the level of physical training of border guards and the effectiveness of their performance of military-professional tasks, in particular at the front in the epicentre of hostilities between Ukraine and Russia. The successes that Ukraine owes in this war with Russia are the merit of Ukrainian military personnel, in particular, changes in their professional training, the desire of the military and political leadership of the Ukrainian state to get rid of the Soviet training system, and as a result, the transformation of the security and defence sector of Ukraine into a powerful institutional setting. The team of contributors conducted the comparative analysis of the content of physical training of the cadets in the Border Guard Academy before and after the full-scale invasion and proved

that it has undergone dramatic changes. At the same time, the requirements for physical training that are currently relevant in the Border Guard Agency were carefully investigated. In order to understand the qualitative changes in the physical training of border guard cadets, the authors turned to similar experience in the armies of countries with a high level of development. The value of this analysis was to prove the transition of the Ukrainian security and defence sector from the Soviet model to the NATO model.

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