

THE INFLUENCE OF MODERN SPORTS TECHNOLOGIES ON HEALTH AND PROFESSIONAL ACTIVITY OF LAW ENFORCEMENT OFFICERS

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ABSTRACT

The aim: Is to investigate the influence of modern sports technologies (Crossfit classes) on health and professional activity of law enforcement officers.

Materials and methods: The study involved 52 law enforcement officer graduates from the National Academy of Internal Affairs (Kyiv, Ukraine) aged 22-30 who attended Crossfit classes while studying. The duration of the study is 5 years (2016-2020). The level of officers' health was examined according to the methodology of H. L. Apanasenko which consists in determining the amount of points for each of the 5 indicators: body mass index, vital capacity index, power index, Robinson index, heart rate recovery time. In order to estimate the effectiveness of the officers' law enforcement activity we conducted a survey of the heads and commanders of units where the officers served using the rating card we developed of a five-point scale. Research methods include analysis and generalization of scientific and methodological works, pedagogic observation, questionnaire survey, medical and biological methods and methods of mathematical statistics.

Results: It was also clarified that the health level of the officers who attended Crossfit classes while studying at higher educational institutions with specific training environment remained stable after graduation for 5 years of service ($p > 0.05$). The results of the units commanders' evaluation of the officers' law enforcement activities showed positive influence of Crossfit classes on the indicators that characterize the quality of service.

Conclusions: It has been established that Crossfit classes during training helped to maintain the level of health of law enforcement officers during 5 years of service on officers' positions after graduation and provide high efficiency of professional activities.

KEY WORDS: health, professional activity, Crossfit, law enforcement officers

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INTRODUCTION

Modern professional activity of law enforcement officers is characterized by significant stress and physical exertion, risk of injury and death, which significantly increases the importance of physical training of future officers in the process of training and education [1 - 3]. Physical training in the system of future officer's professional training takes an important place as one of the main subjects of professional training [4 - 6]. It affects all components of officers' capability. The objective basis of this is transferring of physical qualities, motor skills, and biological features of the body, peculiarities of the psyche and consciousness of officers to the capability formed during the process of physical training. Officers with a high level of physical qualities development in combat conditions prevail according to various indicators of professional activity of officers over those whose level of these qualities is lower [7 - 9]. Due to the high level of physical training the officers can overcome

significant physical and mental stress, maintain a high level of work ability and stress resistance, resist the negative factors of professional activity and quickly restore the level of combat capability. The scientists reveal the most important physical qualities that are professionally important and most effective in forming the officer's physical readiness to professional activity are strength and endurance [10, 11].

Scientists [12, 13] stated that effective means of future officer's physical training are sport classes which, on the one hand, provide a high general level of officer's physical preparedness, and, on the other hand, forms professionally applied skills and abilities that are necessary in professional (law enforcement) activity.

According to the scientists [14, 15], the variety of complexes, exercises, techniques, training systems in Crossfit allow to diversify the physical training of future officers, to offer comprehensive methods of restoring physical qualities after injuries, long breaks in regular classes, to

develop existing qualities, and most importantly efforts for the comprehensive development of all qualities of the officers. Analysis of the work of many scientists [16, 17] suggests that the system of training in Crossfit is based on a number of basic principles. The first principle is diversity. Training should be diversified, without focusing on a particular exercise, try to bring into the classes new and unexpected elements of all available sports to develop all the physical qualities. The second principle is the functionality of movements. It is necessary to depart from a typical cult of use of exercise machines and movements, exercises, repetitions, and to pass to a barbell, dumbbells, a weight, gymnastic tools, using principles of a workout. Attention should be paid to the variety of movements that are performed and can occur in life and professional activities. The third principle is gradual, dosed, systematic and planned classes. It is worth considering the basic principle of physical training – do no harm. All exercises and movements should be selected easy to perform. The fourth principle is intensity. This principle combines all the above principles and known exercises, techniques, but the basis of this principle is their intensive implementation. The authors [18, 19] are convinced that Crossfit is the best means of physical training for law enforcement officers, because Crossfit exercises can be used in any area, using a variety of sports equipment. Crossfit is a constantly varied, high-intensity exercise; it is not a specialized training program, but a specialization without specialization [14, 20].

Since Crossfit was created on the basis of many sports (athletics, weightlifting, gymnastics, swimming, kettlebell lifting, powerlifting, etc.), a wide range of physical exercises and various equipment is used in training [21 - 24]. Crossfit constantly goes beyond a certain sport or training regime, using different movements, changing the energy regimes of muscle activity and, accordingly, the load on different body systems [18].

THE AIM

The aim of this study is to investigate the influence of modern sports technologies (Crossfit classes) on health and professional activity of law enforcement officers.

MATERIALS AND METHODS

The study involved 52 law enforcement officer graduates from the National Academy of Internal Affairs (Kyiv, Ukraine) aged 22-30 who attended Crossfit classes while studying. The duration of the study is 5 years (2016-2020).

To study the effectiveness of Crossfit classes to improve the health and prevent the injuries in the process of law enforcement activity, as well as the attitude of the officers to the necessity of Crossfit implementation into the physical training of the future officers we have performed a survey of the 52 law enforcement officers who did Crossfit during the educational process. Law enforcement officers answered the authors' questionnaire of 10 questions.

The level of officers' health was examined according to

the methodology of G. L. Apanasenko which consists in determining the amount of points for each of the 5 indicators: body mass index, vital capacity index, power index, Robinson index, heart rate recovery time [25]. The body mass index (BMI) characterizes body figure and was determined by the correlation of body weight to body height in kg/m². The vital capacity index (VCI) helps to estimate the reserves of the external respiration functions, determined by the ratio of lung vital capacity to body weight in ml/kg. The power Index (PI) characterizes the state of the human muscular system and is determined by the correlation of the stronger hand dynamometry to the body weight in per cent. The Robinson index (RI) characterizes the effectiveness of the cardiovascular system functioning. Reduction of the indicator determines the improvement of the system performance. Robinson index was determined by the product of heart rate and systolic blood pressure divided by 100 in conventional units (c.u.). The evaluation of the heart rate recovery (HRR) time was carried out in seconds after 20 squats per 30 seconds. According to professor H. L. Apanasenko's methodology, the low level of health corresponded to 3 and less points, below average – 4-6 points, average – 7-11 points, above average – 12-15 points, high level of health – 16-18 points (Table I). The research was conducted based on the results of the annual medical examination of officers.

In order to estimate the effectiveness of the officers' law enforcement activity we conducted a survey of the heads and commanders of units where the officers served using the rating card we developed of a five-point scale. Among the indicators of professional activity of officers are performing the service in daily detail, executive discipline, official duties performance, professionally important qualities, individual and psychological qualities, moral and volitional qualities, personal qualities, appearance, drilling, physical training level, state of health, frequency of appeals to the hospital, number of days on sick leave per year, injuries in the process of law enforcement activity.

Research methods include analysis and generalization of scientific and methodological works, pedagogic observation, questionnaire survey, medical and biological methods and methods of mathematical statistics.

The research was performed according to the requirements of the Regulations on Academic Honesty at the National Academy of Internal Affairs, which were developed on the basis of Ukrainian experience of ethical rulemaking and also the principles of the Helsinki Declaration of the World Medical Association. The consent to participate in the research was obtained from all subjects.

RESULTS

The study of the responses of law enforcement officers, who did Crossfit during studying at higher educational institution, will help to find and justify ways to improve the physical training of future officers to strengthen their health and improve the effectiveness of the future professional activities. The analysis of the question "Did you do

Table I. Evaluation of the physical health level by H. L. Apanasenko's methodology [25]

| Physical health indicators | Physical health level (men) | | | | |
|----------------------------|-----------------------------|---------------|-----------|---------------|----------|
| | Low | Below average | Average | Above average | High |
| BMI, kg/m ² | 28.1 i > | 25.1–28.0 | 20.1–25.0 | 19.0–20.0 | 18.9 i < |
| Evaluation in points | -2 | -1 | 0 | 0 | 0 |
| VCI, ml/kg | 50 i < | 51–55 | 56–60 | 61–65 | 66 i > |
| Evaluation in points | -1 | 0 | 1 | 2 | 3 |
| PI, % | 60 i < | 61–65 | 66–70 | 71–80 | 81 i > |
| Evaluation in points | -1 | 0 | 1 | 2 | 3 |
| RI, c.u. | 111 i > | 95–110 | 85–94 | 70–84 | 69 i < |
| Evaluation in points | -2 | -1 | 0 | 3 | 5 |
| HRR time, sec | 180 i > | 120–180 | 90–120 | 60–90 | 59 i < |
| Evaluation in points | -2 | 1 | 3 | 5 | 7 |
| Sum of points | 3 i < | 4–6 | 7–11 | 12–15 | 16–18 |

Legend: BMI – body mass index; VCI – vital capacity index; PI – power index; RI – Robinson index; HRR – heart rate recovery time after 20 squats in 30 seconds

Table II. Dynamics of health indicators of law enforcement officers who did Crossfit during studying (n=52, Mean±SD)

| Physical health indicators | Years of service | | | | | Significant level p(1–5) |
|----------------------------|------------------|-----------------|-----------------|-----------------|-----------------|--------------------------|
| | 1 st | 2 nd | 3 rd | 4 th | 5 th | |
| | n=10 | n=12 | n=9 | n=11 | n=10 | |
| BMI, kg/m ² | 24.1±0.59 | 24.3±0.63 | 23.4±0.67 | 24.7±0.65 | 24.8±0.62 | p>0.05 |
| VCI, ml/kg | 61.6±1.72 | 61.9±2.14 | 61.2±1.35 | 61.3±1.85 | 61.7±2.28 | p>0.05 |
| PI, % | 72.1±3.51 | 71.5±3.61 | 71.4±2.38 | 71.7±1.80 | 71.6±3.02 | p>0.05 |
| RI, c.u. | 80.9±2.15 | 81.3±1.42 | 81.2±2.24 | 81.3±2.44 | 81.7±1.95 | p>0.05 |
| HRR time, sec | 81.4±5.48 | 81.7±6.62 | 82.1±9.98 | 82.2±7.61 | 82.3±5.58 | p>0.05 |
| PHL, points | 9.10±1.15 | 9.07±1.70 | 8.63±1.09 | 8.64±1.24 | 8.48±1.21 | p>0.05 |

Legend: p(1–5) – significance of difference between the officers' indicators at the 1st and at the 5th years of service

physical training after graduating from university in the process of law enforcement activity?" showed that 53.8 % of the graduates did physical training. 46.2 % of the officers think that the main goal of physical exercises during the law enforcement activity is to improve the state of health, to prevent injuries and prolong professional longevity, 19.2 % of the officers kept fit and lost body weight, 15.4 % of the officers kept physical training level and ability to work, 11.5 % of the officers improve the indicators of the effectiveness of law enforcement activity, 7.7 % of the officers got rid of psycho-emotional stress, prevented stress. At the same time, 84.6 % of the respondent officers noted that the methodical skills obtained in the course of Crossfit classes helped them substantially during the organization of independent exercises or with personnel subordinates. The analysis of the responses to the question "What are, in your opinion, the advantages of Crossfit classes that distinguish it among other means of physical training and kinds of sport?" showed that the advantages rating is as follows: 1 – the simplicity and availability of exercises (56 %), 2 – high efficiency in the development of physical and moral-volitional qualities (73.6 %), 3 – possibility of strengthening the whole body (59.3%); 4 – the opportunity

to conduct classes in any place (indoors, outdoors) (68.1 %); 5 – prevention of spine and joints injury (45.1 %), 6 – a wide range of exercises (42.9 %), 7 – the opportunity to conduct classes on your own and in the group (40.7 %), 8 – the economic effectiveness (no material expenses) (49.5 %). Survey results also showed that 96.2 % of respondents think that Crossfit is an effective means of cadets' physical training for future law enforcement activity. At the same time, 92.3 % of officers are convinced of the necessity of implementation of means of Crossfit into the physical training of higher educational institutions in order to increase the level of physical preparedness and health of graduates and improve the efficiency of their future professional activities.

For the purpose of studying the physical health of the officers who did Crossfit during studying at higher educational institutions, we analyzed the following indicators: BMI, VCI, PI, RI, HRR time and physical health level (PHL). Analysis of the BMI made it possible to note that the dynamics of this indicator is characterized by reliable stability during the 1st – 5th years of service (p>0.05): during the 5th year of service the BMI did not significantly differ from similar indicators during the 1st – 4th years (p>0.05); it indicates the balanced distribution of weight and height

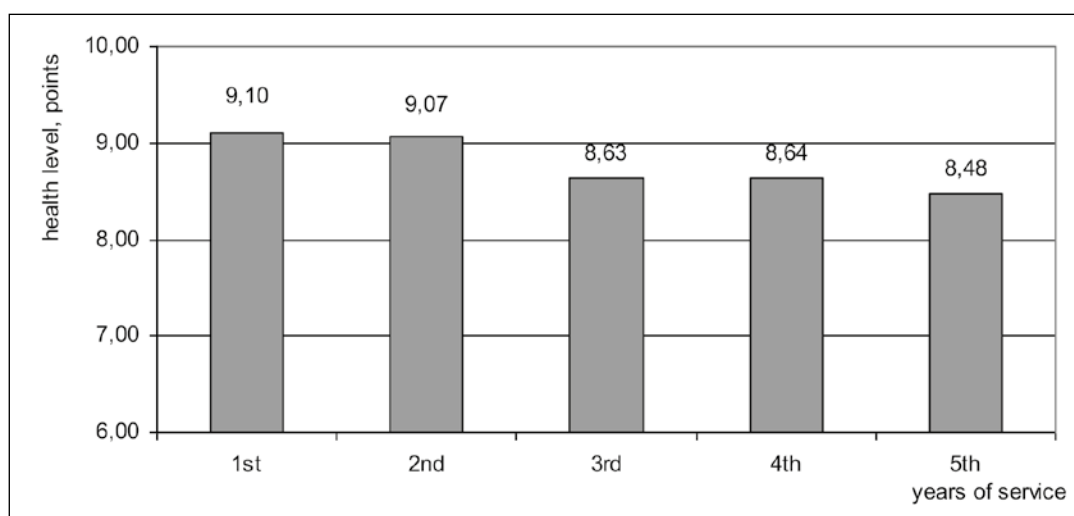


Fig. 1. The physical health level dynamics of law enforcement officers who did Crossfit during studying (n=52), points

of the officers during the service after the graduation. It is important to note that the BMI for all years of service is characterized as good for men (Table II).

The research of the VCI dynamics of officers in the process of service gives the right to state about its non-plausible increase on the 2nd year of service ($p>0.05$), a slight decrease on the 3rd year of service ($p>0.05$) and an incorrect increase on the 4th and 5th years of service ($p>0.05$). It should be noted that on the 1st – 5th years of service, the VCI of the officers who did Crossfit during the studying is estimated as «above average»; it indicates the high level of functional possibilities of the officers' respiratory system. The analysis of PI indicators allows to state their stability – the indicator of the 5th year is lower than the first only by 0.5 % ($p>0.05$). At the same time, the reserve level of muscular system functions of the officers during the 1st – 5th years of service is estimated as «above average». The research of the RI dynamics in the process of service showed that the indicators of the officers of the 1st – 5th years of service did not significantly differ among themselves ($p>0.05$). Functional possibilities indicators of the officers' cardiovascular system during five years of service are at the level of «above average»; it indicates a high level of cardiovascular system of officers who did Crossfit during the studying. Analysis of the dynamics of the HRR time of officers to the initial level after 20 squats per 30 seconds in the process of service allows to state the incorrect deterioration of this indicator during five years of service ($p>0.05$). The average time of officers' HRR time, measured during five year term, is estimated as «above average» which indicates the high functional possibilities of the cardiovascular system of the officers who did Crossfit during the studying.

The physical health level of the officers was reliably stable and did not change significantly during the five years of service ($p>0.05$) – this indicator is only by 0.62 points lower of the officers of the 5th year of service in comparison with the officers of the 1st year of service ($p>0.05$) (Fig. 1). According to the H. L. Apanasenko's methodology the PHL of officers during the 1st – 5th years of service is estimated

as «average». The physical health analysis of the officers who did Crossfit during the studying showed that all the indicators tested didn't change significantly during the five years of service ($p>0.05$). This testifies the positive influence of Crossfit classes on the maintenance of a high level of health, professional longevity of the law enforcement officers, as well as their ability to work in the process of law enforcement activity.

An important indicator of good health is the effectiveness of the officers to perform their official duties and tasks of law enforcement activity. In order to estimate the effectiveness of the professional (law enforcement) activity of graduates who did Crossfit during the studying, we conducted a survey of the heads and commanders of units where the officers served using the rating card we developed of a five-point scale. The level of indicators of the law enforcement activity effectiveness of the officers who did Crossfit (Group 1, n=52), and officers who didn't do any kinds of sport (Group 2, n=50) is shown in Table III.

The analysis of the service activities indicators of the officers of the research groups showed that the evaluation of the service in the daily detail of the officers from both groups did not differ significantly ($p>0.05$). According to the results of the evaluation of the executive discipline (initiative, organizational skills, carrying out the duties of the senior), it was stated that the average point that the units commanders gave to officers of Group 1 (4.35 points) is significantly better than that of the officers of Group 2 (3.76 points) by 0.59 points ($p<0.05$). According to the results of the indicators evaluation that characterize the performance of official duties, professionally important qualities and appearance, it was stated that in Group 1 the average point is higher than in Group 2, but the difference between the indicators of the research groups is incorrect ($p>0.05$). Comparative analysis of individual and psychological evaluation (activity, vitality, ability to work, ability to quickly make optimal decisions in difficult situations, motivation to achievement of goals), moral and volitional qualities (determination in achieving results, adherence

Table III. The level of indicators of the professional (law enforcement) activity effectiveness of the officers (Mean±SD, points)

| Research indicators | Group 1 (n=52) | Group 2 (n=50) | Significant level |
|--|----------------|----------------|-------------------|
| Performing the service in daily detail | 4.26±0.18 | 4.22±0.13 | p>0.05 |
| Executive discipline | 4.35±0.17 | 3.76±0.14 | p<0.05 |
| Official duties performance | 4.11±0.18 | 4.07±0.12 | p>0.05 |
| Professionally important qualities | 4.21±0.20 | 4.14±0.11 | p>0.05 |
| Individual and psychological qualities | 4.59±0.15 | 4.16±0.14 | p<0.05 |
| Moral and volitional qualities | 4.92±0.16 | 4.05±0.13 | p<0.001 |
| Personal qualities | 4.76±0.17 | 3.72±0.12 | p<0.01 |
| Appearance, drilling | 4.50±0.15 | 4.23±0.11 | p>0.05 |
| Physical training level | 4.92±0.09 | 3.80±0.15 | p<0.001 |
| State of health | 4.85±0.14 | 3.71±0.13 | p<0.001 |
| Frequency of appeals to the hospital | 4.56±0.13 | 3.90±0.12 | p<0.01 |
| Number of days on sick leave per year | 4.62±0.11 | 4.09±0.13 | p<0.01 |
| Injuries in the process of combat activity | 4.71±0.10 | 3.69±0.14 | p<0.001 |

Legend: Mean – arithmetical average; SD – standard deviation; n – number of officers

to principle, courage, self-confidence, resolution, perseverance, ability overcome difficulties, level of motivation to improve professional qualities) and personal qualities (honesty, perseverance, organization, tolerance, optimism, independence, authority with personnel) showed that in Group 1 the indicators are significantly better than in Group 2 ($p<0.05-0.001$). The analysis of the assessment results by the units commanders of the level of physical training, state of health, frequency of appeals to the hospital and the number of missed working days due to illness, the frequency of injuries in the process of professional (law enforcement) activity showed that in a group of the officers who did Crossfit the indicators are significantly better than those who did not do any kinds of sport ($p<0.01$; $p<0.001$).

DISCUSSION

The study of the law enforcement activity peculiarities shown a number of common functions and tasks, including round-the-clock patrolling of the service area to ensure proper protection of public order, public safety and control over observance of the road traffic regulations, ensuring its safety; first response to a report of an offense; providing emergency care; independent detection and termination of offenses; the detention of offenders and getting them to police departments; protection of the scene, etc. [3, 26]. Characteristic features of law enforcement activity are social and state significance; significant physical and emotional tension, high pace and dynamics of service; stricter legal regulation of relations between its members in comparison with other professions; the need to perform duties in different climatic, weather conditions, time intervals, etc.; a high degree of cooperation in the process of activity; frequent change of one type of action to another because of the different operational environment [4, 5, 12]. This confirms the findings of many scientists [27-31],

in which the considerable attention is given to physical readiness of future specialists.

The scientists [32-37] point out that power loads have a positive effect on the state of health, ability to work and a range of physical and psychological qualities. The authors figured out that neurosis, psycho and emotional overload, difficulties in adjusting to the professional activity conditions occur 5 times more often in people with weak physical activity than in those with well-developed muscular system. Scientists state that the optimal level of power development is an effective factor in preventing those diseases and providing locomotor and energy-forming functions of the body.

It is indicated in the researches [14, 18] that systematic Crossfit exercises increase self-confidence, develop courage, determination, persistence, purposefulness, will to victory, a sense of collective responsibility, mutual assistance. According to the data [17, 19, 20], in the process of Crossfit exercises, there is a formation of a stable motivation for physical education and sport, physical self-improvement, a healthy lifestyle, and personal experience of the creative application of physical education means is obtained.

CONCLUSIONS

It is set that 96.2 % of the officers consider that Crossfit classes are an effective means of cadets' physical training for the future professional (law enforcement) activity, and 92.3 % of officers are convinced of the necessity of implementation of the means Crossfit into the physical training in higher educational institution in order to increase the level of physical preparedness and physical health of graduates and improve the efficiency of their future professional (law enforcement) activity.

The research of physical health officers' indicators who did Crossfit during studying at higher educational institution, for

five years of service after graduation, reveals that the indicators are reliably stable for 5 years of service ($p > 0.05$), it provides effective performance of professional (law enforcement) activity.

The results of the units commanders' evaluation of the officers' service activities showed positive influence of Crossfit classes on the indicators that characterize the quality of service in the detail, executive discipline, the effectiveness of the official duties performance, professionally important, individual and psychological, moral and volition, personal qualities, state of health and prevention of injuries and diseases of officers, that in general has a positive effect on the effectiveness of professional (law enforcement) activity.

The prospects for future research are aimed at studying the cadets' physical development during Crossfit classes.

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