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CONTENT

Alexander Skaliy, Kateryna Mulyk, Olena Ponomarenko, Tetiana Grynova
TEACHING THE TECHNIQUE OF CYCLING TO PRIMARY SCHOOL CHILDREN ……...5-15
Tetiana Chernykh, Viacheslav Mulyk, Tetiana Skaliy, Daria Okun
USE OF SPECIAL PREPARATORY EXERCISES FOR MASTERING THE BASIC ELEMENTS OF SPORTS ACROBATICS BY YOUNG ATHLETES 7-9 YEARS OLD…….16-26
Maryna Korolova
PROBLEMS OF THE APPLICATION OF LEGISLATION IN THE FIELD OF PHYSICAL CULTURE AND SPORTS……..…….27-36
Oksana Marchenko, Lyudmila Tsykalo, Maria Brychuk, Natalia Symonenko
GENDER PROBLEMS IN PHYSICAL EDUCATION. HISTORICAL AND PHILOSOPHICAL ANALYSIS….……...….....37-58
Andriy Poltavets, Andriy Efremenko, Viacheslav Mulyk, Andriy Kyyko
EVALUATION OF THE EMOTIONAL-VOLITIONAL SPHERE IN THE DEVELOPMENT OF A TRAINING COMPLEX FOR A UNIVERSAL MODEL OF ATHLETES IN THE MILITARY AVIATION PENTATHLON ……..….....59-70
Tetiana Maleniuk, Viktoriia Babalich, Halyna Panchenko, Oleksandr Broiakovskyi
EFFECTIVENESS OF THE EDUCATION AND TRAINING PROCESS PROGRAM FOR ATHLETES 13-14 YEARS OLD DURING THE FIRST MACROCYCLE OF ON ANNUAL TRAINING (ON THE EXAMPLE OF SPRINT RUNNING) …….....71-84
Yuri Shestak, Viacheslav Mulyk, Daria Okun
INFLUENCE OF THE USE OF SPECIAL EXERCISES ON THE PSYCHO-PHYSIOLOGICAL INDICATORS OF YOUNG BOXERS AGED 15-16……..85-94
Volodymyr Perevoznik, Volodymyr Paievskyi, Kateryna Maxymova
INDICATORS OF PHYSICAL AND MILITARY-PROFESSIONAL READINESS OF THE CADETS OF THE AIR DEFENSE FACULTY OF THE GROUND FORCES OF THE KhNUVS NAMED AFTER I. KOZHEDUB.……...…….....95-106
Galyna Artemyeva, Iryna Latvynska, Tetiana Moshenska
CONSTRUCTION A COMPREHENSIVE HEALTH TRAINING PROGRAM FOR WOMEN IN THE FIRST PERIOD OF ADULTHOOD ……..……..….....107-120
Vyacheslav Romanenko, Valeriy Goloha, Anatoly Aleksieiev, Julia Kovalenko
METHODS OF EVALUATION OF COMPETITIVE ACTIVITY OF WRESTLERS WITH THE USE OF COMPUTER TECHNOLOGIES …..…….....121-134
Yaroslavna Puhach, Natalya Pashchenko, Tamara Lyakhova
OPERATIONAL METHODS OF ESTIMATING THE CURRENT SPORTSMAN'S FUNCTIONAL STATE IN THE SYSTEM OF THE TRAINIG PROCESS.....135-151
Yuliia Leonova, Anastasiia Bondar, Svitlana Stadnyk
IMPROVING THE EFFICIENCY OF MANAGEMENT OF DOMESTIC FITNESS CLUBS IN MODERN CONDITIONS OF FUNCTIONING…….……152-161

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TEACHING THE TECHNIQUE OF CYCLING TO PRIMARY SCHOOL CHILDREN

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Purpose: to determine the main elements of cycling technique and establish their relationship with the motor qualities of primary school children.

Material and methods: the study involved 60 children of primary school age (6-7 years old), studying in secondary schools in Kharkov. The study used: pedagogical observations, expert assessment, testing. During the academic year, the dynamics of the level of development of the motor qualities of children of 6-7 years old was determined, and at the end of the school year, the correlation between the use of the basic elements of cycling techniques and the level of development of the motor qualities of children of 6-7 years old was established.

Results: the main elements of cycling technique were analyzed and a list of mistakes that were encountered during training was established. Correlation analysis of the influence of individual motor qualities on the implementation of various

elements of cycling technique was carried out. So, the technique of landing on a bicycle is the main element of the primary assimilation and requires, first of all, the manifestation of static balance. The pedaling technique and acceleration are associated with the manifestation of agility and speed-strength qualities. The braking technique is associated, first of all, with the manifestation of hand strength and was determined by wrist dynamometry. More complex elements of technology associated with cornering and turning and overcoming obstacles require, first of all, speed-strength qualities and dynamic balance.

Conclusions: the conducted studies allowed to determine the motor qualities, which are necessary for the fulfillment of the elements of the landing technique, pedaling, braking, acceleration, turning and turning and overcoming obstacles, and their correlation with control motor exercises was established.

Keywords: bicycle, technical elements, physical qualities, children.

Introduction

According to the results of studies [1, 11], it was found that the largest number of primary school students has external motivation, that is, the school attracts such children mainly as an object of extracurricular activities, in one third of children there is low motivation, indicates the accumulation of fatigue after school and makes it necessary development of measures aimed at restoring the psycho-emotional state of primary school age children. Among the priority types of physical activity of schoolchildren, outdoor and sports games, walks, tourism, cycling, rollerblading, etc. are distinguished.

Cycling technique involves performing all kinds of cycling techniques, braking, climbing, descending and turning. All of these skills are formed on the basis of the development of coordination abilities [5, 10].

Mastering the technique of landing and pedaling does not cause any particular difficulties and is described in sufficient detail [3, 6, 12, 14], and there is practically no methodological support for teaching the technique of cycling, especially with the observance of traffic rules.

Thus, there is a need to introduce training in the technique of cycling for elementary school students into the educational process of general education schools with a parallel study of traffic rules.

Purpose: to determine the main elements of cycling technique and establish their relationship with the motor qualities of primary school children.

Material and methods

The study involved 60 children of primary school age (6-7 years) studying in secondary schools in Kharkov. The study used: pedagogical observations, expert assessment, testing. During the academic year, the dynamics of the level of development of the motor qualities of children of 6-7 years old was determined, and at the end of the school year, a correlation was established between the use of the basic elements of cycling techniques and the level of development of the motor qualities of children of 6-7 years old.

Results of the research

The first idea of motor actions is achieved through stories, demonstrations, explanations, and trial execution attempts. At first, it is advisable to demonstrate the action, if possible in perfect execution. After the first demonstration, it creates a general idea for the student, the main elements of the movement technique and its correct execution should be highlighted.

So, according to Emelyanova E.S. [2] identified the main reference points reflecting the features and structure of the main elements of cycling technique (Table 1).

Based on the analysis of studies [7, 8, 13], we have established a list of errors in cycling techniques that are encountered during the study: improper landing, pedaling with "toes, heels", uneven and non-straight movement, loss of balance and fall associated with incorrect the choice of the trajectory of the turn, the setting of the feet when passing bends, the wrong overcoming of obstacles, braking with one brake.

Table 1

The main datum points of the main elements of cycling technique

(Yemelyanova E.S.)

№	The main elements of technique	Main datum points				
		1	2	4	5	6
1.	Planting technique	Find the most comfortable riding position	Hands on the steering wheel are not clamped, slightly bent at the elbow joints	The shoulders are not tense	The knees are close to the frame	Back straight, not tense
2.	Pedaling technique	Achieve proper landing	Stop evenly and gently, powerfully rotate the pedal in a circle	One foot push, pull the other foot in a circle		
3.	Braking technique	Achieve proper landing	Hands on the brake levers	Index and middle fingers grab brake lever	Smoothly press the brake lever	Maintaining body position on the bike
4.	Acceleration technique	Bend your arms a little at the elbow joints, place them on the brake levers, complete delight	Press sharply on the pedals alternately	Move as a "dancer", transferring body weight over the saddle in time with leg work	Hands pull the steering wheel on itself	Strain your back
5.	Technique of cornering, turning	Make the correct landing	Place your hands on the brake levers, bend slightly at the elbow joints	With the right turn, the left leg is in the lower position, the right leg is in the upper position, the knee is bent and taken to the side	When turning to the left, the right leg is in the lower position, the left is in the upper position, the knee is bent and taken to the side	Tilt the body slightly towards the turn
6.	Obstacle crossing technique	Place your hands on the brakes, bend slightly at the elbow joints	Set your legs on the pedals parallel, bend slightly, take the body position "above the saddle"	Push with arms and legs at the same time	pull the bike towards you at the same time	Smoothly land the bike, perform a shock-absorbing movement with your hands, feet

Thus, the quality of mastering the elements of cycling techniques is ensured with the help of a correctly selected teaching methodology (Fig. 1).

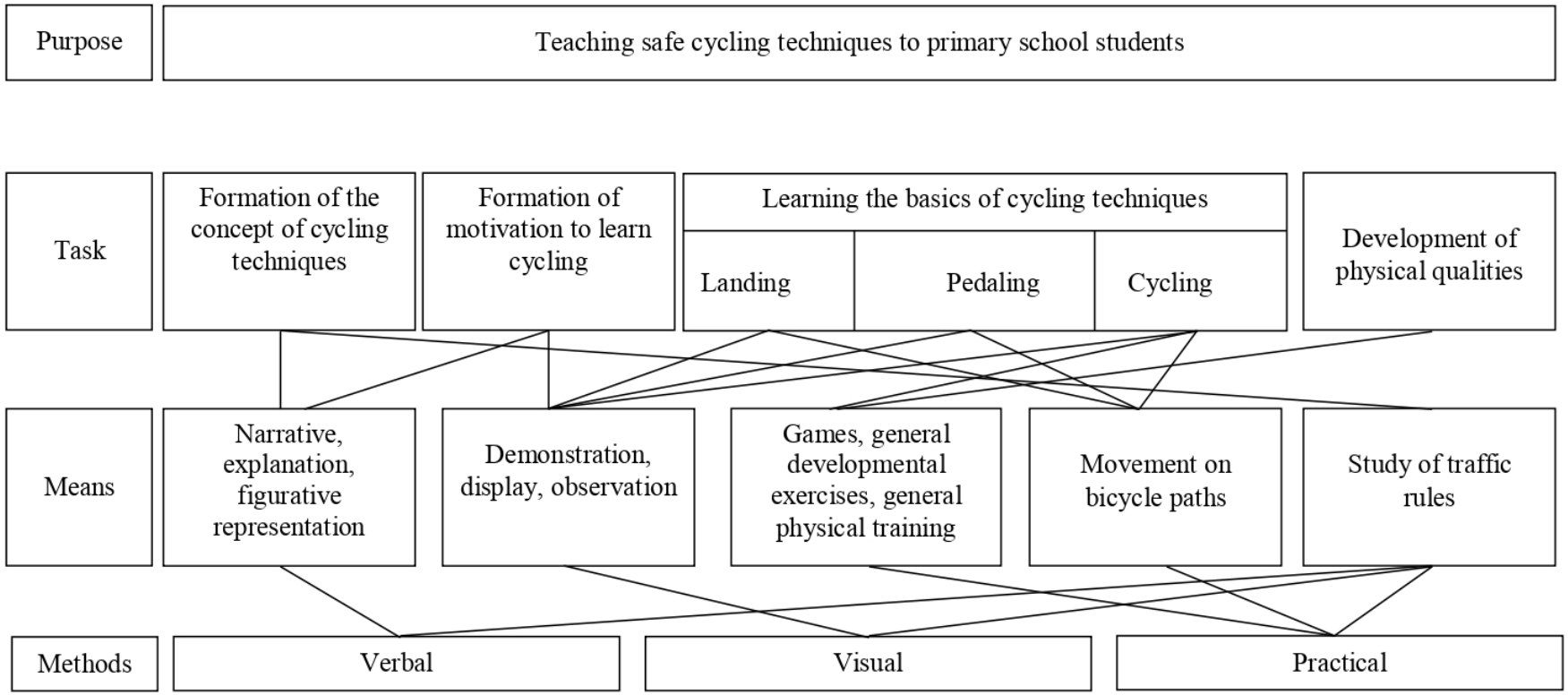

Figure 1. Methods of teaching safe cycling techniques to children of primary school age

Many children now learn to ride a bicycle between the ages of 3 and 5, but research has shown that most injuries occur at this age, compared to those who start learning later at 6-7 years of age. It is important to understand that each child is different from the others, so it is necessary to introduce cycling training classes in elementary school, when most children will be physically ready to cope with balancing on a bike.

Cycling has a complex coordination structure of movements, the implementation of which requires the manifestation of individual motor qualities. Therefore, it is very important to determine which motor quality influences the cycling technique to a greater extent. This will make it possible to develop complexes of tasks for the previous development of motor qualities and mastering the elements of cycling techniques. We have established a correlation relationship between the fulfillment of the main elements of the cycling technique and the motor qualities of primary school students.

The study was used: pedagogical observations, expert assessment, testing. During the year, we determined the dynamics of the level of development of motor qualities of children of 6-7 years old and at the end of the school year we established a correlation relationship between the use of the basic elements of cycling technique and the level of development of motor qualities of children of 6-7 years.

While studying cycling technique, you need to solve the following tasks:

- make children want to ride a bike;
- to provide the process of general physical training;
- to form an initial understanding of the technique of cycling;
- to solve organizational problems of inventory preparation.

It is from the age of 6-7 that, along with the development of motor qualities, the issues of the formation of elements of cycling technique are solved: landing; pedaling; braking; acceleration; passing turns and turns; overcoming obstacles.

It should also be noted that the implementation of individual elements of technique requires the presence of the potential for the manifestation of individual motor qualities.

The carried-out correlation analysis according to the influence of individual motor qualities on the fulfillment of various elements of the cycling technique shows that it is not the same (Table 2).

Table 2

Correlation dependence between the main elements of technique and motor qualities of children 6-7 years old

№ i/o	Elements of technique	Physical qualities	Control motor exercises	Correlation coefficient
1.	Landing technique	Static balance	Stand on one leg	0,62
2.	Pedaling technique	Speed-strength qualities	Standing long jump	0,55
		Agility	Shuttle running 3 × 10 m	0,61
3.	Braking technique	Strength	Hand dynamometry (differentiated muscle effort)	0,67
4.	Acceleration technique	Speed-strength qualities	Standing long jump	0,67
		Agility	Shuttle running 3 × 10 m	0,62
5.	Technique of passing turns	Speed-strength qualities	Standing long jump	0,57
		Dynamic balance	Turns on the gymnastic bench	0,60
6.	Technique of overcoming obstacles	Speed-strength qualities	Standing long jump	0,61
		Dynamic balance	Turns on the gymnastic bench	0,68

So, the technique of landing on a bicycle is the main element of the primary assimilation and requires, first of all, the manifestation of static balance. In our study, to determine the level of development of this physical quality, we used the test "Stand on one leg", the indicators of which correlate with the execution of the landing technique and the simultaneous maintenance of balance on the bicycle (r=0,62).

The performance of the pedaling technique and acceleration is associated with the manifestation of dexterity and speed-power qualities, which were determined by shuttle run 3 × 10 m and long jump from a standing position, the level of which, in accordance with r = 0,61-0,62 and r = 0,55-0,57.

The technique of inhibition is primarily associated with the manifestation of hand strength and was determined by wrist dynamometry, which is confirmed by the correlation (r=0,67).

More complex elements of technology associated with the passage of turns and turns and overcoming obstacles require, first of all, speed-strength qualities and dynamic balance. It was determined that the passage of turns correlates with the standing long jump (r=0,57) and turns on the gymnastic bench (r=0,60), also overcoming obstacles correlates with the standing long jump (r=0,61) and turns on the gymnastic bench (r=0,68).

Conclusions / Discussion

Currently, there are works [4, 8, 10] on the need to determine the level of motor qualities for effective mastering of the elements of cycling techniques (landing, pedaling, braking, acceleration, cornering and turning, overcoming obstacles).

This is due to the fact that the insufficient level of development of motor qualities will not allow to correctly master the technique of motor activity (first of all, coordination of movements, it is important in cycling), or to perform elements of technique with significant errors, which will be difficult to correct in the future. Therefore, the studies carried out made it possible to determine the motor qualities that are necessary to fulfill the elements of the landing technique, pedaling, braking, acceleration, turning and turning and overcoming obstacles, and their correlation with control motor exercises was established.

In the future, it is planned to study the process of mastering the technical elements of cycling by primary school children.

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USE OF SPECIAL PREPARATORY EXERCISES FOR MASTERING THE BASIC ELEMENTS OF SPORTS ACROBATICS BY YOUNG ATHLETES 7-9 YEARS OLD

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Purpose: to develop complexes of special preparatory exercises and determine the effectiveness of their use in mastering basic exercises for beginners acrobats.

Material and methods: research was carried out on the basis of the Complex Children's Sports School No. 6, Slobodsky District (Kharkov). The study involved 28 children 6-7 years old, engaged in sports acrobatics in sports and health groups. The control group (n=14) conducted the training process according to the CYSS program, experimental (n=14) with the use of special exercises for each basic element ("swallow", "standing on the shoulder blades", "birch", "forward roll", "cartwheel", "bridge stand"), in the preparatory part of the lesson. At the end of the annual training, control testing of the implementation of the basic elements of young acrobats of 6-7 years old of the studied groups was carried out, which was assessed by 5 experts according to a 10-point assessment of their implementation.

Results: in the process of using complexes of special exercises for each basic element of young acrobats 6-7 years old, reliably better assessment results were obtained in relation to the control group in performing exercises "swallow" ($t=6,25$; $p<0,001$), "standing on the shoulder blades" ($t=7,89$; $p<0,001$), "forward roll" ($t=4,00$; $p<0,001$), "cartwheel" ($t=4,69$; $p<0,001$) and "bridge stand" ($t=4,33$; $p<0,001$).

Conclusions: as a result of the research, it was found that the use of the developed complexes of special exercises for mastering the basic elements by young acrobats of 6-7 years old effectively influences the formation of the elements of the technique of basic exercises and psychophysiological indicators, ensures their implementation.

Keywords: young acrobats, basic elements of technique, correlation, muscle groups.

Introduction

The main elements that must be mastered by novice acrobats are "swallow", "stand on the shoulder blades", " forward roll"; "cartwheel", "bridge stand", which in the future make up combinations of the competitive program of the III youth sports category [7; 9; 10].

The sequence of their assimilation assumes the beginning from simple to more complex. The main feature is that in order to perform each of these exercises, a sufficient level of development of motor qualities of individual muscle groups is required, which ensure their manifestation. [8; 9].

Our analysis of each of these exercises allowed us to determine the muscle groups and motor qualities necessary for their implementation. One of the simplest exercises is "swallow" (keeping balance on one leg), in the performance of which the following are mainly involved: rectus and oblique abdominal muscles, biceps muscles of the legs; calf muscles; gluteal muscles; deltoid muscles; trapezius and rhomboid muscles of the back. A stand on the shoulder blades ("birch") requires a more significant manifestation of the static strength of the muscle groups of the

abdomen, buttocks, thighs, shoulder girdle and latissimus dorsi. "Forward roll " more needs the manifestation of flexibility and dexterity, which leads to the interaction of the muscles of the back, press, neck muscles and joints, the actions of which they fix. When performing the "cartwheel", most of the muscle groups are involved, ensuring the manifestation of dexterity and resistance of the vestibular apparatus. The exercise "swallow" is associated with the manifestation of flexibility and dexterity with the fixation of muscle groups that provide stability in all joints, including the spinal trunk, and require flexibility and dexterity.

Purpose of the study: to develop complexes of special preparatory exercises and determine the effectiveness of their use in mastering basic exercises for beginners' acrobats.

Material and methods

The research was carried out on the basis of the Complex Children's Sports School No. 6 of the Slobodsky District (Kharkov). The study involved 28 children 6-7 years old, engaged in sports acrobatics in sports and health-improving groups. The control group (n=14) conducted the training process according to the CYSS program, experimental (n=14) with the use of special exercises for each basic element ("swallow", "stand on the shoulder blades", "birch", "forward roll", "cartwheel", "bridge stand") in the preparatory part of the lesson. At the end of the summer training, control testing of the implementation of the basic elements of young acrobats of 6-7 years old of the studied groups was carried out, which was assessed by 5 experts by a 10-point assessment of their implementation.

Results of the research

The muscles that provide the fulfillment of basic elements in young acrobats at the stage of initial training were determined, they made it possible to compose complexes of motor exercises for their further assimilation.

So, to establish balance on one leg ("swallow"), the following exercises were used: standing facing a gymnastic stand, swinging one leg back; balance, standing sideways to the gymnastic stand balance, independently keep from 3-4 s to 10-12 s; balance with closed eyes. At the same time, attention is drawn to the errors that arise:

when the body is tilted forward, the leg drops; the supporting leg is not fully extended; the back is not extended; hands down.

Special exercises for mastering the "forward roll" are: rolls forward and backward in a tuck, lying on your back while sitting in a tuck, roll back and again forward, pushing off with your hands at the head; bending your arms in a squat position and tilting your head until the back of your head touches the floor.

Errors when performing a forward roll that reduce the score are: support with hands is close to the feet; there is no accentuated kick off; insufficient grouping; wrong hand position; support by hands is carried out from behind when moving to the support squat.

To master the technique of performing the "cartwheel" element, exercises were used to facilitate their correct implementation: squats, jumps, stretching during the warm-up, handstand against the wall; side stand; turns 360 degrees; jumping from foot to foot in a standing triangle. At the same time, attention was paid to: relaxation when keeping the legs and arms; too slow motor action; legs at the end of the movement are not in line; strong back arch.

When performing a stand on the shoulder blades ("birch"), the following were used: head bends to the sides, forward and backward; push-ups in support lying on the floor; maximum forward bends of the body; squats until the hip is parallel to the floor.

The main mistakes when performing "standing on the shoulder blades" are: flexion in the hip joints; the body is deflected from the vertical plane; the shoulder blades are wide apart; support is carried out mainly on the neck; pressed chin to chest.

For the implementation of the full implementation of the exercise "bridge stand", special exercises were used: a bridge with an emphasis on the shoulders; "reverse bar"; entrance to the bridge from the gymnastic bench; "half-bridge stand"; entrance to the bridge with support along the wall.

While performing the "bridge stand" exercise as a whole, mistakes should be avoided, which may be: when bending the body back and accepting the "bridge

stand", the chairman is not sufficiently laid back; the legs are bent at the knee joints; the shoulders are offset from the points of support of the hands; arms and legs wide apart.

The specified basic motor actions include: maintaining a rational dynamic posture in the conditions of complex coordination movements; possession of the technique of static-dynamic balance and power movements (the task is solved by means of technical, special and special-motor training); possession of the technique of throwing movements and catching (the task is solved by means of technical and special-motor training); possession of unsupported rotation of varying complexity; possession of the technique of stable landing; possession of the technique of rational interaction of partners.

Table 1

Psychophysiological indicators of young acrobats 6-7 years old under the influence of the use of special preparatory exercises during a one-year macrocycle

№ i/o	Indicators	At the beginning $\bar{x}$±m (n=14)	In the end $\bar{x}$±m (n=14)	t	p
1.	Mental stability according to the Schulte test, c.u.	1,06±0,02	0,95±0,04	2,44	<0,05
2.	Number of errors according to the Bourdon test, c.u.	19,4±0,78	15,6±0,86	3,28	<0,001
3.	Concentration of attention according to the Bourdon test, c.u.	221,5±4,14	243,4±4,21	3,71	<0,001
4.	Switching attention according to the Bourdon test, cu	39,4±1,18	34,5±1,16	2,99	<0,001
5.	Indicator of switching attention according to Gorbov's test, red-black table, c.u.	148,5±3,15	133,1±3,11	3,48	<0,001
6.	Reaction time to light stimulus, average value, ms	346±5,12	328,6±5,06	1,99	>0,05
7.	Reaction time to a sound stimulus, average value, ms	581,5±8,15	542,3±8,04	3,44	<0,001
8.	Accuracy of reproduction of short periods of time, ms	988,7±10,11	902,1±10,15	6,06	<0,001
9.	Rufier index, c.u.	14,0±0,43	13,2±0,41	1,33	>0,05
10.	Romberg test, s	15,8±0,44	17,8±0,46	3,17	<0,001
11.	Selection response time, s	1,31±0,03	1,18±0,03	3,10	<0,001
12.	Yarotsky test, s	29,4±0,56	34,0±1,01	4,00	<0,001

Mastering the indicated motor actions is one of the most important criteria of technical readiness of acrobats [1]. During the implementation of the experimental

program, the indicators for most of the psychophysiological qualities of young acrobats of 6-7 years old have increased, which significantly affect the performance of basic exercises of young acrobats (Table 1).

The most significant ($p < 0.001$) positive changes obtained in the tests: the number of errors according to the Bourdon test; concentration of attention according to the Bourdon test; indicator of switching attention according to Gorbov's test, red-black table; response time to a sound stimulus, average; error of reproduction of short periods of time; Romberg test; choice reaction time; test Yarotsky.

To a lesser extent ($p<0,05$-$0,01$) the indicators improved: mental stability according to the Schulte test; switching attention with the Bourdon test; reaction time to light stimulus, average; Rufier index. It is important to realize about the formation of psychophysiological indicators under the influence of the use of special auxiliary exercises that contribute to the high-quality implementation of the basic elements of the technique at the stage of initial training. Thus, a correlation was established between individual elements of basic training using special exercises and psychophysiological indicators that are formed under their influence (Table 2).

The greatest influence on the formation of the physiological properties of the organism of young acrobats is the performance of the "swallow" exercise, during which the exercises presented at the beginning of the article are used.

The average level of correlation between the performance of the "swallow" exercise is traced with mental stability according to the Schulte test ($r=0,51$), concentration of attention according to the Bourdon test ($r=0,52$), switching attention with the Bourdon test ($r=0,54$), indicator attention switching with Gorbov's test ($r=0,52$), error in reproducing short periods of time ($r=0,60$), Ruffier index ($r=0,51$), Romberg's test ($r=0,63$), Yarotsky's test ($r=0,68$).

The use of exercises for the formation of a "stand on the shoulder blades" affects the increase in mental stability indicators according to the Schulte test ($r=0,53$), concentration of attention according to the Bourdon test ($r=0,51$), errors in reproduction of short periods of time ($r=0,58$), Ruffier index ($r=0,53$), Romberg's test ($r=0,61$), Yarotsky's test ($r=0,56$).

Table 2

Correlation matrix of basic initial exercises and psychophysiological indicators of young athletes 6-7 years old

№ i/o	Exercises / Indicators	«Swallow»	«Stand on the shoulder blades»	«Forward roll»	«Cartwheel»	«Bridge stand»
1.	Mental stability according to the Schulte test, c.u.	0,51	0,53	0,12	0,16	0,50
2.	Number of errors according to the Bourdon test, c.u.	0,15	0,17	0,48	0,21	0,26
3.	Concentration of attention according to the Bourdon test, c.u.	0,52	0,51	0,21	0,54	0,52
4.	Switching attention according to the Bourdon test, cu	0,54	0,27	0,58	0,52	0,36
5.	Indicator of switching attention according to Gorbov's test, red-black table, c.u.	0,52	0,21	0,56	0,54	0,40
6.	Reaction time to light stimulus, average value, ms	0,22	0,16	0,54	0,56	0,21
7.	Reaction time to a sound stimulus, average value, ms	0,19	0,18	0,53	0,54	0,22
8.	Accuracy of reproduction of short periods of time, ms	0,60	0,58	0,24	0,16	0,51
9.	Rufier index, c.u.	0,51	0,53	0,15	0,21	0,54
10.	Romberg test, s	0,63	0,61	0,24	0,17	0,51
11.	Selection response time, s	0,21	0,16	0,52	0,51	0,20
12.	Yarotsky test, s	0,68	0,56	0,40	0,52	0,56

The use of dynamic exercises for mastering the "forward roll" increases the level of indicators of attention switching according to the Bourdon test (r=0,58) and Gorbov's test (r=0,56), reaction time to light (r=0,54) and to sound stimulus (r=0,53) and choice (r=0,52).

In turn, the exercises that are used to perform the "cartwheel" have a positive effect on concentration according to the Bourdon test (r=0,54), attention switching with the Bourdon test (r=0,52), the indicator of attention switching according to the Gorbov test (r=0,54), reaction time to light stimulus (r=0,56), sound stimulus (r=0,54) and choice reaction time (r=0,51), Yarotsky's test (r=0,52).

The exercise "bridge stand", which is formed under the influence of the use of special exercises, has a positive effect on psychophysiological indicators: mental stability according to the Schulte test (r=0,50), concentration of attention according to the Bourdon test (r=0,52), errors in reproduction of short intervals time (r=0,51), Ruffier index (r=0,54), Romberg's test (r=0,51) and Yarotsky's test (r=0,56).

After the end of the one-year macrocycle, testing of the implementation of the basic elements of the primary training technique for young acrobats 6-7 years old was carried out.

Five judges of the first category were involved in the assessment, who carried out the assessment on a 10-point system, which is accepted in acrobatics. The results of the output and final results are presented in table 3.

Table 3

The results of assessing the performance indicators of basic elements by young acrobats 6-7 years old during the annual macrocycle (according to a 10-point assessment) (n1=n2=14), $\bar{x}$±m

№ i/o	Exercises	At the beginning $\bar{x}$±m (n=14)	In the end $\bar{x}$±m (n=14)	Reliability assessment	
				t	p
1	«Swallow»	4,4 ±0,16	6,2±0,24	6,25	<0,001
2	«Stand on the shoulder blades»	3,6±0,18	5,1±0,23	7,89	<0,001
3	«Forward roll»	3,8±0,21	5,2±0,28	4,00	<0,001
4	«Cartwheel»	3,5±0,19	5,0±0,26	4,69	<0,001
5	«Bridge stand»	4,1±0,17	5,4±0,25	4,33	<0,001

Thus, in the process of using the complexes of preparatory exercises, the physical qualities necessary for the implementation of the basic elements of the technique have significantly increased. The average score for the “swallow” exercise increased by 1,8 points (t=6,25; p <0,001), for "standing on the shoulder blades" – by 1,5 points (t=7,89; p <0,001), "forward roll" – by 1,4 points (t=4,00; p <0,001), "cartwheel" – by 1,5 points (t=4,69; p <0,001), "bridge stand" – by 1,3 points (t=4,33; p<0,01).

The above indicates that the use of special exercises in accordance with each exercise allows you to improve the quality of the basic elements of acrobatics at the stage of initial training.

Conclusions / Discussion

Today there are several approaches to teaching individual elements of technology: start learning from simple to more complex elements [2, 4]; training

should be carried out at the beginning of the lesson [5; 6]; use special and underwater exercises, etc. [3].

At that time, along with the positive use of these and other techniques, in our opinion, it is advisable to approach the teaching of exercises more carefully, foreseeing the following: to determine at the expense of which muscle groups each exercise is performed; establish the motor potential that is necessary for their implementation; to develop a set of exercises to increase (normalize) the development of muscle groups, which ensure their implementation; only after that, master the basic elements, and in our case the basic elements of the entry-level acrobatics.

Our results indicate that the use of special exercises for each of the basic elements of the technique allowed us to increase the results in relation to young acrobats 6-7 years old in the control group in the performance of "swallows" ($t=6,25$; $p<0,001$), "standing on the shoulder blades" ($t=7,89$; $p<0,001$), "forward roll" ($t=4,00$; $p<0,001$), "cartwheel" ($t=4,69$; $p<0,001$) and "bridge stand" ($t=4,33$; $p<0,001$).

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PROBLEMS OF THE APPLICATION OF LEGISLATION IN THE FIELD OF PHYSICAL CULTURE AND SPORTS

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Purpose: to characterize from the standpoint of a systematic approach to the problem of application of legislation in the field of physical culture and sports in modern conditions of operation and to suggest ways to solve them.

Material and methods: a set of theoretical methods was used to solve the tasks of the study: analysis, comparison, generalization, systematization of literary sources and documentary materials, the method of historicism, the method of systematic approach.

Results: the system of sports legislation in Ukraine is analyzed, a number of problems are revealed, in particular: imperfection of the system of relations between the state and other subjects of physical culture and sports, unresolved issues of legal regulation of professional sports, unregulated at the legislative level relations of patronage and investments culture and sports, etc. The French experience of codification of sports legislation in the context of development of proposals for improvement of sports legislation of Ukraine is analyzed.

Conclusions: the presence of the above problems in the current system of sports legislation of Ukraine objectively confirms the need to systematize sports legislation, which will address public policy to improve the status of physical culture and sports, clarity of law enforcement, successful development of legislation and sports law.

Keywords: legislation, sphere of physical culture and sports, systematization, codification, sports law.

Introduction

As you know, physical culture and sports at the present stage of its development is not only a way to maintain and strengthen the health of the population, but also the lifestyle of a modern successful person, in particular sport is an important part of the market, public policy. After all, for any state, achievements, and especially successes, in the international sports arena are nothing more than a way to declare one's place in the international political environment. In addition, large-scale international sports competitions over the past 10-15 years leave no one in doubt that professional sports is, above all, an important part of world politics, and not just a sphere of public life [9].

As for Ukraine, in recent years, in our opinion, the status of physical culture and sports has increased significantly. Proof of this is the organization and holding of sports events on a global scale in Ukraine, including the European Football Championship (2012), the final of the Football Champions League (2018) and other events. In addition, the development of professional, amateur sports, physical education of children and youth have become a priority of public policy, as discussed in a number of laws and regulations [2, 4, 5, 6].

The analysis of recent publications shows only an episodic study of legislation in the field of physical culture and sports and the lack of a systematic approach to the study of this issue. Scientific interest in modern domestic literature [1, 7] is the formation of the field of sports law in Ukraine, the mechanism of state management of physical culture and sports in Ukraine and organizational and legal principles of public administration. At the same time, the analysis of the works of foreign authors [10, 12] shows that sports law is a serious and self-sufficient branch of law. Foreign experts in the field of sports law study the trends of "global" sports law, analyze the coherence of international sports law and business in the XXI century.

The purpose of the study is to characterize from the standpoint of a systematic approach to the problem of application of legislation in the field of physical culture and sports in modern conditions and to suggest ways to solve them.

Material and methods

A set of theoretical methods was used to solve the tasks of the study: analysis, comparison, generalization, systematization of literature sources on the research topic, which allowed to clarify the problematic field of research legislation in the field of physical culture and sports in modern conditions. Analysis, comparison, generalization, systematization of documentary materials allowed to characterize the features of the legislation in the field of physical culture and sports. The method of historicism allowed to identify the objective features of sports law as a new branch of the legal system of Ukraine. The application of the system approach method allowed to determine the general tendencies and ways of further development of the Ukrainian sports legislation.

Results of the research

Legal regulation is an important factor that affects the field of physical culture and sports and creates certain conditions for its development. In the basic normative and program documents regulating the sphere of physical culture and sports in Ukraine, in particular in the State target social program of development of physical culture and sports till 2020 [4], Strategies of formation of modern system of Olympic training for the period till 2020 [6], as well as approved in the resolution of the Cabinet of Ministers of Ukraine for № 1089 of November 4, 2020 Strategy for the development of physical culture and sports until 2028 [5] identifies a number of problems and causes of their emergence in the field of state policy in the field of physical culture and sports.

One of the key problems, as indicated in this recently adopted Strategy, is the imperfect system of relations between the state and other actors in the field, which hinders the promotion of physical culture and sports. The reasons for the problem are the unregulated at the legislative level mechanism for monitoring the qualifications of personnel in the fitness industry, the relationship of patronage and investment in the

field of physical culture and sports, insufficient number of information and social campaigns to promote sports and others. [5]. We are convinced that the solution of the above problem is possible only through the improvement of the legal framework in the field of physical culture and sports.

The key legal act in the system of sports legislation is the Law of Ukraine "On Physical Culture and Sports" of December 24, 1993. Work is constantly underway to improve its provisions, as changes have been made to it annually since 1999. In 2009, this Law was adopted by the Verkhovna Rada in a new wording, but even after that it has been repeatedly amended and supplemented. The adoption of the Law in an updated version creates new opportunities for our country to perform its tasks, but, unfortunately, does not solve all the problems that arise in the field of physical culture and sports [2].

The amendments to the Law of June 2, 2020 deserve special attention. Thus, Section II "Subjects in the field of physical culture and sports" is supplemented by Article 211 "Student Sports Union of Ukraine" and Article 212 "Ukrainian Federation of Student Sports". The Student Sports Union of Ukraine and the Ukrainian Federation of Student Sports are public associations of physical culture and sports, which have all-Ukrainian status in accordance with the law and are recognized by the International Federation of University Sports and the International Federation of Student Sports, respectively [2]. After all, this is an atypical situation for Ukraine, when public organizations are included in the legislative document and receive a separate budget column of funding. These changes to the Law will undoubtedly contribute to the development of physical culture and sports movement among pupils and students, the formation of students' long-standing traditions for exercise and a healthy lifestyle, and so on.

The issue of legal regulation of professional sports also deserves attention. In Art. 38 of the Law of Ukraine "On Physical Culture and Sports" states that the state creates conditions for further development of professional sports on a commercial basis. At the legislative level, economic and labor relations in professional sports are regulated, and measures are developed to protect the interests of professional athletes.

However, despite the declared intentions of the state to regulate relations in the field of professional sports by adopting relevant legislation, namely: in 2014 the National Doctrine of Physical Culture and Sports, in 2009 - the Strategy for the formation of a modern Olympic training system until 2020, now many issues in this area remain either unresolved or in need of improvement, and the above documents have expired.

Funding is also an acute problem in the field of physical culture and sports. After all, on the one hand, physical culture and sports are financed from the state and local budgets on a "residual basis" and need to attract extrabudgetary sources of funding, and on the other hand - unregulated at the legislative level relations of patronage and investment in physical culture and sports. create favorable and clear legal conditions for charitable assistance from caring patrons. However, to date there is no separate legal act dedicated to the financial support of physical culture and sports in Ukraine, and the existing legislation on charitable activities does not meet the needs of this area. For example, there is a need to legally define separately for this area: persons who can be patrons, recipients, final beneficiaries of patronage; principles, possible directions of patronage; issues of concluding agreements on providing patronage assistance; certain issues of activity of the profile central body of executive power, which is responsible for the sphere of physical culture and sports. To address these issues, a draft law "On Patronage in the Field of Physical Culture and Sports" was developed and submitted to the Verkhovna Rada of Ukraine, which is designed to promote patronage in the field of physical culture and sports [3].

The analysis of this bill showed that it defines the concept of "patronage" by applying it to the field of physical culture and sports. In particular, the author of the bill interprets this concept as "non-governmental voluntary gratuitous activity of individuals and legal entities that is not aimed at obtaining income." In addition, this bill even states the principles of patronage. The bill also defines the range of recipients of patronage. It can be an individual, or a non-profit organization, or a local community. The directions of use of patronage help are outlined [3]

The strengths of the proposed bill also include provisions to resolve the issue of concluding an agreement on the provision of patronage. In particular, it is mandatory

to comply with the written form of the contract, the conditions for concluding an agreement on the provision of patronage assistance are also determined. In our opinion, the provision of the bill on the rights of patrons deserves special attention. After all, the practice of cooperation between business structures and sports organizations shows that the lack of opportunity on the part of the donor to control the use of his patronage is the cause of most conflict situations. Therefore, it is very important that in accordance with the provisions of this bill, which allows the patron to exercise certain rights of the donor under the Civil Code Of Ukraine. Such rights include: the right to control the use of patronage in accordance with the purpose specified in the contract; the right to receive a legislative guarantee on the possibility of using such assistance for other purposes only with his, the patron's, consent, as well as on the right to demand termination of the contract if the said assistance is used for other purposes. In practice, we see the realization of these rights of the patron in the creation of a supervisory board at a sports organization, or any organization that receives charitable assistance, and the appointment of the chairman of this board is the patron so that he has direct control over financial policy and targeted use of funds provided by him in this organization [3].

The proposed bill creates conditions for public and state control so that there are no abuses in the implementation of patronage in the field of physical culture and sports. This provision will be provided by the following conditions: the patron will be obliged to notify the Ministry of Youth and Sports of Ukraine of the conclusion of the agreement on patronage, providing a copy of such agreement, amendments to it, termination of such agreement. The next condition is the obligatory publication on the Internet on the official website of the specified authority of the essential terms of the contract. The Ministry of Youth and Sports also has the right, in the manner and in cases established by the Government, to inspect the use of patronage.

If this bill is adopted, the implementation of its provisions will not require amendments to other laws. However, it is also advisable to adopt the necessary amendments to the Tax Code of Ukraine on tax incentives for patronage in the field of physical culture and sports, i.e. the provision of tax benefits to patrons. It is

important that the adoption of the bill will not change the indicators of state and local budgets. "At the same time, patrons will actually ensure the implementation of those goals and objectives in the field of physical culture and sports, the implementation of which should be carried out at the expense of state and local budgets" [3]. After all, from the practice of development of physical culture and sports, we know that the revenues of these budgets are constantly lacking in order to anticipate expenditures in amounts that would fully meet the needs of physical culture and sports.

Conclusions / Discussion

The presence of the above problems in the current system of sports legislation of Ukraine objectively confirms the need for systematization of legislation that will ensure proper understanding of law and law enforcement in this area. Considering the known types of systematization, it should be noted that they form a strict hierarchy, at the top of which is the codification.

The work of legal experts [9] emphasizes that currently in Ukraine there are more than 20 codes, and the process of codification of regulations continues in the direction of both revision of existing codes and development of new ones. The authors note that the researchers consider the problems of developing transport, labor, environmental codes of Ukraine and so on. We agree with the authors that the issue of codification is relevant for the development of sports law and is the best way to solve existing problems of legislation in the field of physical culture and sports at the present stage.

In our opinion, the main and most obvious argument in favor of codification is the codification of legislation in the field of physical culture and sports, which is observed in a number of foreign countries (USA, Brazil, France).

Of particular note is France, which has a Sports Code, which was developed in 2004 and adopted in 2006. Like our domestic law, French law belongs to the continental legal family. Therefore, there is an analysis of the French experience of codification of sports legislation extremely important in the context of developing proposals for improving the sports legislation of Ukraine. It should be noted that this Code "was intended to improve the understanding and accessibility of sports

legislation, in fact, for the same purposes today there is a need and development of Ukrainian sports legislation [13].

Briefly characterizing the Sports Code of France, it should be noted that it consists of 4 books, each of which is devoted to a particular aspect of sports law [11]. The first book is devoted to the organization of events in physical culture and sports. The second book is devoted to participants in sports competitions, including athletes, referees, coaches, teachers, officials. The third book is devoted to various sports practices, safety and hygiene of sports, organization and management of sporting events. The fourth book is devoted to the financing of sports and the application of legislation in legal relations arising in the "overseas sports communes".

It is worth noting that the French Sports Code has given a significant impetus to the development of French sport and created real conditions for an effective fight against corruption. The French experience of codification of sports law is a clear example of how the systematization of sports legislation solves the problem of improving the status of physical culture and sports, clarity of law enforcement, lays the vector for successful development of law and sports law.

Thus, we confirmed the data of researchers [1, 9], and the data of our previous studies [7, 8] on the existence of the problem of legislation in the field of physical culture and sports in modern conditions in Ukraine and the need to improve the system of norms in sports relations at the legislative level, in particular the creation of appropriate codified acts.

Prospects for further research are associated with the need to develop and justify specific measures to improve legislation in the field of physical culture and sports, taking into account the positive foreign experience of legal regulation of sports activities.

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GENDER PROBLEMS IN PHYSICAL EDUCATION. HISTORICAL AND PHILOSOPHICAL ANALYSIS

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Purpose: historico-philosophical analysis of gender issue in physical education and clarification of the meaningful characteristics of the category "gender" in the field of physical culture and sports.

Material and methods: to achieve objectives of the research and for generalization the experience of those scientists who investigate educational problems of the gender approach, modern approaches to development and improvement of physical education we used such theoretical research methods as analysis, comparison, generalization, systematization, theoretical modeling.

Results: the historical aspect of the beginning of the gender approach in physical education has certain differences and features that makes it a separate area of gender cognition according to which all pedagogical and socio-cultural aspects of youth physical education can have a gender dimension. The necessity of distinguishing and interpreting the gender approach as a definition in political, public

and social environments is theoretically grounded, its significance for physical training and sports is indicated, and a new term is suggested for use in research, which allows characterizing it as an interdisciplinary and cross-sectoral definition, extrapolated, interconnected and corresponding to the development of physical education and sports in the countries of developed democracy.

Conclusions: acording to the results which were obtained during the research and the theoretical and methodological papers of the gender problem the necessity and expediency of the development and introduction of the gender component in the physical education of modern schoolchildren as an essentially new and progressive direction of the axiological significance of physical culture is justified. The essential and substantive characteristics of the category "gender" in the field of physical culture and sports in the context of psychological and pedagogical research are given.

Keywords: gender, gender approach, physical education, physical culture, sports, history.

Introduction

During the past decade gender issue is always the focus of attention of the modern European community which forms gender and legal space taking into account the gender aspect of the countries that join it. But gender (parity) democracy is important not only for international recognition but also for development of the internal dynamics of the Ukrainian State which is moving for a long time towards ensuring equality of all members of society as an integral part of national obligations reflected, particularly, in the Law “Pro zabespechennia rivnyh prav i mozhlyvostei zhinok ta cholovikiv” (“On Ensuring Equal Rights and Opportunities for Women and Men”) [15]. The new Law of Ukraine “Pro osvitu” (“On education”) provides a rule on the students’ obligation to acquire gender competence which is the ability to realize equal rights and opportunities. In particular the document provides for the expansion of the practice of including a gender component in educational programs, the introduction of a gender approach in general documents in the field of education

a.nd training on gender equality and establishing of a professional community [29,24,25].

Due to this, the purpose of the national education is now proclaimed the priority of personal orientation to the child's development as a subject of his or her own life, creative and self-sufficient personality that keeps with the relevant principles of the gender approach to education [36]. Doctor of psychological sciences, professor Kikinezhdi A.N. rightly observes that the most accordant with our time and perspective for the formation of a gender culture among children and young people is the renewal of traditions and the introduction of innovations in the context of the heritage of outstanding Ukrainian humanist teachers V.Sukhomlinsky, G.Vashchenko, A. Makarenko, Mr. Dragomanova, K. Ushinsky, etc. [17]

Particularly relevant nowadays we consider the possibility of realization the gender approach in physical education which is dealt with activity that contributes not only to the formation of physical, moral and mental qualities of the individual but also through systematic specially organized motor activity helps to identify gender differences in the educational process by defining the role of the physical education in the gender socialization of students.

Systematic analysis of the global scale of scientific knowledge and international experience in gender studies shows certain theoretical advances in coverage of this issue. The problems of formation of gender culture of youth are investigated by T. V. Govorun, O. M. Kikinezhdi, O. B. Kis, N. M. Lavrinenko, P. Kravets, O. A. Lutsenko, O. S. Tsokur and other scientists [2, 7, 17, 29]. An important contribution to the development of a gender approach in pedagogical education belongs to O. A. Voronina (problems of developing the theory and the methodology of gender studies, determining the place and the role of gender education in the system of professional students training) [5]; L. V. Shtylova (development of methodical programs for teachers on the issue of introduction of gender education and personal development in secondary school) [43]; I. S. Klotsyna (outlining the ways of gender socialization of the individual taking into account age features, developing of gender workshop for students to overcome gender

stereotypes) [18, 19]. The intelligence of A. L. Vorozhbitova (2008) represents the gender approach to the professional activity of a specialist in physical culture [6]. The works of N. N. Kuinji and E. D. Laponov (2005), N. V. Kozlovskaya (2006), S. A. Chubarova (2007), V. D. Eremeeva (2008), L. V. Tarasenko (2007) [29] are devoted to the implementation of the gender approach in education and training. Legal experts and politicians in Ukraine also deal with gender issues and they are developers and scholars of gender in the modern domestic legal doctrine of N.M. Onishchenko, I.V. Suslova, S.V Bereza [31].

Current studies by I. V. Evstigneeva (2012) are proved that the main criteria of gender education of primary school students in the process of physical education are cognitive, emotional-value, motivational and behavioural [14]. O. V. Vashchuk (2011) substantiated particularities of teenager attitude to physical education class taking into account gender identification [40]. G. F. Dulmukhametova (2011) proved the existence of barriers to the implementation of gender differentiation of the primary education of pupils in the educational process [13]. A. S. Damadaeva (2010) didn't find general common factors in the analysis of studies of gender differentiation and socialization in sports [12]. The work of V. I. Lukashcuk notes that sport as an activity forms an androgynous personality type of women and leads to increasing masculinity of men [28]. Gender features in the choice of sports, the manifestation of psychophysical and boys and girls motor abilities were studied by M. Slingerland, L. Haerens, G. Cardon, L. Borghouts (2014), B. Antala, V. Dancikova (2012), Wenchao Li (2013)), E. Miloshova (2012), J. Sedlacek, P. Jankovsky, M. Zvonar (2012), S. Stavrev, V. Tsvetkov (2012) [29, 46, 51, 52, 53].

But despite the considerable amount of work on the problem it must be stated the lack of systematic and comprehensive approach to studying the historical bases for the origin of the gender approach to the development of the physical education of children, teenagers and youth that determined the relevance of our study.

The purpose of this article is to study the historical bases of the gender approach in physical education and discover the substantive characteristic of the category «gender» in the field of physical culture and sport.

Material and methods

The paper concentrates on such complex of methods as speculative methods (analysis, comparison, generalization, systematization, theoretical modeling) that were studied with the view to generalization the experience of scientists who are studying the gender approach in education and personal development, modern approaches to the development and improvement of the system of physical education and identify the problem field of research;

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Results of the research

The gender approach in the field of physical culture and sports has certain features that makes it a separate area of gender knowledge of structural and functional approaches according to which all pedagogical and socio-cultural aspects of physical education of youth can have a gender dimension. Studying the history of physical education of youth through the prism of gender, Ukrainian and foreign scientists insist on the relationship of gender, differentiated and personality-oriented approaches as the basis of the humanizing the educational process [23, 39].

The deepening into the history of philosophy and pedagogy leads to the conclusion that all the great and outstanding educators in general were both well-known philosophers and on the contrary almost every great philosopher is usually completed the "construction" of its philosophical system by ethics the main content of which was the teaching of morality, the theory of education and upbringing [31].

Take, for example, ancient philosophers, Thales and Democritus, Socrates and Plato, Aristotle and Parmenides. Were they just philosophers? Did not they see life? Were not they interested in the fate of a man, his education and upbringing? Of

course, they were and they saw. Their ethical views are pure (theoretical) pedagogy. Only with the difference that it was expressed at the appropriate categorical level, systematized in accordance with the general worldview of that time [31, 41]. Since ancient times in the society there was unequal value of men and women motivated by their different nature because the woman was “always explicitly or implicitly coded in the concepts of emotion, sensuality, body” which always received negative polarization being in antiquity the opposite of the greatest values: spiritual and rational which represented the male principle [2, 25, 29]. In particular, in ancient times, Plato of Athens (427-347 BC) introduced the concept of “androgynes” expressing the idea of gender equality. His attitude towards the woman was contradictory. On the one hand, the thinker thought she was beneath the creature. On the other hand, in the ideal state he described the woman could participate in all affairs in a line with the man. These ideas will be realized in the works of many experts including gender psychology [2, 29]. Aristotle Stagiret's reflections (384-322 BC) on the relationship between husband and wife in the family, on the limitation of the population for harmonious relations in society, on the division of labor are still of interest [2, 25, 29]. He considered that success in the state could only be with a small population, so that men under 37 years of age and women under 18 years of age were not allowed to have children. The history of philosophy in which pedagogy and psychology have developed for a long time, shows that boys education was different from girls education in all periods of development of the society [42].

Physical education as a specialised field of social activity separated from physical labour appeared more than 8,000 years ago. Physical education as a specialised area of social activity separated from physical labour appears more than 8,000 years old. At this time gender and age rites of initiation were associated with the boys and girls’ transition into adulthood. Before that they had to get appropriate knowledge and skills of tribal life and to acquire the necessary physical and moral adulthood [22, 23, 26, 29].

Taking into account the problem of this study it was traced the historical, pedagogical and cultural background of the origin of the gender approach in

education based on retrospective analysis. In general, physical education in ancient times existed in Spartan and Athenian systems. During the period of prosperity of Hellenic culture in Greece there were two poleis with different systems of physical education, which became a model for other of ancient Greece Sparta and Athens [26]. According to traditions and laws a Spartan woman had to go to the gym as well as men to keep fit to the benefit of state and family. From a child girls like boys and with the boys did physical exercises and at the same time girls were with naked body. Women, wives and mothers were involved in upbringing boys as brave warriors and girls as patriots of Sparta who were ready to sacrifice. Physical education was based on running, wrestling, discus and javelin throwing and was compulsory for both sexes.

Ancient Egypt (from the 4^{th} to the 3^{rd} millennia BC) had a sufficiently high level of family education. Relations between a woman and a man in the family were based on egalitarian basis so both boys and girls were given equal attention. Until the age of four mother taught her children at home, then boys and girls attended a comprehensive school. Except studying the science young boys of upper classes did physical exercises like swimming, shooting or running. History shows that even at that time boys' and girls' types of physical activity were different. Egyptian boys played more often active games, competed in strength and agility when girls not neglecting such activities loved dancing [9, 10, 26].

In the history of ancient India (the 6^{th} A.D. and the 8^{th} A.D.) women of the Vedic epoch enjoyed greater rights than women of Greece, Rome and the Mediterranean countries.

The relations between the sexes in ancient China are expressed by the means of analogy, metaphor and symbols. They clearly embody the features of the natural and social order in one person. Yin and Yang symbolize complementarity, interdependence and mutual transformation. The classification of Yin and Yang is relative. The borderline between Yin and Yang varies depending on the sex, age and status of the people. In regard to the man the woman is in a subordinate status but in regard to the son and the servant she is in the dominant status of mother and mistress.

Ancient Chinese mythology confirms that every human body contains both male and female elements. C. Jung said that in collective unconsciousness of each individual there were two different archetypes “soul” (anima) that personified the female principle (obscure feelings, mood, ability to love, sense of nature, etc.) and “spirit” (animus) physical strength, initiative and rationality [44]. A man should express his feminine qualities with masculine ones and a woman should show her masculine qualities as well as feminine ones. If these necessary attributes stay undeveloped, the result will be unilateral growth and personality functioning. Only the combination of soul and spirit ensures the harmonious development of the individual [45].

Physical education in the Middle Ages is even more divided from working practice and military activity. Thus, in the early period of feudalism different religious trends which in general (with the exception of Buddhism) had negative attitude to physical education also had an impact on it.

The period of the Renaissance (the 14^{th}-16^{th} centuries) was determined the appearance of theoretical treatises of writers, humanists, utopian socialists, teachers and doctors on the organization of physical education. By the middle of the 17th century there were the first attempts of introducing physical education to the school day. The foundation for the development of natural science basis of physical education were works on anatomy and biomechanics of Leonardo da Vinci (1452 - 1519), on anatomy of Andrea Vesalius (1514 - 1564) and physiology of William Harvey (1578 - 1657) [9, 10, 32].

Thus, in the ancient world the system of upbrining children of different sexes was based on a differentiated approach which was based on the traditional division of social roles of men and women in society, the removal of women from activities outside the family home. First of all, physical education was aimed at preparing the child for the role of a man or a woman.

A great contribution to the development of physical education of the New Age (the 17^{th}-18^{th}centuries) belongs to the Czech teacher J. A. Comenius (1592-1670) who developed and proposed a classroom system of education and also believed that girls should be educated together with boys. The scholar recommended to build the

process of learning, education and physical development using a system of pedagogical observations taking into account the age and individual characteristics of children [37].

The analysis of different pedagogical systems showed that in general until the 18th century the public education of girls was not given much importance as the main task of women was procreation. And, only in the 18th century public figures, philosophers and representatives of natural sciences began to consider the possibility of purposeful education of girls not only for family life, but also for public [42]. Further development of humanities and natural sciences during the age of Enlightenment led to the fact that all famous teachers, doctors and philosophers began to consider physical education as an integral part of the comprehensive education of a member of society. By contrast with ancient times physical education for girls was paid more attention.

Thus, the facts show that at different stages of human development, attitude toward physical education of both sexes was changing but the main thing was a differentiated approach which was based on the traditional distribution of social roles of men and women in society.

J. J. Rousseau developed the theory of sex-differentiated education the main idea of which was due to relationship between behavior and person's life strategy according to his biological sex. This means acceptance of priority of biological sex over social [43].

J. J. Rousseau in his works emphasized that it is impossible to consider that one sex is better than the other and at that time it is impossible to balance them. The purpose, methods and approaches to the upbringing of boys and girls should be different because biological gender differences contain different emotional, cognitive and personal characteristics. Based on these postulates the scientist considered necessary to introduce differentiated education of boys and girls from the first days of their life [3].

In the 16th -18th centuries Ukrainian theory and practice of physical education were developed to a considerable degree under the influence of works of Russian

educator, anatomist and physician P. F. Lesgaft (1837-1909). In the fundamental work “Guide to physical education for school-age children” he substantiated the concept of physical education [27]. He insisted that the systems of physical education subordinate to the laws of physiology. Alongside the development of physiology physical exercises should be constantly revised and improved [23]. P.F. Lesgaft implemented his pedagogical views in the process of training physical education teachers [27].

In the latter half of the 19th century in many countries around the world much attention was given to the problem of women’s education and their participation in different types of physical activity. During the Modern Age in Western European philosophical and anthropological thought the physical education of the younger generation especially women became a relevant task for the governments of European countries, including Ukraine. However, among the main tasks of women's education in our country there was not the education of a freeman. First of all, the woman was the progenitor and that is why taking care of her health was important. And, at the same time, a large number of different, often controversial theories of sex emerged in world science in this period [2, 21, 29].

In the late of the 19th and early of the 20th centuries the situation in society changed in many Western countries such as France, England and the United States, movement for the liberation of women became popular. But despite the fact that feminists achieved the right to participate in municipal elections and be school teachers, it can hardly be said that women became equal to men [2, 29].

Thus, the above changes in our and Western European culture penetrate into the wider social context and build the foundation of social relations, that became background of social relations in society. As for physical education it received the status of a school subject all over the world. Therapeutic physical training was accepted in medicine and the study of different psychical phenomenon that occured under the influence of physical activity begun [9, 10]. Sports events began to have an emotional impact on a person as well as art. People of different classes and different sexes found in physical culture the means to protect their own interests. In most

publications and statements of the time, there was a very substantial reservation that exercise should not harm femininity [7, 29].

In the early of the 20th century problems of psychology of sex and intersexual relations were not studied in our country because psychological science in Ukraine was going through institutionalization which was succeeded by scientific and organizational transformations. Naturally there were not any domestic publications on the psychology of sex during this time period and the attention of scientists was focused on the work of foreign scholars as S. Freud, K. Jung and many others. The status and role of woman in society, her psychological characteristics in comparison with the men's characteristics at this time were mainly statesmen, philosophers, representatives of natural sciences rather than psychologists [34].

Further development of physical education in the 20th -21st centuries characterized in accordance with sociocultural and humanistic oriented changes in the life of our society. Professor Oksana Vatseba studying the history of the development of physical culture and sports in Ukraine found out that the first fundamental works on the theoretical basics of physical education and sports training appeared in the early 1930s. Among them there were synthetical works on theory of sports training by H. Hoske "Trenirovka k sorevnovaniiam" (Kharkiv, 1929), D. Kradman "Zhenshchina v sporte" (Kharkiv, 1931) [4].

There are fundamental changes in the historical social roles of man and woman, image transformation of femininity and masculinity and formation of gender culture of people. Feminist views historically preceded gender processes. Widely accepted in the 1960s and 1980s they demanded to improve women's status and protect their rights [21]. These processes which are too polarized and focused on the problems of only one sex took on their role of overcoming significant disbalance of social and sexual relations and drawing attention to the world community to the women's problems [20].

The evolution of gender development, its historicity has certainly positive importance because it breaks the established social mentality of the men's dominant role and women's minor role in almost all spheres of public life including physical

culture and sports. At this time women are actively involved in sports which is an area where the social conditioning of femininity and masculinity, traditional gender stereotypes and gender-based behavior are very noticeable. For example, until 1952 only cavalrymen were allowed to compete in the Olympic equestrian sport. And, only before the Olympics in Helsinki restrictions on gender and professional features were lifted. However, there are still certain restrictions but they are characterized as more male or female.

In the latter half of the 20th century gender research became active and reached a new level. Three fundamental studies contributed to a kind of revolution that took place in the psychology of gender roles and the emergence of a "new psychology of sex". These are the works of E. McCobby and K. Jacqueline, J. Mani and A. Erhard who showed the power of the socialization effect and S. Bem who proved the inability to oppose the traditional psychology of masculinity and femininity [29, 47].

After analyzing 1,600 studies of psychological gender differences conducted over seven years, E. McCobby and K. Jacqueline came to the conclusion that there are not fundamental innate differences in the psychological characteristics of men and women in many areas of research where these differences were previously recognized; the same differences that young children have are insufficient to justify the traditional inequality of gender social roles that exists in bourgeois society [2]. According to the journal "Psychological Abstracts" 30,000 works on the problem of gender differences were published during the 1950s-1980s [2, 7, 29].

During the 1960s and 1970s of the last century in foreign psychology and during the 1990s in Ukrainian psychology works that include such concepts as "gender", "gender analysis", "gender approach", "gender socialization", etc. began to appear [25, 29]. Gender psychology established itself as a separate branch of psychological knowledge which contributed to the emergence of research in the field of gender differences to the new level of study. In spite of common perception the word "gender" was borrowed from grammar and introduced into the science of behavior not by American feminists but by the eminent sexologist John Mani in 1955 (Money, 1955). He is the first who introduced the concepts of gender, gender

identity, gender role to describe the inner state of the individual from the point of view feeling like a man or a woman. Mani and his colleagues began to develop a model of the process of forming a person's male or female gender or acquiring qualities typical of both sexes when they combined available information with the results of their own clinical research. As a result the term “gender” was included in the scientific context first of all to emphasize not the natural but the socio-cultural cause of intersex differences. One of the most authoritative sociologists of our time the Englishman Anthony Giddens explains that “gender” is not physical differences between a man and a woman but socially formed features of masculinity and femininity. According to him gender means social expectations about behavior that are study as appropriate for men and women [8]. The Ukrainian “Encyclopedia of Education” states that gender differences are not a biological difference between men and women but a socio-psychological difference between women's and men's roles played in society by its members [35]. Analysis of the genesis of gender approaches gave an opportunity to determine that for a short time of its existence it was developed in almost all branches of Ukrainian science. So we have to talk about the feasibility and necessity of its introduction in the process of physical education of youth.

It is stated the different interpretation of gender by systematizing the emergence and interpretation of definitions of “gender” from a historical standpoint as a result of the interpreting of literary sources on the problems of treatment of this concept. It should be pointed out that the concept of “gender” can be considered as a historical and social category. The natural gender hierarchy is associated with a functional role model of behavior. Therefore, gender being a culturally and historically determined phenomenon is determined rather socioculturally than biologically. It is also interpreted as a field of ideas about the personal and behavioral characteristics of male and female [24, 25, 29]. E.P. Illin in his work “Stat I gender” reffering to foreign authors noted that the concept of “gender” contains features due to biological nature while “gender” provides for those aspects of male and female the causes of which are not known yet [16]. Due to this by contrast with sex gender is a

psychological phenomenon that belongs to the acquired forms of behavior and attitudes associated with biological sex [7]. It should be noted that the definitions of gender in various fields of social knowledge have not yet received well-established and generally accepted interpretation which at last shows an insufficient level of development of the analyzed scientific field. Using a defensible content of gender definitions it has systematized and expanded its interpretation of the introduction of physical culture and sports. Thus, it is theoretically substantiated a need of providing and interpretation the gender approach as a definition in political and social medium, it is pointed out its importance for physical education and sports and proposed for use in research a new term that allows it to be characterized as interdisciplinary and cross-sectoral concept extrapolated, interconnected and appropriate to the development of physical culture and sports in developed democracy. It is claimed that this concept should be understood as *socially modeled behavioural models of women and men extrapolated to different areas of social relations, in the context of our study - the relationship in the field of physical culture and sports* [24, 25].

Conclusions / Discussion

Thus, the development of physical education was historically determined by both social and biological and physiological factors. They include interconnected components that have a significant impact on the stages of formation of physical culture of the individual in its axiological significance. It provides the integrity of the process of forming a gender approach in physical education, completeness at each stage, the succession of stages which is achieved in accordance with the age features and balance of natural, social and cultural aspects of physical culture and dominant activities. Thus, gender issues in physical education became deeper in understanding, wider in sphere of its application, in addition, there were new aspects of its realization [31]. The evolution of gender development, its historicity has certainly positive importance because it breaks the established social mentality of the men's dominant role and women's minor role in almost all spheres of public life including physical culture and sports. After analyzing a large number of scientific and popular science psychological sources I.S. Klotsyna notes that "...most psychologists who

have published research on the problem of differences between men and women assume that the anatomical and physiological differences between people of different sexes naturally have to identify differences in their psychological sphere. According to the professor most of these works cannot be considered gender-oriented despite the fact that their name even includes the word “gender” [18, 19, 33]. She explains that this position of psychologists is due to deep-rooted notions that gender is an essential difference not only at the level of human manifestation as an individual but also at such levels as personality, subject of activity, individuality [18, 19]. A group of scientists headed by I. V. Groshev consider this statement quite controversial. As a result, according to the researcher nowadays the world literature has more than 50,000 works in which the authors state the presence of gender differences in various areas of human ontogenesis [11, p. 10]. After analyzing about 4,000 sources, I. V. Groshev found out a statement of more than 2,500 gender differences [11]. Along the same line of thought, it should be noted that the individual psychological properties of man since he was born are organized into certain programs due to which social factors immediately after birth and possibly before birth, in utero, “come across” rather specific human biology than amorphous human biology [11, p.29]. Therefore, the influence of sex on human development (in this case, a direct impact on the development of physical qualities) is quite important. It cannot be changed because sex is a given determined since birth. To amplify that point it was analyzed the works of outstanding scientist-psychologist B.G. Ananiev who studied sexual characteristics as individual characteristics of man and their connection with the peculiarities of his social behaviour: “Sex is one of the fundamental coordinates of individuality which permeates all human properties especially the coordinate of gender and age variability which has a genetic, constitutional innate program and a naturally determined disposition of people in behaviour and activity” [1, p.169]. It is no surprise at all that physical culture and sports are associated with the manifestation of a person’s physical abilities and they are determined to a high degree by his biological sex. However, studying this problem it was found that it is impossible to ignore biological or social factors, they must be considered in close connection [24,

25]. The study revealed that during organizing the process of physical education of children, teenagers and young people it is necessary to take into account biological sex as a basis for differentiation of motor state (amount, intensity, orientation, etc.) and gender characteristics of interests, needs, motives, values can have both individual and group level of manifestation.

Prospects for further development in that process. This study does not spend pass the problem of studying the gender approach in physical education of schoolchildren but raises a number of issues concerning the means and methods in physical education for the formation of individual physical culture of the individual.

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EVALUATION EMOTIONAL AND VOLITIONAL IN DEVELOPING TRAINING COMPLEX FOR A UNIVERSAL MODEL ATHLETES FROM MILITARY AVIATION PENTATHLON (VAP)

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Purpose: to analyze the initial indicators characterizing the type of temperament and lability of the nervous system in first-year cadets of a higher educational institution who are applicants for the national team in international military - aviation pentathlon.

Material and methods: analysis of literature sources, testing, statistical analysis. The study involved 48 first-year cadets of the Kharkiv National University of the Air Force named after Ivan Kozhedub (men) aged 17-18, of whom 38 candidates for Master of Sports and 10 Masters of Sports.

Results: taking into account the initial data on the distribution of male cadets of the first year of the KhNUPS by sport, the type of temperament and certain data on

the lability of the nervous system in the first year cadets of a higher educational institution were determined, they are applicants for the national team in the international military aviation pentathlon. The analysis of the data obtained was carried out in the form of a verbal description, tables, an analytical description of the obtained patterns.

Conclusions: it was determined that the initial indicators of the type of temperament, the level of self-assessment of willpower and the properties of the nervous system of cadets-applicants for the combined team in military aviation pentathlon are non-uniform. In competitions in military aviation pentathlon, the decisive day is the 5th day of the competition - overcoming the obstacle course and orienteering. Since all team members must solve the same, identical task against the background of different initial data on the lability of the nervous system and the type of temperament, this fact motivates the search for a training method that would support the achievements already acquired and develop those who need it equal proportion in all subjects. This method can be a crossfit method based on the philosophy of versatile physical development and meets the goal of developing a training complex for training athletes according.

Keywords: military aviation pentathlon, temperament, properties of the nervous system, lability of the nervous system, circuit training, crossfit.

Introduction

It is known that one of the most difficult complex competencies that an athlete with VAP should have is a competitive day of passing the obstacle course together with orienteering.

During the passage of the obstacle course, the athlete's body experiences functional stress, which in most cases in the absence of special prior training can lead to increased lability of the nervous system, especially the emotional-volitional sphere [1,2].

Orienteering is one of the most specific sports, which combines high physical and mental stress on the background of great volitional and emotional stress, aimed at solving a number of practical problems [3,4].

As the process of training and competition puts before athletes the need to overcome extremely difficult, and in some cases, extreme psycho-emotional and physical stress, especially in the competitive period, and given the fact that when recruiting to the national team with VAP, cadet applicants are 17- 18 years and formed a psychotype of personality, thinking, feeling and perception and have already achieved high results in sports, but in its various forms (game, cyclic, complex-coordination, martial arts), for the formation of a set of training exercises, techniques, methods of research they have typological features of temperament, properties of the nervous system.

Given the above, it is important to develop in athletes during training tolerance to emotional stress, which occurs against the background of functional stress during competitions with VAP.

Therefore, **the aim of the study** was to analyze the baseline indicators that characterize the type of temperament and lability of the nervous system in cadets-applicants for the national team with VAP.

Material and methods

The study involved 48 first-year cadets of the Ivan Kozhedub Kharkiv National University of the Air Force (men), aged 17-18, including 38 candidates for masters of sports and 10 masters of sports in various sports. All candidates for further training in military aviation pentathlon were divided into four groups by sport, namely: game (group I - 12 cadets), cyclic (group II - 14 cadets), complex coordination (group III - 10 cadets), martial arts (group IV - 12 cadets). The cadets who participated in the study were randomized by age, anthropometric, and general health.

To implement randomization, each of the groups was compared according to the indicators of temperament type according to G. Eisenko [5,6] and self-assessment of willpower, which is determined by the test of MM Obozova [7,8].

The evaluation of the properties of the nervous system was carried out using a tapping test according to E.P. Ilyin [9,10]. The advantage of the technique of tapping test EP Ilyina is that in psychomotor activity she reflects first of all the shifts in the nervous system of the subject, and not in his muscles. That is, these are different mechanisms of fatigue, different types of fatigue. Therefore, we can not draw conclusions about the strength of the nervous system for human endurance in work of moderate or high intensity. Based on qualitative criteria, which are the main, E.P. Ilyin divides all subjects into groups with strong, medium, medium-weak and weak nervous system, these are the characteristics we used in the assessment of cadets. Therefore, to assess the state of indicators of higher nervous activity at the stage of formation of the national team with VAP among first-year cadets of Kharkiv National University of the Air Force named after Ivan Kozhedub, we determined the above indicators at the time of screening.

Methods of parametric statistics were used to process the obtained data (Glanz S., 1999). Statistical processing of data entered in Excel spreadsheets was performed. Quantitative characteristics of the main functional indicators were processed statistically, namely, determined the arithmetic mean, the error of the mean. The significance of the obtained data was checked using Student's t-test (for $n < 100$) at a given level of reliability $p = 0.95$. To be able to use the Student's t test, the Fischer-Snedekor test was calculated - the ratio of the larger variance to the smaller one. All mathematical operations and graphical constructions were performed using the software packages "Microsoft Office XP": "Microsoft XP Home" and "Microsoft Excel XP" on a personal computer (license numbers: 00049 153 409 442 and 74017 640 0000106 57664, respectively).

Results of the research

In determining the type of temperament, which is an important indicator when participating in competitions with VAP, when you want to minimize the impact of subjective characteristics of cadets, the results were obtained, which are presented in table 1

Table 1

The predominant type of temperament in the first-year cadets of KhNUPS (men) of candidates for the national team with VAP on the test of G. Eisenko, %

Temperament type	Groups			
	I (n=12) – game sports	II (n=14) – cyclic sports	III (n=10) – hard-coordination sports	IV (n=12) – combat sports
Choleric	6 (50%)	3 (22%)	3 (30%)	3 (25%)
Sanguine	3 (25%)	2 (14%)	4 (40%)	7 (59%)
Phlegmatic	3 (25%)	9 (64%)	3 (30%)	2 (16%)
Melancholic	0	0	0	0

Groups:
Group I - game sports; Group II - cyclic sports;
Group III - hard-coordination sports; Group IV - combat sports.

When analyzing the data in table 1, it was determined that choleric extroverts with a strong but unbalanced type of nervous system, which characterized them as an unstable excitable, unrestrained, aggressive, impulsive, optimistic, active personality with unstable performance and mood and predisposition hysterical-psychopathic reactions in group I (game sports) among cadets-applicants to the national team with VAP was 50%, in group II (cyclic sports) - 22%, in group III (complex coordination sports) - 30% , in group IV (martial arts) - 25% of athletes.

In turn, sanguine extroverts with a strong, balanced, mobile type of nervous system, which characterized them as a stable, social, outward-looking, sociable personality with stubbornness to achieve the goal in group I were 25%, in group II - 14% , in group III - 40%, in group IV - 59% of athletes.

Phlegmatic introverts with a strong, balanced, but inert type of nervous system, which characterized them as stable, slow, calm, passive, unmoved, careful, thoughtful, restrained, reliable, calm in relationships, able to withstand prolonged trouble without disruption of health mood in group I were 25%, in group II - 64%, in group III - 30%, in group IV - 16% of cadets. At the same time, the temperament that would correspond to the characteristics of melancholic introverts with a weak nervous system was not determined among the subjects.

Thus, it can be noted that, despite the predominance of one or another type of temperament in each of the groups, which undoubtedly had an interaction with a sport in which cadets had significant at the time of the study sports achievements (CMS, MS), in general in each from the categories of sports activities were cadets with different types of nervous system, which had already formed at the time of admission to the university and characterized their individual personality.

It should be noted that, taking into account the fundamental differences of each competition day with VAP, each of the athletes had an advantage in a particular sports competition, which helped balance the total number of points at the time of the last day - overcoming obstacles and orienteering. Given that it is not possible to influence the type of temperament and functional state of the nervous system of a cadet in preparation for the competition due to age, previous experience and personality, it is important to develop and implement in the training complex methods that would develop qualities that can to receive at physical and mental loading.

In determining the level of self-assessment of willpower on the test MM Obozova (Table 2) it was determined that none of the cadets who took part in the study had a weak willpower, which is logical given that each of them has high sports achievements at the time of the study.

The level of self-assessment of willpower (subjective criterion, but informational important for the construction of the training process), which was defined as average, in group I was determined in 50% of cadets, 15,1±0,9 points, in group II - in 36%, 18,2±1,1 points, in group III - in 30%, 19,4±0,8, in group IV - in 42% of athletes, 19,2±1,1 points. At the same time, its lowest values were in the subjects who had achievements in playing sports, which was probably ($p<0,05$) less than the number of points in groups II, III and IV, which probably depended on the reduction of responsibility at the personal level when participating in team (game) competitions. In groups II, III and IV, the number of points that characterized the level of self-assessment of willpower was almost different and corresponded to the upper limit of the range of values.

Table 2

Indicator of the level of self-assessment of willpower in cadets of the first year of KhNUPS (men) of applicants to the national team with VAP on the test of MM Obozova, + m, points

The level of self-assessment of willpower	Groups			
	I (n=12)	II (n=14)	III (n=10)	IV (n=12)
from 0 to 12 points - weak willpower	0	0	0	0
from 13 to 21 points - average willpower	6 (50%) 15,1±0,9	5 (36%) 18,2±1,1	3 (30%) 19,4±0,8	5 (42%) 19,2±1,1
willpower is average, points	**$t_{1,2}$=2,70 ($p_{2,4}$<0,05); $t_{1,3}$=3,22 ($p_{1,3}$<0,05); $t_{1,4}$=2,21 ($p_{1,4}$<0,05);** $t_{2,3}$=1,34 ($p_{2,3}$>0,05); $t_{2,4}$=1,41 ($p_{2,4}$>0,05); $t_{3,4}$=0,59 ($p_{3,4}$>0,05)			
from 22 to 30 points - great willpower	6 (50%) 24,6±0,7	9 (64%) 25,1±1,2	7 (70%) 27,2±1,4	7 (58%) 24,9±1,2
willpower is great, points	$t_{1,2}$=1,55 ($p_{1,2}$>0,05); **$t_{1,3}$=2,48 ($p_{1,3}$<0,05);** $t_{1,4}$=1,60 ($p_{1,4}$>0,05); $t_{2,3}$=1,37 ($p_{2,3}$>0,05); $t_{2,4}$=1,47 ($p_{2,4}$>0,05); $t_{3,4}$=0,54 ($p_{3,4}$>0,05)			

Groups:
Group I - game sports; Group II - cyclic sports;
Group III - hard-coordination sports; Group IV - combat sports.

The level of self-assessment of willpower, which was defined as high (high willpower), in group I was determined in 50% of cadets, 24,6±0,7 points, in group II - in 64%, 25,1±1,2 points , in group III - in 70%, 27,2±1,44; in group IV - in 58% of athletes, 24,9±1,2 points. At the same time, its lowest values were in the subjects who had achievements in playing sports, which was probably ($p<0,05$) less than the number of points in group III. The highest number of points was determined by this indicator for cadets who were engaged in complex coordination sports and had high sports achievements.

Another important indicator is the homogeneity of the level of self-assessment of willpower in each of the groups. Thus, this indicator was the least homogeneous in groups I and III, but in group I 50% of cadets had the lowest values of the level of self-assessment of willpower among the entire cohort of subjects. On the contrary, in group III 70% of athletes with the highest values among all studied cadets had a high

score. In groups II and III, this figure was the most homogeneous, but the vast majority of athletes had a high level of self-esteem, 64% and 58%, respectively.

When determining the properties of the nervous system using a tapping test by E.P. Ilyin (Table 3), counted the number of points in each square, and then built a diagram of performance for each cadet separately by plotting on the abscissa 5-second time intervals, and on the ordinate - the number of points in each square. An important point in the interpretation of the data was the understanding that the strength of nervous processes is an indicator of the efficiency of nerve cells and the nervous system as a whole. A strong nervous system can withstand a greater magnitude and duration of load than a weak one.

Table 3

The indicator of the properties of the nervous system in the first-year cadets of KhNUPS (men) of applicants to the national team with VAP with the help of a tapping test according to EP Ilyin, %

Type of nervous system	Groups			
	I (n=12)	II (n=14)	III (n=10)	IV (n=12)
Convex type of curve, strong nervous system	4 (33%)	7 (50%)	6 (60%)	4 (33%)
Smooth curve type, nervous system of medium strength	4 (33%)	4 (30%)	3 (30%)	4 (33%)
Descending type of curve, weak nervous system	4 (33%)	0	0	4 (33%)
Intermediate type of curve, medium-weak nervous system	0	3 (20%)	1 (1%)	0
Concave type of curve, medium-weak nervous system	0	0	0	0

Groups:
Group I - game sports; Group II - cyclic sports;
Group III - hard-coordination sports; Group IV - combat sports.

Our data on the properties of the nervous system in all subjects determined the heterogeneity, the percentage of which coincided in each of the groups, despite the presence of sports results for one activity. Thus, in group I, the convex type of curve, which characterizes a strong nervous system, was determined in 33% of cadets, equal type - nervous system of medium strength - in 33%, and descending type - weak nervous system - also in 33% of athletes. In group II, the convex type of the curve

diagram, its equal type were obtained in 50% and 30% of cadets, respectively, while none of them received an ascending type of curve, and in the last 20% determined its intermediate type, which corresponded to medium-weak nervous system.

In group III, convex, smooth and intermediate curve types were obtained by constructing individual diagrams of 60%, 30% and 10%, respectively. In group IV, the ratio of the type of nervous system among athletes coincided with the results obtained during the analysis of data in group I and was 33%, 33% and 33% convex, smooth and descending type of curve, respectively.

Given the data obtained, it can be noted that the initial indicators of the type of temperament of cadets-applicants for the national team with VAP, the level of self-assessment of willpower and properties of the nervous system are heterogeneous. Given that the first 4 days of the sports competition with VAP are devoted to different ideologies of competitions - air pistol shooting, swimming, fencing and basketball - the presence of heterogeneity of indicators on the tests contributes, on the contrary, the homogeneity of team scores, which are defined as average for all participats. At the same time, the decisive, 5th day of the competition is important - overcoming the obstacle course and orienteering, as all team members must solve the same, identical task against the background of different initial data. This motivates the search for a training method that would support the already acquired achievements and develop those who need it, in equal proportions in all subjects. Thus, the method of crossfit, which is based on the philosophy of multifaceted physical development, is the most that meets the goal of developing a training complex for athletes with VAP.

Conclusions / Discussion

Introduction of tests to determine the type of temperament, level of self-assessment of willpower and nervous system strength during the selection process of athletes in the national team in international military aviation pentathlon is an important point in determining the appropriate algorithm for further training.

When determining the properties of the nervous system using a tapping test by E.P. Ilyin, and the interpretation of the data was an important point in understanding

that the strength of nervous processes is an indicator of the efficiency of nerve cells and the nervous system as a whole. A strong nervous system can withstand a larger magnitude and duration of load than a weak one

When analyzing the data obtained when determining the type of nervous system in each of the athletes, we entered in the table the number of subjects in which the diagrams determined a particular type of nervous system. Given that all cadets at the time of randomization had significant sporting achievements (CMS, MS), the purpose of determining the properties of the nervous system by tapping test was to understand the initial data on the form of balancing the body of athletes with the environment. Since the success of mastering and realizing sports ambitions depends on whether the activity or its style corresponds to the initial psychophysical status, obtaining different, heterogeneous results is a motivation to find optimal psychophysical ways to build a training process aimed at success in one activity (sports competition with VAP). cadets with different typological features

When comparing the data obtained in determining the temperament of the subjects, the type of lability of their nervous system, as well as the level of self-assessment of willpower, it should be noted that the indicators are heterogeneous. Those or other features of each of the athletes add a single whole to the number of points for the first 4 competitive days, as each component of the sports competition with VAP provides for participants to pass stages with different differentiated sports tasks. Thus, it is important to train performance, endurance, motor-coordination skills and cognitive abilities, which would help to collect the maximum number of points on the last day of the competition while overcoming the obstacle course and performing the task of orienteering.

Long-term practice of one or another (game, cyclic, complex-coordination, martial arts) sport on the eve of the status of a candidate for membership in the national team with VAP makes it necessary to develop a universal set of exercises that do not require special equipment is understandable, and meets the requirements that for a certain number of repetitions of different exercises, the skill can be formed by accelerating their performance and increasing their number depending on the

phase of the training process with reaching the peak of opportunities immediately before the competition.

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EFFICIENCY OF THE PROGRAM OF THE TRAINING PROCESS OF YOUNG ATHLETES OF 13-14 YEARS DURING THE FIRST MACROCYCLE OF ANNUAL TRAINING (ON THE EXAMPLE OF SPRINTER RUNNING)

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Purpose: to develop and prove the effectiveness of the training process program for athletes-sprinters during the first macrocycle of an annual training.

Material and methods: the experiment involved ten athletes, ranged from 13-14 years old who train in the athletics section of secondary educational institution. The following research methods were used: theoretical analysis and generalization of scientific and methodological literature data, pedagogical experiment, pedagogical testing and methods of mathematical statistics.

Results: it was determined that athletes at the stage of preliminary basic training use two-cycle planning of an annual training ("double" cycle). The structure of planning the training process in the first macrocycle is revealed on periods, stages, mesocycles. The program of the training process of athletes during the first macrocycle of the "double" cycle of an annual training is developed.

Conclusions: the effectiveness of the training process program among athletes was proved on the basis of increasing their physical preparedness and sports achievements in the track and field athletics competitions.

Keywords: athletics, program, macrocycle, physical strength, young sprinters.

Introduction

V.M. Platonov [11] formulated the main tasks of training athletes at the stage of preliminary basic training: 1) versatile development of motor skills, 2) health promotion, 3) elimination of shortcomings in the level of their physical development and physical fitness, 4) creation of motor potential that involves the formation of motor skills (corresponding to the specifics of future sports specialization), 5) the formation of a lasting interest of athletes in sports improvement in the chosen sport.

The athletics curriculum for CYSS states that the technical training at the preliminary basic training stage is based on the versatile material of the sport selected for the athlete's specialization.For example, in sprinting running the technique of starting exercises (start from walking and slow running, start from falling, leaning on one arm, low start in easy and complicated conditions), special running exercises, running technique (movements of arms, legs, torso position, breathing technique, etc.), running with variable speed, sprint running (smooth running, running up, on sand, etc.), technique of various jumping exercises, pushing the core and stuffed ball are mastered [1].

In the process of physical training of young athletes, special attention should be paid to the development of various forms of speed, as well as speed and strength, coordination skills and flexibility. Given the high growth rate of these motor abilities, it is inappropriate to plan at this stage sets of exercises with high intensity and short breaks, as well as training sessions with heavy loads [3].

Athletics experts [1] recommended the following distribution of the ratio of types of work of different predominant orientation at the stage of preliminary basic training, which is presented in table 1.

Table 1

The ratio of types of sports training of athletes at the stage of preliminary basic training

Stage of long-term preparation	General training,%	Auxiliary training,%	Special training,%	Technical training,%	Annual work volume,%
Previous base training	40	30	15	15	250-600

In the sports training of young athletes it is necessary to take into account a number of methodological and organizational features [12]:

1) training sessions should not be focused on sports achievements at the stages of initial and preliminary basic training;

2) the load must correspond to the functional capabilities of the biological state of the athlete's body;

3) in the training process it is necessary to adhere to a rational regime, ensuring household hygiene, proper organization of control over the health and physical development of the young athlete;

4) with increasing level of training of athletes gradually decreases the percentage of general physical training and increases the percentage of special physical training.

Scientists V.M. Platonov [11] and L.P. Matveev [9] are the founders of the theory of building the training of athletes in the long-term process of sports improvement. According to them, the construction of annual training can be carried out on the basis of one macrocycle - one-cycle training, two - two-cycle, three - three-cycle and so on. In each macrocycle there are periods: preparatory, competitive and transitional.

At the same time, in the multi-cycle construction of the training process during the year, different options are used: "double", "built" and so on. Because the

transition periods between the first and second, second and third, etc. macrocycles are not planned (L.P. Matveev, 1977; V.M. Platonov, 1986).

Analysis of the special literature showed that young athletes at the stage of initial and preliminary basic training are widely used two-cycle planning of annual training [4; 7]. The first macrocycle has a basic character, provides comprehensive training and performance in competitions, not as responsible as the main competitions of the year. The training process in the second macrocycle acquires a specific character, the preparation is aimed at a successful performance at the main competitions of the year [5; 8; 10].

V. Dobrynsky, J. Mudryk [6], O. Vysotska, V. Sergienko [2] and others studied the issues of improving the physical training of young athletes.

Thus, the issues of structure and content of two-cycle planning of annual training of young athletes at the stage of preliminary basic training in the scientific and educational literature are insufficiently covered, which led to the choice of the topic of our study.

Connection of research with scientific programs, plans, topics. This work was performed in accordance with the plan of research work of the Department of Theory and Methods of Olympic and Professional Sports of the Central Ukrainian State Pedagogical University named after Volodymyr Vynnychenko.

The purpose of the study: construction of the training process in the first macrocycle of the two-cycle annual training of sprinters 13-14 years old to competitions in athletics duel.

Objectives of the study:

1. Based on the analysis of scientific and methodological literature to study the planning of annual training of sprinters at the stage of preliminary basic training.

2. To develop the program of preparation of track and field athletes-sprinters of 13-14 years for competitions in track and field dueling during the first macrocycle of two-cycle planning of annual training and to define its efficiency.

Material and methods

The study involved ten athletes aged 13-14, who train in the athletics club of the basic educational institution "Dmitrov secondary school of I-III degrees named after Taras Shevchenko" Dmitrov village council of Znamyansky district of Kirovograd region. Athletes specialize in 60 and 100 m running, have 3-4 years of sports training experience and sports qualification – III and II youth categories in athletics.

The following methods are used to solve the research problems: analysis of scientific and educational literature, pedagogical experiment, pedagogical testing, methods of mathematical statistics.

Results of the research

In the course of the research the structure of planning the training process of sprint athletes in the first macrocycle of two-cycle annual training was developed (Table 2).

Table 2

The structure of planning the training process in the first macrocycle of two-cycle annual training of athletes 13-14 years

Macrocycle																
Periods	Preparatory												Winter competitive			
Stages	General preparatory								Special training				Competative			
Mesocycles	Retracting				Retracting				Base				Competative			
Months	September				October				November				December			
Microcycles	R	R	R	S	R	R	S	S	R	S	S	RM	SM	CM	RM	RM
Competition, h.								2						2		
Recovery tools, h		2		2		2		2		2		2		2		2

Note: R - retracting microcycle, S - shock microcycle, RM - reducing microcycle, SP - supply microcycle, CM - competitive microcycle.

In the structure of planning the training process of athletes during the first macrocycle of two-cycle annual training there are two periods: preparatory and winter competition, as well as three stages: general training (September-October), special training (November) and competitive (December). Thus, athletes at the stage

of preliminary basic training use two-cycle planning of annual training ("double" cycle). Because, with two-cycle planning of annual training between macrocycles there is no transition period. The competitive period of the first macrocycle smoothly passes into the preparatory period of the next (L.P. Matveev, 1977; V.M. Platonov. 1986).

The planning of the training process in the general preparatory stage involved two retracting mesocycles. The task of retracting mesocycles is to increase the level of general and auxiliary physical fitness and functional capabilities of athletes' body systems, strengthen the musculoskeletal system and the ability of athletes to withstand loads, the value of which is gradually increasing.

Upon completion of the general preparatory stage, the participation of athletes in the open Championship of the Kirovohrad region in track and field duel among boys and girls born in 2005-2006 (October 26, 2019, Kropyvnytskyi) is planned to increase their training and competitive experience. The athletics duel, in which the athletes took part, includes a 60-meter hurdles and a 60-meter sprint, as well as a 60-meter hurdles and a 400-meter run.

The special-preparatory stage is represented by the basic mesocycle, which provides purposeful special training, by increasing the percentage of special-preparatory exercises as close as possible to the competitive ones.

The winter racing period is represented by a racing mesocycle. The participation of athletes in the main competitions of the macrocycle - the Championship of Cherkasy region in athletics duel among boys and girls born in 2005-2006 (December 7, 2019, Cherkasy) is planned.

During the development of the program of the training process of athletes during the first macrocycle of the "double" annual cycle of training in the athletics club, we focused on the athletics curriculum for CYSS. Thus, athletes 13-14 years of the first year of training at the stage of preliminary basic training, according to the athletics program for CYSS, have 12 hours of weekly workload (Table 3) [1]. At the same time, the athletes in the athletics club at the basic educational institution have only 8 hours of weekly workload.

Table 3

Minimum age of athletes, minimum group size, weekly training regime in athletics at the stage of preliminary basic training at CYSS

Stage of sports training	Year of study	Number of athletes in the group	Age, years	Requirements for sports training	Weekly training load, hours
Preliminary basic training	1	8	13-14	III jun.-II jun.	12
	2	8	14-15	II jun.-I jun	14
	3	7	15-16	I jun.-III	18
	More than 3 years	6	16-17	III-II	20

The developed program of the training process of athletes during the first macrocycle of training consisted of a program of four mesocycles. In turn, the program of each mesocycle consisted of a program of four-week microcycles. The program of the I and II microcycles was similar, as well as the program of the III and IV microcycles of each mesocycle. The means are the same, but the duration (number of approaches and series) and intensity of work in the second microcycle is greater than in the first, as well as in the fourth microcycle, more than in the third.

In the microcycles of the first *retracting mesocycle*, small and medium loads are planned. There is a small amount of special training exercises aimed at developing different types of endurance: speed, strength, jumping. The development of speed, speed-power, coordination skills and flexibility is planned. Running work is represented by shuttle running 3x60 m, accelerations from 20 to 50 m, starts with a load of 4-6x20 m, interval running at a distance of 50 to 150 m, two or three series with intensity (80-85%). During the mesocycle, the amount of running work increases from 2000 m to 3000 m. Auxiliary physical training of sprinters is represented by a variety of jumping and strength exercises, as well as special barrier exercises. In addition to physical training, there is a variety of technical training: mastering the technique of special training exercises in sprinting and hurdles, long

jump. Regarding psychological training, special attention was paid to the formation of motivation of athletes to regular classes in the athletics club.

In the second *retracting mesocycle*, small amounts of aerobic endurance work are planned. Because the performance of large amounts of aerobic work by sprinters in the preparatory period has a negative impact on speed technique and the manifestation of speed abilities (V.M. Platonov, 1984). During the mesocycle there is a tendency to increase the volume of running work (acceleration from 30 to 60 m, starts with resistance 4x20 m, running at 6x20 s and 6x10 s, barrier running 30-60 m, interval running at a distance of 70 to 250 m with an intensity of 85-90%, etc.), aimed at the development of speed abilities and speed endurance.Thus, the volume of special running work of athletes increases from 2250 m to 3500 m. The volume of speed and strength work to strengthen the muscles of the legs and feet (various jumps, long jumps, jumping complexes, etc.) also increases. In addition, the amount of strength work with the barbell increases (12 kg): jumps, lunges, barbell bench press, etc.

In shock microcycles, athletes performed significant amounts of anaerobic running on Monday, so no running was planned for Wednesday, and strength work aimed at developing absolute strength, power and jump endurance is planned. Significant amounts of running work are scheduled for Friday again.

The basic mesocycle involves the development of speed and speed-power abilities, absolute strength, power, jumping and special speed endurance; improving the coordination structure of movements in the smooth and barrier running of athletes (technical training). Running work of athletes is beginning to acquire a special character. The amount of special running work of athletes increases from 2350 m to 3000 m, but it is smaller than in the previous mesocycle.

In the first two microcycles (retractable and shock), only on Monday, athletes perform significant amounts of special running work aimed at developing speed abilities and speed endurance. This work requires deep use of energy resources of the body and the recovery period can last up to several days. After such classes, there is a significant suppression of speed abilities, so on Wednesday, strength training is

planned in the gym for the development of absolute strength and endurance of athletes. On Friday, the athletes have a recovery exercise with a small load (basketball, massage).

In the third microcycle (shock) on Monday athletes perform a large load of speed and power direction (interval running 2 series 60 + 80 + 100 m with an intensity of 85-90%, jumping complex: 4x20 m jumps on the right leg and 4x20 m jumps on the left leg ; running 4x100 m with a tire). On Wednesday, the amount of load decreases and changes the direction of the load - the development of strength endurance in the gym. On Friday, athletes perform a load aimed at developing speed and general endurance (alternating running series of 1 minute (~ 400 m) and 2 minutes (~ 300 m) 2 repetitions of 2 series, cross 2500-3000 m.

In the fourth microcycle (recovery) the average and small size of loading is planned, the volume of training work in comparison with the shock microcycle is reduced, means of active rest are widely applied.

Thus, when compiling the training program of each microcycle, the impact on the body of young athletes of training with different size and direction of the load, as well as the duration of the recovery process after them was taken into account. The same opinion in the process of building microcycle programs is held by leading experts in the theory and methods of sport (L.P. Matveev, 1977; V.M. Platonov, 1987; V.M. Platonov, F.P. Suslov, 1995; Yu. M. Scrape, 1976 and others).

The competitive mesocycle begins in December. This mesocycle reduces the amount of strength work with weights (barbell, barbell, dumbbells, etc.), but increases the amount of speed and strength work with your own body weight (multi-jumps, deep jumps, one-legged jumps, etc.). The intensity of special running exercises reaches maximum values (90-96 %).There is a tendency to reduce the volume of special running work from 3100 to 2550 m. The technical improvement of the coordination structure of smooth and barrier running continues. Athletes continue to carry out a variety of technical training, mastering the technique of special training exercises in sprinting and hurdles, long jump. The tasks of general and special psychological training of athletes are solved.

In order to determine the effectiveness of the developed training process of athletes during the first macrocycle of the "dual" cycle of annual training, a comparative analysis of statistical indicators of physical fitness of athletes at the beginning and end of the macrocycle (Table 4).

There is a general tendency to improve the statistical indicators of physical fitness of athletes. Significant (P<0,05) increase in results was found in the 30 m run by 3,86 % (t=2,56), the 200 m run – by 5,07 % (t=4,62), the 300 m run. m – by 2,17 % (t=2,47) and long jumps from a place – by 7,57 % (t=3,93). The obtained data show that under the influence of the developed training program during the first macrocycle of training, there was a significant improvement in the indicators of speed abilities, speed endurance and explosive power.

Table 4

Comparison of indicators of physical fitness
athletes at the beginning and at the end of the macrocycle (n=10)

№	Tests	X±m		probability estimation	
		September	December	t	p
1	Running 30 m from the start, s	5,18±0,06	4,98±0,05	2,56	<0,05
2	Running 60 m from the start, s	9,73±0,07	9,50±0,09	2,09	>0,05
3	Running 100 m from the start, s	15,55±0,06	15,38±0,06	2,00	>0,05
4	Running 200 m from the start, s	33,89±0,19	32,17±0,32	4,62	<0,05
5	Running 300 m from the start, s	55,2±0,38	53,8±0,42	2,47	<0,05
6	Long jump from a place, s	186,2±2,33	200,3±2,73	3,93	<0,05

Insignificant (p>0,05) increase in the results of athletes was found in the 60 m run by 2,36 % (t=2,09) and in the 100 m run – by 1,09 % (t=2,00). The calculated value of the Student's t-test in these tests is not significantly lower than the critical value (t_{cr}=2,28).

The unreliable increase in results in the 60 m and 100 m runs from the start in athletes can be justified by research data from leading experts in the theory and methods of physical education and sports. Thus, these tests make it possible to assess the manifestation of speed in the integral motor action, which includes the speed of a simple motor reaction, the frequency of movements, the speed of single cyclic

movements, the rapid onset of movement.In turn, the speed of a simple motor response is little amenable to training, due to genotype (B.M. Shiyan, 2010). The frequency of movements has a significant annual increase in girls 11-12 years, and from 13 to 16 years the annual increase slows down (L.V. Volkov, 1998).

At the same time, we agree with the opinion of L.V. Volkov [3], who states that high rates of speed increase in holistic motor actions are observed in young athletes from 11-12 to 14-15 years. In the course of our research, purposeful high-speed training of athletes aged 13-14 was carried out only in basic and competitive mesocycles. The second macrocycle of the "double" annual cycle of training of athletes is longer and involves planning a larger amount of speed training, compared to the first macrocycle.

Conclusions / Discussion

1. It is determined that athletes at the stage of preliminary basic training use two-cycle planning of annual training ("double" cycle). In the structure of planning the training process during the first macrocycle training of athletes there are two periods: preparatory and winter competitive; three stages: general-preparatory, special-preparatory and competitive; four mesocycles: two retractable, basic and competitive. The main task of the first marocycle is defined - creation of the functional base for trainings during the year and participation in competitions of the winter competitive period.

2. The effectiveness of the program of the training process of athletes during the first macrocycle "dual" cycle of annual training is proved by the following criteria:

a) according to the sports achievements of the athletes during the participation in the main competitions of the macrocycle - the open Championship of Cherkasy region on track and field duel among boys and girls born in 2005-2006 According to the results of the competition, one athlete took the first place in the 60 m hurdles + 60 m, the second - the second place in the 60 m hurdles + 400 m, and the third - V place in the 60 m hurdles. Thus, out of ten athletes who participated in the experiment, one

athlete became the winner of the competition, one - the prize-winner, and the other took the fifth place;

b) on the basis of significant (P<0,05) improvement of statistical indicators of physical fitness (speed abilities, speed endurance and explosive power) of athletes during the experiment. Thus, the results in the 30 m run increased by 3,86% (t=2,56), in the 200 m run – by 5,07% (t=4,62), in the 300 m run – by 2,17% (t=2,47) and long jumps – 7,57% (t=3,93).

Prospects for further research. It is planned to develop a training program for sprinters 13-14 years old during the second macrocycle of the "double" cycle of annual training.

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INFLUENCE OF THE USE OF SPECIAL EXERCISES ON THE PSYCHOPHYSIOLOGICAL INDICATORS OF YOUNG BOXERS AGED 15-16 YEARS OLD

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Purpose: to determine the effectiveness of the use of special exercises using boxing equipment during a one-year macrocycle in young boxers 15-16 years old.

Material and methods: the research was carried out with the involvement of young boxers 15-16 years old, who made up the control (12 athletes) and experimental (12 athletes) groups, who carried out a year-long training process according to the CYSS program, but in the experimental group at the end of each training exercise using boxing equipment (exercises with a bag and a pear, with a wall pillow; pneumatic bag; exercises with a ball on elastic bands; exercises with a small hanging ball). The initial and final measurements of psychophysiological parameters were carried out after training with a high load, which was used in boxers of both groups.

Results: the results obtained make it possible to expand the methodology of using special exercises for the development of speed-strength qualities in accordance with the specificity of the sport. The expediency of using exercises of a special speed-strength orientation in young boxers of 15-16 years old at the end of a training session, against the background of fatigue, has been determined.

Conclusions: the improvement of the results of psychophysiological indicators, which are the components of the motor activity of boxers (the time of a simple reaction to sound and light; Romberg's test, indicators of the Schulte test, concentration and switching of attention according to the Bourdon test) was confirmed.

Keywords: young boxers, psychophysiological indicators, special boxing equipment, speed- strength qualities.

Introduction

Physical training of a boxer is the main factor ensuring the quality of technical, tactical and psychological readiness, the level of development of all other components of mastery [1, 4, 15].

The methodology for the development of speed-strength qualities is associated with the provision of the necessary functional preparation of the body for the improvement of technical and tactical skills and a systematic increase in the speed of a competitive exercise. Special studies [2, 10, 14] indicate the inconsistency of the opinions of coaches in various sports on the training impact of the most popular means of special physical training (SPT). Obviously, the reason for this situation lies in the lack of knowledge about the physiological mechanisms that underlie the athlete's special working capacity and the means that determine the training effect. [3; 6; 7].

Today athletes widely use competitive exercises with high labor intensity in training [8]. Along with other and no less important advantages, this technique acts as a very effective means of SPT, since it is difficult to come up with something more special in this regard. Therefore, the performance of a competitive exercise in training with the maximum intensity of efforts and high speed is an important means of the SPP system, but requires scientific and methodological substantiation. [13].

According to the degree of conformity of the mode of work of the organism when performing a competitive exercise, it makes sense to distinguish three groups of means of SPT [12; 18]: specific - different forms (variants) of the main sports

exercise fulfillment with the task of adapting the organism to the mode of its work in the conditions of competition; specialized - adequate competitive conditions for the most essential motor and functional parameters of the body's working regime; nonspecific - formally do not correspond to the competitive right in terms of motor organization, but contribute to the development of the body's functional capabilities in the right direction; their task is to enhance the training effect of specialized means through additional selective impact on certain physiological systems and body functions.

In practice, when selecting SPP funds, one should be guided by the principle of dynamic compliance [5; 9; 17], according to which they should be adequate to the competitive exercise according to the following criteria: muscle groups involved in work, amplitude and direction of movement; the section of the amplitude of movement is emphasized; the amount of effort and the time of its development; speed of movement, mode of muscle work. Based on these criteria, the starting position, the kinematic scheme of movements, the amount of external resistance, the nature of the manifestation of efforts, and, finally, the method of exercise are determined [12; 16].

In turn, P. Anokhin determines that the most effective is the use of special preparatory exercises, which in the structure of movements correspond to the competitive right.

Purpose of the study: to determine the effectiveness of the use of special exercises using boxing equipment during a one-year macrocycle in young boxers 15-16 years old

Material and methods

In our studies, we supplemented two more provisions on the advisability of using special exercises, which also reproduce not only the structure of movements, but also the structure of efforts, as well as the influence of special exercises for the formation of a functional system (cardiovascular, respiratory, neuromuscular), which provides competitive activity in the chosen sport. It is the selection of speed-strength exercises of boxers to solve these issues that is relevant in sports training.

In this regard, the use of speed-strength exercises with the use of special devices will help improve psychophysiological indicators and contribute to the formation of special preparedness.

Results of the research

The main feature of the experimental methodology was the use of special exercises that form the boxers' motor actions at the end of the training session. This is due to the fact that it is very important for boxers at the end of the fight to show speed and power qualities that affect the determination of the winner. Therefore, it is the use of special exercises at the end of training against the background of fatigue that forms the manifestation of special speed-strength qualities, in terms of the structure of movements, the structure of efforts and the formation of a functional system specific to boxing, is an effective scientific research. The scientific studies presented earlier [11] made it possible to determine the influence of the indicated special boxing equipment on the indicators of general physical fitness, during which their influence on psychophysiological indicators was determined.

Table 1

Psychophysiological indicators of the control group at the beginning and at the end of the annual macrocycle (n1=n2=12) $\bar{x}\pm m$

№ i/o	Indicators	At the beginning	At the end	Reliability assessment	
				t	p
1	Rufier index, c.u.	7,92±0,26	7,01±0,24	1,17	>0,05
2	Romberg test, s	13,6±0,32	14,8±0,43	2,26	<0,05
3	Time of simple reaction to sound, s	0,35±0,03	0,31±0,03	1,00	>0,05
4	Selection response time, s	1,25±0,10	1,21±0,07	0,37	>0,05
5	Time of simple reaction to light, s	0,37±0,04	0,35±0,03	0,40	>0,05
6	Efficiency of work on the Schulte test, c.u.	7,04±1,46	67,5±1,32	1,48	>0,05
7	Schulte test level, c.u.	1,01±0,6	0,92±0,05	1,15	>0,05
8	Mental stability according to the Schulte test, c.u.	0,92±0,05	0,88±0,05	0,57	>0,05
9	Concentration of attention according to the Bourdon test, c.u.	236,6±5,10	252,6±5,46	2,07	>0,05
10	Switching attention with the Bourdon test, c.u.	35,4±1,12	32,5±1,08	2,19	<0,05
11	Tapping test, frequency of movements, (number of times)	4,62±0,15	4,78±0,16	0,79	<0,05

Testing of psychophysiological indicators at the beginning of the annual macrocycle in the control and experimental groups did not reveal a significant (p>0,05) difference between the study groups. The conducted summer training process of young boxers 15-16 years old in the control group according to the CYSS program had a positive effect on the formation of psychological indicators, but significant shifts were obtained in the indicators of the Romberg test (t=2,26; p<0,05) and switching attention according to the Bourdon test (t=2,19; p<0,05).

Table 2

Psychophysiological indicators of young boxers 15-16 years old of the experimental group at the beginning and at the end of the annual macrocycle (n1=n2=12) $\bar{x}$±m

№ i/o	Indicators	At the beginning	At the end	Reliability assessment	
				t	p
1	Rufier index, c.u.	7,44±0,25	6,94±0,23	1,17	>0,05
2	Romberg test, s	13,1±0,33	15,5±0,45	4,29	<0,01
3	Time of simple reaction to sound, s	0,34±0,04	0,23±0,02	2,44	<0,05
4	Selection response time, s	1,27±0,08	1,00±0,06	2,70	<0,05
5	Time of simple reaction to light, s	0,35±0,03	0,27±0,02	2,22	<0,05
6	Efficiency of work on the Schulte test, c.u.	69,5±1,35	62,1±1,21	4,09	<0,01
7	Schulte test level, c.u.	1,03±0,06	0,78±0,04	3,47	<0,01
8	Mental stability according to the Schulte test, c.u.	0,94±0,05	0,74±0,04	3,13	<0,01
9	Concentration of attention according to the Bourdon test, c.u.	238,8±5,04	271,6±5,01	4,62	<0,001
10	Switching attention with the Bourdon test, c.u.	34,8±1,12	28,7±1,02	4,04	<0,01
11	Tapping test, frequency of movements, (number of times)	4,60±0,15	5,06±0,17	2,00	>0,05

But at the end of each lesson, the use of special speed-strength exercises at the end of the study allowed young boxers 15-16 years old in the experimental group in terms of: Romberg's test for 2,4 s (t=4,29; p<0,01), time simple reaction to sound at 0,11 s (t=2,44; p<0,05), response time of choice at 0,27 s (t=2,70; p<0,05) time of simple reaction to light at 0,08 s (t=2,22; p<0,05) efficiency of work according to the Schulte test at 7.4 c.u. (t=4,09; p<0,01); the degree of workability according to the Schulte test by 0.25 c.u. (t=3,47; p<0,01); mental stability according to the Schulte

test at 0,20 c.u. (t=3,13; p<0,01); concentration of attention according to the Bourdon test at 32.8 c.u. (t=4,62; p<0,001); switching attention with the Bourdon test to 3.4 c.u. (t=2,19; p <0,05) (Table 2).

Comparison of psychophysiological indicators of young boxers 15-16 years old of the studied groups at the end of the annual macrocycle, which were determined after the same load in the groups, indicates the effectiveness of using special exercises at the end of training.

So, according to most indicators, the best results were obtained in the time of a simple reaction to sound (t=2,22; p<0.05), the response time of choice (t=2,33; p<0,05), and the time of a simple reaction to light (t=2,22; p<0,05), work efficiency according to the Schulte test (t=3,02; p<0,05), the degree of workability according to the Schulte test (t=2,19; p<0,05), mental stickiness according to the Schulte test (t=2,14; p <0.05), attention concentration according to the Bourdon test (t=2,58; p <0,05), attention switching with the Bourdon test (t=2,21; p<0,05).

Table 3

Psychophysiological indicators of young boxers 15-16 years old of the control and experimental group at the end of the annual macrocycle (n1=n2=12) $\bar{x}\pm m$

№ i/o	Indicators	Control group	Experimental group	Reliability assessment	
				t	p
1	Rufier index, c.u.	7,01±0,24	6,94±0,23	0,21	>0,05
2	Romberg test, s	14,8±0,43	15,5±0,45	1,11	>0,05
3	Time of simple reaction to sound, s	0,31±0,03	0,23±0,02	2,22	<0,05
4	Selection response time, s	1,21±0,07	1,00±0,06	2,33	<0,05
5	Time of simple reaction to light, s	0,35±0,03	0,27±0,02	2,22	<0,05
6	Efficiency of work on the Schulte test, c.u.	67,5±1,32	62,1±1,21	3,02	<0,05
7	Schulte test level, c.u.	0,92±0,06	0,78±0,04	2,19	<0,05
8	Mental stability according to the Schulte test, c.u.	0,88±0,05	0,74±0,04	2,19	<0,05
9	Concentration of attention according to the Bourdon test, c.u.	252,5±5,46	271,6±5,01	2,58	<0,05
10	Switching attention with the Bourdon test, c.u.	32,0±1,08	28,7±1,02	2,21	<0,05
11	Tapping test, frequency of movements, (number of times)	4,78±0,16	5,06±0,17	1,22	>0,05

Thus, after the introduction of the experimental methodology for most of the psychophysiological indicators, the best results were obtained in young boxers, they used special training means at the end of training against the background of fatigue.

Conclusions / Discussion

The results obtained make it possible to expand the methodology of using special exercises for the development of speed-strength qualities in accordance with the specificity of the sport. The expediency of using exercises of a special speed-strength orientation in young boxers of 15-16 years old at the end of a training session against the background of fatigue was determined. This is confirmed by the results of the improvement of psychophysiological indicators, which are components of the motor activity of boxers (time of simple reaction to sound and light; Romberg's test, indicators of the Schulte test, concentration and switching of attention according to the Bourdon test).

Prospects for further research provide for determining the influence of this technique on the results of testing special motor qualities and their correlation dependence with psychophysiological qualities.

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INDICATORS OF PHYSICAL AND MILITARY-PROFESSIONAL READINESS OF THE CADETS OF THE AIR DEFENSE FACULTY OF THE GROUND FORCES OF THE KhNUVS NAMED AFTER I. KOZHEDUB

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Purpose: to determine the dynamics of indicators of physical and military-professional training of cadets of the Faculty of Air Defense of the Ground Forces KhNUVS named after I. Kozhedub.

Material and methods: theoretical analysis of scientific and methodical literature, pedagogical testing, methods of mathematical statistics.

Results: the dynamics of indicators of physical and military-professional training of cadets of the faculty of air defense of KhNUVS named after I. Kozhedub. During the experimental period, which lasted one (2019-2020) academic year, that was attended by third-year cadets of the Faculty of Air Defense of the Ground Forces (Ad of GF), there was an improvement in average test scores, which characterizes the speed of movement, endurance, speed and strength abilities. Increasing the level of physical fitness contributed to increasing the level of military training of cadets. Correlation analysis revealed the relationship between reliability in the actions of cadets in the training environment with the level of development of various aspects of physical fitness.

Conclusions: the dynamics of quantitative indicators of physical and military-professional training of cadets is obtained and the correlation analysis of data is carried out, which gives a basis for adjusting the educational process of cadets of the Ad of GF Faculty in the direction of improving physical training taking into account military-professional activity.

Keywords: cadets, physical fitness, military-professional training, indicators.

Introduction

Modern requirements, which are aimed at improving the training of specialists in various fields, fully apply to the training of military personnel for the Armed Forces of Ukraine (AFU). One of the main stages in the development of professional skills of future officers - specialists of the highest rank - is training in military institutions of higher education (MIHE). The cadet must not only qualitatively prepare for the military profession in special disciplines, but also provide him with a high level of physical readiness for combat, the transfer of significant physical exertion, mental stress in extreme situations [4, 13].

In difficult combat conditions, a serviceman must be required not only a high level of professional training in his military specialty, but also the ability to act as an independent "combat unit", skillfully maneuvering fire and movement. The success of these tasks directly depends on the ability of servicemen to own their weapons, to have a high level of development of military-applied skills, physical and moral and psychological qualities. However, today's experience of combat operations in the anti-terrorist operation zone and other local conflicts, the results of inspections of combat readiness of military units and units indicate a lack of physical training of personnel, and, above all, endurance, training in effective use of personal weapons, grenades, ability to overcome natural and artificial obstacles and perform other military-professional techniques and actions [1, 3, 5].

At the same time, solving the problem of effectively improving the combat effectiveness of servicemen by means and methods of physical training, set out earlier in the Manual on Physical Training (NFP-2014) is not always sufficient. There

is a need to develop special, science-based tools and methods of physical training to increase the combat effectiveness of servicemen in accordance with the specific requirements of their military-professional activities. The need for special (including physical) training of servicemen for hostilities is indicated by a number of authors [7, 15]. The experience of combat training and the results of scientific research indicate that an important and most effective means of solving the problems of special physical training of servicemen is the use of physical exercises and sports, which are most positively close in their impact on physical and professional actions of servicemen [1,4,7].

Significant, extreme physical and mental stresses, which have to withstand personnel in the process of modern hostilities, significantly reduce the combat effectiveness of servicemen. This is the most pronounced in the deterioration of fire performance and maneuvering on the battlefield, in reducing the speed and accuracy of action when using military equipment and weapons. The degree of reduction of combat capability of servicemen during combat missions is determined by the magnitude and nature of the load, special skills, level of physical fitness, physical development, health and other factors [9, 14]. The Armed Forces of NATO's leading nations are developing concepts of physical fitness aimed at the early development of personnel 'physical and psychological qualities and military-applied skills, which ensure the performance of combat missions in a variety of, including extreme conditions [8].

Soldiers with a high level of development of strength, endurance, speed, agility in combat prevail in various indicators of military-professional activity of servicemen, in which the level of these qualities is lower (Yu.A. Borodin, 2002; V.V. Payevsky, O.A. Shevchenko, 2004). Researchers Yu.S. Finogenov (2009) and S.V. Romanchuk (2012) argue that military-professional training (mastering a certain amount of military-applied, special skills) cannot be successful without sufficient development of physical qualities necessary for the ability to move quickly on the ground, overcome various obstacles, swim (including in uniform) with weapons, go skiing [10, 11, 12].

The purpose of the reseach is to determine the dynamics of indicators of physical and military-professional training of cadets of the Faculty of Air Defense of the Groung Forces of KhNUPS named after I. Kozhedub.

Material and methods

Pedagogical testing of indicators of physical and military-professional readiness of cadets of the Faculty of Air Defense of the Ground Forces during the 2019-2020 academic years was carried out, with the help of which the dynamics of these indicators was studied. Research methods: theoretical analysis of scientific and methodical literature, pedagogical testing, methods of mathematical statistics.

Results of the research

In the course of classes with cadets of the Faculty of Air Defense of the Ground Forces, methods of selective influence with the use of repeated and interval training methods, frontal and flow methods of performing exercises. Competitive method was used during relay races and mobile games.

The construction of classes did not differ from the conventional one. Each lesson consisted of preparatory, main and final parts. The principle of selection of exercises for the preparatory and final parts remained traditional. The sequence of the program basically corresponded to the program of physical training of cadets of the Faculty of Air Defense of the Ground Forces. The main difference was that 40% of the time of each lesson was devoted to educational issues, and 60% of the time was used to develop the physical qualities necessary for the military-professional activities of cadets of the Ad of GF Faculty. It should be emphasized that a significant amount of endurance work was performed in the process of mass sports and independent work. Since the time spent on the development of physical qualities, exercises have been used that mainly developed the muscles of the lower extremities - 50% of the time, the muscles of the torso - 30% and the muscles of the arms - 20% of the time.

In addition, the classes alternately used exercises to develop the extensor and flexor muscles of the torso. The muscles of the shoulder girdle were less involved. It is also worth considering the use of jumps of maximum intensity (jumping from

significant elevations of more than 2,5 m). It should also be noted the frequent use of special running exercises, especially at the initial stage, which allowed preparing the musculoskeletal system for the next maximum loads of jumping work. The application of the whole set of exercises allowed to focus on the predominant development of the most professionally important muscle groups, providing on the basis of their diverse development the necessary quality orientation, either in the direction of strength or in the direction of speed. During the experimental period, which lasted one (2019-2020) academic year, and which was attended by third-year cadets of the Faculty of Air Defense of the Ground Forces, there was an improvement in the average results of tests that characterizes the speed of movement, endurance, speed and strength abilities and the actual strength abilities (Table 1).

Table 1

Dynamics of indicators of physical fitness of cadets of the AD of GF Faculty at the beginning and end of the experimental period (n = 25)

№	Researched indicators	Beginning $\overline{X_1} \pm m_1$	End $\overline{X_2} \pm m_2$	t	p
1.	100 m run, s	14,2±0,5	13,6±0,6	0,83	>0,05
2.	General control exercise on the obstacle course, s	143,4±4,4	128,3±4,3	2,45	<0,05
3.	Jump up from a place, cm	49,2±1,9	56,3±1,5	3,00	<0,01
4.	Running for 3000 m, s	710,5±13,5	665,2±9,5	2,75	<0,05
5.	Pull-ups on the crossbar, number of times	13,2±1,2	18,7±1,1	3,37	<0,01

Of the five tests of physical fitness, in which a large number of muscle groups are involved in the work, significant changes ($p < 0,05$) in cadets occurred in four tests (general control exercise on the obstacle course, jumping up, running at 3000 m, pull-up on the crossbar). Thus, there were significant improvements in the results of those areas of improvement of physical fitness, which as a result of the experiment were identified as the main.

Improving the reliability of the actions of servicemen is based on increasing the level of physical performance in normal conditions. Table 2 shows the dynamics of

indicators of the level of military professional training of cadets of the AD of GF Faculty.

Table 2

Dynamics of indicators of the level of military professional training of cadets of the AD of GF Faculty at the beginning and end of the experimental period (n = 25)

№	Researched indicators	Beginning $\overline{X_1} \pm m_1$	End $\overline{X_2} \pm m_2$	t	p
1.	Landing in a combat vehicle (armored personnel carrier), s	27,7±0,5	26,3±0,4	2,19	<0,05
2.	Disembarkation from a combat vehicle (armored personnel carrier), s	14,7±0,3	13,8±0,3	2,12	<0,05
3.	Excavation and camouflage of trenches for military equipment (ZU-23), s	7817,0±54,6	7657,9±53,2	2,09	<0,05
4.	Rolling of ZU-23 by service forces at a distance of 100 m from the combat position with bringing to the combat position at a new firing position (medium-rough terrain), s	235,5±8,9	212,3±5,8	2,19	<0,05
5.	Charging of the combat vehicle "Arrow-10M" with four missiles, s	137,7±2,3	130,6±2,4	2,14	<0,05
6.	Discharge of the combat vehicle "Arrow-10M", s	135,9±1,0	133,9±1,0	1,41	>0,05
7.	Preparation for shooting from different positions (lying down, from a knee, standing, from behind shelter) at actions on foot, s	8,3±0,6	6,6±0,5	2,07	<0,05
8.	Discharge of the AK-74 store, s	19,2±1,4	15,3±1,3	2,07	<0,05
9.	Equipment store AK-74 cartridges, s	40,1±2,7	32,8±2,3	2,08	<0,05
10.	Shooting with a PM on a stationary target during the day (exercise №1), s	19,2±3,2	21,6±3,5	0,51	>0,05
11.	Throwing an F-1 grenade at a distance, m	35,5±2,1	36,6±1,8	0,42	>0,05
12.	Throwing an F-1 grenade from a place on accuracy, points	26,9±3,1	36,8±3,4	2,15	<0,05

Thus, out of twelve tests of military professional training, significant changes ($p<0,05$) in cadets occurred in nine tests (landing, disembarkation in a combat vehicle (armored personnel carrier), digging and camouflage of trenches for military equipment (ZU-23) , rolling of ZU-23 by service forces at a distance of 100 m from the combat position with bringing into combat position at a new firing position

(medium terrain), loading of the combat vehicle "Arrow-10M" with four missiles, preparation to firing from different positions (lying down, from a knee, standing, from behind shelter) at actions on foot, discharge, equipment of shop AK-74, throwing of the grenade F-1 from a place on accuracy.

Table 3

Correlation between special performance indicators and cadets' physical fitness indicators (n = 25)

№	Indicators of special working capacity	Physical fitness				
		Running on 100 m	Pull-ups on the crossbar	Jump up from the place	Running 3000 m	General control exercise on the obstacle course
1.	Landing in a combat vehicle (armored personnel carrier), s	0,54	0,38	-0,42	0,31	0,50
2.	Disembarkation from a combat vehicle (armored personnel carrier), s	0,61	0,40	0,50	0,43	0,59
3.	Excavation and camouflage of trenches for military equipment (ZU-23), s	0,58	0,41	0,26	0,23	0,24
4.	Rolling of ZU-23 by service forces at a distance of 100 m from the combat position with bringing to the combat position at a new firing position (average terrain), s	0,59	-0,18	0,39	0,35	0,53
5.	Charging of the combat vehicle "Arrow-10M" with four missiles, s	-0,63	0,49	0,49	-0,11	-0,39
6.	Discharge of the combat vehicle "Arrow-10M", s	-0,53	0,46	0,22	-0,37	-0,51
7.	Preparation for shooting from different positions (lying down, from a knee, standing, from behind shelter) at actions on foot, s	-0,47	-0,21	0,20	0,01	-0,30
8.	Discharge of the store, s	0,60	-0,31	-0,38	0,34	0,42
9.	Equipment store AK-74 cartridges, s	0,61	-0,38	-0,48	0,54	0,57
10.	Shooting with a PM on a stationary target during the day (exercise №1), points	-0,18	-0,36	-0,10	0,11	-0,38
11.	Throwing an F-1 grenade at a distance, m	0,21	-0,35	0,11	0,19	0,12
12.	Throwing an F-1 grenade from a place on accuracy, points	0,16	0,34	0,21	0,04	0,14

At the same time, positive dynamics took place in the indicators of discharge tests of the combat vehicle "Arrow-10M", firing from a PM on a stationary target during the day (exercise №1), throwing an F-1 grenade at a distance, however, the probability was not found ($p>0,05$). Thus, increasing the level of physical fitness

helped to increase the level of military training of cadets. As a result of correlation analysis (Table 3), the relationship between reliability in the actions of cadets in the training environment with the level of development of various aspects of physical fitness is revealed. The analysis of the correlation matrix allowed determining the factors of reliability of military-professional activity. Factors in this case are different aspects of the physical fitness of servicemen. Correlation analysis allowed determining the degree of significance of physical fitness in connection with the manifestation of qualities: strength in various manifestations, speed, endurance, ensuring reliability in the actions of AD of GF cadets.

The density of the relationship between reliability indicators in actions and tests that reflect the level of development of strength, speed and strength qualities, speed qualities, endurance, shows a high dependence of the level of combat capability on all aspects of physical fitness of cadets. However, there is a difference in the level of correlations, which allows us to talk about the importance of the development of certain motor skills to ensure reliability in the actions of cadets. The highest correlations are found in combat performance and 100 m running, as well as in high jumps, which reflect the level of development of speed and speed-power capabilities. In the results of the 100 m run, the level of four correlation coefficients from twelve at the level of 0,60 and above. In jumps up from a place also four correlation coefficients have sizes 0,42-0,50. Slightly lower correlations of the results in pull-ups on the crossbar, which reflect the actual strength capabilities, with some indicators of special performance, which are at the level of 0,40-0,49. Slightly higher correlation coefficients are observed between the indicators of reliability in special actions and the results of the general control exercise on the obstacle course, which characterizes the level of development of speed endurance, where five correlation coefficients - 0,5 and more. At the same time, there is a slightly lower relationship between combat performance and the results of the 3000 m run, which are at the level of 0,31-0,43 with a single factor of 0,54.

Analysis of the correlation matrix allows us to consider in detail the importance of the development of a quality for each of the groups of professional techniques and

actions. Thus, the mathematical analysis allowed identifying the most important aspects of physical fitness of cadets of the AD of GF Faculty.

The analysis of the correlation matrix allowed determining the system of physical fitness by the most professionally important physical qualities with their selection in the form of factors of reliability of military-professional activity. According to the level of correlation coefficients, we can say that the reliability of the actions of AD of GF cadets in extreme conditions has a specific qualitative basis, which determines the nature of the special direction of physical training. Thus, the generalization of the results of correlation analyzes shows that the factors of reliability of military-professional activity in the system of physical training of cadets are certain motor abilities (qualities), namely: the degree of development of speed, speed, strength and endurance. At the level of physical fitness of the studied contingent, there is a good relationship between the degree of development of individual physical qualities (on average, the correlation coefficients are at the level of 0,5-0,6).

The level of development of speed and strength qualities and endurance (on average correlation coefficients at the level of 0,5-0.65) acquires the greatest value for reliability of military-professional actions. In the system of strength and speed-strength training, the most professionally important is the ability to show high results in exercises with the development of high-speed cyclic type of muscle tension.

Conclusions / Discussion

From the first year of training in MIHE it is necessary to emphasize the use of exercises that develop the most professionally important muscle groups, which contributes to morpho-functional changes in the body under the influence of military-professional activities. During the experimental period, the cadets' physical fitness tests changed significantly ($p < 0,05$) for four out of five tests. Thus, there were significant improvements in the results of those areas of improvement of physical fitness, which as a result of the experiment were identified as the main.

Of the twelve military training tests, significant changes ($p<0,05$) occurred in the cadets in nine tests. At the same time, the positive dynamics occurred in the

indicators of discharge tests of the combat vehicle "Arrow-10M", firing from the PM at a stationary target during the day (exercise №1), throwing a grenade F-1 at a distance, however, the probability was not found ($p > 0,05$). Thus, increasing the level of physical fitness helped to increase the level of military training of cadets.

Prospects for further research in the study are in improving physical fitness through sports and moving games.

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CONSTRUCTION A COMPREHENSIVE HEALTH TRAINING PROGRAM FOR WOMEN IN THE FIRST PERIOD OF ADULTHOOD

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Purpose: to determine the effectiveness of constracting a comprehensive program of health training for women of the first period of adulthood.

Material and methods: the research lasted during the 2019-2020 academic year on the basis of the fitness club "Territory Fitness". According to the homogeneitic indicators, two groups of women of the first period of adulthood - control (CG) and experimental (EG) were formed, 13 people in each group. Modern research methods were used: theoretical analysis and synthesis of literary sources, pedagogical observation, pedagogical experiment, pedagogical testing, medical and biological methods, methods of mathematical statistics.

Results: in the process of conducting an experimental study, the program of health training was constructed. The program took into account the distribution of physical load depending on the tasks of each period, stage, meso and microcycle.

Conclusions: during the experiment, significant intergroup changes in the somatometric and functional indicators of women of the first period of adulthood were observe at $p<0,05$ and physical fitness at $p<0,05$, at $p<0,01$, at $p<0,001$. The increase in somatometric indicators and indicators of the functional state of the body

of women EG is 4,7%-17,3%. At the same time, in women with CG, the range of changes in these indicators ranges from 0,4% to 12,2%. In terms of physical preparedness, there is also a more significant their increase in women with EG, and the range is from 14% to 45,8%. In women with CG, the increase in physical preparedness is in the range of 7%-24%.

Keywords: health training, women of the first period of adulthood.

Introduction

According to the information of Mass Media nowadays in Ukraine, we can observe the negative tendency of changing of people's life expectancy and state of health indexes. Demography is getting worse and this leads to the decline of economic and social component of social existence [6, 10].

Therefore, one of the priorities, which we need to identify today is creating conditions raising the level of health and wellbeing of state's population.

According to the definition of WHO health is a state of full physical, spiritual and social wellbeing, and not only a lack of illnesses and physical defects [3].

In 2006, the decree of the President of Ukraine stated the national strategy of health physical activity in Ukraine for the period until 2025 «Physical activity – healthy lifestyle – healthy nation». The main aim of the strategy is raising the level of involvement of different layers of society into health physical activity, which will help to solve economic, social and humanitarian problems in future of not only one person, but society as a whole [4, 13].

It has scientifically proved that human physical activity of the first period of adult age is a guarantee of health for the whole life. So involving people into a healthy lifestyle affects the improving of the quality of life, provides harmonic development and is one of the efficient factors of disease prevention [2, 16].

O. V. Andreeva (2014); V. M. Zaviyska (2015) suggest to pay much attention to keeping and improvement of women's health of the first period of adult age because due to them we can fight the demographic crisis. This age for the woman is the best for healthy reproduction [1, 5].

With the birth of a child and care for it during the first years women's hormonal environment changes, different physical activity reduces, physical, psychological and emotional tiredness grows, which leads to reduction of health indexes. In this case, T. O. Sinitsia (2015 p) admits that the dynamics of women's health indexes deterioration of the first period of adult age has reverse functional nature and to reduce such negative consequences we can do by optimization of physical activity at fitness classes.

O. Ya. Kibalnik, O. A. Tomenko (2010); O. V. Andreeva (2014); V. Kashuba, N. Goncharova, M. Dudko, O. Martinuk (2016) also stress that fitness classes have a positive dynamics on improving women's physical state of the first period of adult life.

Regarding to the development of health-training programs, it should be mentioned that the application of an integrated approach in their construction allows to solve several health problems. However, the formation of such programs should proceed based on a deep understanding of those physiological changes that occur in the human body under the influence of specific means [1].

The analysis of scientific and methodological literature proved the presence of a sufficient number of studies that address the issues of determining the effectiveness of classes with the women of the first period of adult age by a certain methodology. Much less attention is paid to the use of integrated health-training programs with such segment.

Thus, today there is a demand to expand the theoretical and methodological foundation, which would allow women to choose effective integrated health programs, and fitness trainers to combine the necessary techniques effectively, to apply certain tools and determine their dosing in solving pedagogical problems in health training with the examined segment.

Purpose of the study is to determine the effectiveness of building an integrated program of health training for women of the first period of adult age.

Material and methods

The research lasted during the 2019-2020 academic year on the basis of the fitness club "Territory Fitness". According to the homogeneitic indexes, there were formed two groups of women of the first period of adult age - control (CG) and experimental (EG), 13 people each. We used modern research methods: theoretical analysis and synthesis of literary sources, pedagogical observation, pedagogical experiment, pedagogical testing, medical and biological methods, methods of mathematical statistics.

Connection of research with scientific or practical tasks, plans, programs. The scientific work was performed according to the proactive scientific topic of the Department of Gymnastics, Dance Sports and Choreography: "Theoretical and methodological principles of development of system-forming components of physical culture (sports, fitness and recreation) for 2020-2025), state registration number 0120U101215".

Results of the research

At the first stage of construction of the integrated program of improving training, we defined somatometric indexes, indexes of a functional state and working capacity of a women's body, indexes of their physical fitness.

Taking into account the recommendations of specialists in health training [8, 11, 15, 17], the results of control of the studied indexes and the experience of practical work, we have determined the parameters of health training.

To achieve this goal, we have combined the tools of the following programs: stretching, Tabata protocol, MGF, TRX, gliding, aerobics, fitnessball, aerobic strength classes. The means of training were divided as follows: by anatomic feature (i.e which muscle group will be the main one involved in the work); by nature - static and dynamic; using objects and equipment (dumbbells, bodybars, fitballs, step platforms, etc.) [7].

In the construction of health training we used: a) general theoretical methods aimed at mastering knowledge; b) practical methods that involve mastering physical skills, abilities and development of physical performance [7, 12].

In the process of training we used the following types of control: a) operative, which involves the assessment of operative conditions - urgent reactions of the body to the physical activity (immediately after training, or directly during the exercise); b) ongoing, aimed at assessing the current state of women (during small training cycles); c) stage, which allows to summarize the training results for a certain time (stage, period) [2, 9].

Developing a lesson plan during the annual cycle of health training, we referred to the approach of the authors S.V. Sinitsa, L.E. Shesterova, 2010, who identify two cycle models of health training in the annual cycle and divide the whole year into autumn-winter and spring-summer stages [12]. So, we divided the workouts into two stages. In each stage, according to T.Yu. Krutsevich, 2003, we have identified three periods: preparatory, basic and supporting [7]. In each period, we have identified the middle cycles of health training - mesocycles: involving, gaining physical shape, keeping physical shape and active relaxation. In different mesocycles, we set the tasks and planned the focus of training.

Each mesocycle consisted of small cycles - microcycles that lasted 7 days. During the microcycle there were 3 cardio aerobics and strength training that lasted 60 minutes each and had an intensity of 50-75% of the IPC. The other four days were scheduled to rest. Such training planning allows the body to recover after the exercise and due to adaptation reach a new level of functioning [2, 14].

Adaptation process is functional structural reorganizations of a body, which increases its working capacity and allows to function under certain conditions. With systematic training this mechanisms is improved. All these changes operate at different levels of body structure: within the cell (increases the rate of internal reactions, the speed and ability to utilize the breakdown products, the resistance of the cell to the acidic environment); within the organ of a body (increases the efficiency of its work); within the system (improves the work of the cardio-respiratory, hormone, muscular systems, etc.); within the body as a whole (the amount of work that the body can perform increases) [8, 18].

The percentage of means of health training at the autumn-winter stage of the retracting mesocycle was: 30% - stretching and recovery exercises (stretching, MGF); 35% - exercises for the improving of the cardio-respiratory system (types of running, jumping, elements of aerobics, etc.), 35% - strength exercises (own weight, fitball, bodybars). This percentage was chosen because this stage was specified to gradually prepare the body of the women of the first period of adult age for the main exercise.

At the stage of gaining physical shape the percentage of means was: 25% - stretching and recovery exercises (stretching in the preparatory and final part of training); 35% - exercises for the development of the cardio-respiratory system (intensive exercises to bring the heart rate to the target index (step aerobics, dance aerobics); 40% - strength exercises (with weights, with own weight (gliding, TRH, dumbbells, bodybars).

At the stage of gaining physical shape, the percentage was: 20% - stretching and recovery exercises (stretching exercises, MFF); 40% - exercises for the improvement of the cardio-respiratory system - (on the step platform, jumps and other varieties); 40% - strength exercises - with weights, with fighting the resistance, from related areas of fitness (TRH, gliding, football, Tabata protocol).

During the period of active relaxation from the end of December to the middle of January, classes in the fitness club rotated with recreational facilities and were aimed at recovery of women’s body. The percentage of means was 15% - stretching and recovery exercises (stretching and MGF); 60% - exercises for the improvement of the cardio-respiratory system - used fitness and recreation (hiking, skating, etc.); 25% - strength exercises with weights and exercises with fitness ball.

The percentage of means of health training at the spring-summer stage of the retracting mesocycle was 25% - stretching and recovery exercises (stretching); 40% - exercises for the improvement of the cardio-respiratory system (types of running, jumping, elements of basic aerobics, etc.), 35% - strength exercises (own weight, gliding, fitness ball, Tabata protocol). This percentage was suggested because that stage was specified for the gradual adaptation of women's bodies to the exercise.

At the stage of gaining physical shape the percentage of means was: 15% - stretching and recovery exercises (stretching in the preparatory and final part of training); 40% - exercises for the improvement of the cardio-respiratory system (intensive exercises of dance and step aerobics, running to bring the heart rate to the target index); 45% - strength exercises (with weights, with own weight, with fitness ball, gliding, Tabata protocol, TRH). The chosen percentage was calculated to gain muscle form and a more "athletic body shape".

At the stage of keeping physical shape in the first mesocycle, the percentage of means was 20% - stretching and recovery exercises (stretching, Pilates and MGF); 45% - exercises for the improvement of the cardio-respiratory system (jumping rope and related areas of fitness); 35% - strength exercises (with dumbbells, bodybars, with your own weight, with fitness ball, gliding).

At the stage of keeping physical shape in the second mesocycle, the percentage of means was: 15% - stretching and recovery exercises (stretching, Pilates and MGF); 50% - exercises for the development of the cardio-respiratory system (intensive aerobics exercises, running to remove and keep the heart rate in the target index); 35% - strength exercises (with weights, with own weight, TRX, Tabata protocol). The chosen percentage of I and II mesocycles of physical fitness was calculated to reduce the layer of adipose tissue.

In the mesocycle the active rest classes in the fitness club rotated with recreational facilities.

The main characteristics of the change in the percentage of fitness equipment during the annual cycle of health training was the natural reaction of the body on stress, the speed of adaptation process and the formation of the physical shape.

The effectiveness evaluation of suggested organizational and methodological conditions for building an integrated program of health training and the measures of the impact on the study indexes of the women of the first period of adult age were conducted after the control testing and analysis of initial and control data. The results of the comparative analysis of indexes are presented in table 1 and 2.

Table 1

The comparison of somatometric and functional parameters of women of the first period of adult age in CG and EG during the pedagogical experiment, (n=26)

Indexes		Control (n=13)		Experimental (n=13)		t	P
		$\bar{X}$±m	Growth, %	$\bar{X}$±m	Growth, %		
Age		25,08±0,4	-	25,46±0,43	-	-	>0,05
Body length, sm		166,62±1,53	-	164,62±1,05	-	-	>0,05
Weight, kg	I	63,62±1,76	1,4	64,92±1,51	5,5	0,8	>0,05
	C	62,7±1,58		61,38±1,07			
GC, sm	I	89,77±6,19	2,2	92,15±1,32	7,9	1,76	>0,05
	C	87,77±1,43		84,85±1,32***			
GW, sm	I	72,54±1,57	0,4	75,69±1,6	10,6	2,48	**<0,05**
	C	72,85±2,6		67,69±1,98***			
GH, sm	I	97,77±1,49	3,5	95,92±0,9	6,2	2,78	**<0,05**
	C	94,38±1,54		90±0,94***			
GSh, sm	I	30,69±0,31	1,0	31,31±1,48	4,7	0,78	>0,05
	C	30,38±0,29		29,85±0,19			
Ortostatic test, bpm.	I	19,77±0,99	12,2	17,77±0,96	17,3	2,15	**<0,05**
	C	17,35±1,1		14,7±1,05*			
IHST, c.u.	I	63,93±0,56	7,5	63,84±0,1	12	2,26	**<0,05**
	C	69,1±1,09**		72,6±1,3***			

Remark: B - initial data; K - control data; asterisks marked significant changes inside the group: * - accuracy of changes at p <0,05; ** - accuracy of changes at p <0,01; *** - accuracy of changes at p <0,001

When comparing the somatometric parameters inside the group of CG women, their positive dynamics is noticeable, but no significant changes occurred at p <0,05. In EG women, there is also a positive dynamics of improvement of the study indexes, however, in contrast to the CG indexes in the EG, the indexes of GC, GW and GH changed significantly at p <0,001 (Table 1).

During the pedagogical experiment there is a positive dynamics of changes of indexes of the functional state and efficiency of the body of women of the CG and EG inside the group. However, it should be mentioned that the women of the CG had a significant change in the results at p <0,01 in the IHST test, and the women of the EG had a significant change in the results at p <0,001 in the IHST test and at p<0,05 in the Orthostatic test (Table 1).

When comparing the indexes of the women of the CG and the EG inside the group on reliability of changes, we should mention that at p<0,05 somatometric indexes significantly changed GW (t=2,48) and GH (t=2,78) and indexes of functional status and performance: Orthostatic test (t=2,48) and IST (t=2,26) (Table 1). Other indexes remained unchanged.

Table 2

Comparison of indexes of physical fitness of women of the first period of adult age in CG and EG during pedagogical experiment, (n = 26)

Тести		Control (n=13)		Experimental (n=13)		t	P
		$\bar{X}$±m	Growth, %	$\bar{X}$±m	Growth, %		
Hand dynamometry, kg	right	22,85±0,7	7,5	23,62±0,7	14	2,38	**<0,05**
	right	24,7±0,88		27,5±0,5***			
	left	21,23±0,8	7	22,31±0,6	14,5	2,38	**<0,05**
	left	22,85±0,8		26,1±0,5***			
Strength index, %	I	36,25±1,4	9,1	37,1±1,36	18,5	3,46	**<0,01**
	C	39,8±1,6		45,5±1,1***			
Kuper's Test , km	I	2,3±0,08	8,3	2,38±0,07	15,6	0,85	>0,05
	C	2,51±0,06		2,82±0,07			
Romberg's test, s	I	7,15±0,45	14	7,76±0,44	18	1,24	>0,05
	C	8,3±0,43		9,46±0,43			
Bunch press (15kg), times	I	8,23±0,56	22	7,92±0,51	45,8	3,83	**<0,01**
	C	10,54±0,5*		14,6±0,6***			
Sit-ups with the bar (10kg), times	I	9,77±0,71	22	10±0,58	43	4,2	**<0,01**
	C	12,54±0,7*		17,5±0,7***			
Lifting the torso from a laying position	I	14,15±0,7	24	14,54±0,5	43,2	6,24	**<0,001**
	C	18,6±0,8**		25,7±0,5***			
Flexing and extension of the arms at leaning on the knees	I	9±0,64	22	9,85±0,48	43,7	5,3	**<0,001**
	C	11,46±0,7		17,5±0,6***			
Plank, s	I	39,85±2,7	10	43,54±2,05	21,3	4,78	**<0,001**
	C	44,31±2,9		55,3±2,4***			
Leaning the torso forward from a sitting position	I	8±0,45	16	8,38±0,54	37,5	3,83	**<0,01**
	C	9,54±0,46		13,4±0,6***			

Remark: B - initial data; K - control data; asterisks marked significant changes inside the group: * - accuracy of changes at p <0,05; ** - accuracy of changes at p <0,01; *** - accuracy of changes at p <0,001

Analysing the data in table. 2 we can say that in the CG during the pedagogical experiment we can observe a positive dynamics of changes in physical fitness. The significant changes inside the group at p<0,05 were observed in physical strength in

the tests bench press 15 kg and sit-ups with bar 10 kg and at p<0,01 in the test lifting the torso from a laying position.

Indexes of physical fitness inside the group in the EG have changed more significantly. Accurate changes were observed in the strength indexes at p <0,001 in the hand dynamometry test (right, left) in terms of strength endurance in the following tests: bench press 15 kg, sit-ups with a bar 10 kg, lifting the torso from a laying position, flexing and extension of the arms leaning on the knees, plank; in the indicator of relative strength in the strength index, the indicator of flexibility in the test of leaning the torso forward from a sitting position.

During the pedagogical experiment there were significant changes inside the group in the studied indexes of the women of the first period of adult age of the CG and EG. At p <0,05, the strength indexes in the dynamometry test of the right (t=2,38) and left hand (t=2,38) changed credibly. At p<0,01 there were significant changes in the strength index (t=3,46), strength endurance in the tests: bunch press 15kg (t=3,83), sit-ups with a barbell 10 kg on the shoulders (t=4,2); index of joint mobility in the test, leaning the torso forward from a sitting position (t=3,83) At p<0,001, changes in the strength stamina in the tests are significant: lifting the torso to a sitting position from a laying position (t=6,24), flexion and extension of the arm leaning on the knees (t=5,3), plank (t=4,78).

Conclusions / Discussion

The health-improving effect of physical exercises is observed only when they are rationally balanced and focused with a certain intensity and loading according to the individual capabilities of the people involved. The same is stated in the works of A.S. Kuptsova, T.B. Kukobi, V.P. Shulpina, T.O Sinitsa.

The theoretical principles also have an impact on the final result in the construction of various programs. In determining the basic principles of health training, our idea is similar to the opinion of the well-known experts in the health training: T.S. Lysytska, L.V. Sydneva, S.V. Tit, L.E. Shesterova.

During the pedagogical experiment the positive dynamics of changes in the studied indexes of the CG and EG of the women of the first period of adult age which

shows the effectiveness of the impact of health training. However, the presented distribution of loading and its planning in medium and small cycles during the annual cycle of health training with women of the first period of adult age according to the experimental program has a more significant impact on women's bodies.

During the pedagogical experiment, the increase in somatometric and the functional state of the body of women EG indexes is 4.7% - 17.3%. At the same time, the range of these indexes of the women within the CG varies from 0.4% to 12.2%. In terms of physical fitness, there is also a more significant increase in indexes of the women within the EG, and the range is from 14% to 45.8%. The increase in physical fitness of the women within the CG varies from 7% to 24%.

Thus, a comprehensive health-training program has proven its effectiveness and can be offered for using in the health training for women of the first period of adult age.

In the future, further research. It is planned to determine the impact of an integrated program of health training on the bodies of women of the second period of adult age.

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EVALUATION METHODS OF COMPETITIVE ACTIVITY OF WRESTLERS WITH THE USE OF COMPUTER TECHNOLOGIES

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Purpose of the study is to theoretically substantiate, develop and experimentally test evaluation methods of competitive activity of combat athletes using computer technologies.

Material and methods: theoretical analysis and systematization of scientific sources on the state of the research problem, generalization of modern practical experience, instrumental research method, computer programming method, methods of mathematical statistics. To carry out a research in this area Department of Martial Arts with the support of specialists of the Department of Informatics and Biomechanics developed a specialized computer program that allows to optimize the process of evaluation and analysis of competitive activity of wrestlers.

Results: based on the analysis of scientific and methodological information, Internet sources and generalization of best practices, it was found that the most effective means of assessing competitive activity is video computer analysis. Also, the main parameters of competitive activity evaluation were determined. Viewing video clips of combat situations at competitions allows to identify a particular action, conditions and evaluation of its implementation more accurately. On the basis of data

analysis of scientific and methodical literature and generalization of practical experience, concerning problems of an estimation and the analysis of competitive activity, the computer program "Martial Arts Video Analysis" is created. The use of the proposed computer program allows to optimize the process of analysis of competitive activities of wrestlers. The information obtained through this program will allow to form various models of competitive activity and develop guidelines for improving the quality of the training process.

Conclusions: based on the analysis of scientific and methodological literature, practical experience the most significant parameters for evaluating the competitive activity of wrestlers were identified, methods with the use of computer technology that will optimize the process of evaluation and analysis of competitive activities of wrestlers was developed and tested.

Key words: martial arts, competitive activity, video computer analysis, methods, parameters, computer programming.

Introduction

The study of various aspects of preparedness of leading wrestlers allows to form the most popular areas for improving the process of training athletes who begin to participate in competitions of different levels [1, 3, 4, 5].

Specialists who conduct researches in this field, study the parameters that reflect, in their opinion, features of competitive activity of wrestlers. Thus, Brazilian researchers studied the relationship between attack duration, sex and weight category of athletes [16]. Korean scientists have considered aspects of the performance of poomsae (formal exercises) in taekwondo, which affect the judges' decisions, namely the transfer of body weight, the height and angle of kicks, the length of stances [18]. Spanish scientists have analyzed the attacking actions depending on the round and the characteristics of the fight in taekwondo [14]. Turkish researchers [12], based on the analysis of the 12th World Wrestling Championship among universities, identified the main indicators of the technique of qualified wrestlers. Scientists from Poland [11] studied the impact of changes in taekwondo sports regulations on the

composition of technical actions used by athletes. Boxing specialists, based on the analysis of video recordings of fights, received various characteristics of competitive wrestling, namely: coefficients of attack, defense, coefficients of combat [6].

In our opinion, the most effective means of assessing competitive activity is video computer analysis. Viewing video clips of combat situations at competitions allows to identify a particular action, conditions and evaluation of its implementation more accurately. The development of a convenient, effective method of evaluating and analyzing the competitive activity of wrestlers at the present stage of development of martial arts and new opportunities for computer technology is relevant.

Connection of work with scientific programs, plans and themes. The study was conducted in accordance with the research topics of the Kharkiv State Academy of Physical Culture: "Psychosensory regulation of motor activity of athletes of situational sports" (state registration number 0116U008943), "Scientific and methodological foundations of information technology in training specialists in physical culture and sports" (state registration number 0113U001207).

Purpose of the study is to theoretically substantiate, develop and experimentally test evaluation methods for the competitive activity of wrestlers using computer technology.

Material and methods

The following methods were used to solve the research problems: analysis of scientific and methodological information, Internet sources and generalization of leading practical experience, instrumental research method, computer programming method, methods of mathematical statistics.

To carry out a research in this area the Department of Martial Arts with the support of specialists of the Department of Informatics and Biomechanics developed a specialized computer program that allows to optimize the process of evaluation and analysis of competitive activity of wrestlers.

Results of the research

Based on the analysis of scientific and methodological information, Internet sources and generalization of best practices, it was found that to assess the competitive activity using various methods, the most popular of which is video computer analysis.

Also, the most significant parameters for evaluating competitive activities are identified, which include: the number of actions, the number of points that are an assessment of the action, the effectiveness of the action, the variety of actions performed and more.

Based on the conclusions that were noted earlier, on the issues of evaluation and analysis of competitive activities, a computer program "Martial Arts Video Analysis" was created.

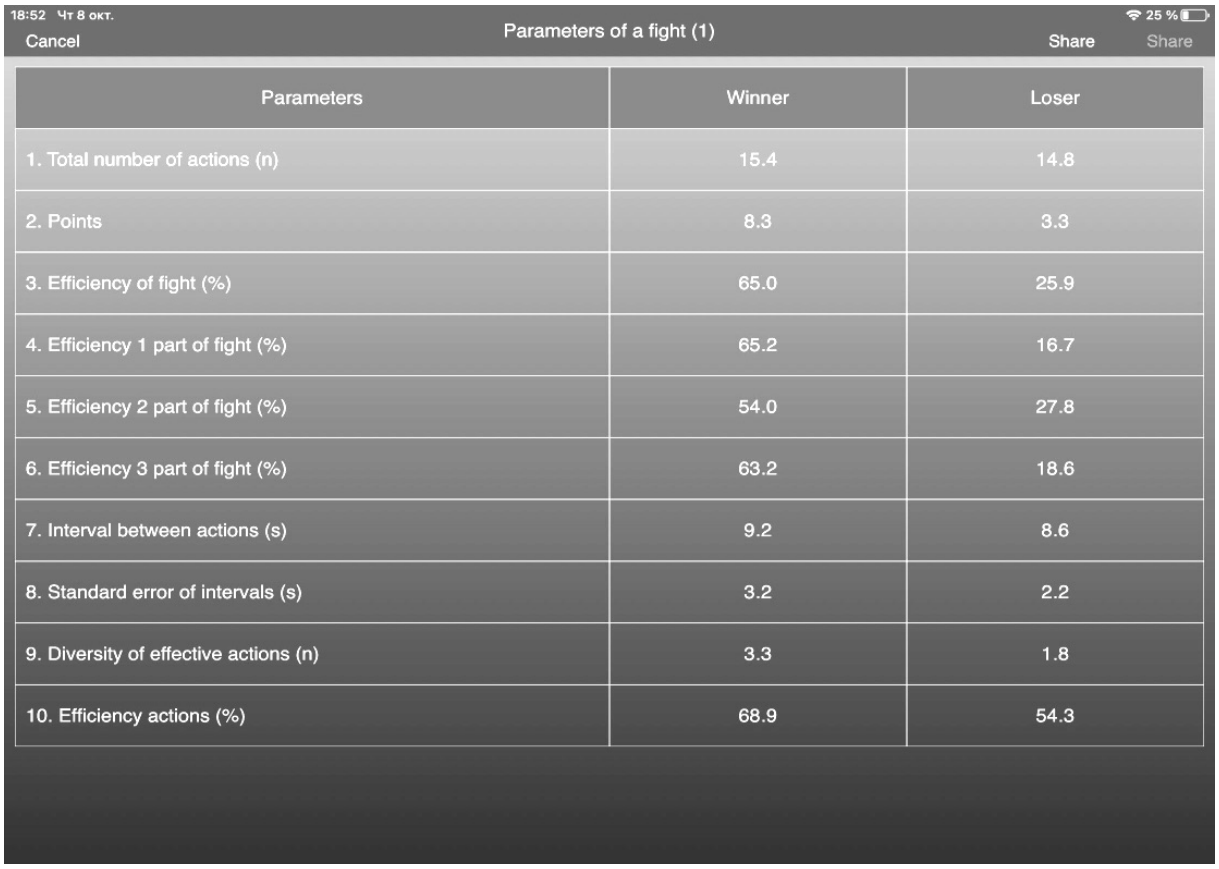
The algorithm of the computer program is developed in such a way that allows to capture the necessary moments of the competitive situation and evaluate them very quickly. The main feature of the program is that the parameters of evaluation of actions performed are created by the specialist, which allows to expand the scope of its use in various types of martial arts.

While watching the video of the competition, the researcher has the opportunity to stop for the required period of time and evaluate the athlete's performance. The computer program records the time, the name of the competitive action and the score on which it was performed. Frame-by-frame viewing of the video, which is provided in the program, allows to create the timing of all important actions in the opinion of the researcher more accurately.

In the process of creating a project of a competitive fight, the specialist has the opportunity to review the already recorded values and, if necessary, change them. If, after saving the project, there is a need to edit it, the program allows to change the data on athletes, change action ratings, add or delete individual actions.

After creating a project, the program allows to get a variety of reports, both for a single bout and a series of fights. Also, it is possible to get a report for the match, which consists of several rounds.

Report №1 presents general characteristics of a bout or series of fights: the total number of actions performed (n), the number of points received (points), the effectiveness of the whole fight (the ratio of effective actions to their total number,%), efficiency in different parts of the fight (%), the average value of the intervals between actions (c), the number of different actions that were evaluated with points (n) and their effectiveness (%) (Fig. 1).



Parameters	Winner	Loser
1. Total number of actions (n)	15.4	14.8
2. Points	8.3	3.3
3. Efficiency of fight (%)	65.0	25.9
4. Efficiency 1 part of fight (%)	65.2	16.7
5. Efficiency 2 part of fight (%)	54.0	27.8
6. Efficiency 3 part of fight (%)	63.2	18.6
7. Interval between actions (s)	9.2	8.6
8. Standard error of intervals (s)	3.2	2.2
9. Diversity of effective actions (n)	3.3	1.8
10. Efficiency actions (%)	68.9	54.3

Fig. 1. Characteristics of competitive activity (report №1)

Report №2 presents characteristics of the bout or series of fights: a list of competitive actions that were effective, the total number of actions performed (average per battle, n), the number of points received (average per battle, score), the effectiveness of actions (ratio of effective actions to their total number,%).

Report №3 is devoted to the analysis of competitive actions in a bout, which consists of several rounds. This report shows, for each round separately, the total number of competitive actions, the number of points obtained and the effectiveness of

these actions. When choosing a round, the researcher has the opportunity to view the timing of all actions or one of their choice (Fig. 2).

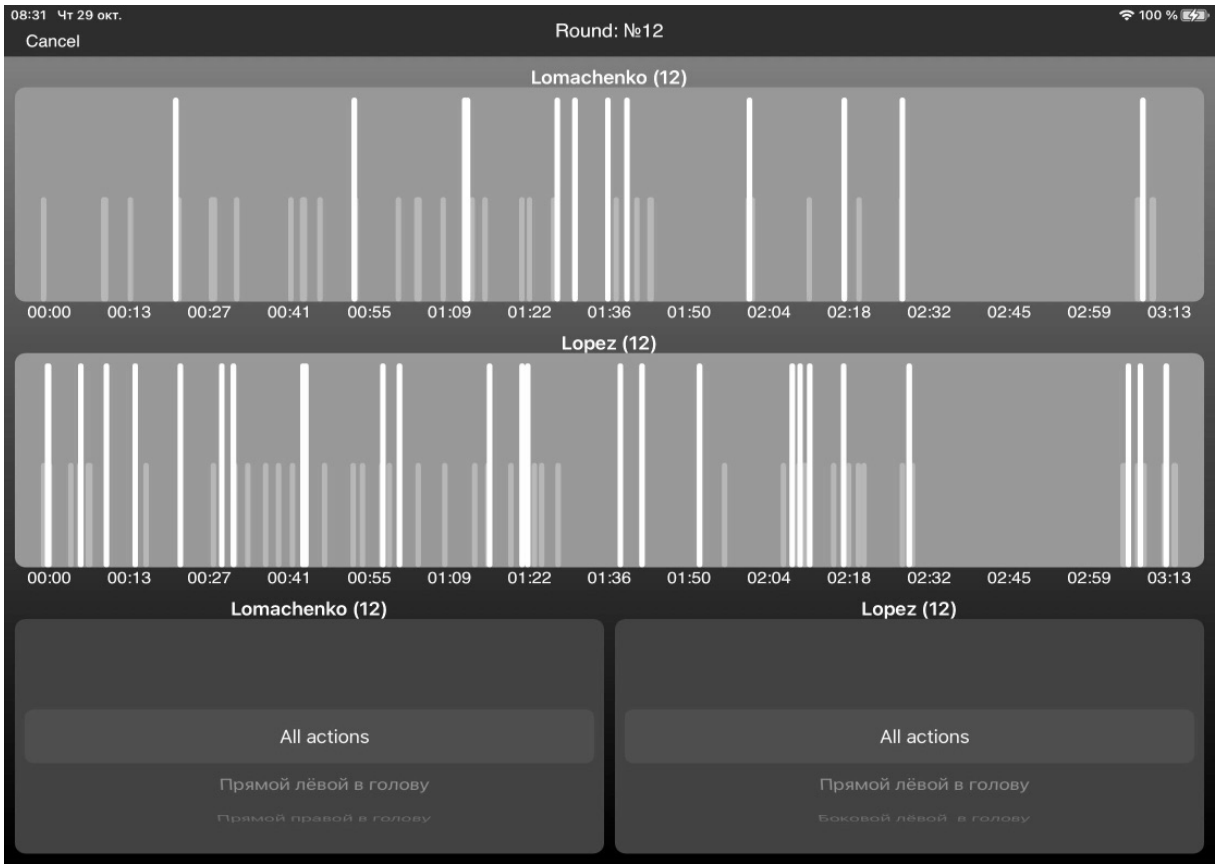


Fig. 2. Timing of competitive actions in the bout (report №3)

The computer program "Martial Arts Video Analysis" provides many opportunities to use the projects of competitive fights that have been created, namely: saving projects in the program itself or in a place specified by the user, the ability to forward projects to other devices and their further adjustment (if there is a corresponding video in the device).

Conclusions / Discussion

Researches of specialists Ashanin, V.S., Romanenko, V.V. (2015), Podrigalo, O., Borisova, O., Podrigalo, L., Iermakov S., Romanenko, V., Podavalenko, O., Volodchenko, O. (2019), Romanenko, V., Podrigalo, L., Cynarski, W., Rovnaya, O., Korobeynikova, L., Goloha, V., Robak, I. (2020) confirm the necessity and convenience of using computer technologies in the analysis of various aspects of training of wrestlers.

The study by González, D.E.L. (2013) claim that based on video-computer analysis of the competitive activities of skilled wrestlers, it is possible to determine the variety of actions, effectiveness of attack and defense, coefficients of work in the parterre, coefficients of tactical proactivity, average effective distances. Based on the study of these parameters, the researcher has the opportunity to create different models of competitive activities of wrestlers.

Specialists like Ostyanov, V.N., Hryb, A.I., Kopachko, O.V. (2010) in this kind of martial arts, such as boxing, argue that counting the number of strikes, different types of defense, as well as their effectiveness, you can identify some features of the individual manner of fighting. The number of such actions determines what form of combat is characteristic of a particular athlete. If attacking strikes prevail, respectively, the boxer is more prone to attacking form.

Analysis of the study results of the competitive activity of Greco-Roman wrestlers by Tropin, Y.M., Korobeynikov, G.V., Shatsky, V.V., Korobeynikov, L.G., Vorontsov, A.V. (2019) allowed to create model characteristics of technical and tactical training of wrestlers depending on their weight categories. Models presented by the experts can be used in solving problems of planning and management in the training process of wrestlers.

According to Romanenko V.V., Golokha V.L., Veretelnikova N.A. (2018), Romanenko V.V., Veretelnikova (2019) the use of video computer analysis in the assessment of competitive activities allows to determine the most important areas of technical and tactical training of wrestlers and the development of their functionality.

Approbation of the computer program "Martial Arts Video Analysis" was carried out by specialists from the Department of Martial Arts of KhDAFK. More than 50 bouts in such types of martial arts as taekwondo, wrestling (Greco-Roman, freestyle), boxing were analyzed. As an example, we provide several models of competitive activities that have been created in this program.

The first two models of competitive activity (Tables 1, 2) were developed from the review of the World Taekwondo Championship 2019 (a series of bouts n=10, medium weight categories).

According to the analysis of the obtained results, the athletes who won perform on average 1.4 actions more per match than those who lost (17,3±3,13; 15,9±2,43), the winners receive an average of 6, 7 points more (Table 1).

Table 1

Model characteristics of competitive fights of qualified taekwondo fighters (model №1)

№ п/п	Parametrs	Winner	SEM*(W)	Loser	SEM*(L)
1	Total number of actions (n)	17,3	3,13	15,9	2,43
2	Points	10	1,49	3,3	0,9
3	Efficiency of the fight (%)	37,3	6,32	16,6	5,95
4	Efficiency of the first part (%)	33,1	7,13	13,3	5,72
5	Efficiency of the second part (%)	38,5	13,19	23,5	11,9
6	Efficiency of the third part (%)	32,1	8,88	15,5	8,43
7	Interval between actions (s)	9,5	2,06	8,9	0,63
8	Diversity of effective actions (n)	3,3	0,56	1,6	0,32
9	Efficiency actions (%)	77,0	9,43	73,0	10,73

** SEM - standard error of the mean*

The efficiency of competitive actions of the winners is 20.7% higher than that of the losers (37,3±6,32%, 16,6±5,95%). The variety of actions that allow you to get points, the winners average 3,3±0,56 action per bout with their effectiveness of 77,0±9,43%, those who lost 1,6±0,32 action per fight with their efficiency is 73,0±10,7%.

Also, it should be noted the large values of SEM (standard error of the mean). For the reliability of the conclusions on the analysis of competitive activities of wrestlers a larger number of studied fights is needed.

Also, it is interesting to determine which competitive actions ensure victory (Table 2).

Thus, according to the analysis of the results (Table 2), most often the winners perform a "Yop chagi" kick, the one that is closer to the opponent (n=4,14), the efficiency of which is 13.8% and receive for its performance 1,14 points and "Ap

joomuk chirugi" hand strike, the one that is farther from the opponent (n=3,43), the efficiency of which is 54.2% and get 1.86 points for its performance. Some strikes for this series of fights (Pandae Dollyo chagi, Toro Yop chagi, Yop chagi jumping kick, Ap joomuk chirugi, front kick) are highly effective (100%), this is due to the fact that these actions are quite difficult in technical performance and are rarely used but the probability of winning points is high.

Table 2

Model characteristics of competitive fights of qualified taekwondo fighters (model №2)

№	Actions (points & n > 0	Total number	Efficiency of actions (%)	Points
1	Dollyo chagi, that is closer to the opponent	1,71	16,7	0,57
2	Dollyo chagi, that is farther from the opponent	1,29	33,3	0,86
3	Dollyo chagi, turning kick	0,43	66,7	0,86
4	Pandae Dollyo chagi	0,14	100	0,43
5	Twid chagi	0,43	33,3	0,29
6	Toro Yop chagi	0,43	100	0,86
7	Toro Yop chagi jumping kick	0,43	66,7	0,57
8	Yop chagi jumping kick	0,14	100	0,29
9	Yop chagi, that is closer to the opponent	4,14	13,8	1,14
10	Yop chagi, that is closer to the opponent, front kick	0,43	66,7	0,57
11	Ap chagi	0,57	25	0,29
12	Ap joomuk chirugi jumping kick	0,14	100	0,29
13	Ap joomuk chirugi, that is closer, front kick	0,57	75	0,43
14	Ap joomuk chirugi, that is farther, front kick	0,29	100	0,29
15	Ap joomuk chirugi, that is closer	1,14	50	0,57
16	Ap joomuk chirugi, that is farther	3,43	54,2	1,86

The second model was developed on the basis of the revision of the Ukrainian Freestyle Wrestling Championship 2020 (a series of fights n=30, middle age categories) (Table 3).

According to the analysis of the obtained results, the athletes who won on average perform 2.1 times more actions per match than those who lost (n=7,9; n=5,8) and receive 7,6±0,48 winning points, those who lost 1,4±0,36 points. The effectiveness of the winners' competitive actions is higher than that of the losers (per bout: 53,7±3,72%, by 11,4±2,5%). Also, it was noted that in all parts of the bout the winners have more effective technique (1 part of the duel – 53,5±5,74% by

17,7±5,21%, 2nd part – 37,6±6,97% by 2,2±1,52%, part 3–34,3±5,96% at 6,9±2,65%). The interval between competitive actions for the winners was 40,6±4,36 s, for those who lost 8,8 s more (49,4±6,0 s). The variety of actions that allow to get points, the winners average 2,6±0,17 action per bout with their effectiveness 92,4%, those who lost 0,8±0,17 action per bout with their effectiveness 40,8±8,35% (Table 3).

Table 3

Model characteristics of competitive fights of qualified wrestlers

№ п/п	Parametrs	Winner	SEM*(W)	Loser	SEM*(L)
1	Total number of actions (n)	7,9	0,53	5,8	0,59
2	Points	7,6	0,48	1,4	0,36
3	Efficiency of the fight (%)	53,7	3,72	11,4	2,5
4	Efficiency of the first part (%)	53,5	5,74	17,7	5,21
5	Efficiency of the second part (%)	37,6	6,97	2,2	1,52
6	Efficiency of the third part (%)	34,3	5,96	6,9	2,65
7	Interval between actions (s)	40,6	4,36	49,4	6
8	Diversity of effective actions (n)	2,6	0,17	0,8	0,17
9	Efficiency actions (%)	92,4	2,51	40,8	8,35

**SEM - standard error of the mean*

The computer program "Martial Arts Video Analysis" allows to create different models of competitive activities. Having a sufficient number of fights in the database and using the selection function, it is possible to analyze the weight categories, age, rank of the competition, to evaluate women's bouts separately and more.

Based on the analysis of scientific and methodological literature, practical experience the most important parameters for assessing the competitive activities of wrestlers are identified, namely: the number of actions, evaluation and effectiveness of their implementation, diversity, interval between actions and more.

Methods with the use of computer technology, that will optimize the process of evaluation and analysis of competitive activities of wrestlers is developed and tested.

Prospects for further research will be aimed at expanding the capabilities of the computer program "Martial Arts Video Analysis" in terms of analysis of competitive activities, increasing productivity and stability of its work.

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OPERATIONAL METHODS FOR ASSESSING THE CURRENT FUNCTIONAL STATE OF AN ATHLETE IN THE TRAINING PROCESS

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Purpose: to develop the methodology for an individual assessment of the current functional state when organizing the training process.

Materials and methods: the following methods were used: analysis and generalization of scientific and methodological literature; generalization of the experience of the practical work of the coaching contingent working with the contingent of sports improvement groups in basketball; methods of mathematical modeling and processing of video materials of sports competitions of various levels in basketball; the modernized method of orthostatic test by N. Teslenko - test «sitting-standing".

Results: an individual method for assessing the functional state in the process of conducting the training lesson allows to determine the measure of working capacity and the athlete's readiness to the loads presented. The practically developed method makes it possible to introduce control over the state of developed fatigue in real time, thereby assessing the level of performance and giving objective assessments of individual endurance. In practice, the developed method makes it possible to introduce control over the state of developing fatigue in real time, thereby assessing the level of performance and giving objective assessments of individual

endurance. It should be noted that the modified method of N. Teslenko orthostatic test with the use of modern computer technology makes it possible to transmit the information received at any distance and control the state of the athlete's body without restricting his motor activity.

Conclusions: the developed technique of the modified orthostatic test by N. Teslenko allows early diagnosis of the development of fatigue, which prevents the deterioration of the body and prevents the phenomena of fatigue.

Keywords: fatigue, modified orthostatic test by N. Teslenko, assessment of endurance, optimization of physical activity.

Introduction

Currently, the urgency of the problem of fatigue and recovery after the transferred load is increasing.

The problem of fatigue has been studied for more than two hundred years [9].

Fatigue is a universal phenomenon inherent in all living things: plants, animals and humans. Despite the universality of this phenomenon and its enormous scientific and practical significance, the answer to the question asked is given to a greater extent in a descriptive form that does not reveal the essence of fatigue and its physiological mechanism [3, 12, 19].

The most widely used definition sounds like: fatigue is a temporary decrease in performance caused by work, which is different in nature, volume and intensity. This definition does not reveal the physiological mechanism of fatigue, since a decrease in working capacity can be considered as a consequence of fatigue, and not as fatigue itself [6, 14, 17].

Of the various directions in the study of fatigue, in full accordance with the above definition, the study of working capacity is widely carried out in order to judge the depth of fatigue by its state. Apparatus study fatigue began using myograph on isolated from the body's neuromuscular preparation, as well as through ergograph in humans.

The first ergographs designed by A. Mosso and I.M. Sechenov's works were designed to control the performed physical load of individual motor acts with an accurate assessment of the volume of work performed and its nature in terms of such parameters as its intensity and duration.

Subsequently, this method was extended to various kinds of tetbans, treadmills, bicycle ergographs and other devices that allow taking into account the volume and nature of the physical work performed.

A common feature of the ergographic method for studying the process of fatigue is that only the study of dynamic work is available to them.

Static stresses cannot be expressed in terms of the units used (kg/ m). all the more it is inaccessible for assessing energy costs, the degree of technical activity, or trophic energy costs under various conditions of being in any stress state.

The problem of assessing fatigue was considered by individual scientists as early as the 17th century. With the development of physiology and the appearance of objective research methods, their number has increased significantly. Already in 1925 their number exceeded more than 13 thousand. This problem was paid attention to by G. Helmholtz, E. Dubois-Reymond, A. Mosso, I. Sechenov. Ch. Sherington, A. Ukhtomsky, K. Bykov and a number of other physiologists. However, the abundance of works on this issue has not allowed to date not only to reveal the theoretical foundations of the process itself, but even to work out a single definition. The term "fatigue" is one of the most imprecise in physiology.

S.H. Bartley, E. Chute (1947), V. Rosenblat (1975) in their works give up to 100 different definitions of this state. Moreover, in a number of works the opinion is expressed that this term is unscientific and should be removed from use. Naturally, this state of the issue is determined by its complexity. Fatigue as a process reflects the state of the organism and can be interpreted as the degree of deviation from its functional optimum, that is, the normal state.

The problem of the norm has been studied throughout the history of the development of biology and medicine and also has significant contradictions in assessing the concept of the norm, its interpretation, up to the complete denial of the

concept itself. Naturally, it is difficult to allow interrelated problems to be resolved on the one hand and remain unresolved on the other. However, the variety of approaches to solving common issues made it possible to supplement the understanding of each of them.

Despite the fact that neither in 1961 at the symposium on the problem of fatigue and recovery of working capacity during muscular activity, nor in 1969 at the symposium in Kyoto there was no consensus on the interpretation of the physiology of fatigue and work capacity, nevertheless, the results of many years of research allowed a significant at least to reveal a number of features of this phenomenon (Rosenblat, 1973).

Such a big difference in opinions and conclusions about the mechanism of fatigue was explained by the fact that various authors used in their studies various objects from isolated organs and tissues to the whole organism, using a wide variety of operating modes.

As a result of these works, it was possible to establish certain ideas about the general biological basis of fatigue, as a certain state of the body relative to its norm. The introduction of the concept of a norm required the definition of its semantic content, since the level of temporary decrease in working capacity relative to its normal manifestation is a quantitative expression of the functional state of the working organ and the organism as a whole.

The set of conditions most favorable to the equilibrium state of this process can be accepted as the norm. The possibility of positive or negative deviations under these conditions requires certain reserve potentials from the body. The greater this potential, the wider the zone of fluctuations in environmental conditions available for a given organism. In practice, it is important to know how it is possible to increase this potential reserve for expanding the zone where the organism or its systems are located and how it is possible, without expanding the zone of oscillations, to ensure movements to another area, in favorable conditions of existence, while maintaining the previous potential capabilities [10, 22, 26].

It should be noted that in this direction, the processes that determine the normal state of the organism or its individual organ have been studied in depth, pictures of age-related changes have been established, ideas about how and in what exactly these changes occur.

Connection of research with scientific programs, plans, topics: This work was carried out in accordance with the topic of the Consolidated plan of research work in the field of physical culture and sports for 2011-2015. on topic 2.6 “Theoretical and methodological foundations of improving the training process and competitive activity in the structure of long-term training of athletes (state registration number 0111U001168).

Purpose of the research: to develop a method for individual assessment of the current functional state in the organization of the training process.

Research objectives:

1. To analyze the types of existing control of the functional state of athletes in situational sports.

2. Determine the non-specific (universal) reactions of the body to external environmental factors and the mechanisms of their control.

3. To establish the structure of the non-specific (universal) reaction of the body.

4. To determine the mechanism of action of the body's nonspecific reaction to the state of the organization of the training process.

Material and methods

In solving the set tasks, the following methods were used: analysis and generalization of the experience of practical work of the coaching contingent, working with the contingent of sports improvement groups in basketball; methods of mathematical modeling and processing of video materials of sports competitions of various levels in basketball; modified method of orthostatic test N. Teslenko - “sitting-standing”.

Results of the research

Currently intensively developed remote methods assessing the functional state of an athlete during running of both training and competitive process. It is based on the analysis of video materials of controlled motor activity with subsequent processing of the kinematics of displacements of the centers of mass of both individual biokinematic links and the general center of mass of the whole body [11, 21]. Regarding these methods, which require a rather complex and expensive video recording technique and the corresponding program processing of the evaluated motor actions, for the subsequent assessment of the measure of fatigue, the method under consideration uses a nonspecific (universal) reaction, which acts as a frequency characteristic of heart contraction or heart rate.

The advantage of this method is that the frequency response reflects the general state of the body, regardless of kinematic or static physical activity, or mental experiences, or in a state of deep sleep, then the ongoing trophic processes reflect the dynamics of the ongoing metabolism.

This method was developed on the basis of a survey of tens of thousands of students of the Faculty of Physical Education of the H.Skovoroda Kharkiv National Pedagogical University. Frying pans, associate professor of the Department of Anatomy and Physiology N. Teslenko. The developed method is based on statistical processing of changes in the frequency response of heart contractions during the orthostatic test "sitting-standing". In the observed reaction of the heart rate (HR), there were changes in frequency, in which the pulse while standing was less than the pulse while sitting; the pulse while standing was equal to the pulse while sitting, the pulse while standing was higher than the pulse while sitting. The data of the initial state were subject to static processing (the characteristic heart rate at rest, observed at the time of the survey, which varied in the surveyed array of students in the range from 39 beats per minute to 120 beats per minute).

The examination involved students of various ages, sex, sports qualifications, and various sports. When performing a standard orthostatic test, a standard test of ergometric motor activity was carried out in parallel, which consisted of three five-

second filling of points on a sheet of paper, applied at the maximum possible speed. The ergometric test was performed both in a sitting position in the mode 3 times for 5 seconds, and in a standing position after measuring the heart rate for a ten-second interval, subsequently recalculating the number of beats per minute [4].

Based on the statistical processing of ergometric data, a scale for assessing the state of the surveyed respondents was compiled, which was converted into index points, compared with the frequency characteristics of the heart rate recorded according to the readings of the heart rate in a calm state before the orthostatic test and immediately after it was performed, on the basis of which the scale was compiled the frequency response of the respondents' heart rate according to the results of the test.

Thus, the developed table of the index assessment of the qualitative state of the cardiovascular system of students when performing the orthostatic test "sitting-standing" (Table 1) includes three dimensions: an index assessment of the state of working capacity or a measure of fatigue (applicate axis Z); the scale of changes in the pulse increment after the test (ordinate axis Y); the scale of the observed heart rate of respondents in a calm state before performing the orthostatic test (abscissa axis X), Fig. 1.

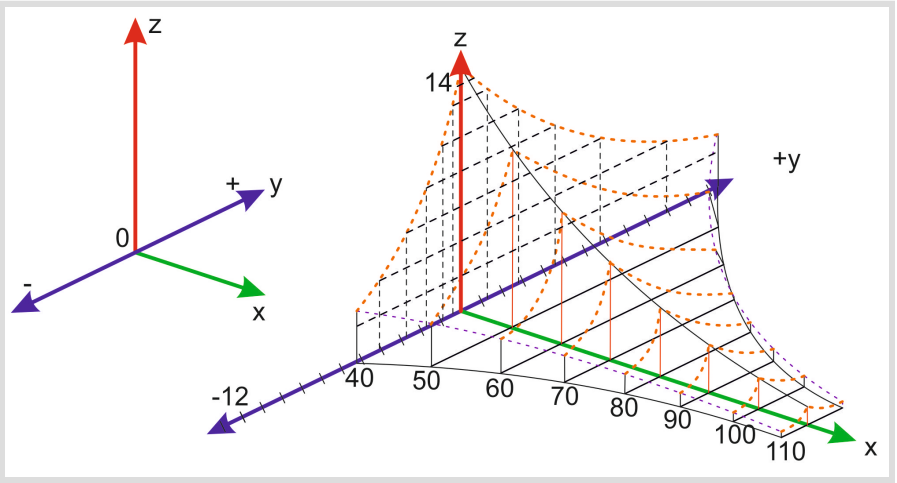

Table 1

Index assessment of the qualitative state of the cardiovascular system of students during the orthostatic test «sitting-standing"

Pulse (HR) in a sitting position beats/min	Heart rate difference (HR)																			
	Less in a standing position than in sitting						=	More in standing position than in sitting												
	-11-12	-9-10	-7-8	5-6	3-4	-1-2	0	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27-28
39-41	11	11,5	12	12,5	13	13,5	14	13,5	13	12,5	12	11,5	11	10,5	10	9,5	9	8,5	8	7,5	7
42-44	10,5	11	11,5	12	12,5	13	13,5	13	12,5	12	11,5	11	10,5	10	9,5	9	8,5	8	7,5	7	6,5
45-47	10	10,5	11	11,5	12	12,5	13	12,5	12	11,5	11	10,5	10	9,5	9	8,5	8	7,5	7	6,5	6
48-50	9,5	10	10,5	11	11,5	12	12,5	12	11,5	11	10,5	10	9,5	9	8,5	8	7,5	7	6,5	6	5,5
51-53	9	9,5	10	10,5	11	11,5	12	11,5	11	10,5	10	9,5	9	8,5	8	7,5	7	6,5	6	5,5	5
54-56	8,5	9	9,5	10	10,5	11	11,5	11	10,5	10	9,5	9	8,5	8	7,5	7	6,5	6	5,5	5	4,5
57-59	8	8,5	9	9,5	10	10,5	11	10,5	10	9,5	9	8,5	8	7,5	7	6,5	6	5,5	5	4,5	4
60-62	7,5	8	8,5	9	9,5	10	10,5	10	9,5	9	8,5	8	7,5	7	6,5	6	5,5	5	4,5	4	3,5
63-65	7	7,5	8	8,5	9	9,5	10	9,5	9	8,5	8	7,5	7	6,5	6	5,5	5	4,5	4	3,5	3
66-68	6,5	7	7,5	8	8,5	9	9,5	9	8,5	8	7,5	7	6,5	6	5,5	5	4,5	4	3,5	3	2,5
69-71	6	6,5	7	7,5	8	8,5	9	8,5	8	7,5	7	6,5	6	5,5	5	4,5	4	3,5	3	2,5	2
72-74	5,5	6	6,5	7	7,5	8	8,5	8	7,5	7	6,5	6	5,5	5	4,5	4	3,5	3	2,5	2	1,5
75-77	5	5,5	6	6,5	7	7,5	8	7,5	7	6,5	6	5,5	5	4,5	4	3,5	3	2,5	2	1,5	1
78-80	4,5	5	5,5	6	6,5	7	7,5	7	6,5	6	5,5	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5
81-83	4	4,5	5	5,5	6	6,5	7	6,5	6	5,5	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0
84-86	3,5	4	4,5	5	5,5	6	6,5	6	5,5	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0	-0,5
87-89	3	3,5	4	4,5	5	5,5	6	5,5	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0	-0,5	-1
90-92	2,5	3	3,5	4	4,5	5	5,5	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0	-0,5	-1	-1,5
93-95	2	2,5	3	3,5	4	4,5	5	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0	-0,5	-1	-1,5	-2
96-98	1,5	2	2,5	3	3,5	4	4,5	4	3,5	3	2,5	2	1,5	1	0,5	0	-0,5	-1	-1,5	-2	-2,5
99-101	1	1,5	2	2,5	3	3,5	4	3,5	3	2,5	2	1,5	1	0,5	0	-0,5	-1	-1,5	-2	-2,5	-3
102-105	0,5	1	1,5	2	2,5	3	3,5	3	2,5	2	1,5	1	0,5	0	-0,5	-1	-1,5	-2	-2,5	-3	-3.5
106-108	0	0,5	1	1,5	2	2,5	3	2,5	2	1,5	1	0,5	0	-0,5	-1	-1,5	-2	-2,5	-3	-3,5	-4
108-110	-0,5	0	0,5	1	1,5	2	2,5	2	1,5	1	0,5	0	-0,5	-1	-1,5	-2	-2,5	-3	-3,5	-4	-4,5
112-114	-1	-0,5	0	0,5	1	1,5	2	1,5	1	0,5	0	-0,5	-1	-1,5	-2	-2,5	-3	-3,5	-4	-4,5	-5
115-117	-1,5	-1	-0,5	0	0,5	1	1.5	1	0,5	0	-0.5	-1	-1.5	-2	-2,5	-3	-3,5	-4	-4,5	-5	-5,5
Current state assessment scale																					

14-10.5 - excellent; up to 85 good; up to 6.5 above average: 65 average; up to 4.5 below average; up to 2.5 bad; up to 1.5 is very bad.

The analysis of the dynamics of changes in the frequency characteristics of heart contractions, the reaction of the alternating factor, made it possible to establish a general pattern, which is an exponential dependence. The individual distinguishability of its manifestation is associated with the coefficient of curvature of this curve, which forms the basis of the performed modification of the orthostatic test by N. Teslenko. by transforming it on the basis of the use of an individual norm into an individual assessment of the current state of the examined athlete.

Each individual has a range of functional state change, which represents a state scale. The extreme values of the state scale from its max to min determine the range of observed states and are an assessment of its physical state. In terms of their variability, the manifestation of their probability is expressed by a 3-sigma distance from the most common point of the norm. In this regard, the full range is divided into a status scale of six parts, which have 7 boundary points. The introduction of a probabilistic measure determined the division of the state scale into 7 zones with an assessment of their qualitative expression in points from 14 to 1,5.

In the plane of the amplitude-frequency interactions of the body's response to the orthostatic test, the dynamics of relations in the system represented by the I-Ching matrix takes place. All the variability of these ratios is expressed in real frequency-amplitude characteristics of the heart rate response to the orthostatic test, which is presented in the table of the index assessment of the cardiovascular system state.

The essence of the tabular material for presenting the assessment of the current state actually consists in the fact that it contains information from a three-dimensional space consisting of three independent scales: the scale of the observed difference in the pulse response to the orthostatic test; the scale of the initial state of the pulse before performing the orthostatic test; school of index assessment of the current state of the body.

The graphical presentation of this information is as follows: Proceeding from the fact that the most effective reaction of the organism to the sample is characterized by a zero difference in pulse rate to it (the speed of the test is not considered). It must be that way to get zero difference. In this case, the index score will be 14; in case of a

different outcome, the resulting index will be reflected in the point of the corresponding difference in accordance with the tabular data; A similar operation is performed for each baseline heart rate before the test.

Thus, in three-dimensional space, the display of tabular data, the (Z) axis of the applicate (vertical scale) is an index assessment of the state. The (Y) axis of the ordinate is the difference in heart rate per sample. The (X) axis of the abscissa is the baseline heart rate before the test.

Unlike a number of other methods of remote assessment of the current state of a person, which can give a sufficiently accurate analysis only with video recording of the performed motor act, the modified test of N. Teslenko is based on a non-specific (universal) heart rate response to the action of any altering factor of any nature, which is inaccessible to any method of remote monitoring and assessment of the current functional state. Modification of test by N.Teslenko became possible with the introduction of a comparison standard, which is the individual norm of the state and its relatively accessible norm of its variation. In each specific case, which is determined by the specifics of the considered professional activity, a qualitative assessment of the final result of this activity is formed, which characterizes its performance rank. In accordance with professional activity, in full analogy with the modification of N. Teslenko is assessing the current state.

With the intensification of production activities, the control of the current state of a person in the “man-machine-environment” or “man-machine” systems becomes an increasingly urgent task, and its solution has not yet been found. The reason for this state of affairs is that in each specific case, to assess the current state, the concept of a norm is used as a comparison criterion, but it does not take into account the comparison with which norm this comparison is made: with a general, universal, reflecting the body's nonspecific response to the influencing altering factor that acts as an analogue of the modified orthostatic test N.E. Teslenko either with the norm of the end result of specialized professional activity, or at the same time use a non-specific universal norm and a specialized one, which also takes place when solving a number of practical tasks.

The use of the practice of assessing the measure of fatigue by the dynamics of heart rate as a non-specific universal response is not the only one. These can be the frequency of respiration, the pH of saliva and blood, a measure of tissue swelling and a number of other reactions reflecting the constancy of the internal environment (its homeostasis). The use of heart rate in monitoring the manifestation of the observed dynamics of changes is the most accessible and there are a large number of means to ensure their registration. However, in the processing of the information received and its interpretation, there is no understanding and identification of the characteristics of the individual norm and the dynamics of its behavior in the adaptation processes of the whole organism. In particular, control of the measure of fatigue and residual potential for the further performance of a certain intensity of a given work.

In fact, the performed index assessment of the qualitative characteristics of the cardiovascular system in the orthostatic test "sitting-standing" carries information about the degree of fatigue in the content of the average statistical understanding of its norm, since this follows from the principle of collecting the information itself. The main merit of the development of an index assessment of the current state of the subject is that, without performing any load, to determine the measure of fatigue only according to the data of changes in heart rate. In the conditions of the test, the need for a quick change in the sitting-standing posture was noted. The test was developed as an alternative to the widely used S. Letunov, which consisted of three consecutive loads of varying intensity and duration: 20 squats, a 15-second run in place with a maximum speed and a 3-minute run in place at a pace of 180 steps per minute. Letunov's test took 5 minutes, could be carried out before and after the training session, based on the average statistical data of the norm of a conditionally healthy individual [5].

N. Teslenko test took 10 seconds, could be carried out during the training session using the table of index assessment of the current state. The concept of an individual norm at that time was completely absent, but the structure of constructing an index assessment contained this information.

When modifying the N.Teslenko test and the developed theory of the individual norm, as a result of the three-dimensional presentation of its content, the conditions for establishing the individual norm, and, consequently, the current state of working capacity or fatigue, as indicated by a single beat of the pulse, were revealed.

Presenting the subsequent blow as a reaction of a change in state relative to the previous state, it is necessary to establish the observed increment, which led to the concept of the norm of the state and the state of the individual norm. The presentation of the dynamics of the behavior of the increments relative to a certain state reflects disturbances in the homeostasis of the internal environment to the transferred load. The individual norm is considered to be 0-difference in increment when changing the sitting-standing posture. When analyzing the data table, it follows that by changing the speed of the rising of the rising, you can always achieve this effect. This load mode will be the norm of the state. Considering the modern miniaturization of sensor sensors and the computer capabilities of the received signal, it can be considered that the set goal has been fully achieved.

If, instead of the amplitude-frequency characteristic of the vessel wall oscillation, we take any other indicator of the oscillation of the final equifinal result of the professional activity performed, then the pattern of his behavior does not change. Consequently, both a nonspecific universal reaction and a differentiated specialized reaction have the same nature of the mechanism of their construction and constitute the structure of a complex of continuous diagnostic monitoring of the current state of the observed individual.

Conclusions / Discussion

Today there are several approaches to teaching individual elements of technology: start learning from simple to more complex elements [2, 4]; training should be carried out at the beginning of the lesson [5; 6]; use special and underwater exercises, etc. [3].

At that time, along with the positive use of these and other techniques, in our opinion, The previous experience in sports medicine shows that the amplitude-

frequency response of the smooth muscles of arterial vessels has two opposite directions of its response to the action of the hydrostatic shock of the orthostatic test. In one case, this manifests itself in an increase in their tension tone and the manifestation of a hypertensive reaction, in the other, a decrease in tone and a manifestation of a hypotonic reaction is observed. Changes in vascular tension tone are closely related to changes in the frequency response of the contraction of the heart muscles (according to the principle of hyperbolic dependence), which underlies the physiological mechanism of the striated muscles [18].

This reaction of vascular tone regulation is determined by the need to regulate the value of the constancy value by maintaining the pulse pressure with a constant dynamics of systolic and diastolic pressures. In general, this dynamics is characterized by nine different directions of its change and seven ranks of changes in the strength of deviations from the stress norm. Depending on the magnitude of the violation of the norm, the direction of the accumulation of fatigue develops irreversible pathological disorders [16, 25].

Systematic monitoring of ongoing deviations from the norm of the process of optimal regulation makes it possible to identify and predict emerging occupational diseases, which is the basis for diagnostics based on a 7-point gradation from syndrome to symptoms, and then to prodrome [1, 8, 14].

The systematization of the results obtained allows us to draw the following conclusions: the underlying physiological processes that determine the morphofunctional changes in the body are analytical patterns. This allows you to control the development of violations and timely anticipate their manifestation.

The analytical patterns that have been identified in the control of the dynamics of amplitude-frequency changes in heart rate are: periodic manifestations reflected in trigonometric functions, hyperbolic dependencies, catenary lines, cycloidal dependence, arithmetic and geometric progressions, which in their interdependent relationships lead to constants π, e, φ, their numerical expressions represent infinite fractions. Their rounding in the practice of actually occurring processes determines

the tolerance of the space of relations, which limits the complexity of building a system of relations.

Individual manifestations of general patterns are associated with a coefficient that determines the curvature of the noted analytical expressions.

The peculiarity of the behavior of the noted patterns is the discrete nature of their manifestation.

Further research It is planned to build a unified system for controlling the development of fatigue for all situational types of sports activity, based on the use of a universal (nonspecific) reaction of the body in response to a change in static stress, controlled only by its rank.

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IMPROVING THE EFFICIENCY OF MANAGEMENT OF DOMESTIC FITNESS CLUBS IN MODERN CONDITIONS OF FUNCTIONING

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Purpose: to develop practical recommendations to improve the efficiency of management of domestic fitness clubs in modern conditions of functioning.

Material and methods: to solve this goal, a set of scientific research methods was used: analysis of literary sources; analysis of documents; system analysis; organizational analysis; expert method, methods of mathematical statistics. The study was conducted on the basis of 10 fitness clubs in Kharkov. The group of experts included 50 clients of fitness clubs: 25 women and 25 middle-aged men.

Results: using the expert method, we determined the importance of the criteria for choosing a fitness club for clients. In the course of our research, it was found that the "most important" for clients when choosing a fitness club is the cost of the subscription and the location of the fitness club, "medium" are the quality of equipment and the range of services; and the “least important” is the professionalism of the trainers and the quality of service.

Conclusions: based on the results of the study, the authors have developed practical recommendations for the management and managers of fitness clubs, the

implementation of which will ensure an increase in competitiveness and strengthening of positions in the fitness services market, as well as an increase in profits. Practical recommendations are aimed at enhancing marketing activities, expanding the advertising campaign and improving the pricing policy of fitness clubs, as well as improving management efficiency in order to introduce modern scientific developments and high-quality customer service, etc.

Key words: management, efficiency, fitness clubs, expert method, fitness services.

Introduction

In modern economic conditions, the management of domestic fitness clubs needs to determine the ways to improve the efficiency of their management and the development of their activities in modern conditions of functioning. To ensure effective management of fitness clubs, it is also necessary to develop effective methodologies and apply effective tools.

The activities of fitness clubs are aimed at solving a whole range of tasks, among which the following are of great social importance: attracting city residents to physical education and health activities; raising the need for physical exercise; striving for a healthy lifestyle [4].

The analysis of recent studies and publications shows that until now scientists have considered only certain aspects of the problem of managing organizational, managerial and marketing activities of fitness-oriented organizations. In particular, modern scientists have characterized the process of providing fitness services in Ukraine (Rusinovich S. [3], Chekhovskaya L. [5], Leonova Yu. Bondar A. [2]) and in the world (Bairner A. [6], Crouhy M. [7], Damodaran A. [8], Jarvie G. [9], Williams J. [10]); analyzed various areas of management and marketing activities of fitness-oriented organizations (Stadnik S., Sereda N. [4], Chekhovskaya L. [5]) investigated the features and disadvantages of managing fitness clubs (scientists Chekhovskaya L. [5], Azhippo A., Bondar A., Petrenko I., Sereda N. [1]) and others. The relevance of this work is justified by the need for scientific substantiation of

increasing the efficiency of management of domestic fitness clubs in today's conditions and the introduction of scientific foundations of management into the practice of their work.

Purpose of the work: to develop practical recommendations to improve the efficiency of management of domestic fitness clubs in modern conditions of functioning.

Material and methods

To solve this goal, a complex of scientific research methods was used: analysis of literary sources; analysis of documents; system analysis; organizational analysis; expert method, methods of mathematical statistics. The study was conducted on the basis of 10 fitness clubs in the city of Kharkov. The expert group included 50 clients: 25 women and 25 middle-aged men. In our study, each expert was asked to assess the importance of the 6 criteria for choosing a fitness club proposed by us on a five-point scale, taking into account that 1 is the highest mark, and 5 is the lowest mark, then the rank, place and weight of each criterion are given (Table 1) and were determined:

- criterion significance factor (C_{sf}) according to the formula 1:

$$C_{sf} = \frac{\sum_{i=1}^{\varepsilon} P_{ij}}{P_{jsum}} \quad (1)$$

- coefficient of concordance (W) according to the formula (2):

$$W = \frac{S}{\frac{1}{12} * (m^2 * (n^3 - n) - m\sum_{j=1}^{m} T_j)}, \quad (2)$$

where S – sum of the squares of the deviations;

m – number of experts;
n – number of factors;
T_j – rank matching metric [7; 8].

- rank matching metric (T_j) according to the formula (3):

$$T_j = \sum_{k=1}^{m} (t_k^3 - t_k), \quad (3)$$

where t_k the number of repetitions of rank k when ranking factors by the j-th expert [7; 8].

Table 1

Revealing the degree of agreement of experts' opinions on the importance of each of the assessed criteria and the definition of standardized ranks

Criteria[1]	Експерти[2]																													
	1–5			6–10			11–15			16–20			21–25			26–30			31–35			36–40			41–45			46–50		
	rank	place	significance	rank	place	significance	rank	place	significance	rank	place	significance	rank	place	significance	rank	place	significance	rank	place	significance	rank	place	significance	rank	place	significance	rank	place	significance
P_1	3	3	3	3	3	3	3	3	3	4	4	4	5	5	5,5	3	3	3	5	5	5,5	5	5	5,5	4	4	4	3	3	3
P_2	5	6	5,5	5	6	5,5	5	5	5,5	5	6	5,5	4	4	4	5	5	5,5	5	6	5,5	4	4	4	5	6	5,5	5	6	5,5
P_3	1[3]	1	1	1	1	1	2	2	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	2	2	2
P_4	2	2	2	2	2	2	1	1	1	2	2	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1
P_5	4	4	4	4	4	4	5	6	5,5	3	3	3	5	6	5,5	4	4	4	4	4	4	3	3	3	3	3	3	4	4	4
P_6	5	5	5,5	5	5	5,5	4	4	4	5	5	5,5	3	3	3	5	6	5,5	3	3	3	5	6	5,5	5	5	5,5	5	5	5,5
All	X	X	21	X	X	21	X	X	21	X	X	21	X	X	21	X	X	21	X	X	21	X	X	21	X	X	21	X	X	21
t_k[4]	t_1=2			t_2=2			t_3=2			t_4=2			t_5=2			t_6=2			t_7=2			t_8=2			t_9=2			t_{10}=2		

Remark:

1. Criteria:

P_1 – quality of equipment;

P_2 – quality of service;

P_3 – subscription cost;

P_4 – location of the fitness club;

P_5 – range of services;

P_6 – professionalism of coaches.

2. Experts: 1–5 - clients 1–5; 6–10 - clients 6–10; 11–15 - clients 11–15; 16–20 - clients 16–20; 21–25 - clients 21–25; 26–30 - clients 26–30; 31–35 - clients 31–35; 36–40 - clients 36–40; 41–45 - clients 41–45; 46-50 - clients 46–50.

3. Highest score - 1, lowest score – 5.

4. t_k – number of repetitions of rank *k* when ranking criteria by *j*-th expert.

The probability of the concordance coefficient was checked according to the Pearson criterion, the calculated value of which ($\chi^2_{calc.}$) is 38,78. At a 1% significance level (that is, with a probability of P = 0.99) and the number of degrees of freedom $\gamma = n - 1$, where n – number of factors (that is, $\gamma = 6 - 1 = 5$), tabular value of Pearson criterion $\chi^2_{tab.}$ = 15,1 [7; 8]. If the calculated value $\chi^2_{calc.}$exceeds the tabular value $\chi^2_{tab.}$ then the hypothesis about the presence of agreement of the thoughts of fifty experts when ranking six criteria is accepted. In our case $\chi^2_{calc.} > \chi^2_{tab.}$ that is 38,78 > 15,1.

Results of the research

In modern conditions of functioning of fitness clubs, we consider it expedient to use the expert method in order to determine the degree of importance of the criterion for choosing a fitness club for clients. After all, each client has his own list of criteria for choosing a fitness club, from which the most important ones stand out [2; 4; 5].

Using the expert method, we determined the importance of the criteria for choosing a fitness club for clients (Table 1), where: P1 - equipment quality, P2 - service quality, P3 - subscription cost, P4 - fitness club location, P5 - range of services (including the presence of a swimming pool, SPA salon, sauna, healthy food cafe, children's room, etc., P6 - the professionalism of the trainers (Table 2).

Table 2

The results of a survey of experts on the degree of importance as a criterion for choosing a fitness club for clients

№	Evaluation experts	Criteria P_j, (rank[1], criterion assigned by experts)						$P_{j\ sum}$ [7; 8]
		P_1[2]	P_2	P_3	P_4	P_5	P_6	
1	Clients 1-5	3	5	1	2	4	5	X
2	Clients 6-10	3	5	1	2	4	5	
3	Clients 11-15	3	5	2	1	5	4	
4	Clients 16-20	4	5	1	2	3	5	
5	Clients 21-25	5	4	2	1	5	3	
6	Clients 26-30	3	5	2	1	4	5	
7	Clients 31-35	5	5	1	2	4	3	
8	Clients 36-40	5	4	1	2	3	5	
9	Clients 41-45	4	5	1	2	3	5	
10	Clients 46-50	3	5	2	1	4	5	
11	$\sum_{i=1}^{\varepsilon} P_{ij}$ [7; 8]	38	48	14	16	39	45	200

In the course of our research, the coefficient of significance of the criteria for choosing a fitness club was calculated, presented in the form of table 3. As can be seen from Tables 2 and 3, among the above criteria, the most important criteria for clients when choosing a fitness club are the criterion for the cost of a subscription (P3) – 0,007 and the criterion location of the fitness club (P4) – 0,08. The next most important criteria are taken by the following criteria: equipment quality (P1) – 0,19 and range of services (P5) – 0,195. The least important, according to the survey results, are the professionalism of the coaches (P6) – 0,225 and the quality of service (P2) – 0,24.

Table 3

Significance coefficients of criteria

№	Criteria	Significance coefficients of criteria
1	Equipment quality (P_1)	0,19 (38 / 200)
2	Service quality (P_2)	0,24 (48 / 200)
3	Subscription cost (P_3)	0,07 (14 / 200)
4	Fitness club location (P_4)	0,08 (16 / 200)
5	Range of services (P_5)	0,195 (39 / 200)
6	Professionalism of the coaches (P_6)	0,225 (45 / 200)
∑	X	1,00

Assessment of the relative importance of directions (factors, parameters) is not limited to the processing of data from questionnaires. An equally important issue for the scientific substantiation of the forecast is the assessment of the indicator of the degree of agreement of expert opinions using a system of indicators. To assess the generalized degree of consistency of opinions by all criteria, we calculated the concordance coefficient (W) equal to 0,776, so we can talk about good consistency of expert opinions. Checking the probability of the coefficient of concordance by Pearson's criterion showed that there is no coincidence in the agreement of experts' opinions.

In the course of our study, it was found that the criteria we defined in terms of the degree of importance in general coincide with the statistics generally established in Ukraine according to official data [3], which is presented in table 4.

Table 4

Comparative characteristics of the distribution of criteria for choosing a fitness club for clients according to the degree of importance

Author's research		The importance of the criteria for choosing a fitness club according to official data is generally established in Ukraine [3]
Criteria for choosing a fitness club	Importance of the criterion	
Subscription cost	Most important	Subscription cost
Fitness club location		Fitness club location
Equipment quality	Medium importance	Range of services
Range of services		Professionalism of the coaches
Professionalism of the coaches	Least important	Equipment quality
Service quality		Service quality

As you can see, the most important criteria are the cost of the subscription and the location of the fitness club. The medium important criteria in our study were the quality of the equipment and the range of services, and according to official data, the professionalism of the trainers, and the quality of the equipment is the least important. However, we believe that these differences are not significant and simply reflect the right to their opinion of clients of fitness clubs, who were experts in our study.

In the course of our research, we have also developed and presented such practical recommendations for the management and managers of domestic fitness clubs:

- firstly, in order to improve the efficiency of managing fitness clubs and improve the system of promoting services on the market, it is necessary to intensify marketing activities, expand advertising campaigns and improve the pricing policy of fitness clubs by developing a set of "viral" advertising events for promotion in social networks, blogs, information portals, forums, video hosting (for example, YouTube) creation of personal online pages of club clients on official websites, etc.;

- secondly, to increase the throughput and convenience of gyms in fitness clubs by opening new groups for training in English, using an online format of training with clients, using computer testing programs, electronic diaries and other fitness novelties in the training process, etc.;

- thirdly, to improve the efficiency of management of fitness clubs by developing and implementing a monitoring system for the physical condition of clients for optimal provision and forecasting of the training process, strengthening

control over the observance of sanitary and hygienic standards and safety regulations, establishing cooperation with educational and scientific institutions in order to introduction of modern scientific developments and high-quality customer service, etc.

Conclusions / Discussion

The problematic area of the development of physical culture and sports, as well as the effective management of organizations in the fitness industry, require realizing the complexity of the tasks facing researchers at the current stage of development of physical culture and sports [4, 5, 7].

Research [4-6] has shown that economic problems slow the development of the fitness industry in the world. Market transformations and commercialization of the infrastructure of mass sports in the world receive new impulses for development and often has not only positive, but also negative consequences. Therefore, it is necessary to develop measures to improve the efficiency of managing fitness clubs and improve the system for promoting their sports and health services, expanding marketing activities, marketing planning strategies, advertising campaigns and pricing policies of fitness clubs. This, in turn, will improve the efficiency of management of domestic fitness clubs through the distribution of criteria for choosing a fitness club for clients according to the degree of importance established by the author.

The study confirmed the opinion of modern domestic scientists, in particular Stadnik S., Sereda N., Chekhovskoy L. and Rusinovich S. on the need to improve the efficiency of management of domestic fitness clubs. In this context, the authors have developed practical recommendations to improve the efficiency of their management by using the expert method.

Thus, using the expert method, among the studied criteria, it was found that the most important criteria for clients when choosing a fitness club are the cost of a subscription and the location of a fitness club. Practical recommendations were developed and presented for the management and managers of fitness clubs in order to improve the efficiency of their management, the implementation of which will

provide fitness clubs with an increase in competitiveness and strengthening their positions in the market of sports and health services, as well as an increase in profits.

Prospects for further research in this direction concern the development of a marketing program for improving the organizational and management activities of domestic fitness clubs.

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